‘Languages connect us’: Investigating the impact of explicit instruction in English derivational morphology and etymology on Welsh pupils’ word decoding and comprehension skills

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Abstract

This thesis investigates whether explicit instruction in English morphology and etymology could support the development of Welsh children's word decoding and comprehension skills, particularly as they transition from primary to secondary school. In September 2022, a new Curriculum for Wales was implemented in primary and secondary schools. The new curriculum takes a more holistic approach to English language and literacy education and, for the first time, names morphology and etymology as key skills that learners need to develop. However, currently there is a lack of understanding about how teachers in Wales may support the development of children's metalinguistic skills—namely, morphological and etymological awareness. Furthermore, only recently have teachers and researchers become aware that, part of the challenge facing a learner at the primary to secondary school transition, is linguistic.

To address this research gap, I designed a six-week online vocabulary skills development programme. The programme—which was conducted online while COVID-19 restrictions were still in place—comprised a series of lessons, instructional videos and interactive tasks that centred on key aspects of English derivational morphology and English etymology. I collected data from 446 learners in years 5, 6, 7 and 8 in 11 schools across Wales. Participants were assigned to the control group (n = 303) or the intervention group (n = 143). All participants completed a pre-intervention questionnaire which collected data about school year groups, mono/bi/multilingual English language status, languages spoken, out-of-school reading habits and levels of school English lesson enjoyment. The intervention group then completed a pre-intervention 'word detectives' challenge, four weeks of explicit morphology and etymology teaching, and a post-intervention 'word detectives' challenge. The control group completed the same pre-intervention challenge, followed by the post-intervention challenge a week later. To ensure equal opportunities for learning, after they had completed the post-intervention challenge, the control group did complete the tutorial aspects of the vocabulary skills development programme. However, no data was collected from the control group tutorials.

The results from the pre-intervention challenge indicated that overall, learners in Wales started the study with fairly high levels of morphological awareness. Conversely, levels of etymological awareness were notably lower. To determine whether the explicit instruction was successful with developing learners' morphological awareness and etymological awareness, I used mixed-effects models to analyse the post-intervention challenge results. The statistical

modelling showed that participating in the intervention was not significantly more likely to increase participants' morphological or etymological awareness challenge scores. The mixed-effects models also showed that some external factors, such as enjoyment of school English lessons and out-of-school reading habits, were significant predictors of morphological awareness outcome. Conversely, no external factors were significant predictors for the etymological awareness results. However, analysis of individual results demonstrates that the statistical modelling does not account for the nuances of the dataset.

Many of the intervention group participants' morphological and etymological awareness scores did increase from the first to the second challenge. In particular, the word decomposition, word derivation and instruction in bound Romance- and Ancient Greek-rooted word parts seemed to support learners' metalinguistic skills development. Additionally, the mixed-effects model showed that the intervention group participants were significantly more likely to have an etymological awareness score that was higher in the post-intervention challenge than in the pre-intervention challenge. Thematic analyses of participants' written feedback helped to explain why some of the quantitative results may have occurred, and demonstrated that other factors, such as enjoyment of the learning, confidence, novelty of the learning topics, perceptions of English as a language, and the setting and environment all require careful consideration in the vocabulary skills development classroom.

Overall, this research concludes that explicit instruction in English morphology and etymology does have a place in Wales's English language and literacy classrooms. Based on the study results and critical discussions, it recommends that increasing Welsh pupils' levels of morphological awareness and etymological awareness could support the development of key word decoding and comprehension skills.

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Table of Contents

List of Tables

List of Figures

1 Introduction

The aim of this PhD is to explore whether explicit instruction in morphology and etymology could support the development of Welsh children's word decoding and comprehension skills, particularly as they transition from primary to secondary school. The motivations behind this overarching aim are threefold: 1) the introduction of a new Curriculum for Wales which allows for the consideration of innovative approaches to teaching and learning about English language vocabulary; 2) personal experience of school-aged learners' lack of awareness about how English vocabulary works, and 3) a personal commitment to the teaching of communication skills that supports young people from all backgrounds in reaching and accessing education and training opportunities.

Effective language and communication skills are the fundamental building blocks upon which subsequent personal and academic life development are based. Yet, language is still a phenomenon we do not fully understand. A multitude of evidence shows that the acquisition of language is complex, multi-faceted and reliant upon a variety of inputs and experiences, as well as a capacity to memorise, construct and produce meaning from words. Children are exposed to language from the earliest stages of life and are surrounded by speakers who offer feedback and provide opportunities for daily practice. Most typically developing children navigate their way through the complexities of acquiring a language: they develop perceptions about the language(s) used around them, babble their way through phonological processes, develop first words, attach meanings to those words, combine the words, construct phrases using the words, and add complexity to the phrases. As language continues to develop, children learn how to converse, how to persuade, how to tell stories, and gain knowledge of the social structures that compound the language they use (Clark 2016). Some children manage this in two or more languages simultaneously. But why, then, when I was invigilating a GCSE English language exam, did 11 out of 23 students, all of whom were at the very end of their compulsory schooling years, put their hands up to ask quietly, "Miss, what does the word admiration mean?" in relation to their 40-mark essay question? How had this many young people reached their final GCSE exam without awareness of what happens to the meaning of a verb when it is converted to a noun through the addition of a derivational suffix?

Outside the room, after the exam, there were many "oh" responses to "admiration just means 'to admire; it is the act of admiring someone'". Most knew what the verb *admire* meant, but

when embedded in a question that provided no context of its meaning, lacked the linguistic awareness and skills required to deconstruct and decode this key word. Although one anecdotal example, the longer I spent working in education as a literacy support teacher, the more I recognised this pattern. The young people I met had acquired the basic skills required for communication, but their development had not continued to allow them to decode more complex, unfamiliar vocabulary. Implicit encounters and exposure to novel language did not appear to be enough to manage the linguistic challenges of the school and exam system. Informal discussions with other teachers suggested that my experiences were not unique, and many had concerns about learners' word recognition and comprehension skills. Therefore, to explore why some learners may face linguistic-based challenges in school, this introduction presents an overview of the wider education and linguistic context in which this research is situated. The chapter also reflects upon my experiences as a literacy support teacher, in order to explore why I suggest that explicit teaching of English etymology and morphology has the potential to offer some solutions to the low child literacy rates in Wales. The chapter then concludes by outlining the thesis aims and structure.

1.1 Education context: Wales

Since the devolution settlement in 1999, which devolved powers on education and training, Wales has had responsibility for nearly all areas of education policy. This means that to reflect its own educational needs, Wales has pursued distinct education policies from other parts of the United Kingdom (UK): its education system offers Welsh-medium, English-medium and/or bilingual (dual stream) schools; it follows its own national curriculum; and has its own education inspectorate, Estyn. In Wales, education is compulsory from the age of 5 to 16, but the majority of children begin their education in nursery at 4-years-old and continue beyond 16. Regardless of the medium of instruction, all children in Wales are required to learn Welsh throughout the compulsory schooling period (Eurydice 2016). The 2021 annual census of schools in Wales showed that there were 1472 local authority-maintained schools (schools funded by a local education authority), 440 of which provide Welsh-medium education (attended by 110,142 pupils, 23% of pupils; Welsh Government 2021). Across Wales, there are four regional consortia to which all but three of the local education authorities belong. Ceredigion and Powys have formed their own partnership, and Neath Port Talbot does not belong to any group. The consortia are:

- Gwasanaeth Effeithiolrwydd Ysgolion (Schools Effectiveness Service, GwE: Conwy, Denbighshire, Flintshire, Gwynedd Isle of Anglesey, and Wrexham);
- Education through Regional Working (ERW: Carmarthenshire, Ceredigion, Neath Port Talbot, Pembrokeshire, Powys and Swansea);
- Education Achievement Service (EAS: Blaenau Gwent, Caerphilly, Monmouthshire, Newport and Torfaen);
- Central South Consortium (CSC: Bridgend, Cardiff, Merthyr Tydfil, Rhondda Cynon).

The consortia also play an important role with ensuring equal education opportunities for learners from a diverse range of backgrounds and experiences (see Welsh Government 2015b: 5). The role of the consortia is particularly important when considering the latest available Welsh Government data, which show that in 2021-22, out of 379,669 pupils aged 5 to 15, 22.9% were known to be eligible for free school meals, up from 19.9% in January 2020 (Welsh Government 2021b). Until August 2022, pupils were eligible for free school meals if their families are in receipt of certain benefits/support payments (Welsh Government 2019b). However, in September 2022, the Welsh Government implemented a 'universal primary free school meals' policy, meaning that all primary school children in Wales will get free school meals by 2024 (see Welsh Government 2022b). Children in the infant school years (i.e., ages 4 to 7) are already in receipt of universal free school meals and the policy continues to be rolled out to higher year groups on a half-termly basis.

The universal free school meals policy responds to the fact that Wales has the worst child poverty rates in the UK (Stone and Hirsch 2021) and there are big variations in poverty levels across the nation. For example, in Cardiff, 33.1% of children live in poverty compared with 23.4% in Monmouthshire (Stone and Hirsch 2021). In every Welsh local authority, more than 1 in 5 children live in poverty, highlighting that the depth of the issue is widespread (Stone and Hirsch 2021). These figures reflect data collected prior to the COVID-19 pandemic and the cost-of-living crisis, meaning that the current state of child poverty in the nation is unclear. The most recent schools census also showed that 87.3% of pupils aged 5 and over identify as White British (Turner 2021). The largest minority ethnic groups are those from a mixed ethnic background (14,006 pupils), a White background other than White British (13,019), Black African (3,376), Bangladeshi (3,329) and Pakistani (3,237). Over 5,000 pupils identify as another ethnic group. Additionally, 92,688 pupils in maintained schools have additional learning needs. Of these pupils, 24,482 have been identified with speech, language and

communication difficulties, 5,738 are dyslexic, and 885 are dyspraxic. The above statistics demonstrate that the educational, social and linguistic landscape of Wales is vast and varied.

1.1.1 PISA: A catalyst for education reform in Wales

Over the last two decades, Wales has undergone a series of major education reforms, in part because of poor Programme for International Student Assessment (PISA) and GCSE results. PISA measures to what extent 15-year-old pupils can apply their skills and knowledge to real-life situations and be equipped for what the Organisation for Economic Co-operation and Development (OECD) term 'full participation in society'. PISA takes place every three years and ranks countries' education systems based on a sample of 15-year-olds. For PISA 2009, the main subject assessed was literacy and results showed Welsh pupils' performances were significantly below the OECD average (16 points behind), particularly for reading (m = 480; England m = 500, Northern Ireland m = 498; and Scotland m = 506). Welsh 15-year-olds had difficulty with summarising information and, in general, performed lower on assessments of continuous text which demand age-commensurate reading attainment in reading comprehension, reading 'stamina' and an ability to infer, interpret and summarise information (Bradshaw et al. 2010). The proportion of low performers on the reading assessment was 20.6%, which was above the UK average (16.7%) and the OECD average (18%). Wales was also the lowest performing of the four UK nations in mathematics and science (Bradshaw et al. 2010). The Assembly Minister for children, education and lifelong learning, Leighton Andrews, described these results as a 'wake up call to a complacent system' (Dauncey 2021). Consequently, in 2011, Wales embarked upon large-scale school improvement reforms and introduced a range of policies to improve the quality and equity of its school system. Education reform has since been a national priority in Wales and although not an exhaustive list, I have presented some key policies from this reform journey in Figure 1.

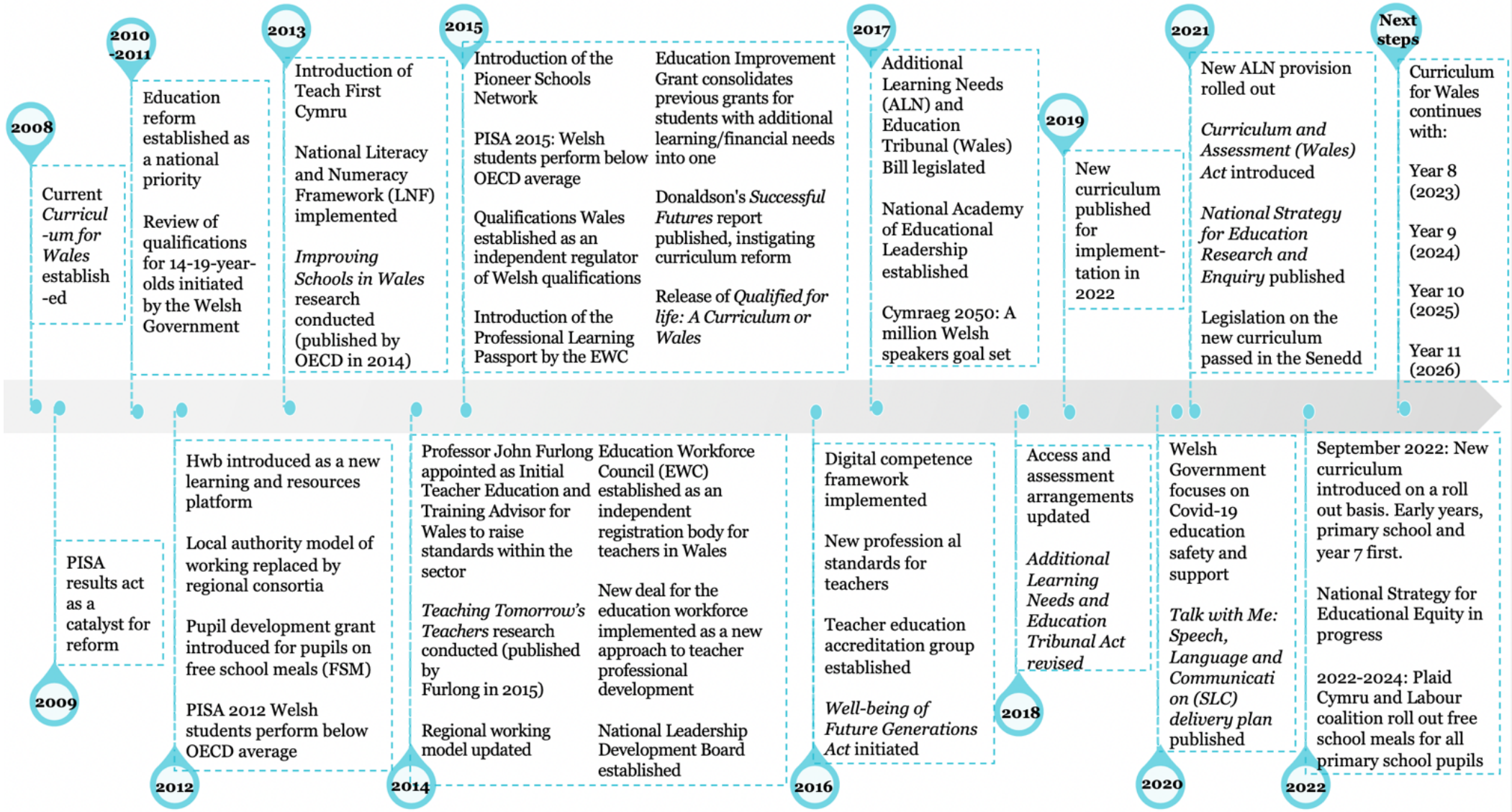


Figure 1: Timeline of key education reform policies in Wales

Despite a focus on literacy in many of the Welsh Government's reform plans, PISA 2012 results were not significantly different from those in 2008. In a statement on Wales's 2012 PISA performance the then Minister for Education and Skills, Huw Lewis, explained that Wales had still scored lower than the other UK nations and the OECD average (Lewis 2013). Consequently, he claimed that the Welsh Government were aware of 'systemic weaknesses in the education system and in response [were] pursuing a relentless drive to raise standards and achieve a positive change in performance in the school sector' (Lewis 2013). Therefore, literacy and numeracy were identified as a main priority in school improvement and, subsequently, the literacy and numeracy framework (LNF) was designed. In 2013, the LNF was implemented for all learners aged 5 to 14 (Welsh Government 2013) and was based on research into 'effective teaching, assessment, recording and reporting practice' (Welsh Government 2013: 2).

The literacy strand of the LNF comprised oracy, reading, and writing across the curriculum. Each strand consisted of different elements (e.g., locating, selecting, and using information) and aspects (e.g., reading strategies). For example, in year 6, learners should, 'use a range of strategies to make meaning from words and sentences, including knowledge of phonics, word roots, word families, syntax, text organisation and prior knowledge of context' (Welsh Government 2008). There was no national level data collection on the LNF. However, the Welsh Government did introduce national tests in reading (which have since evolved into personal assessments) that are taken annually by pupils in school years 2 to 9 (ages 7 to 14). Results from these tests are used to help teachers plan learning and parents/guardians are provided with feedback on their child's results, which aims to help them support children's progress at home (see Welsh Government 2022). Schools do not report this data centrally, but previous evaluations of the effectiveness of the LNF suggest that it has had a positive impact on the quality and consistency of teaching in literacy and numeracy (Carr et al. 2017). In their evaluation of the LNF, Carr et al. (2017) also found that Wales had made notable progress in developing the reading, writing, speaking, and listening skills of its learners. But, progress in these initial improvements slowed. Wales's PISA results in reading have continued to fluctuate, and in 2018, the most recent PISA test, Wales's reading scores remained the lowest in the UK (m = 483; Dauncey 2021).

1.1.2 English language GCSE results

Past GCSE results also provide some insight into literacy levels. Figure 2 (below) illustrates the percentage of pupils in Wales who passed GCSE English language (grade C or above) from the academic year 2008/09 to 2020/21. This was the most recent available data at the time of writing. Despite the literacy strategies and learning improvement aims introduced by the Welsh Government, results have not changed considerably. From 2008/09 to 2017/18, the percentage of pupils who passed fluctuated between 62% and 66%. However, in the 2018/19 academic year, only 59% of pupils passed the qualification.

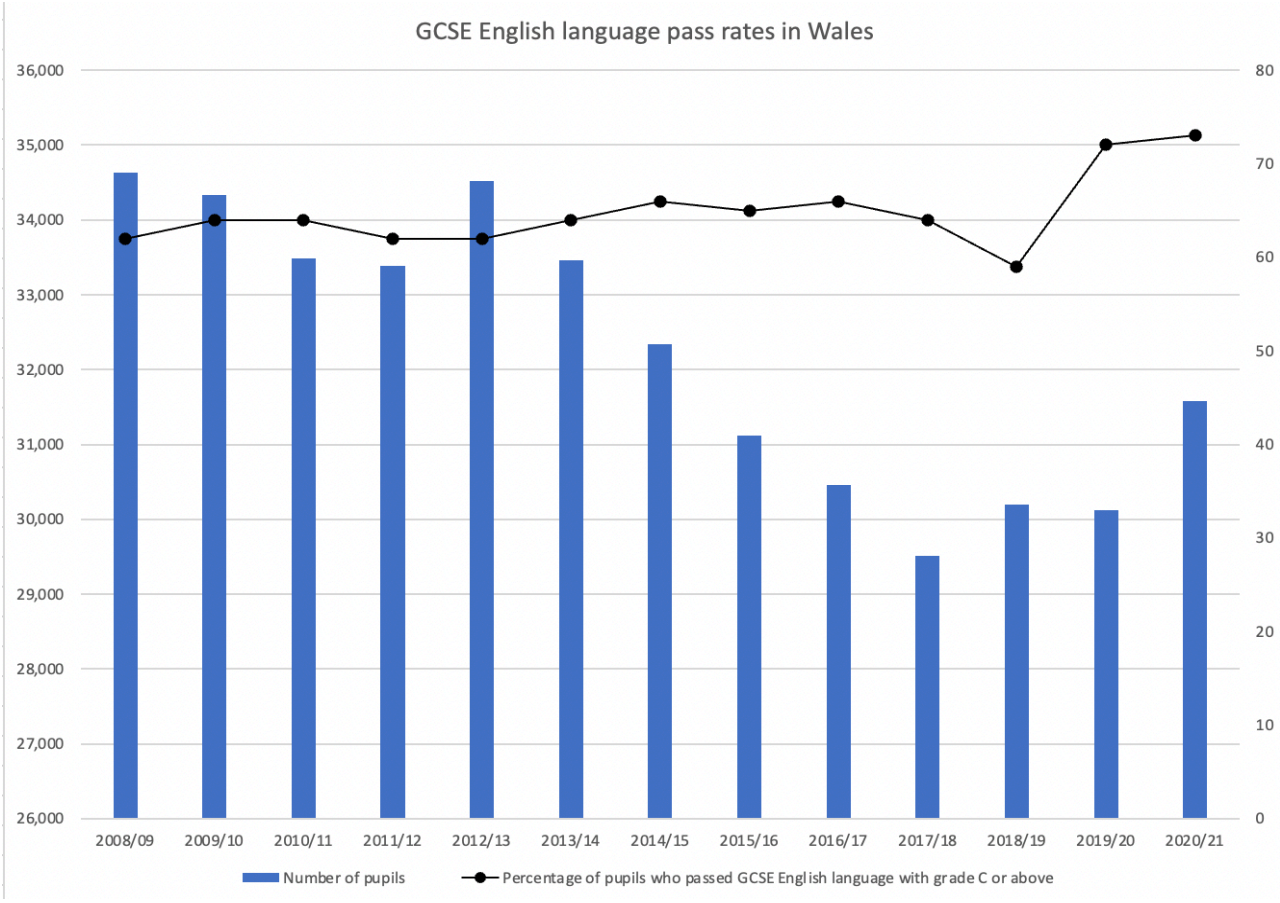


Figure 2. Percentage of pupils in Wales who have achieved grade C or above in GCSE English language (data source: StatsWales 2022).

As a result of the *Review of Qualifications for 14 to 19-year-olds in Wales* (Welsh Government 2012), in 2015, the GCSE English language specification was updated and teaching of the new syllabus began, with the first pupils sitting the new syllabus exams in 2017. This may explain why there was an increase in pass-rate results in 2016/17 (66%; new marking strategies and grade boundaries were tested resulting in the highest pass-rate outcome from 2008 to 2017), but a decrease in pass-rate results in 2017/18 (64%) and 2018/19 (59%) followed. There is,

though, a notable difference between the 2018/19 cohort results and those who completed their GCSEs in the 2019/20 and 2020/21. In 2020, 72% of Welsh year 11 pupils (ages 15-16) achieved A*-C in GCSE English language, and in 2021, 73% of pupils passed (StatsWales 2021). Due to COVID-19, pupils were unable to sit exams in 2020 and 2021, therefore centre assessed grades (CAGs) and teacher assessed grades (TAGs) were used.

The CAG/TAG results must be considered with caution, as there has been much debate about the fairness of their use. In 2020, the algorithm applied to CAGs by the Office of Qualifications and Examination Regulations (Ofqual) was based on the historical results of the school (Anders et al. 2021). The higher the historic performance of the school, the more likely the algorithm was to produce a higher grade. This had major implications for individuals at schools who had previously under-performed. A survey conducted by University College London and the London School of Economics also found that some pupils gained an unfair advantage from this approach, particularly those with graduate parents (Anders et al. 2021). In Wales, an independent review panel found the system to be unfair (Casella 2020). The Welsh Government acknowledged this report and in 2021, the algorithm approach was abandoned and only TAGs were used. According to Ofqual, this meant that pupils were to receive a 'much more accurate' reflection of what they were capable of. Furthermore, the 'pressure to perform in one exam on one day was gone' (in Lough 2021). However, teachers remained sceptical, with nearly 7 in 10 believing that the grading process would not give all pupils the grades they deserved due to inconsistencies of approach taken by different schools (Lough 2021). In 2022 GCSE exams returned to their previous written form and results show that 69% of pupils in Wales achieved A*-C in English language (Joint Council for Qualifications. 2022). This is notably lower than the percentage of pupils who passed GCSE English language in England (73.9%) and Northern Ireland (88.7%; Joint Council for Qualifications 2022). In 2023, the pass rate figure fell again, with just 64.9% of Welsh learners achieving an A*- C grade (Hughes 2023). It seems, therefore, that supporting Welsh children's development of literacy skills remains an educational priority.

PISA and GCSE exam results present only part of a much wider and more complex education landscape. As is evident above, differences in exam syllabi, grade boundaries, marking inconsistencies, as well as a global pandemic, mean it is important not to overly rely on test outcomes as a capture-all, state-of-the-nation picture of literacy. Rather, they are included in this chapter because the UK's education system relies heavily upon exam results as a measure

of school, teacher, and student success; there are no other ways to gain an overall sense of 15/16-year-olds' educational outcomes. In agreement with Diamond (2010: 781), I also argue that the goal of education should not be 'simply the memorization of obscure facts'. Young people's skills and knowledge are much more expansive than are tested within the current system. In 2010, Alexander explored and debunked numerous educational 'myths', including the idea that high stakes testing directly equates to learning. Rather, Alexander (2010: 635) advocates 'meaningful learning', which they define as the 'concepts and processes [which are] held as central to academic domains'. Previously termed 'principled knowledge' (Alexander 1997; Gelman and Greeno 1989), Alexander's (2010: 635) notion of 'academic development' focuses on embedding skills which will support overall social, emotional, physical, and academic progress. Alexander (2010: 635) also argues that 'there is much to be gained when education is viewed as a developmental process rather than a year-by-year, course-by-course treatment of instructional content'. In other words, there is an assumed, implicit relationship between course content and the development of academic skills, such as problem solving, critical thinking and communication (all listed as 'core skills for learning, work and society' by the British Council 2016). However, in this thesis, I suggest that educational practice, which explicitly addresses and embeds core learning skills, could provide individuals with the foundations required for continued engagement with learning in a dynamic sociocultural context. Learning is not a static experience; it is complex and multifaceted. But, by having to memorise and reproduce prescribed factual information in one exam on one given day, the opportunities to understand how things work beyond a surface level are diminished.

Consequently, although we rely on GCSE result outcomes to gain some insight into the state of education, the current GCSE testing system means that our ability to explore and understand the underlying cognitive skills that young people have gained throughout their school careers is also diminished. While I agree with Diamond's (2010) and Alexander's (2010) more holistic approaches to education, unfortunately, exam results are used as the determiner for access to employment opportunities and further education. Without GCSE English language, young people in the UK are denied access to both further vocational and academic training. Therefore, while operating within a grade-focussed system, it is crucial that investigation into approaches and strategies that may support young people's academic skills development continues. However, the new Curriculum for Wales takes a more holistic approach to education and has four core purposes from which practitioners have been encouraged to develop their own school

curricula that meet the specific, context-based needs of their learners. The four purposes of the new Curriculum are to build:

- ambitious, capable learners, ready to learn throughout their lives;
- enterprising, creative contributors, ready to play a full part in life and work;
- ethical, informed citizens of Wales and the world;
- healthy, confident individuals, ready to lead fulfilling lives as valued members of society (Welsh Government 2019a).

The next sub-sections of this chapter work to outline the rationale and foci of the new Curriculum for Wales, with a specific focus on the Languages, Literacy and Communication Area of Learning and Experience.

1.1.3 A new Curriculum for Wales: Languages, Literacy and Communication

A context-based approach to curriculum design came after the Welsh Government commissioned the OECD to conduct a review of its education system, which concluded that Wales did not have a focussed long-term vision and lacked a 'coherence and synergy' in strategies for school improvement (OECD 2014: 116 & 108). As a response to the findings above, the Welsh Government published an education improvement plan, *Qualified for Life* (Welsh Government 2015a). Consequently, rather than subject-specific programmes, Wales is transitioning to the use of six Areas of Learning and Experience (AoLEs). The AoLEs are: Expressive Arts, Health and Well-being; Humanities; Languages, Literacy and Communication; Mathematics and Numeracy; and Science and Technology (Welsh Government 2019a).

Literacy is considered one of the 'cross-cutting competencies' that should be taught and/or addressed in the classroom, regardless of which lesson a learner is in. This means that subject teachers who, previously, may not have considered literacy teaching part of their job remit (such as Maths or Physics, for example), are now responsible for teaching literacy skills within their subject area. As such, literacy and, more specifically, vocabulary skills, cut across all elements of the curriculum. In this project, I have chosen to concentrate on the role of morphology and etymology in relation to the Languages, Literacy and Communication (LLC) AoLE. Morphology- and etymology-based skills have the potential to support vocabulary

development and skills across the curriculum—knowledge of the morphological make-up and etymology of Scientific words could support a pupil's learning in the Science and Technology AoLE. But as vocabulary skills and knowledge about language are required, addressed, and tested most explicitly in the LLC AoLE, it is this area that remains the focus of this research.

The Languages, Literacy and Communication (LLC) AoLE claims to 'address the fundamental aspects of human communication […] support learning across the whole curriculum and to enable learners to gain knowledge and skills in Welsh, English and international languages as well as in literature'(Welsh Government 2021a). The LLC guidelines continue by explaining that different languages should 'be explored in relation to one another, so too the skills of listening, speaking, reading and writing' (Welsh Government 2021a). In the previous curriculum, English language, English literature, Welsh, and other Modern Foreign languages were treated as standalone subjects. However, the new Curriculum states explicitly that learners should 'transfer what they have learned about how languages work in one language to the learning and using of other languages' (Welsh Government 2021a).

One of the key 'statements of what matters' in the LLC framework is *Languages Connect Us* (Welsh Government 2019a). This statement promotes a multilingual approach to literacy education, which is intended to 'ignite learners' curiosity and enthusiasm' and provide them with a 'firm foundation for a lifelong interest in the languages of Wales and the languages of the world' (Welsh Government 2021a). The approach also aims to develop a learners' sense of their own cultural identity, as well as the cultural identities and communities of others. The purpose of these approaches is to raise learners' awareness of the diversity of languages from a young age, and to enable them to recognise similarities between languages, and to embrace the differences between them. In this area, learning and experience aims to support learners with developing an understanding of the 'origins, evolution, and features of a range of languages'(Welsh Government 2021a). In other words, learning about language histories and language connections is a fundamental aspect of the new curriculum. Prior to the new curriculum, the national curriculum was organised into blocks of years called Key Stages. However, Wales has moved away from this Key Stage model and now uses progression steps. The Welsh Government (2019a) explain that, '[w]hile the learning continuum is the same for each learner, the pace of progress through it will differ.' Consequently, the progression steps broadly to expectations at:

- Age 5, progression step 1;
- Age 8, progression step 2;
- Age 11, progression step 3;
- Age 14, progression step 4;
- Age 16, progression step 5 (Welsh Government 2019a).

Figure 3 and Figure 4 below show some of the morphology- and etymology-based progression steps included under the *Languages Connect Us* statement of what matters in the new curriculum. In the figures, PS stands for progression stage and the numbers refer to primary school aims (2 and 3) or secondary school aims (4 and 5).

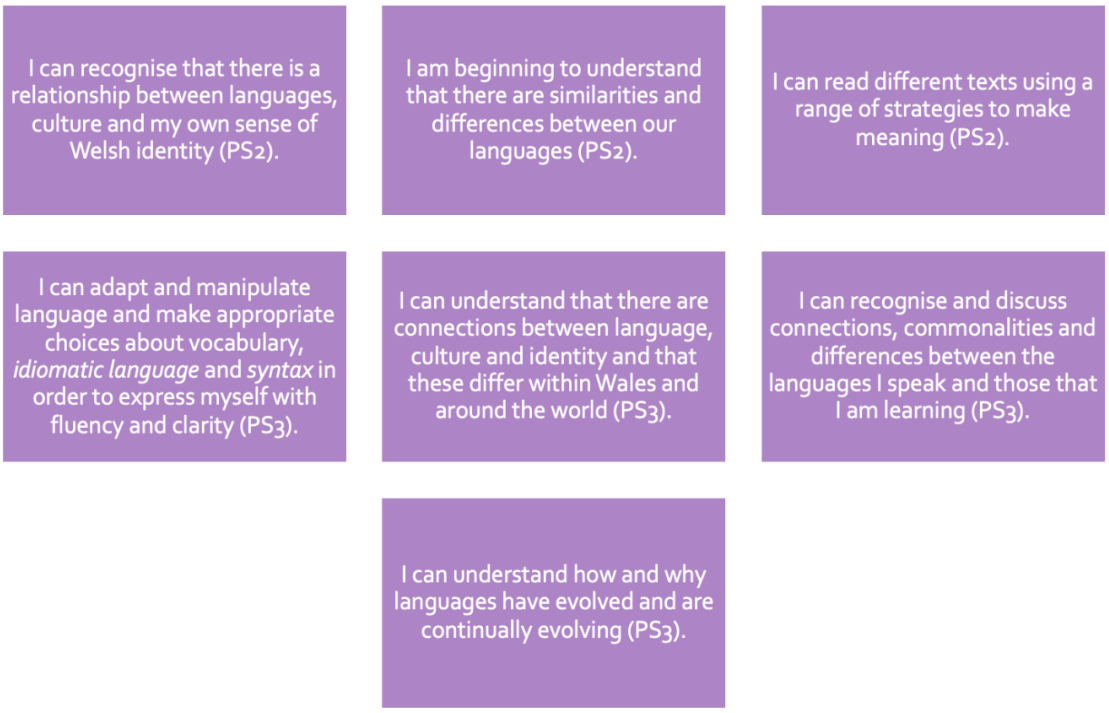


Figure 3: Primary school morphology- and etymology-related progression steps (PS) in the new Curriculum for Wales.

Figure 4: Secondary school morphology- and etymology-related progression steps (PS) in the new Curriculum for Wales.

The LLC framework does not, however, address *how* teachers should approach instruction that supports learners with achieving the above progression steps. This is particularly problematic when considering that a recent report by Wales's Education Inspectorate, Estyn, identified that where there are shortcomings in language teaching in both Welsh-medium and English-medium schools, staff 'do not recognise the importance of learners developing their vocabulary knowledge when planning for learning or provide them with explicit opportunities to do so' (Estyn 2021: 12). This, in turn, limits the progress that learners make. Estyn's (2021: 86) evidence suggests that in some schools, teachers feel that they do not have a 'secure enough understanding of teaching vocabulary knowledge to learners' and they find it difficult to assess the impact it has on learner progress, particularly in reading. These findings map on to Hurry et al.'s (2006: 135) earlier survey results which indicated that:

> […] teachers have explicit knowledge of some aspects of morphology but not of others; this was also reflected in their teaching. Only 25% of teachers interviewed could define

> a morpheme, and most teachers talked about morphemes in terms of letter strings based on their sound or visual pattern; only one teacher out of 20 was clear that morphemes were connected to meaning. Therefore, any connections children make are probably based on implicit knowledge.

While the LLC guidelines provide an innovative framework from which schools can build their own context-based curriculum, exactly how they could do this is unclear. The evidence above suggests that Wales's literacy challenge is twofold: 1) understanding how to support children with developing explicit vocabulary knowledge that enables them to access the new Curriculum for Wales and the GCSE exam system which grants them access to further education and training; 2) understanding how to support practitioners with developing confidence and a 'secure understanding' (Estyn 2021: 86) of how they can facilitate the development of learners' morphological and etymological awareness skills. As such, this thesis works to explore strategies which may develop awareness of how to address and make progress with these challenges.

1.2 Skills not words

Before further examining the role of morphology and etymology in children's school-based vocabulary development, it is important to state that the purpose of this research is to investigate skills, rather than knowledge of a specific set of words or a specific number of words. Perhaps ironically for research on vocabulary, I argue that the words themselves do not matter; it is metalinguistic vocabulary-based skills that do. A full discussion of what I mean by 'metalinguistic skills' is offered below (section 1.2.1) but here it is important to note that my reasoning for the focus on word skills, not word depth or breadth of specific word knowledge, is that schools are key spaces in which language, power and identity intersect. Many researchers and teachers have long believed that, to succeed in school, a pupil needs access to a form of language that is different from everyday language (see Deignan et al. 2023: 24). In order to explore the vocabulary learners in Wales need to be able to decode and comprehend, I conducted an analysis of the last five years of GCSE English language and literature Welsh Joint Education Committee (WJEC) GCSE papers. Chapter 4 offers a full discussion of the corpus, but it is important to note here that the analysis showed that much of the language used in exams is infrequent in everyday discourse (Appendix I: Building the GCSE word corpus also offers a full explanation of how the GCSE word corpus was built). As such, the analysis

indicates there are differences in everyday and academic vocabulary registers. However, these differences in register have led to widespread discourse about the idea that many children—particularly those from marginalised communities—are linguistically 'poor' and that they have a 'word gap'.

Two recent Oxford University Press reports (2018 & 2022) define the word gap as, 'children in Early Years' settings or pupils entering primary school with a vocabulary far below age-related expectations'. This definition suggests that there is a 'gap' between what children know and what policymakers think children 'should' know for their respective ages. The 'word gaps' conversation in schools is not new (see Cushing 2022 for a full history). But as Cushing's (2022: 2) seminal 'word rich or word poor?' paper demonstrates, these deficit discourses are rooted in racist, classist and ableist ideologies that are 'tethered to European colonialism and its ongoing legacies, within which low-income and racialized speakers' language practices are perceived as deficient, incomplete, and indeed, full of gaps when compared against the language practices of the idealized white middle-classes.' As such, the seemingly innocent 'word gap' centres around children from non-white and non-middle-class backgrounds not achieving expected forms of English which, as Flores (2016) argues, are often characterised by standardisation, social prestige and power.

In education policy and research, many of the ideas around the 'word' or 'vocabulary gap' stem from Hart and Risley's (1995) work, which attributed the low academic performances of Black children living in poverty to their supposedly 'diminished' vocabulary size and 'suboptimal' child-directed speech, and Bernstein's (1958) 'restricted' and 'elaborated' language codes. Bernstein (1995; 1966) suggests that restricted code is predominately routinised and bound to physical and social context as utterances and their forms are predictable, with 'limited' vocabulary and 'simple' syntax. Bernstein (1966: 58) also contends that in restricted code 'the meanings are likely to be concrete, descriptive or narrative, rather than analytical or abstract'. Bernstein (1964: 67) argues that differences in the codes have a major impact on educational success as he claims, 'as a child progresses through school, it becomes critical for him to possess, or at least be oriented towards, an elaborated code, if he is to succeed' (Bernstein 1964: 67). His argument follows that while all speakers have access to a restricted code, only some have access to an elaborated code: 'there is a relatively high probability of finding children limited to this code among sections of the working class population' (Bernstein 1964: 62). Like many of Bernstein's critics, such as Rosen (1974), Jones (2013) and Cushing (2022), I also

suggest that Bernstein's approach to thinking about vocabulary in education is highly problematic, as the deficit position frames learners from marginalised communities as 'lacking' something that white middle-class children possess. The statistics presented in section 1.1 of this introduction, which illustrate the diversity of Wales's school population, show why this ideology is both problematic and dangerous. Furthermore, rather than leading educators and researchers to question and critique the systemic inequalities which may result in some children finding it difficult to access school-based vocabulary, word deficit models insinuate that it is the fault and failure of the learner, and their families and communities, that they face linguistic challenges that may impact their learning experiences.

Educational linguists, primarily those based in England and the USA, have long critiqued deficit-based language ideologies in schools (Labov 1972; Rosen 1974; Snell 2013; García and Otheguy 2017; Johnson and Johnson 2021). However, recent education policies in England have resulted in a resurgence of discourses surrounding the 'word gap' or 'vocabulary gap' (see Cushing 2022). It is important to note that in the UK, it is England's education policies that dominate this discourse and, perhaps due to the vast and varied social, cultural and linguistic landscape discussed in section 1.1 (above), the notion of 'word gaps' or 'vocabulary gaps' has not been, and continues not to be, so dominant in Wales's education policies. But this does not mean that England's 'vocabulary gap' discourse has not influenced conversations and pedagogies around vocabulary knowledge in Wales. Uncritical and under-researched 'teaching aids', such as Alex Quigley's *Closing the Vocabulary Gap* (which reinforces the idea that increasing the number of words poor, racialised children know will solve structural social inequities), are still used frequently by Welsh teachers to inform their vocabulary teaching practice (see Quigley 2018).

It is important to note that, like Cushing's (2022), my critique of the creation and use of these sorts of teaching aids is not directed at any one individual. High-stakes testing, league tables, scrupulous inspections, and demands on a time-poor profession have driven and re-emphasised what Grainger and Jones (2013) describe as a 're-emergence of monoglossic and deficit language discourses'. Rather, my critique is of the systems which support, reinforce and disseminate the idea that some children are 'word poor' and, therefore, 'not good enough'. When working in schools, I have seen that young people can tell fantastic stories, talk about and engage with complex topics, and express themselves using varied and relevant spoken language; they are linguistically efficient and proficient in everyday situations. However, I

noticed that often, young people lacked the confidence and skills required to breakdown words they were unfamiliar with. Instead, they would just panic. While we do not all need to know the same specific, standardised set of words, we do need skills that allow us to decode and comprehend new words if and when we encounter them.

Figure 3 and Figure 4 (above) show that the progression steps in the new Curriculum focus on skills. Also, the statements focus on learners making progress with their learning in relation to their own capabilities (i.e., 'I can use **my** knowledge of word construction, *grammar*, including *syntax*, and text organisation to support **my** understanding of what **I** hear and read'), rather than making progress in relation to a prescriptive, set standard.[1] As such, I suggest the implementation of the new Curriculum in Wales offers researchers, policymakers, and educators alike the opportunity to re-think and re-evaluate approaches to vocabulary teaching and learning. Thus, rather than recycling and adding to models and conversations of 'word gaps' and 'word poor' children, the new curriculum provides opportunities to explore more holistic approaches to thinking about English vocabulary. Developing strategies that support the progression of learners' vocabulary skills does not mean measuring how many words each child knows, ignoring the linguistic knowledge they already have, teaching children 'better' words or holding every child to the same set of prescriptive standards. Instead, it means investigating which, if any, approaches to teaching the metalinguistic skills associated with English vocabulary could support learners' word recognition, decoding and comprehension abilities.

1.2.1 What are metalinguistic skills?

Tunmer et al. (1988: 136) define metalinguistic awareness as, 'the ability to reflect on and manipulate the structural features of spoken language'. More recently, Bialystok et al. (2014: 179) have extended this definition to suggest that metalinguistic awareness comprises a set of multiple skills that are related to the formal aspects of language: phonological, morphological, syntactic and lexical awareness. Bialystok et al. (2014) suggest that these aspects of language underpin an individual's understanding of how language works, not just in speech, but across various forms of communication. The progression steps in the LLC framework make clear that in Wales, learners need to develop these underlying linguistic skills to demonstrate and interpret how language works in various contexts. As such, developing metalinguistic skills,

[1] Bold emphasis my own.

and awareness of the linguistic aspects that underpin the English language, is highly important. In this thesis, I draw upon Myhill's (2012: 250) definition, which states that metalinguistics is:

> […] the explicit bringing into consciousness of an attention to language as an artifact, and the conscious monitoring and manipulation of language to create desired meanings, grounded in socially shared understandings.

The above definition has strong resonance with Vygotsky's (1986) and Williams's (2005) social views of language learning, which hold that the cognitive resources learners develop are influenced by what they have become aware of in language. Section 1.1.3 (above) demonstrates that for learners in Wales, 'becoming aware' of how to recognise, decode and comprehend the meanings of academic vocabulary is key to educational success. Furthermore, through the inclusion of 'attention to language' and 'monitoring and manipulation of language', Myhill (2012) considers both the linguistic (i.e., recognition) and cognitive (i.e., comprehension) aspects of developing metalinguistic skills (see Myhill (2012: 250) and Gombert (1992) for further descriptions of the linguistic and cognitive aspects of metalinguistics). Previous literature on explicit teaching about language has suggested that equipping students with the ability to pay attention to and recognise what is happening within language, as well as the ability to demonstrate awareness and skills in relation to language, is an important means of enhancing students' participation in learning (Christie and Unsworth 2005; Hammond 2014; Moore and Schleppegrell 2014). Yet, despite past research findings, and the centrality of explicit metalinguistic skills in relation to vocabulary on the curriculum (i.e., the ability to consciously recognise, decode and comprehend words), research into how students develop and use these skills to understand unfamiliar vocabulary in different contexts is limited.

Duncan et al. (2009) suggest that metalinguistic skills are acquired later in the language acquisition process—around the ages 5 to 6—as an individual must use their pre-existing linguistic knowledge to build an understanding of the structures and forms of a language. Previous metalinguistic development models, show why metalinguistic skills may be developed later in the language development process, as both Gombert's (1992) model and Karmiloff-Smith et al.'s (1996) model indicate that in metalinguistics implicit knowledge operates below the level of consciousness, whereas explicit knowledge is the ability to consciously reflect upon and manipulate linguistic units. As such, learners need the ability to both demonstrate and articulate their understanding about a specific aspect of language. Gombert's (1992: 191) model supports this claim, as the model suggests that implicit

knowledge includes unconscious knowledge of grammar rules and evidence that certain linguistic 'capacities' have been mastered but cannot yet be articulated, whereas 'explicit manifestations' are a 'functional awareness of the rules of the organisation or use of language'. Myhill and Jones (2015: 849) exemplify this implicit/explicit distinction, as they explain that 'in the context of writing, implicit knowledge may govern the use of certain syntactical structures that a writer could not explicitly name'. They provide examples, such as a writer's ability to use a genre convention, like the formulaic 'once upon a time...' opening to a fairy-tale, without the ability to consciously note or reflect on the choice to use it (Myhill and Jones 2015: 850). It seems, therefore, that the implicit/explicit binary in metalinguistic understanding is closely aligned to unconscious or conscious awareness.

There are debates in the literature about how binary this distinction really is. For example, one key issue relates to an individual's ability to verbalise their knowledge and/or awareness. Several authors, such as Roehr (2008: 179) see implicit knowledge as 'knowledge that cannot be brought into awareness or articulated'. Roehr (2008: 179) continues that explicit knowledge is, 'declarative knowledge that can be brought into awareness' and 'be available for verbal report'. However, Myhill and Jones (2015: 850) explain that 'explicit teaching of a new particular linguistic pattern [...] may represent new metalinguistic knowledge, consciously manipulated at first, but later becomes automated, part of a linguistic repertoire'. This calls into question when new, explicit skills just become part of everyday, implicit language practice. Nonetheless, the wording of the progression step statements in the new Curriculum for Wales make clear that being able to apply, demonstrate *and* articulate an understanding of how language works lies at the core of learner success. It would not be enough to understand the language concept but lack the ability to explicitly demonstrate and discuss the skill. Therefore, I suggest that for learners in Wales, developing explicit metalinguistic skills, particularly in relation to morphology and etymology, is highly important. Consequently, it is explicit metalinguistic skills—the ability to demonstrate and discuss skills relating to language—that this project focuses on.

1.3 The role of morphology in word comprehension skills

The LLC progression steps in the new Curriculum for Wales show that one of the key metalinguistic skills learners need to develop is morphological awareness. Morphology is the system in which the smallest units of meaning, known as morphemes (i.e., root words, prefixes

and suffixes), combine to form words. Root words (sometimes referred to in the literature as 'base' or 'stem' words) carry the majority of a word's meaning. Some root words are free (i.e., they can stand alone and hold meaning e.g., *dog, go, happy,* etc.), and other root words are bound (i.e., they must be attached to other word parts to hold meaning e.g., *rupt, voc, vis* etc.). Prefixes precede the root (e.g., *un*happy) and suffixes follow the root (e.g., happi*ness*). English frequently combines both prefixes and suffixes to form new words (e.g., *un-* + *happy* + *ness* = *unhappiness*) and the addition of some suffixes alters the spelling and sounds of the root word (see Chapter 2 section 2.6.1 for full discussion on types of English suffixes). Some words also add multiple prefixes (e.g., *in* + *sub* + *ordinate* = *insubordinate*) and others add multiple suffixes (e.g., *character* + *ist* + *ic*). Affixes can also be either inflectional or derivational. Inflectional affixes preserve the meaning and grammatical class of the lexeme changing only the tense or number (i.e., *dogs, going, played*), whereas derivational affixes change the grammatical class and/or meaning of the root word (i.e., *disengage, happiness, unpredictable*).

English also makes use of compound words in which two root words are joined together to form a new word (e.g., *pain* + *killer* = *painkiller; note* + *book* = *notebook*). Morphemes can, therefore, have a lexical role in which new words are created from a combination of affixes and a root word, or they can be syntactical to signify the number or tense of something. Morphology underpins both English word spellings and meaning. Resultantly, numerous researchers have investigated the role of morphology in children's language acquisition and development (for full reviews, see Clark 1993; Clark 2016; Spencer et al. 2017). Chapter 2 of this thesis discusses the morphology acquisition process and the role of morphological awareness in vocabulary and reading comprehension in more detail, but next, I discuss why the term *morphological awareness* is used throughout this thesis.

1.3.1 What is morphological awareness?

In the literature, the terms *morphological knowledge* and *morphological awareness* are both common and, initially, it appears that their definitions are very similar. For example, Fejzo et al. (2018: 112) describe *morphological knowledge* as the 'identification and use of morphological units and the application of principles that govern the concentration of morphemes'. Furthermore, they propose that *morphological knowledge* 'does not necessarily operate at the level of awareness but instead is demonstrated simply through children's production' (Fejzo et al. 2018: 112). This suggests that if a child uses words, such as *play* and *playing* in spontaneous talk, they understand how to use the *-ing* suffix with a relevant verb,

but the choice may not necessarily be conscious. On the other hand, Kuo and Anderson (2006: 161) propose that *morphological awareness* is 'the ability to reflect upon and manipulate morphemes and employ word formation rules in one's language'. The above definitions indicate that the difference between *morphological knowledge* and *morphological awareness* is consciousness, or an active and explicit understanding of how words work. Given that the focus of this research is the 'conscious monitoring and manipulation of language' (Myhill 2012: 250), and that the new Curriculum for Wales makes clear that an explicit awareness of how language works underpins many of the named progression steps—i.e., 'I can adapt and manipulate language and make appropriate choices about vocabulary, idiomatic language and syntax in order to express myself with fluency and clarity' (Welsh Government 2021a)—I use the term *morphological awareness* throughout this thesis.

Furthermore, numerous studies have shown that morphological awareness is connected to children's spelling and reading skills in English (Lieberman 1995; Deacon and Kirby 2004; Carlisle and Stone 2005). Additionally, past research has shown that morphological awareness can contribute to reading comprehension, word reading, vocabulary, and phonological awareness (see Carlisle 2000; Nagy et al. 2006; Kieffer and Lesaux 2008). However, as discussed in section 1.1.3, the new Curriculum for Wales does not provide teachers with guidance about *how* a learner may develop morphological awareness. This lack of guidance is particularly problematic when considering the complexity of the morphological structures learners encounter in school-based academic words. As mentioned in section 1.3 (above), to explore the morphological and etymological awareness school learners require for GCSE exams in Wales, I built a corpus of past English language and literature exam papers (henceforth referred to as the GCSE word corpus). In Wales, the Welsh Joint Education Committee (WJEC) is the most frequently used examination board and GCSE syllabus provider. All GCSE papers, from 2017 onwards, are freely available for download from the WJEC website. As the focus of this project is literacy ability in the English language classroom, I downloaded the available English language and English literature past papers (48 in total) which comprised question papers, excerpts of core texts, and answer booklets. I uploaded the past paper files to Sketch Engine and compiled a corpus. Overall, the corpus contained 9706 items, but this included unnecessary items such as punctuation marks, question numbers/codes and exam paper barcodes. I removed these entries resulting in a corpus of 9251 lexemes with a total of 95,942 tokens.

To explore the morphological make-up of the words in the GCSE word corpus, I selected 500 high frequency and 500 low frequency words and conducted a morphological analysis. To do this, I tagged each of the low/frequency words by number of morphemes and morpheme types (i.e., prefix, root word, derivational suffix etc). Table 1 (below) shows the results of the analysis and demonstrates that 77.8% of the low frequency words were structurally complex (i.e., they were multimorphemic and comprised a number of different types of word part). Conversely, just 23.4% of the high frequency words were multimorphemic. Most of the high frequency words were just root words or root words with an inflectional suffix.

Table 1: Morphological analysis of high/low frequency words in the GCSE word corpus

Number of morphemes	**Morphological construction of words**	**Percentage of word type in the high frequency GCSE words corpus**	**Percentage of word type in the low frequency GCSE words corpus**
1 morpheme	Root word	76.6	22.2
2 morphemes	Root + root (compound)	2.2	0.4
	Root word + inflectional suffix	15.4	28.6
	Root word + derivational suffix	4.2	24.2
	Prefix + root word	0	2.2
3 morphemes	Prefix + root word + inflectional suffix	0	4.4
	Prefix + root word + derivational suffix	0.4	5.2
	Root word + derivational suffix + inflectional suffix	0.2	4
	Root word + inflectional suffix + inflectional suffix	0.2	0.2
	Root word + derivational suffix + derivational suffix	0.8	3.2
	Root word + root word + inflectional suffix	0	1.8
4 morphemes	Prefix + root word + derivational suffix + derivational suffix	0	1.6
	Prefix + root word + derivational suffix + inflectional suffix	0	1
	Root word + + derivational suffix + derivational suffix + inflectional suffix	0	0.4
	Prefix + root word + root word + inflectional suffix	0	0.4
	Prefix + prefix + root word + derivational suffix	0	0.2
	Root word + derivational suffix + derivational suffix + derivational suffix	0	0.2

The above findings demonstrate why supporting the development of learners' morphological awareness—i.e., awareness of how words are structured and how to decode the structures—could aid word comprehension and broader metalinguistic skills. In particular, the variety of morphological structures in the low frequency GCSE word sub-corpus highlights that developing learners' awareness of derivational morphology is highly important. Therefore, one of the primary aims of this research is to investigate the extent to which explicit instruction in English morphology could support the development of learners' word recognition, decoding and comprehension skills.

1.4 But Miss, what's the point in learning dead people words?": The role of etymology in word comprehension skills

As shown in section 1.1.3 (above), in addition to morphology, etymology now forms a key part of the LLC framework. Etymology is the study of the origin of words and the way in which word meanings have changed and developed throughout history. English is a language of complex and varied origins. When we talk about English, we often think of it as a single language. However, through key historic events and generations of speakers, the English language has undergone major changes, borrowed many words and been influenced by many other languages (for reviews and timelines, see Durkin 2009 & Durkin 2014). In English morphology and etymology are closely bound; both explore word parts and word parts meanings. But, throughout this thesis, I draw a distinction between the two by focusing on free word parts in the morphological aspects of the study, and on bound word parts in the etymological aspects of the study. I draw this distinction because, in modern-day English, we use many word parts that are rooted in various languages, namely, Latin and French and Ancient Greek. Often, these word parts are bound within a word, which means that in modern-day English, they cannot stand alone, but they hold the main meaning of a whole word. For example, the word part *dict,* found in words like *dictator, dictionary* and *diction,* originates from the Latin *dictum* meaning 'said' or 'a thing said' (dictum, n. Etymology 2023). The modern-day word part *dict* holds the same meaning as its historical origin. However, it now only holds meaning when it appears in conjunction with affixes (*dict* + *ion*, etc.). As such, I suggest it is important to question whether integrating the teaching of etymology (i.e., the origins, connections and meanings of bound modern-day English words and word parts) into the LLC classroom could offer learners the opportunity to develop an awareness of how to decode and comprehend the meanings of semantically complex academic words.

My own education showed me that understanding more about the history of the English language can offer new insights into how words work. I attended a state secondary school in the South of England and, having been identified as 'gifted and talented' at humanities and languages in Year 9 (aged 14), was offered the opportunity to start Latin lessons. In my school, there was one teacher who taught the subject and, until Year 10 (GCSE level), we were taken out of other core subjects to attend the lessons. In other words, you could learn Latin if you were in top sets across numerous subjects and were able to catch up on what you missed elsewhere. Consequently, there were only nine of us in the class. However, the teacher completely changed our understanding of how languages work, where the English language comes from, how the modern-day English vocabulary came to be, as well as why word classes, sentences, and word parts function in the way they do. She had as much of a fight on her hands to get Latin on the timetable (and make it stay there) as we did getting permission to leave other classes to attend her lessons. When she wasn't teaching Latin, she was the substitute teacher for Food Technology, Drama, Religious Studies and, even on occasion (and much to our amusement), PE. In other words, while some of us had the opportunity to learn Latin, the teaching and learning of Latin didn't feel particularly valued.

It was only when returning to school as a teaching assistant that I appreciated how rare the opportunity to learn Latin in a state school had been. In England in 2011 (the year I sat my GCSEs), only 0.2% of state comprehensive school pupils sat GCSE Latin (Gill 2012). In modern secondary schools, the figure was 0% and in secondary academies 0.6%, while in grammar and independent schools, the figures were 5.9% and 11.4%, respectively (Gill 2012: 7). In 2011, Latin was the subject with the lowest GCSE uptake in England and there is no data available for this figure in Wales. However, government school statistic archives show that across three years (from 2015/16 to 2018/19), approximately only 157 pupils from 16 different state secondary schools in Wales passed the Level 2 (equivalent to GCSE) Latin course (see Welsh Examination Database 2020). In two schools, fewer than five pupils completed the course, therefore the number of exam candidates was not recorded. In the same time period, approximately 41 pupils from 22 different schools entered Level 2 Classical Ancient Greek exams. For Ancient Greek, four schools had fewer than five pupils complete the course, thus the number of exam candidates was not recorded. In 2020, 100 pupils from 27 different centres (schools or examination centres) sat GCSE Latin language and 144 pupils from 22 different centres sat GCSE Latin language and Roman civilisation. The statistics for 2021 are not available as fewer than 50 pupils and/or five centres entered for GCSE Latin exams, and I could

not find any data about Classical Ancient Greek results for 2020, 2021 or 2022. These findings suggest that, largely, Latin remains a subject of the privately educated or, if extended beyond that, a subject of the already highest achievers. Studying an ancient language at a state school is still a very rare opportunity. Yet, the benefits of learning ancient languages, particularly Latin, on English literacy skills are indisputable.

Evidence from *The Latin Programme,* a Latin teaching initiative that was first piloted in London schools in 2007, shows that, after three years of Latin instruction, 98% of children in Key Stage 2 (ages 8 to 10 years), reached the expected level for reading and 91% achieved the expected level for writing (Bell and Wing-Davey 2018: 121). This data represents children from 39 different classes in 9 different schools, the majority of whom were previously considered 'underachieving'. Even after one year of instruction, 90% of pupils achieved the expected level for writing, and 80% for reading (Bell and Wing-Davey 2018: 121). Additionally, Bell and Wing-Davey (2018: 121) argue that for pupils who have English as an additional language (EAL), particularly those who do not speak an Indo-European language at home, Latin acts as a '*tabula rasa'.* Pupils were able to spot the connections between languages and learn a new language, completely from scratch, alongside their first-language English peers. Analysis showed that this really improved EAL pupils' confidence levels and one headteacher reported: 'We have seen a sharp increase in our literacy results as a result [of the Latin programme]. Our ethnic minority children who have English as an additional language are now taking pride in their mother tongue'(Bell and Wing-Davey 2018: 122).

Bell and Wing-Davey's (2018) findings suggest that ancient languages have the potential to help learners capitalise on and celebrate linguistic differences, while supporting children's literacy skills and confidence development in the English language classroom. As a teacher, I was aware of what ancient languages could offer for literacy skills development and I tried to integrate etymology-based vocabulary learning strategies into lessons. I know of many other colleagues who also trialled different etymology-based decoding strategies, and there is no doubt that some schools have already integrated etymology teaching and learning into their everyday practice. Anecdotally, many teachers have told me that 'word of the week', or 'word of the day' learning strategies are used frequently. But while these teaching moments contribute to a broader discussion about language, arguably, they promote passive, rather than active, learning about words. Learners look at and are told about the 'word of the day'. They do not actively select, analyse and investigate their own words. Subsequently, I suggest that it is

important to question whether this passive learning supports learners with developing the skills, confidence and resilience required when encountering an unfamiliar word. Furthermore, I often found that, when I attempted to discuss Latin, Ancient Greek and Old English with pupils, I was met with an overwhelming "But Miss, what's the point in learning dead people words?" response. The impact that etymological awareness could have on vocabulary understanding across subjects, not just English, was undervalued by pupils and unclear and/or inaccessible to staff.

Programmes such as *Classics for All,* founded in 2010 with the aim of reversing the decline of Classics teaching in state schools, and the *Advocating Classics Education* association, which aims to extend uptake of Classics-based qualifications across the UK, are working successfully to expand access to education in Latin, Ancient Greek and ancient history (see Swallow and Holmes-Henderson 2021). However, after Northern Ireland, Wales has the next lowest level of engagement with these programmes. Overall, 33 schools (18 secondary schools, 11 primary schools, 2 independent schools, 1 further education college and 1 university) were working with *Classics for All* at the end of 2021 (Classics for All 2021). Only 7 centres (3 state secondary schools, 2 private schools, 1 private further education college and 1 university) were working with *Advocating Classics Education* in 2022 (see Advocating Classics Education 2022). While the aforementioned programmes are working hard to widen access and participation in Classical subjects, when combined with the above statistics regarding the number of schools entering pupils for GCSE Latin and Ancient Greek exams, it seems that in Wales ancient language learning opportunities are inconsistent and, therefore, so are literacy development opportunities. It seems overly ambitious that all state schools will have the capacity to engage with and/or offer their pupils a Classical languages programme. Consequently, instead, I posit that the implementation of the new Curriculum for Wales offers an opportunity to question whether some of the teaching and learning approaches taken in the study of ancient languages could be embedded into already compulsory school subjects, such as English.

An analysis of the etymological make-up of the words used in past English language and literature GCSE papers strengthen the above claim. Similarly to the morphology-based word analysis (Table 1), I selected 500 high frequency and 500 low frequency words and used the *Oxford English Dictionary* (*OED*) online to tag each word by the language from which the root originated. The analysis demonstrates that the historical origins of the low frequency words

were both more complex and varied than those of the high frequency GCSE words. Table 2 (below) shows of the 500 low frequency words, 71.4% were rooted in a Romance language, 16.4% were rooted in a Germanic language, 4.4% were rooted in Ancient Greek, and the remaining 7.8% of words were root in an Other or unknown language. Conversely, 72.6% of the high frequency words were rooted in Old English. Just 23.4% were rooted in a Romance language and 3% were rooted in Ancient Greek.

Table 2: Etymologies of high/low frequency words in the GCSE word corpus

Word family	Language of origin	Percentage of high frequency words from the language of origin	Percentage of low frequency words from the language of origin
Romance languages	Latin	19.2	28
	Latin/French	2.2	24.5
	French	2	18
	Italian	0	0.6
	Spanish	0	0.4
Germanic languages	Old English	69.6	8.2
	Germanic	1	5.8
	Old Norse	2	0.8
	Scandinavian	0	0.8
	Dutch	0	0.2
Ancient Greek		3	4.4
Other/unknown origin		1	7.8

The above findings demonstrate why supporting the development of learners' etymological awareness—i.e., awareness of how languages are connected, word families, etymological word patterns etc.—could aid broader word decoding and comprehension skills. But, previously, whether a learner has experienced etymology-based vocabulary learning strategies has been down to an individual teacher's practice and knowledge which may result in inconsistent learning opportunities and experiences. Consequently, one of the primary aims of this research is to investigate the extent to which explicit instruction in etymology could support the development of learners' word recognition, decoding and comprehension skills.

Therefore, in conjunction with exploring strategies for developing children's morphological awareness, this project also examines strategies for developing children's etymological awareness. The overarching question this research project asks is:

> *How does explicit teaching of English morphology and etymology impact the development of children's word decoding and comprehension skills at the transition from primary to secondary school?*

The Literature Review (Chapter 2) works to address why the primary to secondary school transition frames this research and presents the sub-questions that guide this research. However, this chapter ends by providing an overview of the thesis structure.

1.5 Thesis outline

This introductory chapter has outlined the context of this research and highlighted that many children in Wales appear to find the demands of school vocabulary challenging. This chapter has acknowledged that there are issues with using examination data to make claims about children's literacy abilities, as it does not present the nuances and complexities of children's learning experiences. However, numerous statistics suggest that, in relation to other UK and international countries, learners consistently underperform in literacy-based tests. Section 1.2 illustrated that there are class-, race- and ableism-based issues with discussing children's literacy results in terms of a 'vocabulary gap'. Consequently, rather than contribute to deficit models of language learning, this project focuses on the development of children's metalinguistic *skills*, rather than the development of knowledge about a specific set of words.

Overall, this contextual overview has shown that there is a lack of resources regarding how to support the development of children's awareness of English morphology and etymology. I suggested that this is particularly problematic when considering the analyses of English language and literature GCSE past papers, which showed that the words learners in Wales must decode and comprehend are morphologically and semantically complex. Furthermore, past research has shown that both morphological awareness and awareness of ancient languages may contribute to the development of literacy skills (i.e., Goodwin 2016; Bell and Wing-Davey 2018). Yet, for numerous reasons (e.g., lack of teacher knowledge and guidance regarding approaches to explicit vocabulary instruction; social and geographical barriers surrounding

ancient language education etc.), not all children have access to or are exposed to learning experiences that could support their metalinguistic skills development. Furthermore, many ancient language-based studies have focussed on the impact of direct instruction in Latin or Ancient Greek on children's general literacy skills (i.e., reading, spelling etc.), rather than the influence of broader etymology-based instruction on word decoding and comprehension abilities. Overall, these insights have worked to contextualise the key study aim: to explore whether explicit teaching of English morphology and etymology could impact the development of Welsh children's vocabulary decoding and comprehension skills at the transition from primary to secondary school. I suggest that attaining data which allows for an exploration of this key aim could provide unique, valuable contributions to the field of children's vocabulary development studies, and vocabulary-based teaching and learning practices in Wales.

The rest of this thesis is structured into seven chapters. Chapter 2 provides a review of the literature on the linguistic challenges of the primary to secondary school transition, explicit instruction in reading and vocabulary, as well as the processes involved with the development of children's morphological and etymological awareness. An exploration of these literatures adds justification to the choices of research sub-questions posed at the end of the Literature Review chapter. In Chapter 3, I offer an in-depth discussion of the research methods employed, as well as explanations of how I designed a school-based research project and collected data during the COVID-19 pandemic. Chapter 3 also discusses the key ethical considerations of the study, and information about the research participants. Chapter 4 then explains how I designed a six-week online vocabulary skills development programme that provided learners in years 5 to 8 with explicit instruction in English morphology and etymology. This chapter explains the linguistic and pedagogical rationale behind the programme, and discusses how I collected pre- and post-intervention data which allowed for an examination of if and how the intervention impacted the development of learners' vocabulary decoding and comprehension skills.

The thesis then continues with the first of the results and discussion chapters. Chapter 5 analyses the morphology-based data collected in the pre- and post-intervention challenges, in order to establish whether the programme was effective with developing learners' morphological awareness. Chapter 6 then explores why some of the morphological awareness results may have occurred by examining which, if any, external factors influenced the outcomes. Chapter 6 also analyses written feedback from participants in order to consider which other factors may have affected the learning experiences of different groups of

individuals. I suggest that understanding how different factors may influence learning experiences is key to considering how metalinguistic skills (i.e., morphological and etymological awareness) could be integrated into everyday classroom practice. Chapter 7 then repeats the same data analysis and discussion process, but in relation to the etymological awareness results. The etymology dataset is smaller than the morphology dataset, therefore the results and discussion are offered in just one chapter, rather than being split across two.

Chapter 8 concludes the thesis with a summary of the research findings, limitations of the study, possibilities for future research and insights for pedagogical practice. There are 14 key appendices at the end of the thesis, including: an overview of the GCSE English language and literature past exam paper corpus, ethical documentation, the pre-intervention challenge, the post-intervention challenge, and materials from the vocabulary skills development programme tutorials.

2 Literature Review

To address the overarching research question posed in Chapter 1 of this thesis—*How does explicit teaching of English morphology and etymology impact the development of children's vocabulary decoding and comprehension skills at the transition from primary to secondary school*—this chapter begins by reviewing studies which suggest that for some children, the primary to secondary school transition poses difficult linguistic challenges. The discussion below makes clear that throughout this research, the transition from primary to secondary school theme is not a primary focus but rather, it informs thinking about when explicit instruction in derivational morphology and etymology could be of benefit to learners. The chapter continues with an exploration of studies that discuss what is meant by the term 'academic vocabulary' in the school setting. I then offer a critical discussion of past and current approaches to explicit vocabulary- and morphology-based instruction and maintain a particular focus on works which explore the pedagogical strategies employed within the Welsh context. Next, I review key research that has examined the developmental stages involved with the acquisition of English morphology and, subsequently, I evaluate studies which have analysed the linguistic and cognitive processes associated with developing morphological awareness. The chapter then analyses research that has focused on the role of etymology and the role of specific language families in English vocabulary. Finally, I conclude the chapter by posing the three research sub-questions which underpin and drive the approach taken to the research design, data collection and data analyses.

2.1 The linguistic challenges of the school transition

In Wales, children transition from primary to secondary school around the age of 11. For many learners, starting secondary school is a positive experience. For example, Jindal-Snape and Cantali (2019) found that students look forward to certain changes, such as meeting new people, having specialist teachers, new subjects such as food technology, a wider range of sports and clubs and more equipment (see also Coffey 2013; Eskelä-Haapanen et al. 2020). However, there also appears to be many challenges facing a learner at the primary to secondary school transition. Zeedyk et al. (2003: 68) state that the transition period 'is regarded as one of the most difficult in pupils' educational careers, and success in navigating it can affect not only children's academic performance but their general sense of well-being and mental health'. Pascoe et al. (2020) note that stress has a negative impact on effective learning, and Vogel and Schwabe (2016) suggest stress also affects memory formation and retrieval. Findings from

West et al.'s (2010) longitudinal study of 2000 Scottish school students aged 11 to 18/19 support the above claims about the impact of stress on learners. West et al. (2010) showed that a poor primary to secondary school transition predicted lower levels of attainment and well-being than their peers at age 15. Moreover, the effect was reduced but still detectable at age 18/19 after the participants had left school. There is widespread agreement that there is a decline in academic achievement in the early years of secondary school (e.g., McGee et al. 2004; Topping 2011; Goldstein et al. 2015; Evans et al. 2018; Jindal-Snape and Cantali 2019). Only recently, though, have Deignan et al. (2023) established that part of the challenge for students moving into Year 7 is linguistic.

As learners progress through the school system, the language they encounter and need to manage becomes more specialised, and increasingly less like non-academic language (Schleppegrell 2001). A recent study by Deignan et al. (2023) was the first to investigate the linguistic challenge of the transition to secondary school in the UK context. In an interview with the researchers, one secondary school teacher explained:

> Children are able to think but they can't articulate their thoughts because of the lack of language. It is not the concepts they are finding difficult at KS3; it is the ability to access material given to them (Deignan et al. 2023: 9).

Durran (2017) suggests that one reason for this could be that students go from a single literacy teacher in primary school to subject specialist teachers who may have little awareness of the demands that their disciplinary genre places on children. While this may be a contributing factor, Braund and Driver (2005: 78) found a more noticeable difference is the complexity of the academic language used in primary schools compared to secondary schools. Martin (2013: 23) describes this linguistic change from 'a concern with basic literacy and numeracy, often taught in general terms' in primary schools, to a 'subject-based teaching and learning involving highly specialised discourse of various kinds' in secondary schools. Nagy et al. (2012: 92) also suggest that school material 'becomes increasingly technical and nuanced, and concerns topics that are not normally the subject of everyday discourse'.

The above findings are reflected in Deignan et al.'s (2023: 29) data, as they explain: '[a] notion that we heard repeatedly is that writing academically is a kind of translation exercise, in which the writer converts their everyday, colloquial language into a "better" form, word by word'.

This demand to translate is a big ask of a learner and is one that also disempowers an individual's voice; it reinforces the idea that their own voice is 'not enough'. In Meston et al.'s (2021) investigation of students' and educators' understanding of academic talk, a number of students also mentioned 'fancy words' and/or talked about some words being 'better'. Meston et al.'s (2021) findings suggest that, for some learners, the 'your vocabulary is not enough' message had become entrenched.

Although not specifically about the transition, Phillips Galloway et al.'s (2015) study also elicited students' reflections on academic language. They asked American students in grades 4 to 8 to evaluate some sample texts. Like in Meston et al.'s (2021) study, participants also wrote about 'better words', 'longer words', 'detailed words' and words that 'explain more', which the authors interpret as references lexical precision. Phillips Galloway et al. (2015: 221) write that 'in learning academic language, students learn on two levels: they learn the forms and meaning of new language, and simultaneously, they develop metalinguistic awareness of the academic register'. This suggests that to develop vocabulary skills, pupils require the ability to use metalanguage about academic words as this enables them to talk with teachers and deepen their knowledge about and awareness of the language they encounter. Myhill and Newman's (2016) research proposes that, in the writing classroom, teachers play an important role in framing the use of metalanguage and facilitating discussions about metalinguistic choices. However, teachers also need support with developing confidence in managing these types of metalinguistic discussion (Myhill and Newman 2016). This finding maps onto Estyn's (2021) findings which explained that in Wales, many teachers do not feel confident in the explicit teaching of metalinguistic and vocabulary-based skills (see section 1.1.3). Furthermore, the 'vocabulary gap' evidence (discussed in section 1.2), suggests that this perception of a 'gap' and the demand to 'translate' is most likely to impact the learning experiences of those from marginalised communities. It is important to consider, therefore, how differences in vocabulary registers may contribute to the stress that some learners experience at the school transition, and how approaches to vocabulary teaching and learning could support learners during this transition, rather than perpetuating and re-enforcing 'vocabulary gap' discourse. In order to examine why 'translation' is required in the first place, this chapter continues by exploring what school-based 'academic vocabulary' actually is.

2.2 What is 'complex' about school vocabulary?

An exploration of 'academic' vocabulary in the school setting offers insight into the challenge facing learners. For example, in a review of the research on academic language, Snow and Uccelli (2009: 119) identified five central components of academic language:

1. *Interpersonal stance.* Academic texts generally use an authoritative but detached voice. The author or speaker makes grammatical and lexical choices that convey distance from the audience and expertise regarding the content.

2. *Information load*. Academic texts are often both dense and concise. The information load of an academic text is heavy as they often express abstract and/or technical concepts, but writers and speakers aim to express the concepts as concisely as possible.

3. *Organization of information*. Academic texts use 'tightly constructed' arguments, and 'logical unfolding' of ideas (Snow and Uccelli 2009: 119). This often requires the use of complex grammatical structures i.e., subordinate clauses.

4. *Lexical choices*. Academic texts can be highly abstract and use 'a *diverse*, *precise* and *formal* repertoire that includes appropriate cross-discipline and discipline-specific terms' (Snow and Uccelli 2009: 120).

5. *Representational congruence*. Academic language often differs from typical (i.e., everyday) words or parts of speech; words do not appear in their 'typical' forms. Halliday and Matthiessen (2004) call this process 'grammatical metaphor'.

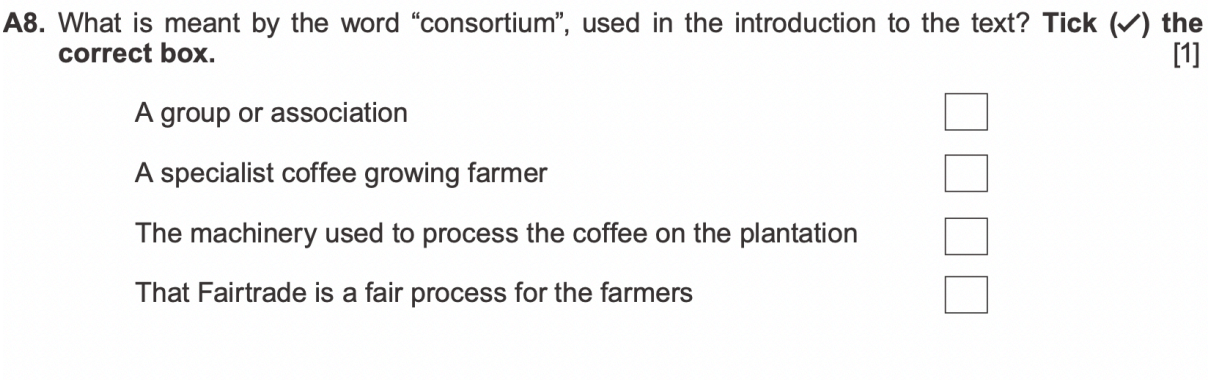
Snow and Uccelli's (2009) components of academic language suggest that it is highly likely the vocabulary learners in Wales encounter is often complex in meaning ('dense'), technical, abstract, and different from the 'typical' language encountered daily (see also Schleppegrell 2004). The above list also exemplifies that gaining awareness of academic words is more complicated than just learning their definitions. Hancioğlu et al. (2008: 468) note that learning the definitions of academic words is not a sufficient remedy for students who find academic discourse challenging. This adds gravitas to the question posed in Chapter 1 of this thesis about

whether developing skills that support vocabulary decoding and comprehension, rather than knowledge of a specific set of words, may be more beneficial to learners. However, as well as dealing with complex, abstract language, learners must deal with the polysemy that many academic words entail (see Hyland and Tse 2007 for full discussion). Some words may have one meaning in one discipline, but a different meaning in another. Townsend et al. (2012: 500) provide the example of the word *function,* which has 'a highly technical meaning in mathematics, but it appropriates different meanings in civics or science'. Consequently, several researchers, including Schleppegrell (2001), argue that academic language is not a single register, but rather many registers that represent genres, including narratives, descriptions, and definitions. Bower and Ellerton (2007) extend this idea as they propose that, within a discipline, there are a number of sub-genres. Deignan et al. (2023: 11) also found that, while there were 'changes to the genres, registers, grammar and vocabulary of the language of school' (i.e., qualitative changes), there were also 'changes to the quantity of language that students encounter and interaction patterns'.

Deignan et al.'s (2023) findings support Tobbell and O'Donnell's (2013) earlier research, which followed a group of Year 7s who attended different schools in England throughout their school day. Tobbell and O'Donnell (2013: 21) found a common pattern of teachers talking at length to the students, meaning that 'students may have spent well over half their day sitting in silence and listening to teachers talk'. This contrasts with a typical primary classroom, which Deignan et al. (2023) suggest is more likely to be task-focussed, with students spending a considerable amount of time working alone or talking to peers. Tobbell and O'Donnell (2013: 21) saw that the written text students needed to read to access the curriculum included worksheets, textbooks, and PowerPoint presentations. Deignan et al. (2023:12) found that, on average, these types of text contain 'many more words, much more densely crowded onto the page or screen in Year 7, in contrast to Year 6'. They continue, '[o]ur spoken data consist of teacher talk (we did not transcribe student talk), and again, an average teacher presentation consists of many more words in Year 7 than in Year 6'. At the transition, not only do words become more complex, they become greater in number, too. As such, it is clear that academic texts have their own register(s).

Figure 5, Figure 6 and Figure 7 (below) also demonstrate why explicit awareness of how words work is crucial if learners are to manage the demands of 'academic vocabulary'. The questions,

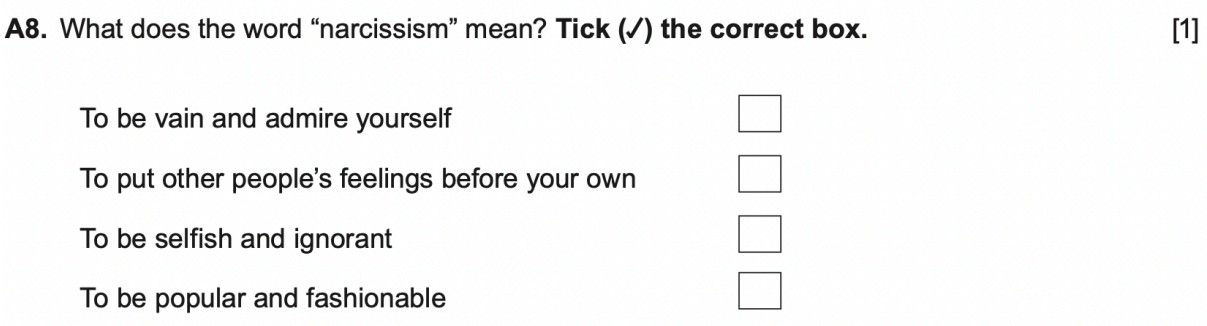
taken from past WJEC English language exam papers, ask learners to define specific words that have been removed from their original context (a series of short articles).



A8. What is meant by the word "consortium", used in the introduction to the text? **Tick (✓) the correct box.** [1]

- A group or association ☐
- A specialist coffee growing farmer ☐
- The machinery used to process the coffee on the plantation ☐
- That Fairtrade is a fair process for the farmers ☐

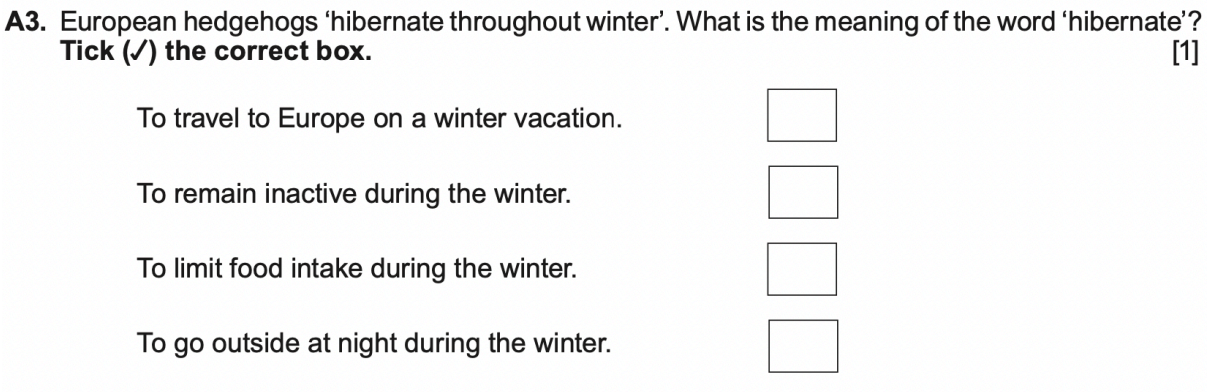
*Figure 5. Example question from a past WJEC English language paper 3 question (*Welsh Joint Education Committee 2017).



A8. What does the word "narcissism" mean? **Tick (✓) the correct box.** [1]

- To be vain and admire yourself ☐
- To put other people's feelings before your own ☐
- To be selfish and ignorant ☐
- To be popular and fashionable ☐

Figure 6. Example question from a past WJEC English language paper 3 question (Welsh Joint Education Committee 2018).



A3. European hedgehogs 'hibernate throughout winter'. What is the meaning of the word 'hibernate'? **Tick (✓) the correct box.** [1]

- To travel to Europe on a winter vacation. ☐
- To remain inactive during the winter. ☐
- To limit food intake during the winter. ☐
- To go outside at night during the winter. ☐

Figure 7. Example question from a past WJEC English language paper 3 question (Welsh Joint Education Committee 2021).

The above examples illustrate that learners must rely on their ability to recognise, decode and comprehend the meaning of words to select the correct answer. This finding correlates to Uccelli et al.'s (2014) work which suggests that there are six Core Academic Language Skills (known as CALS) a learner requires to develop linguistic knowledge and awareness. The list includes unpacking complex words, comprehending complex sentences, connecting ideas, tracking themes, organising argumentative texts, and awareness of academic register. More recently, MacFarlane et al. (2022) have added two further skills: metalinguistic vocabulary and identifying epistemic stance (i.e., attitudes towards reading and writing). Uccelli et al. (2014) and Uccelli et al. (2015) assessed the first six of the above CALS and compared the results with students' academic word knowledge, socioeconomic status, word reading fluency and reading comprehension. They found CALS to be an independent predictor of reading comprehension test scores, even after controlling for the other variables including academic word knowledge (Uccelli et al. 2014; Uccelli et al. 2015). These findings suggest that developing the skills required to recognise and comprehend academic vocabulary are complex and multifaceted. Additionally, in a review of the CALS, Uccelli and Phillips Galloway (2017: 397) note that reading outside of school is also an important factor in children's linguistic skills development; however, they also note that some students have much more frequent opportunities to 'participate in school-like literacies at home'.

There is an abundance of literature that demonstrates why reading outside of school and/or reading for pleasure is crucial to children's literacy skills development, disposition towards literacy and emerging sense(s) of identity. For example, Clark and Rumbold (2006: 8-9) summarise that the positive effects of reading for pleasure have been linked to attainment in literacy, vocabulary development, confidence, comprehension, positive attitudes, general knowledge, and empathetic response (see also Kirsch et al. 2002; Marsh 2004; Sullivan and Brown 2015). Additionally, Echols et al.'s (1996) two year-long study demonstrated that engagement in reading activities at home contributed to the vocabulary growth of 157 students (aged 9 to 12 years). More recently, Oakhill et al.'s (2014) research has also shown that reading as part of leisure time can support vocabulary development (see also McKenna et al. 1995; Wang and Guthrie 2004; Morgan and Fuchs 2007). However, Cremin et al. (2012) warn that, where reading for pleasure becomes institutionalised as another part of the school curriculum, there is a danger that children stop becoming motivated to read, as their opportunities to engage with a range of texts that help them to explore a variety of literacy identities diminishes. Yet, the findings from both Uccelli and Phillips Galloway (2017: 397) and MacFarlane et al. (2022)

suggest that not reading outside of school (i.e., as part of leisure time) could be problematic for learners' broader vocabulary skills development. As such, schools have an important role to play in attempting to ensure children enjoy reading (and associated activities), and that children have access to vocabulary development opportunities.

The above findings and discussions regarding the idea that 'writing academically is a kind of translation exercise', and that enjoyment of reading and literacy may be key factors in developing learners' word skills, raise some important questions about the way in which explicit instruction in vocabulary is approached in the classroom. Chapter 1 (section 1.2) highlighted the issues with being prescriptive in approaches to vocabulary instruction, but Wales's current exam system means that children need to be able to manage varieties of academic vocabulary to succeed. Unfortunately, little can be done about some of the emotional and psychological stressors that affect children at the school transition, and the current exam and qualification system. However, more could be done to consider how learners' literacy skills and, more specifically, vocabulary skills and awareness, could be supported as they transition from primary to secondary school. Additional consideration could lead to improved end-of-school outcomes. Furthermore, it seems that to ensure learners feel included and empowered by their word learning and development experiences, approaches to explicit vocabulary instruction need to consider carefully the roles of learner identities, motivation, and engagement as part of the classroom-based vocabulary development process. As such, investigation into new vocabulary skills development strategies may provide a better understanding of how to negate some of the linguistic challenges learners face. Moreover, teachers and researchers recognise that there are issues surrounding pupils' vocabulary skills as they move from primary to secondary school. But, as yet, there is little understanding of how to support learners' vocabulary development, particularly in the context and expectations of the new Curriculum for Wales. Therefore, this PhD project aims to address this research gap. To explore this gap, the current chapter continues by exploring current approaches to developing children's school-based vocabulary in Wales.

2.3 Approaches to children's vocabulary development in Wales

Generally, the link between vocabulary knowledge and reading comprehension is uncontroversial, as coefficient correlations are usually found to be very strong, falling in the 0.70 to 0.95 positive correlation range (see Biemiller 1999; Stahl and Nagy 2005). Although

academic words occur in a variety of contexts, Corson (1997) found that they appear much more frequently in text than in speech. Thus, the ability to comprehend complex written vocabulary is key to interpreting school texts. However, Wales's current approach to teaching children how to read may present some challenges for academic vocabulary comprehension. Regardless of English- or Welsh-medium status, the majority of schools in Wales use phonics-based programmes (i.e., *Jolly Phonics* in English-medium schools; see Jolly Learning 2023) to introduce children to written words and school vocabulary. Programmes like *Jolly Phonics* teach children how to create letter-to-sound connections and blend the sounds to read words. Past word reading models, such as Perfetti's (1992) and Ehri's (1998) models, have focussed on repeated exposure of written letter combinations and sounds to ensure links become well-established and word recognition becomes more automatic. As Carlisle and Stone (2005: 431) explain, 'forging these connections involves internalising the statistical regularities in the system of mapping spellings and sounds'. Such models include mapping letter combinations like *sh* to *ship* or the *th* to *the*. Comprehensive government reviews of reading instruction, including those conducted in the United States (e.g., the National Reading Panel 2000), the United Kingdom (e.g., the Rose Review; Rose 2006), and Australia (e.g., the Department of Education, Science and Training, or DEST; Rowe 2005), also illustrate the scientific importance of phonics instruction in the initial stages of learning to read. Consequently, in Wales, both previous and current curricula encourage phonics-based instruction in early reading acquisition and children are required to demonstrate knowledge of 'grapheme-phoneme correspondences' when reading (see Welsh Government 2016; Welsh Government 2019).

There is no doubt that a child needs to develop phonological knowledge about letters and sounds to read a word initially. However, Carlisle and Stone (2005: 431) suggest that such a strong focus on phonics may mean that some morphemes are 'processed as common orthographic patterns—that is, without regard for their morphemic identities and their syntactic and semantic functions'. For example, the last stage of Ehri's (1998) model is 'consolidated alphabetic phase', meaning that children are supposed to learn letters that frequently occur together (e.g., the *est* in *nest* and *pest*). Ehri (1998: 23) postulates that knowing *est* as a consolidated unit means that the letters and sounds have been analysed and 'bonded'. Ehri's (1998: 23) reasoning for this is that 'if a reader knew units such as *-est, -tion, -in,* and *-ing* as consolidated units, the task of learning longer sight words such as *question* and *interesting*

would be easier'.[2] Conversely, Carlisle and Stone (2005: 431) found that 'the transparency of the structure of a word with more than one morpheme plays a role in word identification', but past word-reading models, such as Ehri's (1998), and programmes like *Jolly Phonics,* do not differentiate between letter patterns that form morphemes and those that are just sound combinations. As Castles et al. (2018: 6) argue, 'reading comprehension clearly entails more than the identification of individual words: Children are not literate if they cannot understand text'. There is very little value in a child being able to say a word if they cannot also attach some meaning to it.

2.3.1 Problems with the 'phonics only' approach to word comprehension

Gleitman and Rozin (1977) and Carlisle (2003) suggest that English is best characterised as a morphophonemic language—that is, a system in which emphasis should be placed on both phonemic and morphemic elements. The ability to blend sounds to read words is important but reading sounds without meaning will come to have little value later in the education and language development process. For example, Fowler and Liberman (1995) explored second- and fourth-grade (ages 7 to 8 and 9 to 10) English-speaking children's abilities to select the correct form of both phonologically transparent and opaque morphologically complex words. Carlisle and Stone (2005) define phonological transparency as pronunciation of a root word that is fully accessible in the derived word e.g., *warm* in *warmth* or *four* in *fourth.* On the other hand, an opaque word has a vowel/consonant shift which means the pronunciation of the root changes, i.e., *five* in *fifth* or *heal* in *health.* Fowler and Liberman's (1995: 161) participants were asked to complete sentences with the root of a derived word given to them at the beginning of the sentence, such as:

Fourth. When she counted the puppies, there were ([four])

Target words and derivations were divided by phonological transparency or opaqueness and the target items derived from six suffixes: *-ion, -ous, -y, -able, -th* and *-ation*. Fowler and Liberman's (1995) results showed that, when reading, children were more accurate at extracting root words from phonologically transparent items (m = 87%) than phonologically opaque ones (m = 74%). Carlisle and Nomanbhoy (1993) found the same root word

[2] Sight words are words that children recognise and can read instantly without sounding them out (for further information, see Miles et al. 2018: 715).

transparency effect in kindergarten and Grade 1 children in the United States (US). Duncan et al. (2009) found that children's word reading accuracy decreases when diminutive (e.g. *-let, -y* or *-et/-ette*), specific agentive (e.g. *-or, -ist*), and collective/abstract (e.g. *-ery, -ure, -age*) suffixes are introduced. With these suffixes, performance accuracy decreases to 65% for children in Grade 1 (ages 6 to 7) but rises to 75% for children in Grade 3 (ages 8 to 9). When considering that the chance-level performance in this study was 50%, these accuracy scores are quite low. Collectively, these studies suggest that instruction in phonics alone may not be enough to support children with comprehending a morphologically complex word, particularly when the word is phonologically opaque.

Mann and Singson's (2003) results make clear another problem with a phonics-only approach. They found that, by the fifth-grade (equivalent to Year 6, ages 10 to 11 in the UK), morphological awareness was a stronger predictor of reading ability than phonological awareness, particularly in derived word reading (see also Carlisle 2000; Verhoeven and Perfetti 2003). More generally, morphological awareness leads to higher levels of accuracy in word decoding (e.g., Fowler and Liberman 1995; Singson et al. 2000). As such, only having access to phonemic knowledge (i.e., letter-to-sound knowledge) may cause problems for learners; knowledge about morphemes and word structures is also required. Moreover, a multitude of evidence indicates that vocabulary knowledge matters for, as Castles et al. (2018: 29) suggest, 'understanding the majority of individual words within a text is a prerequisite to understanding that text' (see Spencer et al. 2017a for full review).

As established above and in Chapter 1, vocabulary knowledge correlates with reading comprehension, which is the primary literacy skill tested in Wales's education system. Yet, the vocabulary learning children achieve occurs despite the little focus school curricula place on explicit instruction. For educators who do integrate aspects of explicit vocabulary instruction into their teaching and/or use research to inform their approach, navigating the guidance that does exist is complex. Two explicit vocabulary instruction strategies that are frequently cited in the literature appear to be in conflict. Therefore, the next section of this chapter briefly explores these approaches before making the case for why investigating children's morphological awareness, and subsequently etymological awareness, could offer new insight into how Welsh pupils' word decoding and comprehension skills could be developed.

2.4 Explicit vocabulary instruction

Biemiller and Boote (2006) favour what Bowers and Kirby (2010: 516) characterise as '*shallow but wide'* direct vocabulary instruction. This approach posits that primary school students should be taught around ten words a day with the support of context (i.e., reading a story). Biemiller and Boote's (2006) research draws upon intervention studies that tested the use of brief word explanations to build knowledge of the words (e.g., Sénéchal 1997) and studies that showed that using one or two sentences to describe a new word can be sufficient to establish effective referents for new words (e.g., Stahl et al. 1991). Broadly, this approach aligns with Carey's (1978) 'fast mapping' hypothesis which, as Bowers and Kirby (2010: 516) explain, suggests that young children can use meaning that is 'illustrated by specific concrete task contexts to "map" (quickly associate) new words with meaning'. Carey (1978) reasoned that, after the initial mapping, learners can extend the meanings of words they encounter as and when they experience them in other contexts. Both Carey (1978) and Biemiller and Boote (2006) do emphasise that meanings in context are just the beginning of acquiring a new word—subsequent exposure is needed—but it seems that this approach still relies heavily on children having implicit knowledge about how vocabulary works to be able to make word meaning and understanding connections.

In contrast, Bowers and Kirby (2010: 5) note that some research (e.g., Beck et al. 1982; McKeown et al. 1983; McKeown et al. 1985; and Beck et al. 2002) favours a '*rich but narrow'* approach to vocabulary instruction. The '*rich but narrow*' approach is based on findings from Mezynski's (1983), and Stahl and Fairbanks' (1986) earlier evidence reviews on vocabulary instruction. As Bowers and Kirby (2010: 517) explain, these reviews found that to influence comprehension, vocabulary instruction had to engage with 'active or deep processing' and involve 'multiple and varied experiences with word meanings'. In other words, vocabulary knowledge is not just about the number of words known but, as Castles et al. (2018: 29) explain, 'how well they are known and how flexibly they can be used in a given context (this is critical given that the majority of words are polysemous—i.e., they have multiple meanings or "senses" to a greater or lesser extent)' (see also Rodd 2018).

In a meta-analysis of 37 different vocabulary and reading comprehension studies, Elleman et al. (2009) found that vocabulary instruction led to significant improvements on bespoke passages (i.e., passages written to contain the words individuals had been taught directly; effect

size $d = 0.50$). However, in comparison to passages that had not been changed in anyway (i.e., passages that contained words participants received no direct instruction on), vocabulary instruction did not have such a notable effect ($d = 0.10$). Wright and Cervetti (2017) also found the same pattern. On passages containing the taught words, children who received explicit vocabulary instruction displayed better comprehension than their control group counterparts, but the transfer of knowledge to more general comprehension measures was not significant (Wright and Cervetti 2017). These findings suggest that a *'rich but narrow'* approach to vocabulary instruction does not necessarily provide children with an understanding of how to apply their knowledge to new/unfamiliar words and contexts. This limitation is problematic when considering the breadth and depth of word knowledge and awareness children require to access school- and exam-based texts.

What it means to 'know a word' is an elusive concept and, as Milton and Fitzpatrick (2014: 1) explain, 'we are still unable to capture, in a simple description, everything that knowing a word might involve. Word knowledge, it seems, is complicated and it is hard to capture all of its many facets in a simple yet comprehensive definition'. But the evidence is clear: explicit vocabulary instruction can facilitate improved reading comprehension and, therefore, stronger language and literacy skills. However, instruction in prescribed sets of words only supports children's development of knowledge about those specific words; children still lack the ability to transfer their taught knowledge to unfamiliar contexts. These findings support my earlier argument that school vocabulary instruction should not focus on a set of specific words, but rather the skills required to decode and comprehend the meanings of words, regardless of their novelty or context. While both vocabulary instruction approaches—'*shallow but wide'* and '*rich but narrow'*—hold potential benefits for learners, their limitations mean that there is no clear-cut solution for teachers who already lack the time and capacity to take on additional investigative work and ensure their pupils reach required learning targets and outcomes.

Numerous studies have demonstrated that morphological awareness and vocabulary knowledge are related (e.g., Nagy and Anderson 1984; Anglin 1993; Carlisle 1995; Singson et al. 2000; McBride-Chang et al. 2005; Nagy et al. 2006; Wagner et al. 2007). These findings may result from the fact that English is a morphophonemic language, and that 'as children's knowledge of morphological structure becomes more sophisticated, they are better able to use morphological information in a way that aids their acquisition of new vocabulary words' (Spencer et al. 2015: 3; see also Nunes et al. 2006). As such, morphological awareness is an

aspect of vocabulary knowledge. This suggests that morphology-based instruction and interventions could directly affect vocabulary skills development and that explicit vocabulary instruction should also include explicit teaching about morphology.

2.5 Explicit instruction in morphology

Investigation into morphological awareness and classroom instruction is particularly important in the UK context. As will become increasingly evident through discussions of 'grades' rather than Key Stages or year groups, reviews of evidence and morphology-based studies have been, and continue to be, conducted in North America. However, section 2.1 makes clear that awareness of how words work—i.e., how they are constructed, how their parts have meanings etc.—is crucial to accessing and understanding school-based vocabulary in Wales. Some studies have worked to assess the impact of morphological training interventions on literacy outcomes (for full reviews, see Bowers et al. 2010and Goodwin and Ahn 2013) and have often found that morphological instruction in vocabulary, reading aloud, reading comprehension, and spelling increases children's broader literacy skills. Children appear to acquire some morphological knowledge early in the language acquisition process (see Clark 2016) and consequently, they develop some morphological knowledge implicitly through their experiences with language and reading.

Due to its importance in the language acquisition process, morphology has gained attention in recent years, which has resulted in extensive evidence which indicates that morphological knowledge plays an important role in literacy acquisition in English (Carlisle et al. 2010; Nagy et al. 2014). However, Carlisle (2003b: 312) suggests that 'leaving morphological analysis to be discovered by students on their own means that those who are not inherently linguistically savvy are likely to be left before their peers in the development of vocabulary, word reading and comprehension, and spelling'. It is not clear exactly what Carlisle (2003b) means by one who is 'not inherently linguistically savvy'; however, as highlighted in Chapter 1, learners in Wales still seem to struggle with accessing the level of word awareness required to fully access school activities and examination materials. As discussed in Chapter 1 (section 1.3), previously, morphology has only formed part of the curriculum in terms of teaching children what prefixes, suffixes and root words are (see Welsh Government 2016). There has been no focus on word part meanings. As such, the Welsh education system has been relying on

children ‘discovering’ for themselves how to analyse and comprehend the meaning of English words and word parts.

Adams (1990) first acknowledged that morphological awareness forms an integral part of reading comprehension, as she devised a model that considered word reading as a series of components that included phonological, orthographic, and meaning processes. She proposed that the connection between the orthographic and meaning processes might be ‘responsible for skilled readers’ perceptual sensitivity to the roots or meaning-bearing fragments of polysyllabic words and nonwords’ (Adams 1990: 151). Following Adams’ (1990) work, some subsequent word reading and spelling models, such as Seymour and Duncan’s (1997) model, have taken a dual orthographic and morphographic approach to reading development. However, Kruk and Bergman (2013), and Deacon et al. (2014) found that there are high levels of variability associated with morphological instruction. Moreover, past models of word reading acquisition have not been consistent in their inclusion of or approach to the role of morphology, meaning that early classroom practice often exclusively focuses on the development of letter-to-sound knowledge.

This lack of morphology-based focus is problematic because Goodwin and Ahn’s (2013) meta-analysis found a moderate effect size (d = 0.32) of morphological instruction on language and literacy outcomes. Overall, this result suggests that children who experience explicit morphological instruction perform significantly better in measures of literacy achievement than children in the control groups. Specifically, Goodwin and Ahn (2013: 257) found significant and moderate intervention effects on decoding (d= 0.59), phonological awareness (d= 0.48), morphological knowledge (d = 0.44), vocabulary (d= 0.34), decoding and spelling (d = 0.30), but weaker or no effects on reading comprehension (d = 0.09) or fluency (d = -0.05). The reading-based findings could be a result of the limited number of studies available for inclusion in the meta-analysis (30 in total). The small number of studies also means that it is difficult to make any broad claims about the role of morphology instruction in literacy, particularly in terms of what explicit instruction may look like. Nonetheless, the above findings begin to indicate that, in Wales, a lack of focus on the development of children’s morphological analysis skills, particularly in relation to how to decode unfamiliar words, may explain why some learners find academic vocabulary difficult to access and comprehend.

Findings from Bowers and Bowers' (2017) and Devonshire et al.'s (2013) studies indicate that morphological instruction should be introduced at the earliest stages of learning to read, potentially before alphabetic knowledge is fully established. However, there is little other evidence to support these claims. Masterson et al.'s (2010) analysis of the 'Children's Printed Word Frequency' database suggests that, in the first year of reading instruction, children primarily read texts that only contain monomorphemic words (see also Rastle 2019). Therefore, instruction in morphology may not be helpful to the learner nor relevant at this point in their education journey. Explicit morphological input at this stage may even add confusion to a child's learning of relevant letter-to-sound patterns. Consequently, it is important to question whether explicit instruction in morphology may be more beneficial to vocabulary development at a later stage. Children require some experience with letters, sound patterns and monomorphemic words before learning how to analyse word meanings and multimorphemic vocabulary. This does not necessarily mean that early reading instruction is devoid of conversations around morphology and vocabulary knowledge more broadly (many primary and secondary schools already teach children what a prefix/suffix is etc.). But, rather, that explicit instruction in more complex aspects of morphology may be more beneficial at a later stage, such as the primary to secondary school transition.

2.6 Developing morphological awareness

Baayen et al. (1993) built a lexical database which comprised over 160,000 different English word forms and their analysis of the morphological structures of the English words showed that around 80% of words were morphologically complex (i.e., built from more than one morpheme, such as *happiness, careful, inconsequential* etc.). Consequently, Schreuder and Baayen (1995) proposed a model for morphological processing, in which an individual develops connections between orthographic strings (i.e., word parts) and their corresponding meanings through multiple encounters with the relevant words and word parts. Once these connections have been created, a 'concept node' is formed. A concept node becomes stronger every time the individual encounters the word part and, over time, additional semantic and syntactic information is added. Schreuder and Baayen (1995) explain that, when a learner encounters an unfamiliar, morphologically complex word, the relevant concept nodes (i.e., the word parts indexed in the mental lexicon) are activated so that the individual can analyse how the morphemes might be combined to infer word meaning. The concept nodes also work to

check the inferred meaning against any other semantic and syntactic information that is available from the context.

Perfetti's (2007), and Perfetti and Hart's (2001) recent research into the Lexical Quality Hypothesis (LQH) has extended this processing model to suggest that the nodes must entail 'high-quality' information, which means an individual also needs access to precise and stable knowledge of a word's form (i.e., its phonological and orthographical forms), as well as in-depth information about its meaning, grammatical functions, and pragmatic roles. Consequently, Bowers and Kirby (2010: 168) argue that morphology acts as a 'binding agent' that draws together the orthographic, phonological, and semantic aspects of word knowledge. As such, the above evidence illustrates that developing morphological awareness is a multifaceted process and one that occurs in multiple stages. This may give reason to why Carlisle (2000: 319) suggests that developing morphological awareness is a 'prolonged aspect of language learning' which continues into adulthood. However, completion of each stage is important because it seems that full development can result in more stable and robust lexical representations that can be used in a variety of different contexts.

It is not surprising, then, that numerous studies have shown that there are many benefits to increasing children's morphological awareness, particularly in relation to word reading and vocabulary comprehension. For example, Kuo and Anderson (2006) found that students' awareness about how words are constructed advanced typical language development, and Singson et al. (2000) and Nagy et al. (2006) demonstrated that morphological awareness could advance reading skills. In particular, evidence suggests that derivational morphology plays an important role in children's oral and written language development. For example, Anglin (1993) found that children's oral vocabulary grows by about 20 words per day between Grades 1 to 5 (ages 6 to 11), and just under half of these words are derivations of a frequent root word. Nagy et al. (1993) also estimated that 40% of unfamiliar words that Grade 5 students (ages 10 to 11) encounter in print are derivations of root words (see also Nagy and Anderson (1984). The morphological analysis of words in the GCSE word corpus also suggested that the low frequency words (i.e., words that learners may be less familiar with) were more likely to include derivational morphemes (see Chapter 1, section 1.3). Furthermore, Adams (1990), Carlisle (2003a), and Kuo and Anderson (2006) found that children's use of inflectional morphemes appears to develop before their use of derivational morphemes. It seems important, therefore, to explore whether a focus on derivational morphology could support Welsh pupils with

developing the word decoding and comprehension skills required to access the complex and varied registers of 'academic' school-based vocabulary.

2.6.1 The acquisition of derivational morphology

Tyler and Nagy (1989: 649-50) suggest that full awareness of derivational morphology includes three different aspects:

(i) Relational awareness, which refers to recognising that 'words have complex internal structures and that two or more words may share a common morpheme, i.e., the ability to see morphological relations between two words that share a common morpheme base'. This means that an individual can recognise that *person* is related to *personify* and *personality,* but that *tea* is not related to *teacher*.

(ii) Syntactic awareness, which means knowing that 'derivational suffixes mark words for a syntactic category'. They describe syntactic awareness as 'tacit knowledge', meaning an individual understands that a word like *standardise* is a verb because of the *-ise* ending, whereas *standardisation* is a noun because of the *-ion* suffix.

(iii) Distributional knowledge, which requires understanding of the constraints on the connections between roots and affixes. For example, *-less* attaches to adjectives but not to verbs, so *hopeless* is an adjective, but *holdless* is not.

Tyler and Nagy (1989: 650) hypothesise that children do not acquire all three aspects of morphological awareness simultaneously. They explain that a child may understand that 'the word *regulate* exists in *regulation* without assigning any systematic part-of-speech characterisation to *-ate* or *-ion'* (Tyler and Nagy 1989: 650). Conversely, syntactic and distributional awareness presuppose relational awareness and should, therefore, be acquired later. Condry et al.'s (1979) earlier findings support this claim, as they found that American children in second-grade (ages 7 to 8) had already begun to learn the relationship between roots and derived forms with common suffixes, such as *argue* and *argument.* However, Freyd and Baron (1982) found slightly different results. They explored derivational morphological awareness in older children and compared high-performing fifth-grade students (ages 10 to 11) with average-performing eighth-grade students (ages 13 to14). Students were given a vocabulary test consisting of morphologically simple words (i.e., root words: *equal, allow,*

desire etc.) and derived words (e.g., *movement, expansion, fortunate*). Interestingly, results showed that, with the derived words, the fifth-grade students performed better than the eighth-grade students as they had a greater tendency to analyse the words into roots and suffixes before selecting a definition of the word (see Freyd and Baron 1982: 292). This suggests that literacy ability and increased awareness of the structure of words influences word comprehension. Nevertheless, neither the fifth- or eighth-grade students performed well overall, particularly in relation to their ability to correctly identify and define suffixes. On average, the fifth-grade students correctly defined 14.1 out of 30 derived words and the eighth-grade students, 8.8 out of 30 (Freyd and Baron 1982: 291). Freyd and Baron (1982: 293) postulate that the above results may have occurred because students focus on the root and ignore the suffix, as the meanings of suffixes are more 'abstract, and thus more difficult to learn'.

Nagy and Tyler (1989: 651) suggest that there are two types of derivational suffixes: 'neutral' suffixes and 'nonneutral' suffixes. They propose that 'neutral' suffixes, such as *-ness, -er, -ize,* and *-ment*, may be relatively easy to learn because they attach to independent words. For example, when the suffix *-er* is removed from *owner,* the result is an independent word, *own.* Neutral suffixes do not cause changes of stress or vowel sound in the root word and usually, the meaning of the derived word formed is still related to the root. In other words, the root word remains transparent when a neutral suffix is added to it. This may give reason as to why Clark (2016) found that children acquire the use of suffixes like *-er* early in the morphology acquisition process. The suffix *-er* can be added to almost any verb to form an agentive and, although children sometimes overextend the use of these types of suffix, broadly, they understand how to use neutral suffixes to affect the syntactic role of a word. Conversely, nonneutral suffixes attach to bound morphemes (word roots which are not words in their own right) and include, but are not limited to, endings such as *-ity, -ify, -ous,* and *-ive*. For example, removing the *-ous* suffix from *enormous* or *superfluous* fails to produce an independent word. Additionally, nonneutral suffixes tend to cause changes to the stress (e.g., *<u>ic</u>on* and *iconi<u>c</u>ity*) and vowel sounds in the root word to which they are affixed (e.g., the sounds represented by <a> in words like *humane* and *humanity*). Finally, Tyler and Nagy (1989: 651) explain that the meanings of words formed with nonneutral suffixes are often not transparently related to their roots, as can be seen in the removal of suffixes from words like *emergency, nativity, confident, virtual* or *faction.* Unlike neutral suffixes, nonneutral suffixes cannot be applied to such a broad range of words and there are also often idiosyncratic exceptions, such as the triplet

deprive/deprival/deprivation. As such, when a 'nonneutral' suffix is added, the root word of the word becomes opaque.

In a study of children's derivational morphology abilities, Carlisle and Nomanbhoy (1993) gave kindergarteners (ages 4 to 6) and Grade 1 students (ages 6 to 7) cue words and asked them to complete the sentence i.e., *farm. My uncle is a ([farmer]).* A third of the cue words focussed on phonologically transparent derived words (e.g., *farm/farmer*), another third were phonologically opaque derived words (e.g., *explode/explosion*), and the last third were inflected words (e.g., *jacket/jackets*). The kindergarten-aged children found the tasks highly challenging. They scored an average of 37% accuracy on inflected words, 23% on phonologically transparent words, and only 2% on opaque derived words. In Grade 1, these scores increased to 61%, 41% and 11% respectively. Although the oldest children who participated in Carlisle and Nomanbhoy's (1993) study were only 7 years old, the findings begin to illustrate a trend: producing derived forms of phonologically opaque words takes longer and is a more complex aspect of the morphological awareness development process than other aspects, such as inflection. Carlisle (1995) also found that most children are only able to successfully derive words that are phonetically and/or semantically transparent (i.e., *happy* in *unhappy* and *hand* in *handful*). Overall, the above findings suggest that a focus on children's derivational morphological awareness may be of particular importance in the Welsh education context.

2.6.2 Awareness of prefixes

The focus of the discussion has, so far, been on root words and derivational suffixes in part, because there is a lack of studies and tests that directly explore the role of prefixes in morphological awareness. In their paper on morphological knowledge and literacy acquisition, Nagy et al. (2014: 10) acknowledge this 'dearth' in research is 'surprising' given that a large number of words in the English language incorporate a small set of prefixes, making knowledge of them highly productive in terms of information that could support reading, spelling, vocabulary and writing performance. It is important to note that productive prefixes contribute to the meaning of a word and can be added freely to root words (i.e., *un-* in *unhappy*). Some productive prefixes cannot be added/removed freely from a root word (i.e., they are bound), but they do contribute to a word's meaning (i.e., *pro-* in *project* and *prospect* or *ex-* in *extract* and *express*). On the other hand, non-productive prefixes do not affect a modern-day English word's meaning (i.e., *con-* in *considerable*).

Honig et al.'s (2000) research highlights why awareness of 'small set of prefixes' could be an important aspect of children's morphological awareness, as they identified that *dis-, re-, un-* and *in-, im-, il-,* and *ir-* are the four most frequently used productive prefixes in printed school English.[3] In fact, in Honig et al.'s (2000) work, these four prefixes accounted for 97% of all prefixed school English words. Interestingly, Clark and Carpenter (1995) found that one of children's earliest demonstrations of affix knowledge appears to be use of the prefix *un-*. Clark and Carpenter (1995) found that children start to use *un-* just before the age of three and, in many cases, the prefix is used to indicate the prior actions of enclosing, covering or attaching something. For example, Clark and Carpenter (1995: 645) recorded the following interaction between a child (aged two years ten months) who had his thumbs hidden in his fists and his mother:

> Child: *They've disappeared.*
> Mother: *Can you make them appear again?*
> Child: *No, I can't make them undisappear.*

This interaction shows that the child understands the meaning of the prefix *un-* and has knowledge of how to attach a prefix to a root word. However, at this age, children sometimes lack an understanding of which root words the specific affix may be used with.

Nicol (1980) explored prefix awareness in slightly older children as they assessed fourth-, fifth- or sixth-grade (ages 9 to 12) students' understanding of sixteen commonly used English prefixes. Nicol (1980) found that comprehension of prefix meanings ranged from 88% accuracy for *mis-* to 20% accuracy for *in-* (evidence from an unpublished thesis cited in Graves 1986). But, Nicol (1980) did not provide information about performance on the other prefixes tested. Similarly, White et al. (1985; also cited in Graves 1986), reported that fourth-grade students' accuracy in defining prefixes ranged from 80% for *non-* and *re-* to 20% for *anti-* and *en-*. These studies were not published, and are only cited in Graves' (1986) work, therefore the validity and reliability of these findings are questionable. Instead, they only begin to offer insight into children's knowledge of and awareness about prefixes.

[3] Due to their shared meaning, *in-, im-, il-,* and *ir-* are treated as one word part. A discussion of how I treat these four prefixes in the current study is offered in Chapter 4, section 4.1.1.

A more recent study by Mitchell and Brady (2014) does offer some understanding about the role of prefix knowledge in children's wider affix knowledge. In this study, third- and fifth-grade participants (ages 8 to 9, and 10 to 11) were tested on their abilities to ascertain the meaning of low frequency, morphologically complex real words and pseudowords. The affixes were selected using Ebbers' (2004) and Henry's (2010) literacy skills research and comprised 16 high-frequency prefixes and 16 high-frequency suffixes. The pseudowords used the same, real English affixes as the real words (e.g., *anti-, co-, dis-, mal-, -able, -age, -ist* etc.) but contained made-up roots (Mitchell and Brady 2014: 216). Performance levels between the real word and pseudoword pairs did not differ significantly, although on two of the prefix items (*mismatch* and *insecure*) and seven of the suffix items (*forceful, betterment, blockage, closure, thicken, likelihood* and *thunderous*), accuracy was significantly higher on the real word items (Mitchell and Brady 2014: 221). In contrast, in the pseudoword part of the test, accuracy was significantly higher on three of the prefix pairs (*inter-, co-,* and *post-*) and three of the suffix pairs (*-able, -ology* and *–less)* (Mitchell and Brady 2014: 221). Both the real word and pseudoword results suggest that knowledge of the meaning of these affixes was weaker than with some of the other tested items. However, overall, results showed that fifth-grade students exhibited significantly higher levels of affix knowledge than third-grade students ($t(75) = -4.546$, $p = <0.01$; Mitchell and Brady 2014: 218). Age was significantly correlated with performance on vocabulary knowledge, word reading, and morphological measures ($p = < 0.01$) and affix knowledge was strongly correlated with receptive vocabulary knowledge ($r = 0.75$).

Although accuracy levels were lower for suffixes than prefixes, Mitchell and Brady's (2014) study suggests that children do have some awareness of how derivational suffixes can affect root word meanings. However, participants made fewer mistakes with the prefix elements of the test, implying that knowledge about the meaning of prefixes and their relationship with root words is stronger. One reason for this could be that, although there are many different prefixes in the English language, they do not affect several aspects of word structure and meaning in the same way derivational suffixes do; they only affect word meaning. Furthermore, unlike derivational suffixes, prefixes do not change the phonological or orthographical structure of a root word. For example, adding the prefix *re-* to the root word *admit* does not affect the root word's structure in any way (*i.e., readmit*), whereas adding the derivational suffix *-ion* to the same root word does (i.e., *admission*). It is important to note that the above claim about stronger prefix knowledge is based on just one study that only tested 77 American students, ages 8 to 9,

and 10 to 11. The role that prefixes play in Welsh children's awareness of English word structures and meanings, at both primary and secondary school ages, remains unknown.

2.7 Developing etymological awareness

Durkin (2009: 2) defines etymology as '[…] the application, at the level of an individual word, of methods and insights drawn from many different areas of historical linguistics, in order to produce a coherent account of that word's history'. He continues, that 'a key function of etymology is that it illuminates the formal and semantic relationships between the words of a language' (Durkin 2009: 25). As such, etymology can help us understand patterns, structures and meanings in the modern-day vocabulary of a language (see Durkin 2009: 27). As discussed in Chapter 1 (section 1.4), English morphology and etymology are closely related. For example, Henry (1988), Henry et al. (1989), Abbott and Berninger (1999), and Roberts Frank (2008) suggest that instruction in word origins, such as patterns and rules regarding Latin, Ancient Greek, and Anglo-Saxon words is another example of morphological teaching. However, studies by Henry (1993), Treiman (1993), Venezky (1999) and Moats (2000) all suggest that, in addition to an awareness of morphology, an awareness of word origins/etymology could make the learning of words more meaningful and interesting. Henry (1988: 259) gives reason to this claim, as she describes English as a 'polyglot' language shaped by numerous 'historical forces'. Henry (1988) draws on unpublished work by Calfee and Associates (1981), and Calfee and Drum (1986), to propose a triangular foundation for understanding layers of etymological knowledge (see Figure 8).

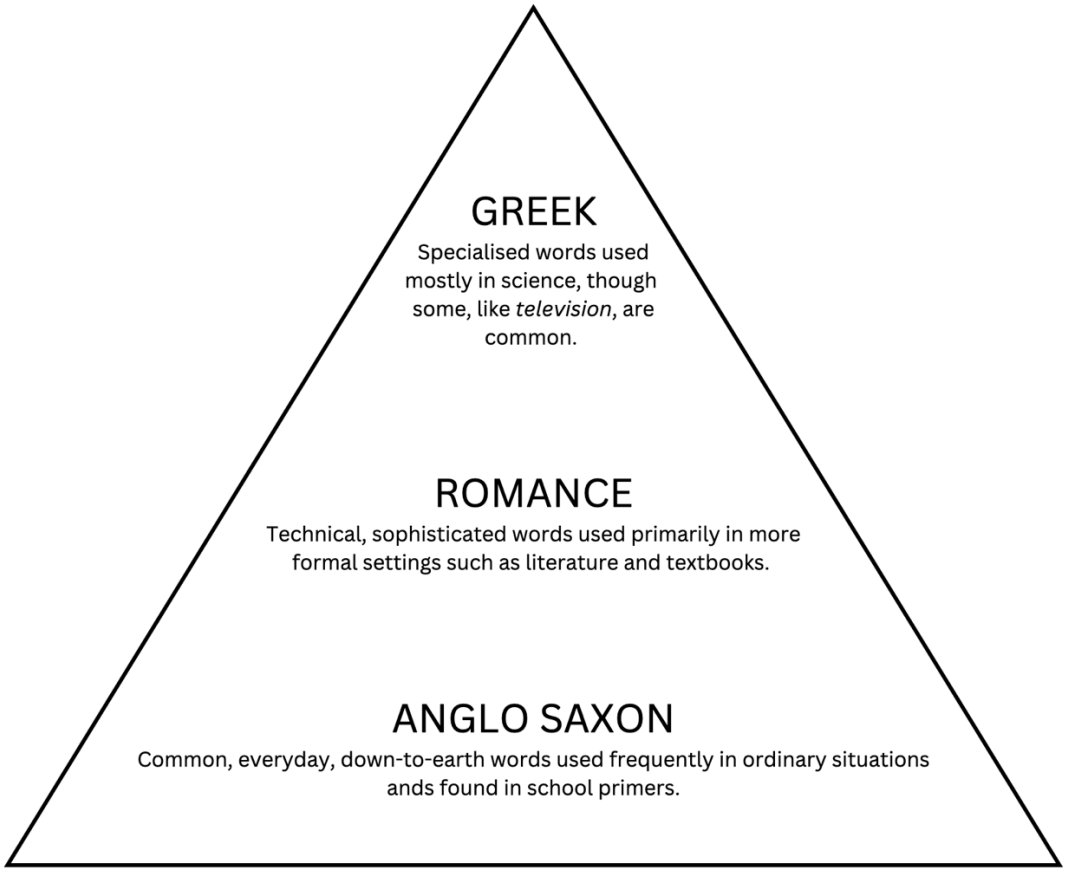


Figure 8. Henry's (1988: 259) 'The layers of the English language'.

The above structure was created to explore instruction and learning in children's spelling abilities. It is an oversimplification of the language family groups. For example, many everyday, monomorphemic English words are of Romance origin (e.g., *face, uncle, aunt* etc. are French derived terms). However, broadly, Henry's (1988) structure offers an important layered approach to considering the role of word origins in learning. Henry (1993: 229) suggests that these historical origins, along with the primary patterns in English words (i.e., letter-sound correspondences, syllable patterns, and morpheme patterns) of the Anglo-Saxon, Romance, and Greek language families, provide potential problem-solving clues for the reader. Henry (1993: 229) exemplifies this by proposing that 'the student who knows that the /k/ sound is likely to be spelled with a ch in scientific words of Greek origin will be more apt to spell *chemistry* correctly given that he recognizes *chemistry* as a scientific word'. Interestingly, Henry's (1988) model aligns closely with the statistics presented in Chapter 1 (1.4), which showed that the majority of low frequency words that appeared in the GCSE word corpus were rooted in Romance languages, particularly Latin and French. This suggests that each of these

language families may have an important role to play in children's school-based vocabulary development.

The varied origins of the words that comprise the English language give reason to why numerous studies have recommended that etymology-based knowledge could be beneficial to children's vocabulary development (e.g., Harmon et al. 2005; Malatesha Joshi 2005; Sadoski 2005). Yet, due to a lack of research and evidence, these authors all hedge their claims about the benefits of etymology on word recognition and comprehension; all state that more research is required to fully understand what the relationship between etymology and vocabulary skills might be. Crosson and McKeown (2019: 690) explain that most interventions have 'focused on derivational relations (such as the role of *de* and *ion* in *detection*), leaving the potentially important role of bound roots (*tect*) unclear, despite the fact that bound roots are often the major meaning-carrying constituent in the academic lexis'. As such, it is surprising that so little is known about how an awareness of bound word parts could contribute to the development of children's vocabulary decoding and comprehension skills.

Bowers and Kirby (2010) did investigate whether instruction in derivational affixes, freestanding root words, and bound roots supported fourth- and fifth-grade monolingual English students' abilities to infer the meanings of unfamiliar words. They found that students who received explicit instruction in the aforementioned areas were able to identify the meanings of new words more accurately than their control group counterparts who received no explicit instruction. Consequently, they conclude that teaching word analysis in this way can help students learn and decode vocabulary beyond the words taught. However, this study did not examine the effects of instruction on bound roots specifically. Nor did it offer explicit instruction in etymology itself (i.e., the origins of the word parts and how to spot etymological patterns). Additionally, all word types (i.e., free word parts and bound word parts) were analysed together. Thus, the effects of learning bound roots on word recognition and decoding skills are not disentangled from the effects of learning about productive, freestanding word parts. Consequently, the implications for instruction in bound roots, while promising, remain unclear. Moreover, extensive searches of the literature demonstrated that, overall, there is still a lack of evidence and investigation into how teaching about etymology could be integrated into the classroom and/or develop children's word awareness. Given the feedback provided by a headteacher in Bell and Wing-Davey's (2018) study (discussed in Chapter 1, section 1.4) on how much direct instruction in Latin had supported the school's EAL learners, it is surprising

that so few studies exist on the impact etymology-based knowledge on second/additional English language learners.

Multiple studies have demonstrated that being bilingual can impact an individual's metalinguistic skills and ability in both of their languages. For example, in a study of bilingualism and morphological awareness in dual educated Spanish-English children, Kuo et al. (2017) found that that, due to increased sensitivity to structural language features, being bilingual had a positive impact on participants' English and Spanish word decoding skills. In other words, developing an explicit awareness of how the structures and meanings of words/word parts are connected across languages could act as a vocabulary comprehension 'resource' for bi/multilingual learners. Given the linguistic diversity and bilingual context in which Welsh education operates, it seems particularly important to question whether explicit instruction in etymology (i.e., bound word part meanings and connections) could support the development of learners' 'resources'. One study, conducted by Crosson and McKeown (2019), did explore the extent to which explicit instruction in Latin-rooted bound word parts impacted 84 fourth- and fifth- grade students' abilities to use information about word parts and access word meanings. The participants in this study all had English as an additional language (EAL). Crosson and McKeown (2019) found that learners who received explicit instruction in bound Latinate root words showed large treatment effects for morphological problem-solving of unfamiliar words, and lexical access. Their findings imply that instruction in bound word parts could increase EAL learners' word decoding and comprehension skills. While the above findings offer crucial insight into the potential impact of explicit bound word part instruction on EAL learners' word decoding skills, no research has explored whether the explicit teaching of etymology could also benefit the vocabulary skills of monolingual English learners. As such, it seems highly important to attain data that allows for analysis of the impact of explicit etymology teaching on both bi/multilingual pupils and monolingual pupils.

Another study, conducted by Devonshire et al. (2013), also investigated the effect of teaching children multiple levels of representation in orthography, including morphology and etymology. Children who participated in Devonshire et al.'s (2013) intervention were taught the definitions/conventions relating to prefixes, root words and suffixes, how to identify the word parts, and the rules for combining them to make new words. They were also taught some 'basic etymology', such as the fact that certain silent letters in words are etymological markers which relate to other words that share the same root i.e., the silent <w> in *two* is an etymological

marker relating to the words *twin, twice, twelve* and *twenty* (see Devonshire et al. 2013: 89). Results showed that, compared to children in the control group, who only received phonics-based instruction, the intervention group showed more knowledge of morphemes, etymology, and word forms. They performed better in both reading and spelling tests, were able to understand the terms 'base word' and 'suffix' and could parse words into these constituent parts (Devonshire et al. 2013: 91). Consequently, Devonshire et al. (2013: 94) conclude that 'in addition to teaching morphology, children should be taught etymology, and rules about form, from the very beginning of their formal literacy education, from the age of five years'.

While Devonshire et al.'s (2013) study acts as a strong foundation, I contend that further research into explicit instruction in etymology is required. As the authors acknowledge, it remains unclear how both morphology and etymology may contribute to literacy skills throughout primary school, not just in the early years. Furthermore, the focus of Devonshire et al.'s (2013) study is broader literacy skills, not vocabulary recognition and comprehension directly. This is the only study I was able to find that included etymology as one of its primary factors. The above discussion of Henry's (1988) model shows that taking an historical approach to English word learning is not a new idea. However, most of the research conducted in this area focuses on the impact of learning Latin, not etymology more broadly, and, like morphology, the majority of the research that does exist has been conducted in the United States (see Holmes-Henderson and Kelly 2022: 4). Furthermore, Henry's (1988) model makes clear that, while English includes many Latin-derived words, it also comprises morphemes that have been borrowed or derived from other languages, namely Old English, other Romance languages (i.e., French), and Ancient Greek (see also Nist 1966; Hanna et al. 1971; Balmuth 1982). The role that knowledge about these other influential languages might play in children's vocabulary comprehension is both unclear and under-investigated.

Unlike the term 'morphological awareness' which, as noted in the sections above, has become prevalent in language and education literature, the term 'etymological awareness' is absent. Many authors use terms such as 'word identification' (e.g., Verhoeven and Perfetti 2003) or 'semantic awareness' (Eason et al. 2012) to refer to word meaning knowledge, and some include etymology as an aspect of knowledge within these concepts. In this thesis, I use the term 'etymological awareness' to mean a learner's ability to use their knowledge of a bound word part's origin and history to comprehend its meaning. Chapter 3 explains fully that, due to COVID-19 restrictions, I only had four weeks in which I could provide learners with explicit

instruction in English etymology and morphology. Therefore, I had to prioritise which language families might be of particular relevance to the development of learners' awareness of English etymology. The etymological analysis of GCSE words presented in Chapter 1 demonstrated that a focus on Romance-rooted languages and Ancient Greek may be most relevant to learners' abilities to decode and comprehend unfamiliar words. Unfortunately, this meant that it was beyond the scope of this research project to investigate the role of Old English on children's etymological awareness development. The tutorials did discuss and include some Old English-based word activities. But the time constraints meant that I was unable to assess the impact of this instruction in the pre- and post-intervention tests. Future research may look to extend instruction to include more aspects of Germanic-rooted word parts and to assess the impact of this instruction on English word decoding and comprehension skills. However, this chapter continues with an exploration of what is already known about the role of Romance and Ancient Greek bound word parts in English vocabulary.

2.7.1 The case for Romance languages

Chapter 1 of this thesis demonstrated that numerous studies found a positive correlation between pupils who receive instruction in Latin and increased English literacy skills (see section 1.4). These findings offer an important foundation from which to consider how integrating elements of Latin instruction into the English language classroom may support learners in Wales. Yet, the majority of the available studies focus on Latin as a stand alone subject and/or the impact of Latin on broader literacy skills, not vocabulary specifically. For example, Sparks et al. (1995), Pelling et al. (2010), Holmes-Henderson et al. (2018), Imrie (2019) and Taylor et al. (2022) found that knowledge about Latin can facilitate and even simplify the learning of other languages, develop critical and cultural literacy knowledge, and can enrich learning in other subjects, such as geography, sciences and the arts, by explaining and contextualising technical vocabulary via etymological links (see Holmes-Henderson and Kelly 2022 for full review).The above studies suggest that instruction in Latin may increase literacy skills for a number of reasons—i.e., increased understanding of grammatical structures, word order, tenses etc. Furthermore, Crosson and McKeown (2016) found that explicit instruction in the relationship between English and Latin was important because of the bound nature of many of the roots found in English words. This study found that American sixth- and seventh-grade students (ages 11 to 13) gained awareness of Latin roots after fairly minimal instruction and this helped them comprehend words containing those roots when reading them

in context, regardless of whether they had come into English directly from Latin or through French (e.g., *spect*, as in the words *prospect, specimen, spectacles, inspect, prospector, respect; voc*, as in *vocal, advocate, vocalize, vocabulary, vociferous)*.

The findings from Crosson and McKeown's (2016) study suggest that explicit instruction in Latin roots could also support the development of learners understanding of bound word parts. However, as hinted at above, many modern-day English words are not only influenced by Latin, but also French. These findings indicate that it is important to question whether awareness of the broader 'Romance languages' category—including, but not exclusively Latin—may be beneficial to learners' vocabulary development. Additionally, Sylvester et al.'s (2013) work has shown that both Latin and French have had significant influences on English lexis. For example, many originally French or Latin affixes have become highly productive in English (see Durkin 2014 for full explanation). This process of borrowing of affixes ultimately facilitated further borrowing of more French and Latin words and word parts for, as Durkin (2009: 151) writes, 'in many cases the composition of a newly encountered French or Latin word would be transparent to an English speaker'. As a result of this amalgamation of languages, there are many instances where it is too difficult to determine whether an English word shows the result of word formation within English and just happens to have parallels in French and Latin, or whether it is modelled on French and/or Latin words, or whether it is in fact a borrowing from French and/or Latin (see Durkin (2009) for examples).

Arguably, for learners in Wales, this level of detail about a specific word's history is not important. Instead, developing awareness about how to identify connections between a target word and other words, and how to use awareness of a word part's historic meaning to decode and comprehend an unfamiliar word may be more beneficial. Despite extensive searches of the literature, I was unable to find studies that had looked at the broader impact of learning about Romance languages as part of English etymology instruction. Therefore, this research aims to offer new, important insight into the role of explicit instruction in Romance-rooted bound word parts on learners' word decoding and comprehension skills.

2.7.2 The case for Ancient Greek

While investigations into Latin learning are sparse, rarer still are studies which examine the influence of Ancient Greek on English literacy skills. As Morwood (1990) explains, Ancient

Greek is all around us and its relevance can be seen, for instance, in the words used for speech-making and rhetoric, for sport, and especially within science, technology, engineering and mathematics (STEM) subjects. Holmes-Henderson and Kelly (2022: 18) argue that knowledge of Ancient Greek 'enhances vocabulary development and can aid understanding in a range of seemingly unrelated fields, by helping to decode both familiar and unfamiliar terminology: from scientific terms such as *leukaemia* and *dermatologist,* to common emotions like *panic* and *sarcasm*'. Mitropoulos and Holmes-Henderson (2016: 57) also note that Ancient Greek 'teaches and fosters a number of skills: analytical, deductive, methodical, persuasive and evaluative'. A recent *Classics in Communities Project* supported some primary schools in England with integrating Ancient Greek into their curriculum as the chosen foreign language. One teacher at a private school in Suffolk reported to the *Classics in Communities Project* that:

> Our twice annual data, compiled through INCAs [Interactive Computerise Assessment System], shows that accessing an ancient language has improved English Reading Comprehension, Spelling, Word Reading and Word Decoding for the pupils since they have started studying Greek. No comparative improvement has been seen in the INCAs standardised scores for Maths or Mental Maths which have been collected at the same time as 'English skills' assessment. This is a demonstrable impact for these children who have accessed a Classical language (reported in Holmes-Henderson 2023: 5).

Although the above quotation reports on outcomes for pupils who received direct instruction in Ancient Greek, the finding suggests that developing children's awareness of Ancient Greek as part of explicit instruction in English etymology could be highly beneficial. Nevertheless, the extent to which this may be the case remains unknown. Therefore, this research aims to address this research gap by examining the effects of explicit instruction in Ancient Greek-rooted bound word parts on Welsh pupils' word decoding and comprehension skills.

2.8 Chapter Summary and research questions

This chapter has reviewed the literature on the linguistic challenges of the primary to secondary school transition, school vocabulary, past and current approaches to explicit vocabulary instruction in vocabulary, and the development of morphological and etymological awareness. The literature has illustrated that approaches to developing children's morphological and etymological awareness in the UK education context are under-represented in research. Based

on the literature reviewed in this chapter, this research aims to gain understanding of how explicit teaching of English morphology and etymology may impact children's broader vocabulary decoding and comprehension skills, particularly as they transition from primary to secondary school. Findings from some of the research discussed above also highlight that external factors—such as age, mono/bi/multilingual status, out-of-school reading habits and reading enjoyment—may similarly affect children's word knowledge and awareness. Therefore, this project will also examine these factors. Consequently, I refined these overarching aims into three key research questions, which guide the study:

1. To what extent do children in Wales already have an awareness of English morphology and etymology?

2. How does explicit instruction in English derivational morphology (word parts and structures) and etymology (bound word parts and word origins) affect children's abilities to comprehend complex school vocabulary?

3. To what extent do external factors, such as age, mono/bi/multilingual status, languages spoken, enjoyment, and out-of-school reading habits, affect the development of morphology- and etymology-based vocabulary decoding and comprehension skills?

Each of these sub-questions was used to design different elements of this research project. As such, the thesis continues by outlining the research approach taken, as well as key ethical considerations for collecting data in schools and working with children, and participant demographics.

3 Research approach, ethical considerations and participant demographics

Chapters 1 and 2 of this thesis have identified that, currently, there is a lack of understanding about how teachers in Wales may support the development of children's metalinguistic skills—namely, morphological and etymological awareness—as children transition from primary to secondary school. Therefore, in this chapter, I present a critical account of the research approach taken to data collection, as well as a discussion of core ethical considerations. Firstly, this chapter explores how key findings from the literature review have shaped the rationale and theoretical underpinnings of the research design. This is followed by an exploration of the central issues of the research design: generating both quantitative and qualitative data from children and schools during the COVID-19 pandemic, and using online tools to develop an online vocabulary skills development programme. Attention then moves to the practical aspects of the study, including: ethical considerations, recruiting participants, the demographic details of the children involved, the organisation of the dataset, and the anonymisation process used. Finally, I discuss the data analysis approach employed. The next chapter (Chapter 4) provides a detailed discussion of the linguistic and educational rationale behind the vocabulary skills development programme itself. Here, I provide a broad outline and timetable of the programme.

3.1 Vocabulary skills development programme overview

For this research project, I designed a six-week vocabulary skills development programme that was aimed at learners in years 5 and 6 at primary school and years 7 and 8 at secondary school. Each week of the vocabulary skills development programme focussed on a different challenge or tutorial which lasted for one lesson of the participants' timetabled lessons (approximately one hour). Table 3 provides a basic outline of the programme that the intervention group completed.

Table 1: Vocabulary skills development programme tutorials outline

Week	Purpose	Learning episodes
Week 1: Word detective Challenge 1 (pre-intervention test)	• To establish participants' base etymological and morphological skill level	Pre-intervention questionnaire Task 1: Decomposition Task 2: Derivation Task 3: Word analogy Task 4: Word connections Task 5: Word definitions
Week 2: Tutorial 1	• To introduce core concepts about English etymology, including word families and the roles of Latin, French, Ancient Greek, and Old English. • To gain some understanding of how the English language developed. • To identify some of the changes that have happened to the English language over time. • To understand that our modern-day English vocabulary comprises lots of different languages.	1. The history of the English language 2. What is etymology? Language families 3. A Latin and Ancient Greek word part challenge 4. Etymology recap
Week 3: Tutorial 2	• To begin to understand what the term 'morphology' means. • To understand how to identify and recognise prefixes, root words and suffixes. • To identify and comprehend root words. • To explore what compound words are.	1. What is morphology? 2. Recognising the parts of words 3. What is a root word? 4. What is a compound word? 5. Reflection task
Week 4: Tutorial 3	• To build understanding of some Latin and Ancient Greek root word parts. • To expand understanding of common English prefixes. • To explore the im-, in-, il- and ir- prefixes and spelling patterns.	1. Latin and Greek root word expansions 2. Introduction to prefixes 3. The im-, il-, ir-, and in- prefixes 4. Reflection task
Week 5: Tutorial 4	• To expand understanding of common English suffixes and related spelling patterns. • To practice manipulating words and words parts. • To consolidate learning from the four tutorials and think more broadly about word families and word structures.	1. Expanding awareness of suffixes 2. Suffixes and root word spellings 3. Logomachy! Word game 4. Becoming a word master challenge 5. Putting it all together and reflection task
Week 6: Word detective Challenge 2 (post-intervention test)	• To establish if and how participants' etymological and morphological skills have developed	Task 1: Decomposition Task 2: Derivation Task 3: Word analogy Task 4: Word connections Task 5: Word part definitions Post-intervention questionnaire

The control group completed the post-intervention challenge (Challenge 2) in week 2 of the programme, one week after they had completed the pre-intervention challenge (Challenge 1). Originally, I had hoped the control group participants would complete the two challenges further apart. However, as explained in detail in section 3.1.2 (below), COVID-19 restrictions that were in place at the time of data collection made this very difficult. Additionally, I had hoped that the intervention group participants would be able to take part in six weeks of tutorials, plus two additional weeks for the pre- and post-intervention challenges. But, informal discussions with teachers showed that it was more practical for the whole programme—tutorials and challenges—to take place across one six-week half-term. Therefore, the programme included two weeks of challenges and four weeks of tutorials. As shown in Table 3, for the intervention group, the tutorials took place from weeks two to five of the programme. Chapter 4 presents lesson plans that explain the learning episode/activities, the linguistic and/or pedagogical rationale behind the tasks, and how the activity links to leaning aims in the Curriculum for Wales. However, next, this chapter continues by discussing why I collected both quantitative and qualitative data and how COVID-19 restrictions impacted the study methodology and data collection methods.

3.1.1 Collecting quantitative and qualitative data

Given the theoretical underpinnings of this research (i.e., a pragmatic approach to exploring children's awareness and skills relating to English morphology and etymology), I collected both quantitative and qualitative data. As discussed in Chapter 1, learning is not a static process and much previous testing of children's vocabulary and literacy abilities has relied solely on quantitative tools that capture specific measurements at one time on one day in a child's learning journey. However, I propose that a quantitative-only approach is problematic when researching children's learning development and experiences. Quantitative methods provide limited scope for understanding *why* a result may have occurred outside of the initial focus of the research tool, thus the nuances and complexities associated with the learning can be missed. Likewise, using a qualitative-only approach may not provide the data required to measure the extent to which progress in the targeted vocabulary skills has been made. The point at which individuals fully gain self-awareness is highly debated in the literature. But developmentally, it is thought that children begin to gain a sense of self-awareness around age 5, with emotional complexity in self-awareness developing around age 13 and continuing into adolescence (see Rochat (2003) for child development; Harter (2012) for adolescent development). Thus, relying

solely on children's self-reporting of vocabulary skills development, may not be a reliable method. Instead, collecting both statistical and written qualitative data allowed for a balance to be struck between skills measurement data and experiences of learning from a child's perspective. Furthermore, following a content analysis of 232 social science articles, Bryman (2006: 105-107) suggested that the benefits of collecting both types of data can include:

- Triangulation (input of qualitative and quantitative data enhances validity);
- Generation of a comprehensive picture;
- Consideration of a wider range of research questions;
- The complex nature of real-world experiences can be captured to a greater extent;
- Qualitative data can provide context and reasons for quantitative measures and outcomes;
- Findings can be more useful in an applied field (e.g., Educational Psychology).

Therefore, the selected approach offers an opportunity to explore both what has occurred in a dataset and, arguably more importantly, *why* certain outcomes may have occurred. Understanding why certain factors may have occurred also allows for an understanding of which aspects of the research may be useful to education professionals moving forwards.

3.1.2 Online learning in the COVID-19 pandemic

Originally, I had planned to collect data and deliver the vocabulary skills development programme in-person, starting after the Easter break in April 2020. The challenges were paper tests and the tutorial materials were compiled into one work booklet that would have acted as a guide for students to work through (see Appendix II: The original vocabulary skills development programme). I would have travelled to schools, taught the programme and facilitated discussions with learners both about their knowledge and understanding of the topics/tasks, and their attitudes and experiences of participating in the programme. This would have allowed participants to ask questions if anything was unclear and, as Karpicke (2012: 157) suggests is good pedagogical practice, would have allowed me to facilitate knowledge retrieval discussions that 'do not merely produce rote, transient learning', but 'meaningful, long-term learning'. I would have also worked with learners to adapt and differentiate the approach required based on age, skill-level and additional learning needs. This format of the

programme was in the final stages of being approved by the ENCAP Ethics Committee and I was about to start recruiting schools.

However, on 23rd March 2020, the UK went into a national lockdown because of the COVID-19 pandemic. Schools closed and in-person learning was replaced with online, primarily asynchronous, lessons. The pandemic brought huge challenges for the education profession and, on a much lesser scale, this project. Teachers had to focus on supporting learners through an unprecedented time, as well as quickly adapting their own practices to deliver home learning. Overnight, parents/guardians, even siblings, became home-school teachers. Schools' capacities to participate in additional activities and projects disappeared, and the research materials I had originally developed were no longer viable for use. After long discussions with education professionals and my academic supervisors, the decision was made to move the project online.

In the early stages of the pandemic, it was not clear how long the national and local lockdowns would last, how long schools may be closed for, what effective and reliable methods for online teaching and learning looked like under the circumstances or, most importantly, the impact that the pandemic was having on young people's health and well-being. Therefore, while I did draw on some of the many available sources to develop my knowledge about online learning and pedagogical practices (e.g., Anderson 2008; Caplan and Graham 2008; McGreal and Elliott 2008; Fontaine and Chun 2010; Moore et al. 2011; Salmon 2013), this project took place during a time of the unknown in education. I sought advice from Cardiff University's IT department to find the most reliable, viable and practical platforms for developing an online learning programme, but schools could not guarantee how successful or effective any chosen platform may be. Due to the complexities of working with schools at this time, as well as the time it took to re-design the research materials, it was not possible to run a pilot study prior to data collection. With their parents' permission, one year 5 child (aged 10) tested the online programme and gave informal feedback about their user/learner experiences. Some of the changes made as a result of this discussion are reflected upon in subsequent sections in this chapter.

As detailed in section 3.2 (below), I also had to consider new ethical risks that online learning posed. I had to develop new knowledge around gaining informed consent from gatekeepers, parents/guardians and child participants, as well as collecting data from, interacting with and

safeguarding children online. Following discussions with teachers and advice from ENCAP's Ethics Committee, it was decided that the programme should be delivered asynchronously. The reasons for this were threefold: 1) at this point in the pandemic it was unclear whether students would participate in the programme at home, as part of lockdown learning, or in schools if they were to re-open; 2) vulnerable learners and children of keyworkers were still attending school in-person so there may not have been equal access to learning opportunities; 3) the safeguarding risks were substantially reduced. Teachers explained that they could not guarantee children's online safety and protection if teaching synchronously. Because of the ages of the target groups and the complexities of home-learning (access to technology, WiFi access, number of siblings learning together, parents working from home etc.), regular class teachers were delivering all learning asynchronously. Consequently, I built the programme using GoogleForms and pre-recorded tutorial videos. The next section of this chapter outlines the procedures followed and details the design tools used to create the vocabulary skills development programme.

3.1.3 Tools used to design the research materials

Discussions with teachers revealed that GoogleForms are accessible on school internet networks (some internet sites are blocked centrally by local education authorities) and throughout the pandemic, students became very used to using GoogleForms to complete home-school tasks. This platform also allowed me to include a variety of question types—multiple-choice, long paragraph answers, short answers—within the tasks and, therefore, collect both quantitative and qualitative data. Additionally, using GoogleForms allowed me to ask participants multiple-choice and free textbox attitudinal questions, such as 'how easy/difficult did you find this task?', 'did you enjoy this task?' and 'provide at least one reason for your answer', throughout the tutorials. All questions/tasks were uploaded as pictures as this allowed for the font of the questions to be larger and different colours, diagrams etc. could also be used (for examples, see Figure 9).

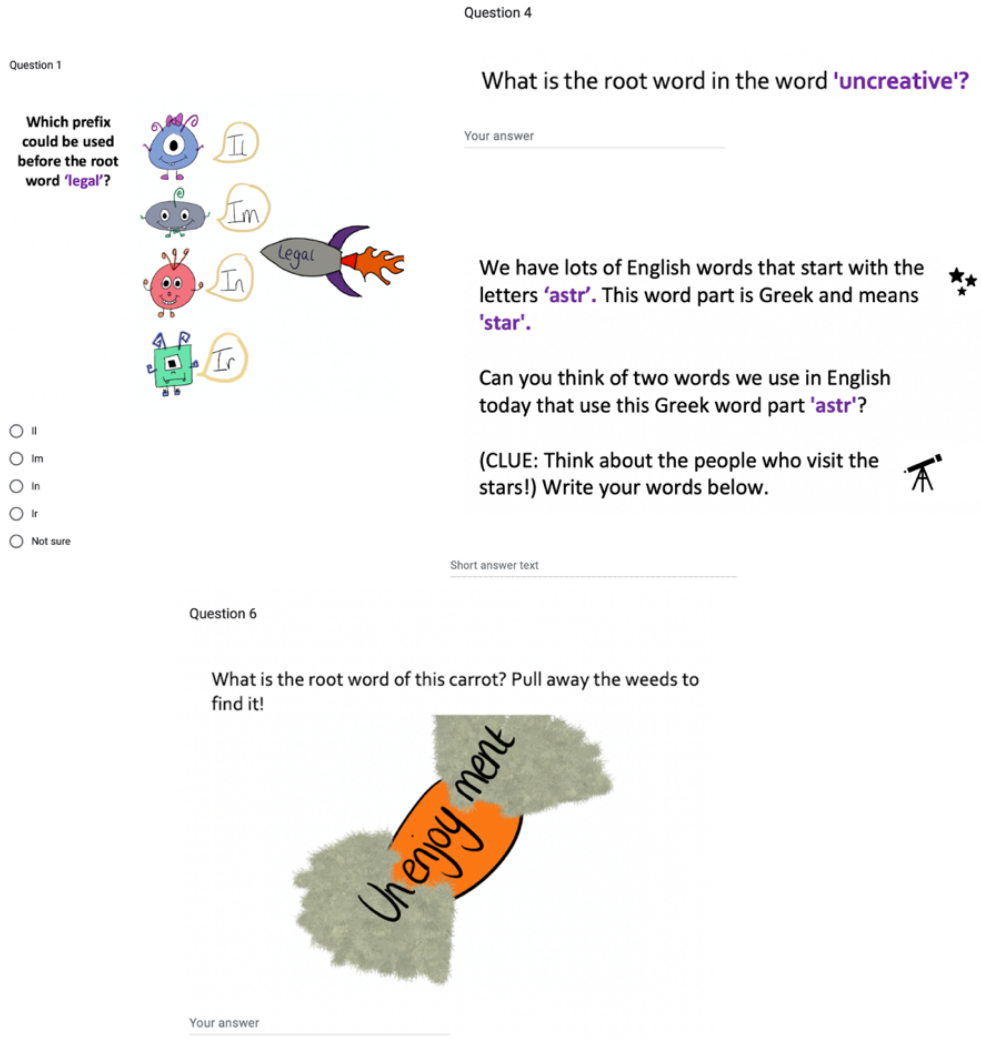


Figure 9: Example question from the vocabulary skills development programme.

By using GoogleForms, I could also ensure that only those with whom I shared the relevant weblinks could access the programme. Each GoogleForm was directly linked to an encrypted Excel spreadsheet, so that as soon as participants clicked 'submit', participants' responses were stored safely. Each week of the programme had its own GoogleForm that comprised different tasks, activities and videos that worked as mini lessons on an aspect of morphology and/or etymology and contained verbal instructions to help participants complete tasks. I used the online video tool Panopto to record and edit the videos for the programme. Once complete, each video was uploaded to a private YouTube account and published as 'unlisted'. This meant that only those with whom I shared the video link could access the content; the videos are not searchable for general public use. The YouTube videos were then embedded into the relevant

sections of each GoogleForm. The next sub-section of this chapter explains how the instructional videos were created.

3.1.4 Creating the instructional videos

Past research has shown that technology can enhance learning (e.g., Means et al. 2009; Schmid et al. 2014) and multiple studies have shown that, for adult learners, videos can be highly effective educational tools in a variety of academic disciplines (Kay 2012; Lloyd and Robertson 2012; Moore and Smith 2012; Stockwell et al. 2015). The medium is not inherently effective, as Guo et al. (2014) showed that students often disregard large segments of educational videos, and Machardy and Pardos (2015) suggest that some videos contribute little to student performance. These doubts about learning effectiveness may give reason to why, prior to the pandemic, online/video learning had become part of some adult courses and higher education teaching practices (see Guo et al. 2014), but had seldom been used in the primary/secondary school context. The pandemic changed online learning for children. However, a lack of research and literature regarding school-based online learning made it difficult to determine which instructional approach that should be taken, how many videos should be included in a primary/secondary school level programme, and how long the videos should be.

As mentioned above, searches of the literature illustrated that the empirical research that exists about the use of videos as educational tools is based in the higher education context and, often, the research appears as a blog or teaching and learning conference paper, rather than a peer reviewed book chapter or journal article (for example, see Braume 2015). However, a paper delivered by three university researchers, and published in the 'Learning at Scale' 2014 conference proceedings, suggests that for university students the median engagement time with online learning videos was six minutes, regardless of overall video length (see Guo et al. 2014). The study also found that the shortest videos included in the study, usually around 3 minutes long, had the highest levels of student engagement. As participants in the vocabulary skills development programme were notably younger than university-age, I decided to try and make the majority of videos between one and three minutes long. Some of the videos that introduce key concepts (i.e., what a suffix is etc.) are longer than three minutes. The longest video in the programme was eight minutes long, but this was partly because learners were asked to pause the video, complete an activity and then return to the video for the next steps of instruction.

Overall, there were 44 videos in the programme and the average length for each video was 2 minutes and 52 seconds.

Previous research has shown that, in addition to length and engagement/attention span, it is also important to consider the visual aspects of educational videos. In videos, cueing is the use of on-screen text or symbols that highlight important information to the learner (De Koning et al. 2009). Mayer and Johnson (2008) and Ibrahim et al. (2012) suggest that cueing may appear in the form of two or three key words that prompt the learner to pay attention to specific idea. Furthermore, De Koning et al. (2009) suggest that a change in colour or contrast, or a symbol that draws attention to a region of the screen (i.e., an arrow or picture) can help to direct a learners' attention to certain aspects of the learning and, by indicating which aspects of information are important, can support the development of learners' working memory of the core concept. Consequently, I designed the visual slides for the videos in Microsoft PowerPoint and used the tool ProCreate to draw diagrams and artwork that may help draw learners' attention to key concepts (see example drawings in Figure 10).

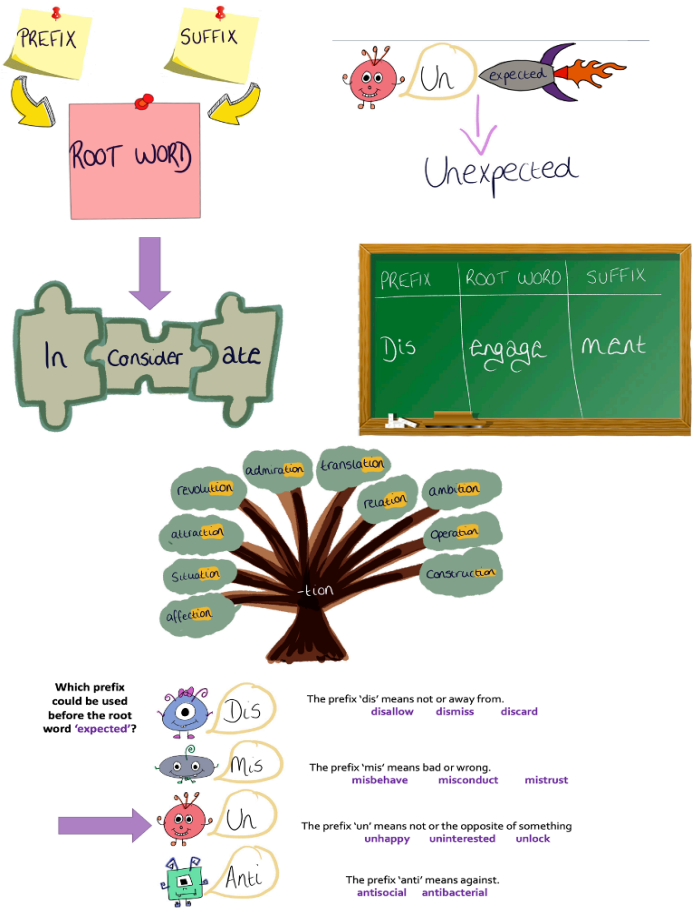


Figure 10: Diagram and artwork examples taken from tutorials 2 and 3.

3.1.5 The role of the researcher

Before discussing the ethical considerations of the research, it is important to acknowledge the influence that I may have had as the researcher and instructor on schools' and learners' experiences. As discussed in the introduction to the thesis, previously, I worked as a secondary school literacy support teacher, and this experience helped me recruit participants; headteachers and literacy co-ordinators showed a level of trust in my ability to work with and teach young people. However, I have not been a classroom teacher in Wales, and I have limited experience of working with primary school-aged children. My knowledge of the Curriculum for Wales stems from reading policy documents and working for the Welsh Government in education policy research. This meant that having informal conversations with education professionals and stakeholders in Wales was key to understanding the realities of teaching literacy and, more specifically, vocabulary skills in Wales's classrooms. The conversations I had with professionals who work in Welsh-medium primary and secondary schools were of particular importance in developing my understanding of how the different language education streams work, as well as the function of the English language in Welsh-medium education settings. Welsh-medium teachers made clear that many children struggle with English word reading and spellings, perhaps because Welsh is considered a phonetically transparent language where English is opaque (Ellis and Hooper 2001). The teachers were hoping that explicit discussions of why and how some English words work may help with these aspects of learners' metalinguistic skills. I tried to build teachers' feedback into the programme I designed with my academic knowledge, and previous experience of working in schools, to inform some of the activities in the vocabulary skills development programme.

In addition to the influence of my teaching experience, it is important to consider how I may have been viewed by the participants in the study, as this could have impacted study results. I am a white female from the South of England and am also a first language English speaker who, as both a teacher and learner, only has experience of the UK education system. Therefore, my understanding about vocabulary learning in different contexts, the processes of learning additional/foreign languages, and how this may impact vocabulary skills development in English as an additional language, stems entirely from academic study and informal discussions, rather than personal experiences. My reflective thoughts on how this may impact my analysis of qualitative data collected from children are threaded throughout subsequent results chapters.

Finally, as explained above, due to the COVID-19 pandemic, all data collected in this project came from asynchronous, pre-recorded online lessons and this was not the initial plan. Had I delivered the tutorials in-person, it would have been necessary to provide a more detailed reflective account of my own teaching approach and learners' responses. I do reflect on some of the instructional video content in the subsequent results and discussion chapters. However, as the project was conducted entirely online, it is not possible to provide reflections on how I responded to learners' feedback and experiences as the learning took place. The online programme does mean that every participant received exactly the same lesson in the same teaching style for every tutorial; there was no variation in delivery. Therefore, although teaching in this way has limitations (i.e., a lack of ability to differentiate the teaching approach for the needs of learners, or to react to and develop materials based on learners' feedback), collecting data online has provided a larger, more robust, and consistent dataset for analysis.

3.2 Ethical considerations

Before any data was collected, I gained ethical approval from the School of English, Communication and Philosophy (ENCAP) Research Ethics Committee at Cardiff University. Ethical considerations are particularly pertinent and intensive in research involving children. Children are viewed as a 'vulnerable group' requiring considerable protection, especially when collecting personal data, but the British Education Research Association's (BERA) ethical guidelines on conducting education-based research state that the same principles of consent apply to children as well as adults (British Education Research Association 2018: 14). Likewise, the British Association of Applied Linguistics (BAAL) ethical guidance states that:

> In cases where research is about or with children […] researchers should try to obtain their consent in an appropriate manner, ensuring that participant information sheets and consent forms are written in a way they will understand (The British Association of Applied Linguistics 2021: 5)

Therefore, this study was designed in accordance with BERA's, BAAL's and ENCAP's ethical research guidelines, as well as additional ethical guidance provided by the extensive literature on research with children of school age/in the school setting (e.g., Hill 2005; Shaw et al. 2011; Brindley and Bowker 2013; Alderson and Morrow 2020). Researchers must also follow ethical codes of practice and take into account the rights and duties of those that have legal responsibility for children, who, as BERA states, are 'those [that] act in guardianship (parents,

for example) or as 'responsible others' (that is, those who have responsibility for the welfare and wellbeing of the participants, such as social workers)' (British Education Research Association 2018: 15). Consequently, stage one of the consent process was to gain gatekeeper, in this instance head/lead teacher consent, followed by parent/guardian consent.

3.2.1 Gatekeeper consent

Interested gatekeepers were sent information letters and a link to an online Microsoft consent form (see Appendix IV: Gatekeeper information sheet and consent form). Gatekeepers were provided with information sheets which explained the data collection process and research purpose. No information was withheld in this study, and this ensured adults were able to give full informed consent. I was not contacted by any gatekeepers or parents/guardians with any questions or concerns. Gatekeepers wrote their name by each statement to indicate their understanding and agreement to participate in the study. After giving permission for their school to take part, parent/guardian information letters and online Microsoft consent forms were distributed (see Appendix V: Parent/guardian information sheet and consent forms). All schools sent the parent/guardian letters and forms themselves so that I did not unnecessarily have parent/guardian email addresses and whole year groups could be targeted. I agreed a deadline with each school which gave parents/guardians two to three weeks to return the form. Some schools sent email reminders to parents/guardians to complete the form.

3.2.2 Parents/guardians and children: Assent or consent?

As is stated above, gaining informed consent is key to ethical research and practice. BAAL explain that researchers must ensure that, 'when participants give their formal consent, they are aware of the nature of the research, how it will be conducted and how the data they provide will be used and shared' (The British Association of Applied Linguistics 2021: 4). In this study, children are the only participants, which, according to both BERA's (2018) and BAAL's (2021) guidelines, means that informed consent should be obtained 'even from young children, but researchers need to spend time ensuring children understand, to a degree commensurate with their capacities and interests, what they are agreeing to when they give consent' (The British Association of Applied Linguistics 2021: 9). However, parents/guardians play an active role in engaging their children in research, not only as 'gatekeepers' and consent-givers, but also as 'brokers' of their children's consent (Lewis 2009). This adds a level of complexity to the concept of children giving fully informed consent. For example, the parents/guardians and

children may have different views about participating in research and adults may be involved with persuading, even coercing, children to participate (Lewis 2009; Ilina Singh 2010). This can cause tensions in the conceptualisation of children as free agents in the consent process, as parent/guardian perceptions may be that they are the responsible final decision-maker rather than their child (Lewis 2009).

The line of responsibility and 'informed' consent is blurred by the Mental Capacity Act, which is a legal document that states 'everyone aged 16 and over is presumed to be able to make their own decisions'. Mental capacity is defined as:

> […] being able to understand, retain and use or weigh the information relevant to a specific decision, and to communicate your decision. A person only lacks mental capacity if they are unable to make a decision because of an impairment of or disturbance in the functioning of the mind or brain […] A person must be assumed to have capacity unless it is established that he lacks capacity (United Kingdom Government 2023: Mental Capacity Act sections 2 and 3).

The above definition suggests that because of their age (under 16), the children targeted for this study lack the 'mental capacity' required to make an informed decision about whether they wish to participate in the research or not. Consequently, this legal instruction proposes that only the consent of parents/guardians (on behalf of the child) was needed to participate in the research. However, this approach presents an inherent discord between researchers viewing children as 'informed' and consenting participants in social research and the ethical protocols designed to protect a 'vulnerable group' (Gallagher 2009). For many researchers, the solution to this discord is the concept of assent (Dockett et al. 2013). Assent refers to a proxy consent procedure whereby a parent/guardian provides informed consent of participation on behalf of a child and the child then verbally agrees to take part (Cocks 2006; Dockett et al. 2013). Some scholars view this approach as disempowering for children as it fails to consider their differing capabilities and levels of understanding (see Bray 2007). The agency of the actual participant is removed. Therefore, for this study, I used a combined assent and consent approach.

The combined approach was partly a result of the recruitment process followed. Before the study began, gatekeepers gave consent for me to contact parents/guardians and children at their school. Parents/guardians were not consulted prior to a gatekeeper consenting to the school

participating in the research. This also meant that consent from parents/guardians centred on whether their child's data would be collected as part of the study or not, rather than whether their child would participate in the programme. To ensure equal opportunities for learning, and to manage the practicalities of participating in research as part of the school timetable, all learners, regardless of consent, took part in the vocabulary programme as part of their regular English lessons. Parents/guardians and children do not consent to going to school nor do they consent to what their child learns at school. In Wales, it is a legal requirement to attend school until the age of 16 and mainstream schools are obliged to deliver the Curriculum for Wales. Parents/guardians do not consent to which lessons their children participate in or not, even now in the case of sex and relationships classes. The only way to not consent to school and the curriculum is to not attend school, which can result in parents/guardians being fined by local authorities. Consequently, if parents/guardians did register interest and provided consent for their child to participate in the study, children were automatically enrolled for their data to be collected from the vocabulary skills development programme; there was little choice or decision-making power for the child. As this process was carried out through online forms, rather than discussions or direct contact, I had no way of knowing whether a child had verbally assented to participation. However, BAAL explain that, to conduct ethical research with children, a researcher needs to consider that:

> [c]hildren may be in a relatively powerless position vis-à-vis researchers and other adults: it is important that care is taken to be clear that participation is not related to their educational grading and assessment and ensure they do not feel undue pressure to participate in or continue with research; it is also important not to exploit children's enthusiasm, and to ensure they do not undertake activities that may be against their own interests (The British Association of Applied Linguistics 2021: 9).

Therefore, following the above guidance from BAAL (2021), and my own attempts to respect children's agency to choose to participate (or not), in addition to parental/guardian consent, I sought written informed consent directly from the child.

Parents/guardians wrote their name and their child's name against each statement to indicate their understanding and agreement. Only 3 parents/guardians who completed the forms did not consent to their child's data being collected. To gain children's informed consent, I created a short video which explained the purpose/aims of the research and what they could expect from

taking part in the study. As with parent/guardian consent, because all children took part in the programme as part of regular learning (regardless of parent/guardian consent), the focus of the video was whether children consented to having their data collected or not. The video also explained why I was carrying out the research and how it may or may not impact their learning. I chose to create a video, rather than a written document, because of the ages of the children involved. Some of the language used was complex and technical and may have been difficult for some participants to read. Thus, by giving a verbal explanation, I could give examples and breakdown any complex vocabulary used.

The video was the first page of the GoogleForm before participants began the pre-intervention questionnaire and Challenge 1 (see Appendix VI: Child consent forms and pre-intervention questionnaire). They were then given four options: I understand the video and would like to take part in the study; I do not understand the video but would like to take part in the study; I understand the video and do not want to take part in the study; I do not understand the video and do not want to take part in the study. Participants were then asked to type out their full name as a final indication of their decision. If they understood and gave consent, the next button automatically took them to the pre-intervention questionnaire. If they did not understand but wanted to take part, they were taken to a screen that asked them to talk to their teacher about what they did not understand. Teachers had their own gatekeeper information sheets that they could use to answer questions. These participants could then return to the screen and select whether to take part or not depending on whether their understanding was clearer. If a participant did not want to take part in the study, they were taken to the challenge screen, but no data was collected from them. To ensure their voices were accounted for, children had the final say in whether their data was collected or not. All but two children selected 'I understand the video and want to take part in the challenge'. Two children did not understand the video, sought additional information from their teacher, and then consented to take part. No data was collected from children who gave their own consent but did not have parent/guardian consent for data to be collected.

3.2.3 Risk

The study itself posed minimal risk to participants. Some of the set tasks were challenging and this could have caused some distress. Throughout the study, it was repeatedly made clear that participants could choose not to answer questions and that trying their best was more than good

enough. This was to reduce any stress or discomfort participants may have experienced. Some learners chose not to answer or participate in all the tasks they were set. However, no teachers/gatekeepers formally reported distress-based issues and no participants with parent/guardian consent withdrew. The study's biggest risk was safeguarding children online. By pre-recording the tutorials, lots of the risks associated with delivering 'live' online sessions (e.g., protected online platform, chat functions, child online safeguarding etc.) were negated. Usually, an adult must obtain a Disclosure Barring Service (DBS) certificate for working with children. But, as I did not have to visit a school site in person, the Ethics Committee and gatekeepers agreed that I did not require a DBS certificate. My past job roles mean that previously, I have held DBS certificates and completed training in child safeguarding. Information sheets and the pre-intervention video made clear to teachers, parents/guardians, and participants that any responses given in the programme that raised safeguarding concerns would be reported to the school's designated safeguard lead in line with school policy. No safeguarding concerns were raised.

3.2.4 Data management and the anonymisation process

Data collected from the vocabulary skills development programme was stored on password protected Excel spreadsheets. I was the only person who had access to the raw data which, as detailed below, was anonymised two weeks after data collection ended at a school. Information sheets made clear that it was not possible to withdraw from the study after this point. To begin the anonymisation process I checked that each participant had parent/guardian consent and had given their own consent for data to be collected. Data from participants who did not have consent and had submitted work accidentally was deleted immediately. Each participant was given a code, e.g. P1C or P1I depending on whether they were in the control or intervention group. I matched individual's data using the same code across the different challenges and tutorials and then deleted their real names. School names were also anonymised by using codes S1 to S11. Only I know which code applies to which school; when reading study outcomes, etc., teachers will not know which school or participant codes apply to their students. Some information provided by participants regarding the languages they speak could have made some individuals identifiable in the dataset. For example, there were some languages where only one or two participants spoke the language which made the individuals traceable. Consequently, responses to this question were grouped by language family: Celtic, Germanic, Romance or Other.

In line with recommendations from the ENCAP Ethics Committee, I have retained the non-anonymised personal data (gatekeeper and parental/guardian consent, etc.) for the duration of the PhD. It is advised by Cardiff University that the researcher keeps their data until the mark for the assessment is confirmed by an exam board. Upon confirmation of completion of the PhD, I shall delete the non-anonymised personal data, but retain all the anonymised data for a minimum of five years. The data may be used in future publications, conference presentations etc. This is made clear on all the consent forms.

3.3 Research sites

To recruit schools to the project, I presented a briefing about the research aims, design and purpose of the study to school literacy co-ordinators who attended local authority education meetings. I also explained the inclusion criteria: participants must be in years 5 or 6 at a mainstream primary school in Wales or in years 7 or 8 at a mainstream secondary school in Wales. Beyond these stipulations, there were no exclusion criteria. Capturing data from a diverse range of learners was crucial to exploring different influential factors, but also to ensuring the sample represented the wider school learner population in Wales. After the briefing, co-ordinators/headteachers were invited to contact me with expressions of interest. Overall, approximately 45 schools were present in the meetings. I was contacted by 15 schools, 11 of whom opted-in to the project and, subsequently, completed Gatekeeper consent forms and received information letters. Table 4 provides a breakdown of the types of school that participated in the study. I tried to recruit more primary schools to the project. However, following the difficulties of the pandemic, most schools responded saying that, due to a lack of IT equipment, they were unable to participate.

Table 4: Participating schools by type of schools and language of instruction

School type	Number of schools
English-medium primary school	1
Welsh-medium primary school	1
English-medium secondary school	6
Welsh-medium secondary school	3
Total	**11**

3.3.1 Research setting

The study took place over a six-week period in each school. Six schools completed the programme from April to May 2021, and five schools completed the programme from April to July 2021. The schools had no contact with one another and participated during the half-term most convenient to them. In the end, schools were open at the time participants completed the vocabulary skills development programme, therefore they completed the programme in school during one of their regular English lessons. All participants used school iPads or computers to take part and used headphones to listen to the videos. This controlled the noise levels in the classroom, but also meant that students could watch videos and complete tasks at their own pace. Each challenge or tutorial took students between 50 – 60 minutes to complete. If students finished a tutorial earlier than expected, they were encouraged to read their school library book. If students ran out of time and did not finish the whole tutorial, they were asked to skip through to the submit button so that the tasks they had completed were recorded. Participants were not taking part in any other vocabulary-specific interventions at the same time as this programme.

Participating schools were from different parts of Wales, so the likelihood of students from different schools informing one another about the content of the programme was minimal. However, whole year groups participated in the research during the same six-week period and there was some variation in the days/times different classes within the year groups completed the weekly sessions. For example, in one school, Year 8 set 1 completed the weekly tutorials from 9:10 until 10:10 am on a Monday, and Year 8 set 2 completed the weekly tutorials from 14:15 – 15:15pm on a Tuesday. There is, therefore, a possibility that students within schools could have shared information with one another about the programme. While it is important to be aware of this possibility, it is not possible to account for this effect in the data analyses.

3.3.2 The role of school staff

Headteachers/literacy co-ordinators sent a list of the classes who met the inclusion criteria. I received no information about the classes (i.e., languages spoken, school English language level etc.) other than school year group, number of students in the class and the class name (e.g., 32 children, Dosbarth Acorn, year 5). From these lists, I randomly assigned a class to either the control group or the intervention group. The breakdown of groups is shown in Table 5.

Table 5: Assignment of classes to vocabulary skills development programme groups

Year group	Number of classes in the control group	Number of classes in the intervention group
5	2	2
6	1	1
7	8	8
8	4	4
Total	**15**	**15**

Chapter 4 (section 4.1) explains in full the process used to select the words and word parts included in the programme, and this discussion makes clear that the language was both age appropriate and relevant to the vocabulary learners may have to recognise and comprehend in the school setting. Nevertheless, I recognised that, due to their low frequency and structural complexity, some of the words selected may have been difficult to read for some lower-ability students, those who have additional learning needs and/or English as an additional language. In these instances, schools were told that a member of staff could read questions/activities aloud to a participant, but they must not help with challenge or task question answers. This decision was made in line with Joint Council for Qualifications assessment access and learning arrangements, which state that all children should have equal access to learning, regardless of reading ability (see Joint Council for Qualifications 2023). The purpose of this programme was also not to test reading skill, but word decoding and comprehension abilities; having words read aloud to you does not necessarily mean the number of parts within a word, nor the meaning of the word, are clear. No teachers formally reported needing to read the programme aloud to students.

3.4 Sample size and participant demographics

Overall, 661 students from 11 different schools gained parent/guardian consent to participate in the project, but only 568 students completed both the pre- and post-intervention challenges. Hox et al. (2017: 5) argue that, once a participant has been assigned to an experimental group—i.e., intervention or control—regardless of their attendance/completion rate of the study, they should be included in analyses of the data. This strategy, called 'intention-to-treat', indicates that participant data should be analysed even if they 'stop the intervention, do not receive the intervention, or cross-over into the other arm of the study' (Hox et al. 2017: 5). The intention-to-treat strategy denotes that excluding some participants can lead to selection bias. Participants who do not complete aspects of the study may be systematically different from those who remain (e.g., younger, have lower literacy abilities, etc.) and those who are compliant (i.e., complete the full programme) might have higher achievement levels than non-compliers, regardless of the actual impact of the intervention. This is particularly important to consider in an education setting. Based on past literacy enjoyment, motivation and engagement studies (i.e., Goldsteinet al. 2015; McGeown et al. 2015; Tanaka 2017; Preece and Levy 2020), one could predict that learners who found the programme more challenging may have been less likely to complete the full intervention. As such, the intention-to-treat analysis strategy could be considered a robust approach because it avoids bias associated with loss of participants. However, because one of the primary focusses of this research was the role and impact of explicit instruction on specific metalinguistic skills, I chose only to analyse data from the participants who had completed both the pre- and post-intervention challenges. Additionally, because Challenge 2 aimed to measure the extent to which the vocabulary skills development programme influenced participants' morphological and etymological awareness skills development, it was crucial that participants had completed all the tutorials so that valid and reliable conclusions could be drawn. Therefore, in the intervention group, I only analysed the results of participants who had submitted data for every week of the programme. This resulted in the analysis of data from 446 participants: 303 control group participants and 143 intervention group participants.

It is not surprising that there is an imbalance in the dataset when considering that 100% completion for the control group meant submitting Challenges 1 and 2, whereas for the intervention group, 100% completion meant submitting Challenges 1, 2 and all four tutorials. Chapters 5 to 7 offer detailed analyses of the data collected and report that many participants

put ‘don’t know’ as lots of task answers, some left some answer boxes blank and others provided answers that were unrelated to the programme and/or showed frustration (i.e., random clusters of letters, swearing etc.). Consequently, I suggest that there is still a wide variation of learners and learning experiences captured within the 446 participants’ datasets. Also, as explained in detail in section 3.5.1 (below), to take dataset imbalances into account, I used mixed-effects statistical models to analyse the quantitative data.

3.4.1 Pre-intervention questionnaire

Prior to completing the pre-intervention challenge, participants completed a short questionnaire which, in line with research sub-question three, collected data about a participant’s age, school year group, enjoyment level of school English lessons, mono/bi/multilingual status, English language status, languages spoken and out-of-school reading habits. These factors were selected as a result of the context and literature review findings discussed in Chapters 1 and 2. I did also collect data about participants’ genders as a multitude of national and international evidence has demonstrated that gender can play a role in the literacy classroom, particularly in relation to reading and writing outcomes (for examples and reviews, see Lietz 2006; Jones and Myhill 2007; Logan and Johnston 2009; Beard and Burrell 2010; Adams and Simmons 2019). However, overall, 102 of the 446 participants responded that they would ‘prefer not to say’, were non-binary, or wrote things like ‘questioning’. Some participants also gave responses such as ‘alien’, ‘guinea pig’ and ‘lemons’. Previous studies, such as Lahelma 2014; Wolter et al. 2015) have interrogated the negative impact that gender stereotyping can have on learners’ motivation and engagement in the literacy classroom. When considering these research findings in conjunction with participants’ responses, I decided not to analyse whether gender may have influenced participants’ morphological and etymological awareness results. I was concerned that exploring gender as a binary factor could lead to problematic and/or misleading results.

The next sub-sections of this chapter provide an overview of the demographics of the study participants, based on their pre-intervention questionnaire responses. As explained above, there is an imbalance in the number of intervention group participants (n = 143) and control group participants (n = 303). Therefore, to allow for more accurate comparisons between the control an intervention groups, in the subsequent sections, I present the percentages of participants in each external factor group in conjunction with the raw figures.

3.4.2 Participant school year groups and ages

Table 6 (below) shows the number of participants in each school year group and illustrates that the majority of participants were in year 7 (ages 11 or 12). As noted above (Table 5), I was only able to recruit two primary schools to the project, therefore it is not surprising that years 5 and 6 had the fewest number of participants (n = 51 and n = 22, respectively). The table also shows that there is a particular imbalance between the number of year 8 participants who were in the control group (n = 103) compared to the intervention group (n = 23). This imbalance will be accounted for as part of the mixed-effects models used in the data analysis process.

Table 6: Distribution of participants by school year group

School year group	Number of control group participants	Number of intervention group participants	Percentage of control group participants in each year group	Percentage of intervention group participants in each year group
Year 5	23	28	7.6	19.6
Year 6	12	10	4	7
Year 7	165	82	54.5	57.3
Year 8	103	23	34	16.1
Total	**303**	**143**	**100**	**100**

Overall, the average age of participants was 12 years and 1 month. Table 7 shows the range and average age of participants for each year group.

Table 7: Participant age ranges and averages organised by school year group

School year group	Condition	Age range in years and months	Average age in years and months	Overall year group average age in years and months
Year 5	Control	9.4 – 10.8	10.1	**10.1**
	Intervention	9.4 – 10.7	10	
Year 6	Control	10.3 – 11.7	11.1	**10.10**
	Intervention	10.9 – 11.6	10.8	
Year 7	Control	11 – 12.9	12.1	**12.1**
	Intervention	11 – 12.7	12	
Year 8	Control	12.4 – 13.9	13.1	**13.1**
	Intervention	12.3 – 13.9	13.1	

3.4.3 Participant mono/bi/multilingualism status and languages spoken

Participants provided information on their English language status and languages spoken to allow for an investigation into whether these factors impacted the development of word decoding and comprehension skills. Figure 11 (below) shows that most participants reported English as their first language (L1; n = 289). Overall, 137 participants reported being bi/multilingual with English as one of their main languages and 20 students responded that they had English as an additional language (EAL). Figure 11 shows that the percentage of participants in each of the categories is fairly evenly distributed across the two experimental groups.

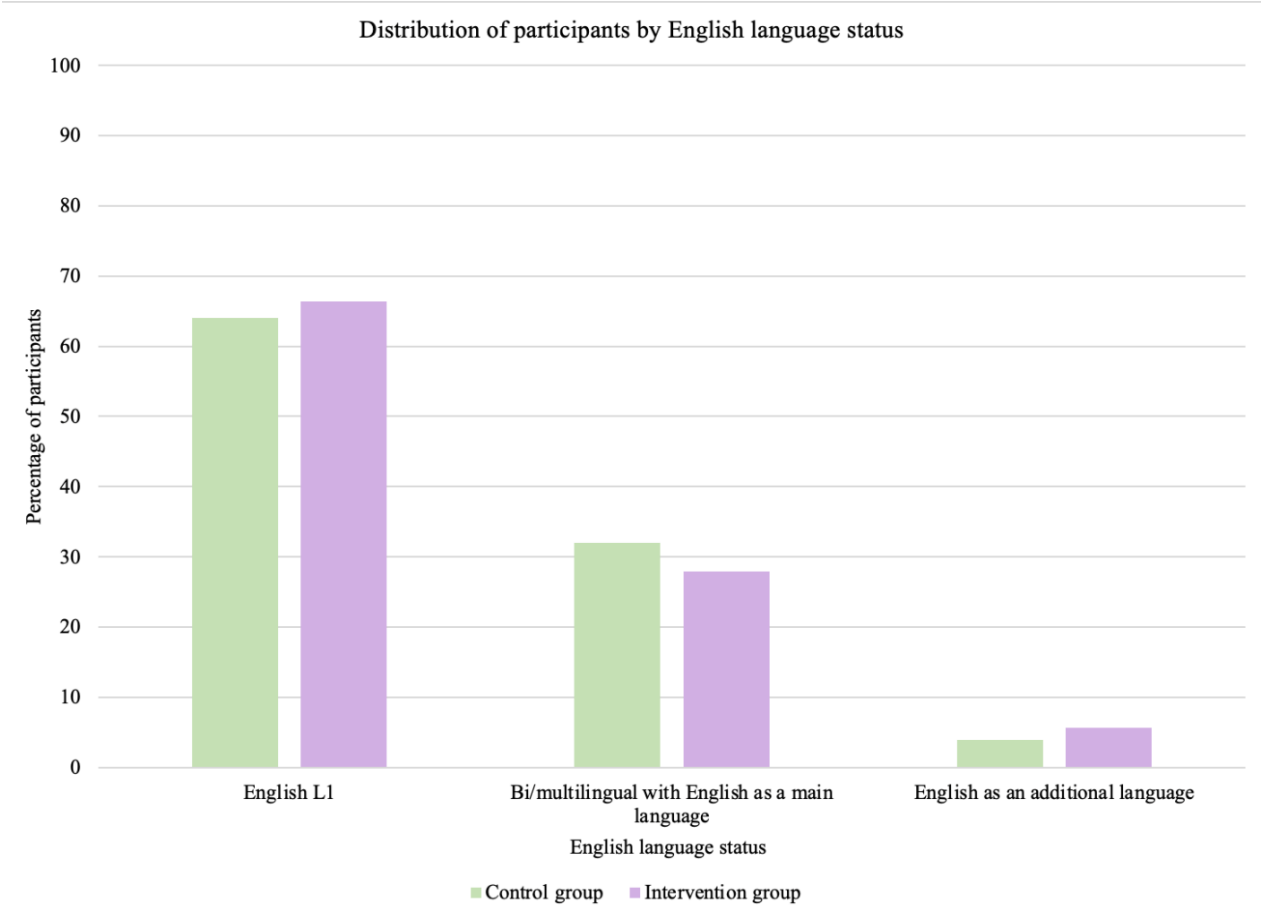


Figure 11: Distribution of participants by English language status

As explained in section 3.2, to protect participants' identities, the language data were grouped according to family. As the etymological aspects of the vocabulary skills development programme incorporated Romance-, Ancient Greek- and Old English-based root words and affixes, I categorised the languages as Romance, Germanic or Other. Originally, I also had a Hellenic languages category, but no participants reported speaking a Hellenic language. Celtic

languages are also included as a separate category to allow for an exploration of the impact of speaking a Celtic language—in this instance, primarily Welsh—on children's etymological and morphological awareness and skills development. Figure 12 illustrates the first language distribution of both the control and the intervention group's EAL participants. The languages are categorised by etymological language family. The chart shows, unsurprisingly, that the majority of participants who said English was an additional language had a Celtic-rooted language as their L1. A further 20% of EAL participants' L1s were rooted in language families other than those described above, and 10% had a first language of Romance origin.

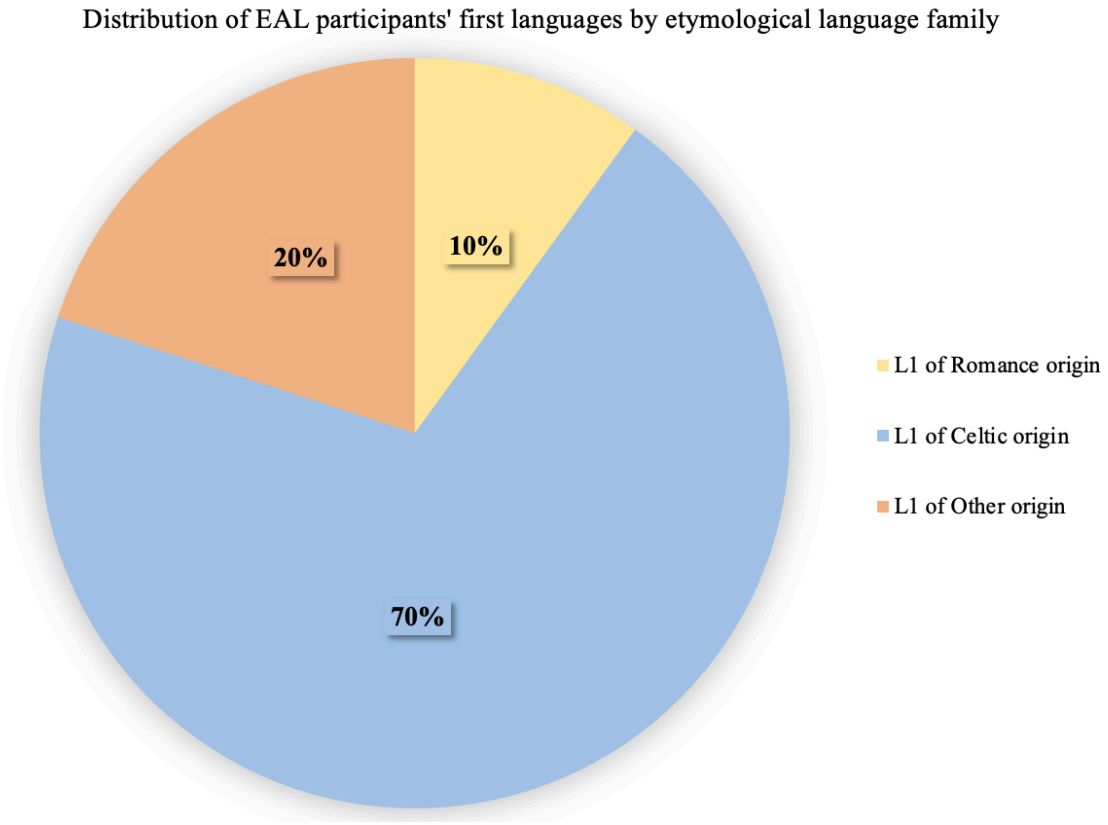


Figure 12: Distribution of EAL participants' first languages by etymological language family

Of the participants who reported being bi/multilingual with English as one of their main languages, 77.4% spoke English plus one other language. A further 17.5% spoke English plus two other languages and 5.1% spoke English plus three or more other languages. Two participants reported speaking six languages fluently. Table 8 (below) shows the combinations of languages that the bi/multilingual participants spoke. As above, languages are categorised by their family. The table indicates that the majority of bilingual participants spoke English plus one Celtic language (n = 99). This is not surprising considering the number of Welsh-medium schools that took part in the study. The next most frequent combination of languages

spoken was English, one Celtic language and one Romance language (n = 14), followed by English, one Celtic language and one Other language (n = 7).

Table 8: Bi/multilingual participants' language combinations

Number of languages spoken	Language combinations	Number of participants
2 languages	English + 1 Celtic-rooted language	99
	English + 1 Other-rooted language	4
	English + 1 Romance-rooted language	3
3 languages	English + 1 Celtic-rooted language + 1 Romance-rooted language	14
	English + 1 Celtic-rooted language + 1 Other-rooted language	7
	English + 1 Romance-rooted language + 1 Other-rooted language	3
	English + 2 Celtic-rooted languages	1
	English + 2 Romance-rooted languages	1
4 languages	English + 1 Celtic-rooted language + 2 Romance-rooted languages	2
	English + 1 Celtic-rooted language + 1 Germanic-rooted language + 1 Romance-rooted language	1
	English + 1 Celtic-rooted language + 1 Romance-rooted language + 1 Other-rooted language	1
	English + 1 Germanic-rooted language + 2 Romance-rooted languages	1
Total		137

3.4.4 School English lesson enjoyment and difficulty levels

Chapter 2 (section 2.3.1) identified that enjoyment, and how hard an individual finds a subject, can influence learning outcomes and experiences, therefore participants were asked about how much they enjoy English at school. Figure 13 (below) shows that the majority of participants responded 'yes' to the question 'do you enjoy English at school?' (n = 232) and only 19 participants responded 'no'. Overall, a higher percentage of intervention group participants said that they enjoy English at school compared to the control group (58% and 49.2% respectively). However, the proportion of participants that said they do not enjoy English at school was more evenly matched across the two groups.

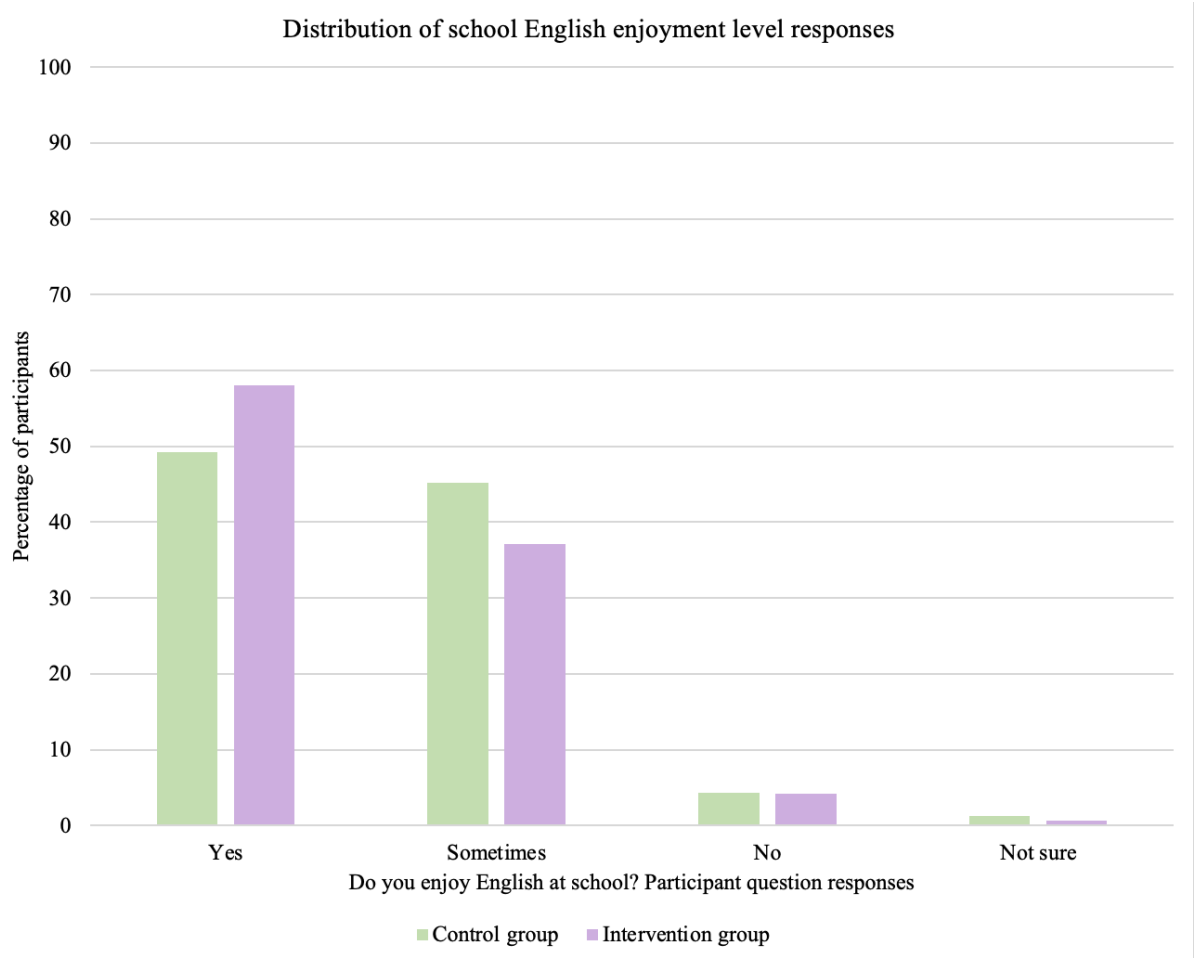


Figure 13: Distribution of school English enjoyment level responses

Figure 14 (below) shows participants' responses to a question which asked how difficult/easy they find English lessons at school. The majority of participants (n = 242) said they find English 'sometimes easy, sometimes hard'. Overall, 7.9% of control group participants said that they find English lessons 'somewhat hard' or 'very hard', whereas only 3.5% of intervention group participants gave these answers.

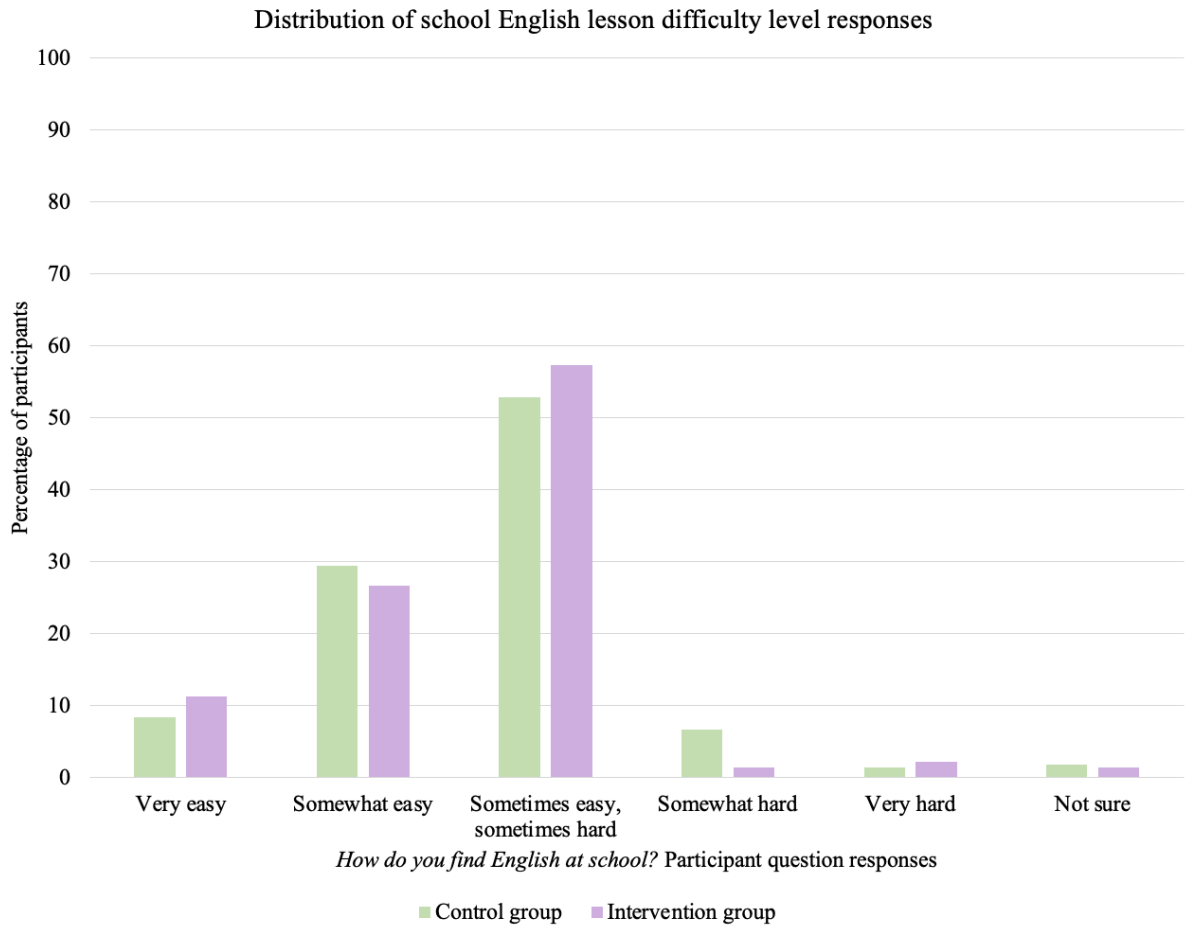


Figure 14: Distribution of school English lesson difficulty level responses

3.4.5 Participant out-of-school reading habits

Finally, the pre-intervention questionnaire collected data regarding participants' out-of-school reading habits. Participants were told that reading material could include books, online articles, magazines etc. Figure 15 shows that in both the control and intervention group, the majority of participants said that they 'sometimes' read outside of school (n = 240). Only 20.4% of participants said that they 'read outside of school all the time' (control group n = 28; intervention group n = 16), but 25.7% of participants said that they 'never' read outside of school (control group n = 44; intervention group n = 16). Chapters 6 and 7 examine whether out-of-school reading habits are a good predictor of morphological or etymological awareness score outcome.

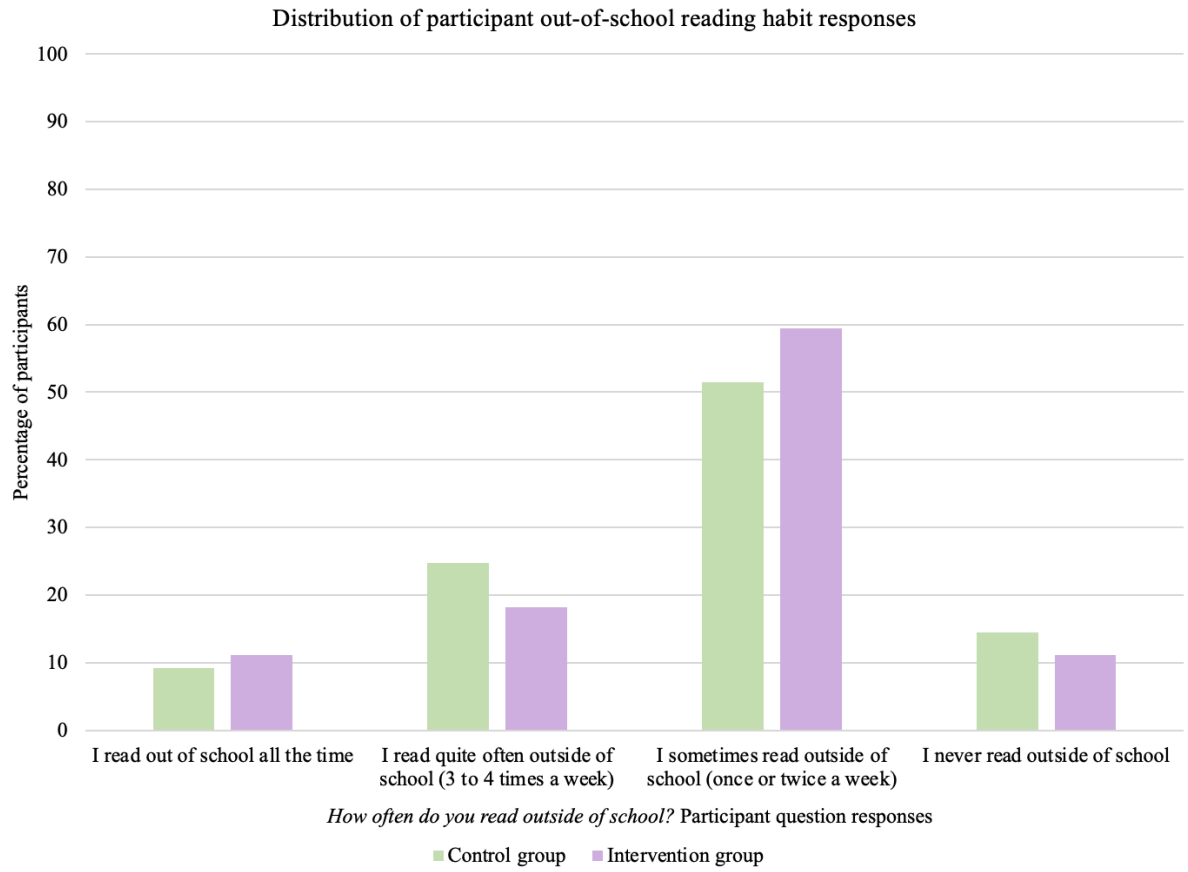


Figure 15: Distribution of participant out-of-school reading habit responses

3.5 Data analysis

As explained in section 3.1, in the pre- and post-intervention challenges, participants completed three morphology-based tasks and two etymology-based tasks. The literature discussed in Chapter 2 demonstrated that the acquisition of derivational morphology is a multifaceted process that seems to occur in developmental stages (see section 2.6.1). However, very little is known about the effects of acquiring etymological awareness on children's word decoding and comprehension skills. Some researchers, such as Henry (1988), Henry et al. (1989), Abbott and Berninger (1999), and Roberts Frank (2008), have explored etymology as an aspect of morphological awareness. However, the progression steps in the new Curriculum for Wales make clear that learners require a distinct awareness of both English morphology and English etymology. Additionally, Schreuder and Baayen's (1995) word processing model (discussed in Chapter 2 section 2.6) suggests that individuals develop awareness of orthographic strings (i.e., word parts), and additional semantic and syntactic information separately. As explained in Chapter 2, in English, there are two types of morphemes: free morphemes and bound morphemes. When added to a root word, free morphemes change the structure, meaning and class of a word, but they can be added and removed and leave a whole word, and its original

meaning, intact. In other words, a free morpheme's function is both structural and semantic. Conversely, bound morphemes must always be attached to another word part to hold meaning; they cannot stand alone, thus their function is entirely semantic. Additionally, in English, the majority of bound word parts are of Latin/French or Ancient Greek origin. Therefore, throughout this research, I draw a distinction between the development of morphological awareness and etymological awareness by focusing on the decoding and comprehension of free word parts in the morphological aspects of the study, and on the decoding and comprehension of Romance- and Ancient Greek-rooted bound word parts in the etymological aspects of the study. Consequently, to allow for detailed analysis regarding the effects of awareness development in each of these areas, I have kept analysis of the morphology- and etymology-based results separate. Table 9 (below) shows how the tasks were organised for analysis.

Table 9: Stages of data analysis

Stages of data analysis	Awareness type	Challenge tasks	Purpose
Stage 1	Morphological awareness	Word decomposition (task 1) Word derivation (task 2) Word analogy (task 3)	• To explore learners' abilities to decode and comprehend multimorphemic words (i.e., words that comprise prefixes, free root words and derivational suffixes). • To explore which, if any external factors, influence learners' levels of morphological awareness.
Stage 2	Etymological awareness	Word connections (task 4) Word definitions (task 5)	• To explore learners' abilities to decode and comprehend multimorphemic words that contain Romance- and Ancient Greek-rooted bound word parts. • To explore which, if any external factors, influence learners' levels of etymological awareness.

As explained in section 3.1.1, I collected both quantitative and qualitative data. In the results and discussion chapters, the quantitative and qualitative results are presented in conjunction with one another. However, to make clear the processes involved in analysing the two different types of data, I have divided the explanations of the analysis methods employed. Firstly, the section below explains how the quantitative data were analysed.

3.5.1 Quantitative data analysis

Firstly, I conducted descriptive statistical analyses of participants' pre- and post-intervention data. This offered broad, initial insight into how participants had performed in the challenge tasks and allowed me to explore the average score differences and similarities between the two experimental groups. Then, to explore whether the differences in the challenge scores were statistically significant, I analysed the data using mixed-effects models that were produced in RStudio (2015). All inferential statistical modelling was carried out using the *lme4* (Bates et al. 2015) and *lmerTest* (Kuznetsova et al. 2017) packages for RStudio (R Core Team 2020). Mixed-effects modelling allows a researcher to distinguish between fixed and random effects (Baayen 2009). In this study, condition (i.e., control group or intervention group), challenge number (i.e., Challenge 1 (pre-intervention) or Challenge 2 (post-intervention)), school year group, mono/bi/multilingual status, school English lesson enjoyment level, perception of how difficult participants find English at school, out-of-school reading habits and perception of how difficult participants found the various challenge tasks, were all treated as fixed effects as they are factors that are all replicable in further studies. However, participant and school were all treated as random effects because they are not replicable factors in future studies (see Baayen 2013: 350).

Mixed-effects models account for inter-participant and/or inter-item variation when predicting which factors may have influenced challenge scores from the vocabulary skills development programme (Johnson 2009: 365). To do this, the models take into consideration the random factors and present coefficients that illustrate and predict any deviations from the baseline. For example, if exploring the difference between the control and intervention group scores, a positive coefficient result would suggest that the named factor level (i.e., being in the intervention group) was more likely to influence the vocabulary development scores than the baseline factor level (being in the control group). Similarly, a negative coefficient would

indicate that the named factor level (i.e., being in the intervention group) was less likely to influence the challenge score(s) than the baseline factor level (i.e., being in the control group).

Firstly, I built a mixed-effect model that analysed whether the difference between the control and intervention group morphological awareness scores was statistically significant or not. Then, in order to explore which, if any, external factors may have influenced the morphological awareness results I built a series of models in which one fixed effect factor was added at a time. Each time I added a new factor, I used the *anova* function in R to test whether the new model was more effective than the previous model (see Appendix VI (p. 423) for full code and process). If the *anova* test result showed that, statistically, the new model was significantly different from the one before, the fixed effect factor remained in the model because this indicated that the new model was more effective. However, if there was no significant statistical difference between the new model and the model before, the fixed effect factor was excluded because this indicated that the new model was less effective. Once I had completed this process with the morphological awareness results, I repeated it with the etymological awareness results (see Appendix VII (p.453) for full code and process).

3.5.2 Qualitative data analysis

As discussed in section 3.1.1, in order to explore participants' learning experiences and attitudes towards the vocabulary skills development programme challenges and tutorials, I also collected qualitative data. To explore this data, I took a thematic approach to analysis. As Braun and Clarke (2022: 4) explain:

> At a very basic level, TA [Thematic Analysis] is a method for developing, analysing and interpreting patterns across a qualitative dataset, which involves systematic processes of data coding to develop themes—themes are your ultimate analytic purpose. TA is– more or less– a method for data analysis, rather than a methodology.

Thematic analysis usually requires an in-depth analysis of the researcher's position within the research and a high level of reflexive awareness (i.e., the ability to reflect upon the influence the researcher may have had on the elicited qualitative responses; see Braun and Clarke 2022: 5). While aspects of the qualitative analysis chapters (Chapters 6 and 7) do explore how my teaching approach seems to have influenced some participants' outcomes, reflexivity does not

play such a large role in this project because all the qualitative data was collected asynchronously and is written, rather than spoken. That does not mean that the qualitative data discussions in this thesis are devoid of reflexivity, as it is still important to recognise and take responsibility for one's own position within the research, as well as 'the effect that it may have on the setting and people being studied, questions being asked, data being collected and its interpretation' (Braun and Clarke 2022: 5). This is particularly important when working in the education context within a qualitative paradigm, for as Braun and Clarke (2022: 11) explain, 'researcher subjectivity – who we are, and what we bring to the research, ranging from our personal identities and values, through to our disciplinary perspectives – is an integral part of the analysis'. However, rather than taking a more latent approach to analysis (i.e., exploring what participants mean at an underlying or implicit level), this project explores the meaning of participants' responses at a surface, explicit level. I also take a more inductive approach to thematic analysis, meaning that identification of key themes is driven by the data content rather than my own expectations of what may exist within the dataset (Braun and Clark 2022: 10). I chose this analysis method in order to capture and explore learners' own perspectives and understandings of the vocabulary skills development programme and associated learning. As such, the analysis follows a realist and essentialist approach to identifying key themes in the data, as the aim is to capture the truth and reality of learners' experiences as expressed within the dataset.

To identify key themes, I followed Braun and Clarke's (2022: 35-36) six phase approach to thematic analysis. Table 10 (below) details each of the six steps and shows how I applied each step to analysing the qualitative data collected in this project.

Table 10: Six phase process followed for thematic analysis of qualitative data

Steps of Braun and Clarke's (2022: 35-36) **six phase approach to thematic analysis**	**Application to the current project**
1. **Familiarising** yourself with the dataset	Read through participants' challenge feedback and intervention groups' responses to tutorial tasks.
2. **Coding.** Code the entire dataset, systematically and thoroughly. When done, collate your code labels and then compile the relevant segments of data for each code.	• Attitude(s) to learning • Learning experience • COVID-19 restrictions • Video instructions • Technological issues • Morphology feedback • Etymology feedback • Vocabulary awareness • Online learning • New knowledge • Boredom • Interest in topic • Repetition • Creativity • Interactivity • Languages spoken/bilingualism
3. **Generating initial themes.** Identify shared patterned meaning across the dataset. Compile clusters of codes that seem to share a core idea or concept, and which might provide a meaningful 'answer' to your research question.	Categorise/cluster codes according to shared meaning/concept: • Confidence • Enjoyment • Setting and environment • Novelty • Motivation • Frustration • Linguistic diversity • Anxiety
4. **Developing and reviewing themes.** Check that themes make sense in relation to both the coded extracts, and then the full dataset. Does each theme tell a convincing and compelling story about an important pattern of shared meaning related to the dataset? Collectively, do the themes highlight the most important patterns across the dataset in relation to your research question?	Analyse the number of times each code/theme occurs across the morphology dataset and the etymology dataset. Codes applicable to morphology dataset: • Enjoyment • Confidence • Setting and environment • Frustration Themes applicable to etymology dataset: • Novelty and motivation • Linguistic diversity

5. Refining, defining and naming themes. Ensure that each theme is clearly demarcated and is built around a strong core concept or essence. Ask yourself 'what story does this theme tell?' and 'how does this theme fit into my overall story about the data?' writing a brief synopsis of each theme.	**Enjoyment** Positive and negative learning experiences relating to the creativity, interactivity, and un/interest in the programme topics. **Confidence** Self-esteem in relation to challenges and tutorial tasks. **Setting and environment** The role/impact of online learning, Covid-19 restrictions, social anxiety on learning experiences. **Frustration** Negative experiences of/attitudes towards the programme and learning and experience. Disengagement with the programme as a result of negative learning experiences. **Novelty** The 'newness' of the concepts, topics and skills explored in the programme. Also, the use of games in the language learning classroom. **Motivation** The qualities that drive an individual's behaviour towards or within a particular task. **Linguistic diversity** Learners' English language statuses and perceptions of English as a language.
6. Writing up	Discuss themes in relation to quantitative results i.e., the external factors that did/did not significantly influence study results.

The above themes were analysed in conjunction with the quantitative study results primarily to address research sub-question three: *To what extent do external factors, such as age, mono/bi/multilingual status, languages spoken, enjoyment, perceptions of task/subject difficulty and out-of-school reading habits, affect the development of morphology- and etymology-based vocabulary decoding and comprehension skills?*

3.6 Chapter summary

In this chapter, I have detailed some of the key challenges experienced when conducting research in schools during the COVID-19 pandemic. I have provided an overview of the vocabulary skills development programme, explained how pre-existing online learning pedagogies were adapted and used to suit the needs of learners in Welsh primary and secondary schools. I have discussed the tools used to create various visual aspects of the programme. I have then explored my role as the researcher, and examined key ethical considerations of the study, which illustrate that good ethical practice lies at the core of the research. Next, the chapter has provided an account of how the data was managed, anonymised and organised for analysis. I have explained that data was collected from 446 children in 11 schools across Wales (control group n = 303*;* intervention group n = 146). The chapter continued with an overview of participants' pre-intervention questionnaire responses to various external factor questions. Finally, I have explained how mixed-effects models were used to analyse the quantitative data, and how thematic analysis methods were used to analyse the qualitative data collected. The next chapter of the thesis explains the linguistic and educational rationale behind the challenges and tutorials in the vocabulary skills development programme.

4 Designing the vocabulary skills development programme

Chapter 3 has explained the overall research approach, ethical considerations, and participant demographics. However, before presenting the study results and discussion chapters, this thesis continues with an explanation of how the vocabulary skills development programme was designed. This chapter explains how the vocabulary was selected for the programme, how the pre- and post-intervention tests were designed, and how the intervention tutorials were created.

4.1 Identifying and selecting vocabulary for the skills development programme

As explained in Chapter 1, to explore the morphological and etymological awareness school learners require for GCSE exams in Wales, I built a corpus of past English language and literature exam papers. A full discussion of how the corpus was built, and the reliability of the word frequency statistics that resulted from the corpus, is not directly relevant to this section and, therefore, is offered in Appendix I: Building the GCSE word corpus, rather than in this chapter. However, here, it is important to note that all of the vocabulary used in the skills development programme appeared in the GCSE word corpus. Although the purpose of the study was not to teach learners specific, prescriptive sets of word lists (see discussion in Chapter 1), using words from past GCSE papers ensured that the words used were both age-appropriate and relevant to school learners in the Welsh education context. The next sub-sections of this chapter explain how the various words and word parts were selected. For clarity, I have divided the sub-sections by word part type (i.e., prefixes, suffixes etc.) but some word parts were used in multiple aspects of the programme (i.e., some prefixes were also used in the tutorial tasks that focussed on derivational suffixes etc.).

4.1.1 Selecting prefixes and free root words

One of the primary aims of this study was to explore whether explicit instruction in prefixes could support the development of Welsh pupils' word decoding and comprehension skills. As explained in Chapter 2 (section 2.6.2), prefixes contribute to the meaning of a word and the freedom of a prefix depends on the root word to which it is attached. For example, *dis-* is a free prefix in a word like *disconnect* or *dismiss,* but is bound in a word like in *disaster* or *distribution.* Regardless of whether it is free or bound, usually, the prefix holds the same meaning. Various instructional videos included in the vocabulary skills development programme explained the differences between free and bound word parts to try and help

learners determine when a prefix can be detached from a word and when it cannot (see tutorial plans in sections 4.5.1 to 4.5.4, below).

The literature reviewed in Chapter (section 2.6) showed that developing an awareness of the relationship between prefixes and free root words, and how productive a prefix is, could support the development of learners' morphological awareness and, in turn, their word decoding and comprehension skills. Subsequently, the morphology aspects of the programme focussed on the development of participants' abilities to decode words that contained productive prefixes and free root words. The etymological aspects of the programme focussed on the development of participants' abilities to decode words that contained bound prefixes and root word parts. To determine which prefixes and root words occur commonly in school-based vocabulary and, therefore, should be included in the vocabulary skills development programme, I used the GCSE word corpus. Table 11 (below) lists the 19 prefixes that were present in the corpus in order of the number of root words with which they occurred.

Table 11: Prefixes present in the GCSE word corpus

Prefix	No. of root words with which the prefix occurred in the GCSE word corpus
re-	248
un-	207
dis-	200
co-	197
in-	168
en-	63
im-	53
pre-	53
ex-	24
ab-	20
over-	19
non-	11
trans-	11
mis-	10
sub-	9
inter-	8
il-	5
anti-	5
ir-	4
hyper-	3

The prefixes shown in Table 11 correlate with Honig et al.'s (2000) work which identified that *re-, un-* and *dis-* are the three most frequent prefixes in printed school English. As mentioned in Chapter 2 (section 2.6.4), there is some debate in the literature about how the *in-, il-, ir-* and *im-* prefixes should be treated. For example, Chapman and Skousen (2005: 344) explain, these prefixes can be treated as four distinct and unrelated prefixes or, because they all hold the same meaning and share the same etymology, as a single morpheme with four allomorphs. In this study, I chose to treat each prefix as distinct and unrelated. The use of each prefix depends upon the initial sound/letter of the root word to which it is attached (for example, the *im-* prefix

is attached to root words that begin with a bilabial consonant: e.g. *import* or *immoral;* the *ir-* prefix is attached to root words that begin with the consonant *r*: e.g. *irregular*; the *il-* prefix is attached to root words that begin with the constant *l*: e.g., *illegal* etc.). Therefore, I suggest that children need to develop awareness of when and why each of these different prefixes are used.

Overall, I used all of the prefixes listed in Table 11 (above) in the vocabulary skills development programme challenges and tutorials. For the morphology aspects of the programme, I then used the low frequency GCSE sub-corpus to randomly select some free root words with which the prefix occurred. Table 12 (below) shows some examples of the root words selected for use with the prefixes.

Table 12: Examples of prefixes and free root words used in the vocabulary skills development programme

Prefixes	***Free root words***
Re-	use
	create
	mark
	place
	treat
	build
	direct
	assess
	new
	act
	process
	gain
	appear
Un-	usual
	able
	easy
	happy
	certain
	steady
	spent
Dis-	order
	approve
	infect
	regard
	taste
	loyal
	appear

Co-	(l)league construct work
In-	form come correct different sight
En-	courage joy courage force close
Im-	prove moral patient migrant
Pre-	occupy heat pack
Ex-	press claim
Ab-	normal sail
Non-	sense renewable
Mis-	manage take
Sub-	urban merge
Inter-	act connect
Il-	legal luminate
Anti-	freeze social
Ir-	regular
Hyper-	alert

In the etymological aspects of the programme, the prefixes listed in Table 11 were also used in conjunction with bound Romance- and Ancient-Greek rooted word parts. The selection process for the bound word parts is discussed in section 4.1.3 below.

4.1.2 Selecting derivational suffixes and root words

As discussed in Chapter 2 (section 2.6), the focus of this study was developing learners' awareness of derivational morphology, as multiple studies have shown that due to the 'abstractness of the information conveyed in derivational suffixes' (Nagy et al. 1993: 56), the acquisition and comprehension of derivational morphemes is a prolonged aspect of the language learning process (also see Tyler and Nagy 1989). Therefore, similarly to the prefixes, I used the GCSE word corpus to identify which derivational suffixes occur frequently in school-based vocabulary. Table 13 (below) lists the 16 derivational suffixes that were present in the corpus in order of the number of root words with which they occurred.

Table 13: Derivational suffixes present in the GCSE word corpus

Suffix	No. of occurrences in the GCSE word corpus
-ly	202
-ion	183
-able	57
-ive	51
-ment	51
-ity	48
-ness	45
-ous	44
-ful	35
-ant/-ance or -ent/-ence	32
-less	29
-ist	11
-ian	10
-ship	9
-dom	5
-hood	3

As with the prefixes, it is important to note that the productivity of the suffixes listed above depends on the root word to which they are attached. For example, *-ist* is productive in *scientist,* but not in modern-day English words like *exist* or *assist.* As the purpose of this study was to explore how awareness of derivational suffixes effects learners' word decoding and

comprehension skills, I excluded instances of non-productive suffixes. However, because derivational suffixes are always bound (i.e., they must be attached to a root word to have meaning and/or function), all the derivational suffixes listed in Table 13 were used in the morphological and etymological aspects of the programme. Interestingly, the most common suffixes are of Romance origin. Table 14 (below) shows some examples of the words selected for use with the suffixes. Some suffixes were also added to the prefixed words shown in Table 12.

Table 14: Examples of derivational suffixes and free root words used in the vocabulary skills development programme

Word	***Suffixes***
factual	
(in)accurat(e)	
abrupt	**-ly**
victorious	
suspicious	
abduct	
introduc(e→t)	
predict	
induct	
concentrat(e)	
visit(at)	**-ion**
transform(at)	
project	
subject	
reject	
prescri(be→pt)	
comfort	
valu(e)	
(un) sustain	**-able**
(in) dispos(e)	
(im) mov(e)	
(un) endur(e)	

contrast descri(be→pt) (un) creat(e) (in) effect (un) offens(e)	**-ive**
achieve (re) place amuse judg(e)	**-ment**
divers(e)	**-ity**
sensual (in) sincer(e) confidential uniform conform	
(un) happ(y→i) lonel(y→i) peace + ful persua(de→s) + ive	**-ness**
thunder myster(y→i) grac(e→i) ponder	**-ous**
disturb refer infect deter	**-ance** **-ence** **-ant** **-ent**
(un) care (dis) grace beaut(y→i) power	**-ful**
shape effort shame use	**-less**

vocal biology(y) scien(ce→t)	**-ist**
music statistic guard magic	**-ian**
friend relation scholar hard	**-ship**
free kind martyr bore	**-dom**
child neighbour likl(y→i)	**-hood**

4.1.3 Selecting Romance- and Ancient Greek-rooted bound word parts

One of the other primary aims of this study was to explore whether explicit instruction in bound Romance- and Ancient Greek-rooted word parts influenced the development of participants' etymological awareness and, subsequently, word decoding and comprehension skills. In *The Reading Puzzle: Word Analysis,* McEwan-Adkins (2008) analysed and identified the most commonly occurring Romance and Ancient Greek roots used in texts for American pupils in grades 4 to 8 (when children are aged 9 to 14; similar ages to participants in the current study). Therefore, I explored how frequently the word parts on McEwan-Adkins's list occurred in the GCSE word corpus. This helped to establish which word parts may be relevant to learners in the Welsh context. Table 16 (below) shows the bound Romance-rooted word parts identified in McEwan-Adkins' (2008) study and the frequency with which they occurred in the GCSE word corpus.

Table 2: Frequency of common Romance-rooted bound word parts in the GCSE word corpus

Bound Romance word parts (from McEwan-Adkins's (2008) study	Word part meaning	Frequency in the GCSE word corpus	Examples of words from the GCSE word corpus that contained the bound Romance word part
port	to carry	37	passport transport import
vid/vis	to see	34	video evident visit visor
form	shape	25	uniform conform transform
fac	to do; to make	19	factory satisfaction factual
spect	to look	19	inspector aspect spectacle
cent	one hundred	18	percent century centenary
dict	to say	16	dictionary predict dictate
fort	strength	15	effort comfort fortify
duc/duct	to lead	14	introduce abduct induct
sens	to feel	13	sense nonsensical sensual
ject	throw	11	project subject reject
contra/counter	against	9	contradict contrast counterfeit counterpoise

aud	to hear	8	audible audio audience
rupt	to break	8	interrupt disrupt corrupt
struct	to build	8	instruct destruct construct
bene	good	7	benefit beneficial benefactor
sent	to send	6	absent dissent (to) sentence
ambi	both	4	ambivalent ambidextrous
circum	around	4	circumference circumstance circumnavigate
scrib/scribe	to write	4	describe transcribe prescribe
voc	voice; to call	4	vocal vocabulary advocate
jud	judge	3	judge prejudice judgment
sec/sect	to cut	2	section dissect
aqua	water	1	aqua
fract	to break	0	-------
pater	father	0	-------

Table 16 shows that not all of McEwan-Adkins's (2008) most common Romance word parts occurred in the English language and literature GCSE word corpus (i.e., *fract* and *pater*). Similarly, some word parts, such as *aqua,* only occurred once. Due to the short timescale of the study, I did not use word parts that had an occurrence of one or zero in the GCSE word corpus. Again, it is important to reiterate that the purpose of teaching the word parts identified in the GCSE word corpus was not to make learners' vocabulary 'better', but rather, to explore whether developing awareness of some common bound word part structures and meanings could support broader word decoding and comprehension skills. Nonetheless, the majority of

McEwan-Adkins's (2008) Romance-rooted word parts were present in the corpus and, therefore, also appear to be relevant to learners in the Welsh education context. I also explored the corpus for additional Romance-rooted bound word parts that were not included in McEwan-Adkins's (2008) wordlist. I found that the Latin word part *pro,* meaning *forward* and found in words like *project, propel* and *productive,* was common in the GCSE word corpus (frequency = 29). Likewise, the word part *man/manu,* meaning *hand* and found in words like *manuscript, manicure, manipulate,* was also common in the GCSE word corpus (frequency = 12). Subsequently, these word parts were included in the vocabulary skills development programme.

I repeated the above process with the Ancient Greek word parts that McEwan-Adkins (2008) had identified. Table 16 (below) shows the frequency with which the Ancient Greek word parts occurred in the GCSE word corpus.

Table 16: Frequency of common Ancient Greek-rooted bound word parts in the GCSE word corpus

Bound Ancient Greek word parts (from McEwan-Adkins's (2008) study	**Word part meaning**	**Frequency in the GCSE word corpus**	**Examples of words from the GCSE word corpus that contained the bound Ancient Greek word part**
gram	a written/drawn thing	12	programme grammatically telegram
graph	writing; drawing	11	paragraph photograph grapheme
auto	self	7	automatic autograph autobiography
bio	life	5	biodiversity biology biography
tele	far off	5	television telephone telegram

logy	study of	3	technology ecology biology
meter/metr	measure	3	perimeter kilometre metre
chron	time	2	chronicle chronological
dyna	power	2	dynamic dynasty
hydr	water	2	hydrocarbons hydrates
nym	name	2	acronym anonymous
scop(e)	viewing instrument	2	microscope telescopic
techn(o)	art; science; skill	2	technology technique
dys	bad; hard; unlucky	1	dystopia
hypo	below or beneath	1	hypocrisy
micro	small	1	microplastic
phon	sound	1	telephone
photo/phos	light	1	photograph
anthropo	man; human; humanity	0	-------
hetero	different	0	-------
homo	same	0	-------
mono	one	0	-------
morph	form; shape	0	-------
phil	love	0	-------
phobia	fear	0	-------
pseudo	false	0	-------
psycho	soul; spirit	0	-------
therm	heat	0	-------

Table 16 shows that, overall, Ancient Greek word parts are more infrequent in the GCSE word corpus than Romance-rooted word parts, and not all of the word parts on McEwan-Adkins' (2008) list occurred in the GCSE word corpus. These findings reflect the earlier discussion in Chapter 1 (section 1.4), which demonstrated that only 4.4% of the 500 words on the low frequency sub-corpora were rooted in Ancient Greek. However, Table 16 (above) illustrates that the Ancient Greek word parts occur within some highly technical, multimorphemic words

and, therefore, still form an important aspect of explicit etymology instruction. Thus, to provide variety within the Ancient Greek-based etymology tasks, I used all the Ancient Greek word parts that occurred at least once in the GCSE word corpus. Like the Romance-rooted word parts, I explored the corpus for additional Ancient Greek word parts that were frequent but did not appear on McEwan-Adkins' (2008) wordlist. I found that *path(os),* meaning 'feeling' and part of words like *sympathy, psychopath, antipathy,* and *empathy,* was common in the GCSE word corpus (frequency = 7). Likewise, the Ancient Greek root *para,* meaning 'alongside, altered or abnormal' and part of words like *paragraph, paraglide, paradox, paralysis,* was also common in the GCSE word corpus (frequency = 6). Therefore, these word parts were also included in the vocabulary skills development programme. As explained in detail in section 4.5 (below), the above listed bound word parts were taught explicitly and used in various activities and challenges in the vocabulary skills development programme.

4.2 Overview of the pre- and post-intervention challenges

Having explained the word and word part selection process, the chapter now continues by discussing how the pre- and post-intervention challenges were designed. For the pre- and post-intervention activities, participants acted as 'word-detectives' to solve a series of word decoding and comprehension clues. In line with research sub-question one—*To what extent do children in Wales already have an awareness of English morphology and etymology?*—the aim of the pre-intervention challenge was to measure participants' base morphological awareness and etymological awareness levels prior to the vocabulary skills development programme. Likewise, in line with research sub-question two—*How does explicit instruction in English derivational morphology (word parts and structures) and etymology (bound word parts and word origins) affect children's abilities to comprehend complex school vocabulary?*—the post-intervention challenge worked to measure the extent to which the programme influenced the development of participants' etymological and morphological awareness. Each of the challenge tasks targeted a different aspect of morphological or etymological awareness. Therefore, in this section, I present an overview of linguistic and/or educational rationale behind the design of each task.

4.2.1 Being word detectives

In total, there were three morphological awareness tasks and two etymological awareness tasks included in the pre- and post-intervention challenges. Instructions for each task were given in a short one-to-two-minute video. Informal conversations with the test participant suggested that they would have stayed more engaged with the challenge if, after each task, they could have self-reflected on how they had performed and kept track of the task answers/clues as they progressed through the programme. As a result of the feedback, participants were shown the correct/possible answers after some of the challenge tasks. However, they were not shown their scores and were not able to click back to change their responses.

Second language research has shown that capitalising on the 'naturally creative skill[s] young learners bring into the classroom' (Halliwell and Jones 1991: 10) is fundamental to 'sustaining enjoyment and interest' in the language learning classroom (Bakhsh 2016: 120). Furthermore, Richard-Amato (1988) proposes that using games in the language learning classroom can help to decrease nervousness and shyness, and Uberman (1998: 23) extends this notion by adding that games and challenges can be particularly effective if 'the true test is hidden within a fun task.' As shown in Chapter 3 (section 3.4.3), the majority of participants in this study were first language (L1) English speakers (i.e., they were not being tested in an additional/foreign language). However, by 'hiding' the vocabulary tests within the 'word-detective' challenge, as Uberman (1998: 23) suggests, I hoped that students would stay more actively engaged with the pre- and post-intervention activities and complete them to the best of their ability.

The overall story of Challenge 1 was that a criminal had stolen £10,000 from a bank. For Challenge 2, a burglary had taken place and the thief was on the loose. The participants acted as detectives and had to figure out a series of word clues (the tasks) to reveal who the criminal was (see Figure 16, below). Challenge 2 followed the same format as Challenge 1, but in an attempt to limit the effects of test repetition and memory recall, the storyline and vocabulary used in some of the questions was changed (see Appendices VIII, p. 470, and VIIII, p. 510, for the full challenges).

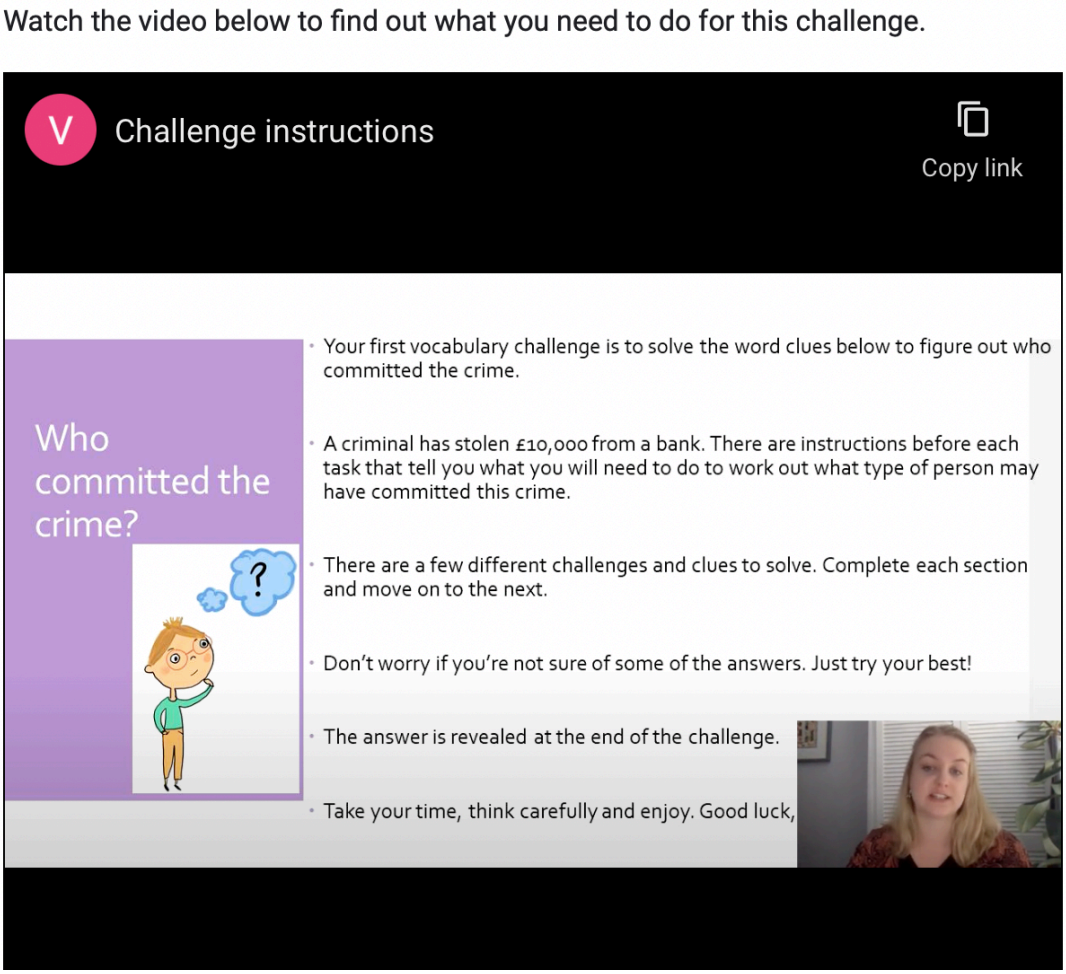


Figure 16: Challenge 1 instructions.

4.3 Morphological awareness challenge tasks: Rationale

The three morphological awareness tasks in the pre- and post-intervention challenges draw on findings from Berthiaume et al.'s (2018) review of studies that assess derivational morphological knowledge among students ranging from kindergarten to high school ages. In this review, Berthiaume et al. (2018) assessed 221 research studies published in English or French in peer-reviewed journals or edited books between 1984 and 2017 (the year the review was written). The studies reviewed include but are not limited to: examining the role of morphological knowledge in the development of reading, spelling, or vocabulary; verifying the extent to which children with reading disabilities use the morphological structure of a word or pseudo-word to understand its meaning; assessing the effects of morphemic instruction on vocabulary and/or reading development (Berthiaume et al. (2018: 59). The purpose of the review was to establish the types of test that are most frequently used to explore the role of morphological awareness in children's literacy skills. Following an in-depth analysis process

(for methods, see Berthiaume et al. 2018: 64), the researchers established ten categories of morphological task type. In Table 17, I have provided a short summary of each of the categories. Combined with findings from some key morphological awareness studies (listed in Table 17 and discussed below), I used Berthiaume et al.'s (2018) morphological task-type categories as a framework to design the morphological awareness pre- and post-intervention tasks.

Table 17: Summary of types morphological tasks adapted from Berthiaume et al.'s (2018) integrative review of derivational morphological tasks in morphology awareness literature.

Type of morphological task	**Objectives/aims of task type**	**Examples of studies that use the morphological task type**
Decomposition	Participants analyse morphologically complex words. The participant has to decompose the word to identify both the root form and its attached affixes. This type of task tests whether they are able to extract the root/base form of a word part.	Kieffer and Lesaux (2008) Garcia et al. (2010) Berthiaume and Daigle (2014) Binder et al. (2015) Hamavandi et al. 2017)
Definition	Participants must define the meaning of a word or pseudo-word. This type of task tests participants' morphological knowledge in relation to their ability to interpret the meaning of derived words. This task can test: • The relationship between the spelling of multimorphemic and knowledge about morphemes. • Knowledge and awareness of morphological rules relating to the meaning of affixes. • Quantify the number of multimorphemic words that children can define and use.	Nunes et al. (2006) Lipka and Siegel (2012) Mitchell and Brady (2014) Trussell and Easterbrooks (2014)
Derivation	Participants aim to produce the correct derived form of a target base word e.g., *clean* → *unclean.* Usually, participants are asked to think of a word from the same word family i.e., it has similar meaning to the one they are presented with. Participants can also be required to modify	Carlisle and Nomanbhoy (1993) Carlisle (1995) Carlisle (2000) Carlisle and Fleming (2003) Casalis and Sopo (2004) Arredondo et al. (2015)

	the word they are given to complete a sentence. In some instances, participants are required to combine a root word and an affix to produce a derived word. Occasionally, they also have to provide the meaning of the newly created derived word.	
Lexical decision	Participants are presented with sequences of letters and must decide whether a word is real or not. This type of task explores the effect of the morphological structure of words on reading skills, as well as the relationship between the organisation of morphological word structures and the mental lexicon.	McCutchen et al. (2008) Schiff et al. (2012) (Casalis et al. 2015)
Morphological relation judgment	Participants are tested on their understanding of the morphological relation between two or more words e.g., *quick/quickly* share a morphological relation, but *pill/pillar* do not. Sometimes participants are presented with this type of word in a sentence and asked if the sentence makes sense or not.	Ku and Anderson (2003) McCutchen et al. (2008) Niedo et al. (2014) Goodwin (2016)
Naming	Participants read multimorphemic words aloud as quickly and accurately as they can. The aim of this task is to assess how accurately and quickly participants can read derived items (e.g. *walker*) compared to non-derived items (e.g. *river*).	Nagy et al. (2003) Nagy et al. (2006) Suárez-Coalla and Cuetos (2013)
Plausibility judgment	Participants are asked if a root word and an affix can be put together to make a word or whether they can determine which of two pseudo-words most resembles a real word. This task tests participants' ability to apply morphological rules of word formation to pseudo-words.	Tyler and Nagy (1989) Berthiaume and Daigle (2014)
Spelling	Participants are required to spell a variety of multimorphemic/affixed words. The aim of this task is to explore how participants use their knowledge of morphological components to spell morphologically complex items, sometimes in relation to	Carlisle (1988) Kemp (2006) Casalis et al. (2011) Goodwin et al. (2013)

	words that do not contain these types of component.	
Suffix choice	Participants are asked to choose the most appropriate word (or pseudo-word) to complete a sentence. The objective of this task is to investigate participants' understanding of how suffixes can be added to change the syntactic category of a word i.e., *consider* → *consideration*: *verb* → *noun* because of the addition of the *-ation* suffix. This task works to demonstrate participants' syntactic knowledge of how suffixes can function.	Tyler and Nagy (1989) Singson et al. (2000) Berninger et al. (2010) Goodwin (2016)
Word analogy	Participants are presented with two pairs of words. They must complete the second pair by producing an analogy based on the first. The purpose of this task is to test participants' ability to identify the nature of the relationship between a pair of words and to test their knowledge of derived forms that can be produced from root words.	Deacon and Kirby (2004) Kirby et al. (2012)

While it is important to be aware of the most frequent types of derivational morphology skill past research has tested, the pre- and post-intervention challenges do not test each of the above categories. This is partly because of the length of time it would have taken to test each one of the above skills. But the primary reason is that the focus of the morphological aspects of this study was to develop awareness of productive and free derivational word parts. Some of the morphological skills listed in Table 17, such as the definition and lexical decision tests, focus more on non-productive and/or bound word parts. However, as explained in Chapter 3 (section 3.5), the progression steps in the new Curriculum for Wales make clear that learners require a distinct awareness of both free and bound word parts, as well as the ability to use etymological awareness to understand the meanings of common bound word parts. Additionally, Schreuder and Baayen's (1995) word processing model (discussed in Chapter 2 section 2.6) suggests that individuals develop awareness of orthographic strings (i.e., word parts), and additional semantic and syntactic information separately. Therefore, bound word part-based tasks were included in the etymological aspects of the programme. The three awareness tasks I designed for the morphological aspects of the pre- and post-intervention challenges aimed to explore learners' productive word decomposition, word derivation and word analogy skills.

4.3.1 Marking the morphological awareness tasks

Before explaining the design rationale behind each of the morphological awareness challenge tasks, it is important to explain that I did not use a binary marking system (i.e., 0 for incorrect and 1 for correct) for them. Using a binary scoring system may not have allowed for an assessment of the extent to which some learners' morphological awareness skills had or had not developed. As explored in the discussion of Schreuder and Baayen's (1995) word processing model, Perfetti and Hart's (2002) and Perfetti's (2007) Lexical Quality Hypothesis, and Tyler and Nagy's (1989) derivational morphology acquisition research (discussed in detail in Chapter 2 section 2.6.1), there are multiple stages and processes involved with developing derivational morphology-based awareness. Consequently, I hypothesised that some learners may develop some aspects of awareness, but not necessarily all aspects required for complete accuracy (i.e., that a word's prefix *and* suffix need to be removed to identify a root). To reflect the aforementioned possibility, I used a scale of correctness to mark participants' challenge answers as this ensured that I could evaluate the extent of the progress a learner had made, if any (for example, see section 4.3.2). For the morphology-based tasks, I did not mark mistakes in the spelling of root words as incorrect (i.e., some participants wrote <thort> rather than <thought>), as the purpose of the tasks was not to explore participants' spelling abilities, but rather to analyse their word part recognition, decoding and comprehension abilities (i.e., that they had accurately removed the prefix *un-* and suffix *-ful* to identify the root word *thought/thort*). However, mistakes in the spelling of root words that required adjustment due to the addition of a particular suffix were marked as incorrect (e.g. <happy> → <happ**i**ness>*).* Overall, there were 42 marks available for the morphology-based challenge tasks. The next sections of this chapter outline the rationale behind each of the morphological awareness pre- and post-intervention tasks and show how each of the tasks were marked.

4.3.2 Task 1: Decomposition

Task 1 is adapted from one of the most frequent types of test in the morphological awareness research field: decomposition (as labelled by Berthiaume et al. (2018); see Table 17). Originally, this style of task was designed by Rubin (1988), who named it the 'morpheme analysis test'. The aim of the task is to evaluate participants' ability to separate a spoken word into its constituent parts. According to the new Curriculum for Wales (Welsh Government 2019a) this is a skill that learners should develop from progression stage 3 onwards (end of primary school/start of secondary school, age 10/11), as they require an 'awareness of how root

words work'. However, under 'reading', the Curriculum for Wales states that students should 'use knowledge of word roots […] to support understanding' (Welsh Government 2019: 21). Thus, in this task, participants were given a written sentence and a number of affixed words that shared the same root. Each sentence was part of the Chief Inspector's news story speech and participants had to help the Inspector figure out the missing root word.

As discussed in Chapter 2 (section 2.6), past research has shown that the transparency of the root within a multimorphemic word seems to affect children's accuracy with identifying root words (e.g., Carlisle and Stone 2005). Therefore, to explore the extent to which learners in Wales possessed/developed morphological awareness in relation to root word transparency, some questions used affixed words in which the root was transparent (Figure 17), and others used affixed words in which the root was opaque (i.e., the root had undergone orthographic and/or phonetic changes; Figure 18). In an attempt to limit the effects of prior word knowledge on decomposition task results, the target words were all selected from the low frequency GCSE word sub-corpus. Participants were asked to identify the root word and type the answer into a box to complete the sentence.

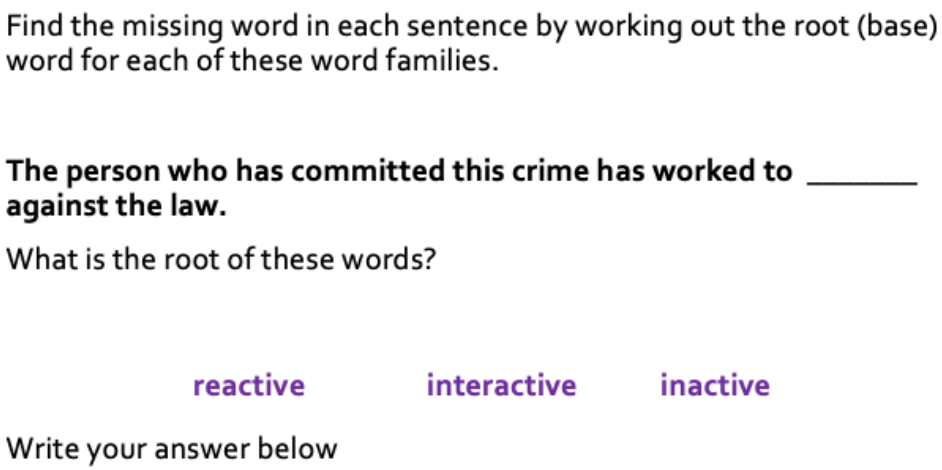


Figure 17: Example of a task 1 question in which the root word is transparent.

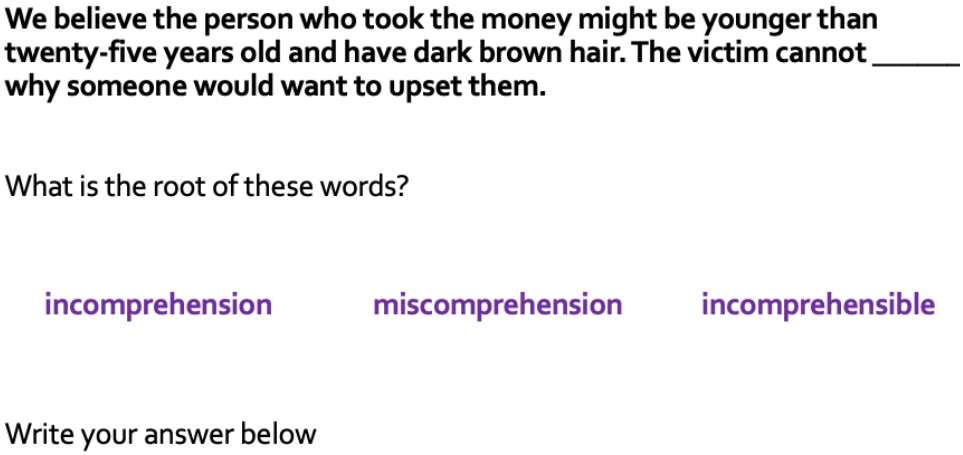


Figure 18: Example of a task 1 question in which the root word is opaque.

Task 1 comprised eight questions and Table 18 (below) shows how each question was marked using a scale of correctness. Participants were given two marks for a completely correct answer. If a participant removed one affix but not the other (i.e., they removed the prefix from the root word, but not the suffix) they were given one mark. If they removed no affixes from the root word or gave the incorrect answers, they were given a mark of zero. In total, there were 14 marks available (per challenge) for this task.

Table 18: Task 1 marking processes

Challenge and task number	Question number	Question answers	Mark given
Challenge 1, task 1	Question 1 (transparent)	Target word: criminal	2
		Removal of one affix (e.g., criminalise)	1
		Removal of no affixes/incorrect answer (e.g., re-criminalise)	0
	Question 2 (transparent)	Target word: predict	2
		Removal of one affix (e.g., predictive)	1
		Removal of no affixes/incorrect answer (e.g., unpredictable)	0
	Question 3 (opaque)	Target word: compete	2
		Removal of one affix (e.g., competitive)	1
		Removal of no affixes/incorrect answer (e.g., noncompetition)	0
	Question 4 (opaque)	Target word: comprehend	2
		Removal of one affix (e.g., comprehension)	1
		Removal of no affixes/incorrect answer (e.g., incomprehensible)	0
	Question 5 (transparent)	Target word: thought	2
		Removal of one affix (e.g., thoughtful)	1
		Removal of no affixes//incorrect answer (e.g., unthoughtful)	0
	Question 6 (transparent)	Target word: inform	2
		Removal of one affix (e.g., misinform)	1
		Removal of no affixes/incorrect answer (e.g., uninformative)	0
	Question 7 (opaque)	Target word: decide	2
		Removal of one affix (e.g., decisive)	1
		Removal of no affixes/incorrect answer (e.g., indecision)	0
Challenge 2, task 1	Question 1 (transparent)	Target word: act	2
		Removal of one affix (e.g., react)	1
		Removal of no affixes/incorrect answer (e.g., inactive)	0
	Question 2 (opaque)	Target word: possess	2
		Removal of one affix (e.g., prepossess)	1
		Removal of no affixes/incorrect answer (e.g., repossession)	0
	Question 3 (opaque)	Target word: concentrate	2
		Removal of one affix (e.g., reconcentrate)	1

		Removal of no affixes/incorrect answer (e.g., overconcentration)	0
	Question 4 (opaque)	Target word: conclude	2
		Removal of one affix (e.g., conclusion)	1
		Removal of no affixes/incorrect answer (e.g., inconclusive)	0
	Question 5 (transparent)	Target word: tense	2
		Removal of one affix (e.g., intense)	1
		Removal of no affixes/incorrect answer (e.g., intenseness)	0
	Question 6 (transparent)	Target word: care	2
		Removal of one affix (e.g., careless)	1
		Removal of no affixes/incorrect answer (e.g., uncareful)	0
	Question 7 (transparent)	Target word: detect	2
		Removal of one affix (e.g., detectable)	1
		Removal of no affixes/incorrect answer (e.g., indetectable)	0

4.3.3 Task 2: Derivation

Like decomposition-based tasks, morphological derivation tasks are highly common in vocabulary skills studies. In the literature, this type of test appears under multiple names: production of word forms (Carlisle and Nomanbhoy 1993); morphological production task (Carlisle 1995); or test of morphological structure (TMS; Carlisle 2000; Carlisle and Fleming 2003). Like Berthiaume et al. (2018), I adopt the term 'derivation task', rather one of the above labels, as section 4.1.1 (above) has argued that awareness of derived word forms, particularly those that use prefixes, is important for decoding and comprehending school-based academic words. Therefore, the aim of this task was to measure the extent to which the vocabulary skills development programme supported the intervention group participants with segmenting words into parts and comprehending common prefixes.

Usually, morphological derivation tasks only require participants to turn the target root word into its derived form(s) (see Carlisle and Nomanbhoy 1993; Carlisle 2000; Arredondo et al. 2015). However, in task 2, for some questions, participants were also required to take prefixes away from the root word. Evidence suggests that the ability to segment morphologically complex words into their relevant morphemes is strongly correlated with reading achievement

(see Mahony 1994; Casalis and Louis-Alexandre 2000). Consequently, task 2 aimed to explore to what extent participants were able to identify, add and remove productive prefixes from written root words (for examples, see Figure 19). In particular, this task focussed on participants' abilities to manipulate four common negating prefixes: *dis-* and *un-* (due to their high frequency in the GCSE word corpus), and *in-* and *im-* (due to their phonetic similarity but different spelling applications; see section 4.1.1 above for full explanation).

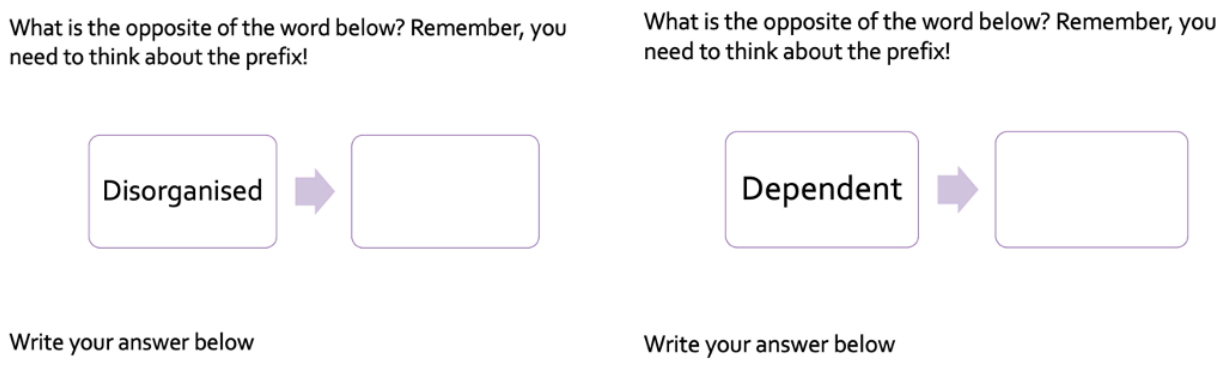


Figure 19: Task 2 example questions.

Task 2 comprised eight questions and Table 19 (below) shows how each question was marked using a scale of correctness. A scale was used to mark this task because, based on past research findings (e.g. Nicol 1980 and Graves et al. 2012; see Chapter 2 section 2.6.4 for full discussion), I hypothesised that participants may show some development in prefix awareness, but not full accuracy. Although full accuracy is important for learners' broader word awareness and comprehension skills, the aim of the vocabulary development skills programme was to explore the extent to which explicit instruction in morphology could support the development of word parts, word structures and derivational morphological awareness. Therefore, I awarded completely correct answers with two marks, answers with incorrect prefix addition or overextended removal answers with one mark. If the participant made no changes to the given word or gave an incorrect answer, they were given a score of zero. In total, there were 16 marks available (per challenge) for this task.

Table 19: Task 2 marking processes

Challenge and task number	Question number	Question answers	Mark given
Challenge 1, task 2	Question 1 (prefix removal)	Target word: organised	2
		Overextension of the prefix removal (e.g., ganised)	1
		No prefix removal/incorrect answer (e.g., disorganised)	0
	Question 2 (prefix removal)	Target word: committed	2
		Overextension of the prefix removal (e.g., mitted)	1
		Removal of no affixes/incorrect answer (e.g., uncommitted)	0
	Question 3 (prefix addition)	Target word: disrespectful	2
		Addition of incorrect prefix (e.g., unrespectful)	1
		Addition of no affixes/incorrect answer (e.g., respectful)	0
	Question 4 (prefix addition)	Target word: independent	2
		Addition of incorrect prefix (e.g., undependent)	1
		Addition of no affixes/incorrect answer (e.g., dependent)	0
	Question 5 (prefix removal)	Target word: envious	2
		Overextension of the prefix removal (e.g., vious)	1
		Removal of no affixes/incorrect answer (e.g., inenvious)	0
	Question 6 (prefix addition)	Target word: sincere	2
		Addition of incorrect prefix (e.g., unsincere)	1
		Addition of no affixes/incorrect answer (e.g., insincere)	0
	Question 7 (prefix removal)	Target word: eloquent	2
		Overextension of the prefix removal (e.g., loquent)	1
		Removal of no affixes/incorrect answer (e.g., ineloquent)	0
	Question 8 (prefix addition)	Target word: impractical	2
		Addition of incorrect prefix (e.g., inpractical)	1
		Addition of no affixes/incorrect answer (e.g. practical)	0
Challenge 2, task 2	Question 1 (prefix addition)	Target word: disgraceful	2
		Addition of incorrect prefix (e.g., ungraceful)	1
		No prefix removal/incorrect answer (e.g., graceful)	0
	Question 2 (prefix removal)	Target word: competent	2
		Overextension of the prefix removal (e.g., petent)	1
		Removal of no affixes/incorrect answer (e.g., incompetent)	0

	Question 3 (prefix addition)	Target word: unhelpful	2
		Addition of incorrect prefix (e.g., dishelpful)	1
		Addition of no affixes/incorrect answer (e.g., helpful)	0
	Question 4 (prefix removal)	Target word: persuasive	2
		Overextension of the prefix removal (e.g., suasive)	1
		Removal of no affixes/incorrect answer (e.g., inpersuasive)	0
	Question 5 (prefix addition)	Target word: intolerant	2
		Addition of incorrect prefix (e.g., untolerant)	1
		Addition of no affixes/incorrect answer (e.g., tolerant)	0
	Question 6 (prefix removal)	Target word: daring	2
		Overextension of the prefix removal (e.g., ring)	1
		Removal of no affixes/incorrect answer (e.g. undaring)	0
	Question 7 (prefix removal)	Target word: decisive	2
		Overextension of the prefix removal (e.g., cisive)	1
		Removal of no affixes/incorrect answer (e.g., indecisive)	0
	Question 8 (prefix addition)	Target word: impolite	2
		Addition of incorrect prefix (e.g., inpolite)	1
		Addition of no affixes/incorrect answer (e.g., polite)	0

4.3.4 Task 3: Word analogy

In the third morphological awareness task, participants were presented with two pairs of words. They had to complete the pair by producing a word that had been formed analogically on the basis of the first one. The aim of this task was to test participants' abilities to identify and comprehend the structural relationship between root words and their derivations. Carlisle (2003) suggests that, because of the skills involved in a word analogy task (i.e., decomposition of the pair of words and production of the morphological pattern identified in relation to the target word), individuals require a more explicit level of awareness of morphological patterns than for other judgment or production tasks. Therefore, this task allowed for an investigation into whether the programme, which provided explicit instruction in recognising and identifying word part patterns and applying knowledge of word structures to new unfamiliar words, supported children's word skills development. This task focussed specifically on participants' awareness of derivational suffixes and used the seven most common suffixes found in the GCSE word corpus (see Table 13, section 4.1.2). I also tested the *-ist* and *-cian* suffixes because

informal discussions with teachers indicated that, in written tasks, learners make recurrent errors with the spelling and use of these word parts. These suffixes also occurred commonly in the GCSE word corpus. The words used in the task comprised a mixture of transparent derived pairs and opaque derived pairs (see Figure 20 and Figure 21, below). The same suffixes were used in both challenges; however, the root words were changed. Participants were told that finding the missing word in each pattern would give them another clue about the type of person who committed the crime.

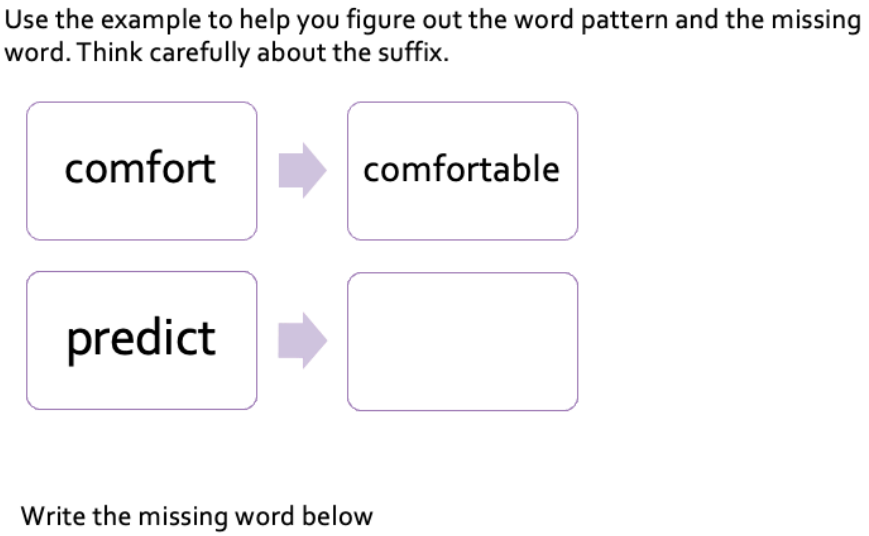


Figure 20: Task 3 example question for a transparently derived word pair.

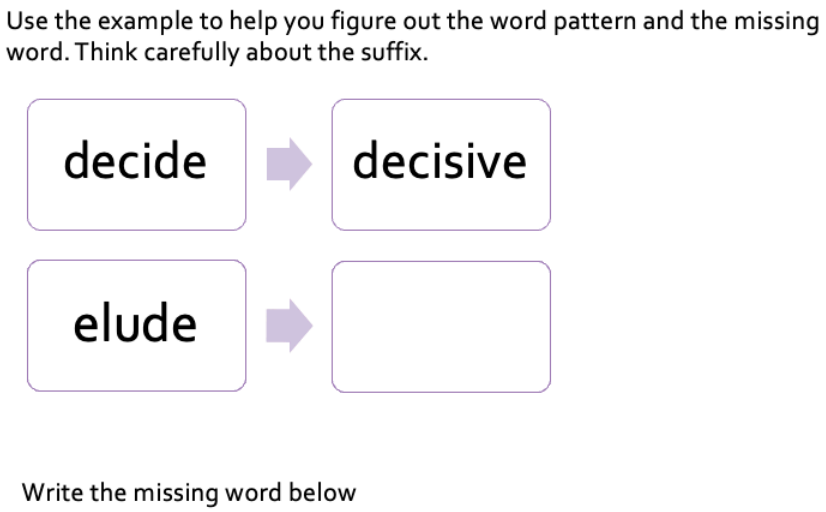


Figure 21: Task 3 example question for an opaquely derived word pair.

Task 3 comprised ten questions and Table 20 (below) shows how each question was marked. Unlike tasks 1 and 2, for task 3, I did use a binary marking system to indicate whether a

participant had correctly recognised and comprehended the word analogy pattern or not. Participants were awarded one mark for a correct answer and zero for an incorrect answer. In total, there were 12 marks available (per challenge) for this task.

Table 20: Task 3 marking process

Challenge and task number	Question number	Correct answer	Mark given
Challenge 1, task 3	Question 1 (transparent)	Astonish → Astonishment	1
	Question 2 (opaque)	Elude → Elusive	1
	Question 3 (transparent)	Predict → Predictable	1
	Question 4 (transparent)	Destruct → Destructive	1
	Question 5 (opaque)	Science → Scientist	1
	Question 6 (opaque)	Music → Musician	1
	Question 7 (opaque)	Horrible → Horribly	1
	Question 8 (opaque)	Explode → Explosion	1
	Question 9 (transparent)	Flexible → Flexibility	1
	Question 10 (transparent)	Hard → Hardness	1
	Question 11 (transparent)	Heart → Heartless	1
	Question 12 (opaque)	Confuse → Confusion	1
Challenge 2, task 3	Question 1 (transparent)	Consist → Consistent	1
	Question 2 (opaque)	Revise → Revision	1
	Question 3 (transparent)	Adapt → Adaptable	1
	Question 4 (transparent)	Product → Productive	1
	Question 5 (opaque)	Biology → Biologist	1
	Question 6 (opaque)	Statistic → Statistician	1
	Question 7 (opaque)	Terrible → Terribly	1
	Question 8 (opaque)	Apprehend → Apprehensive	1
	Question 9 (opaque)	Responsible → Responsibility	1
	Question 10 (transparent)	Dark → Darkness	1
	Question 11 (transparent)	Fear → Fearless	1
	Question 12 (transparent)	Develop → Development	1

4.4 Etymological awareness challenge tasks: Rationale

As discussed in Chapters 1 and 3, the aim of the etymological aspects of the vocabulary skills development programme was to explore Welsh pupils' awareness of Romance- and Ancient Greek-rooted bound word parts. Chapter 2 (section 2.7) made clear that very little research has been conducted in this area of metalinguistic skills. Therefore, rather than using past research to design the tasks, as I did for the morphology-based tasks, I designed the etymology tasks by

using progression steps from the new Curriculum for Wales, and questions from past WJEC GCSE English language papers.

4.4.1 Task 4: Word connections

The Curriculum for Wales makes clear that learners need to use 'knowledge of language evolution and *etymology* to deepen [their] understanding of language construction', and 'apply [their] knowledge of connections, commonalities and differences between languages to improve [their] communication' (Progression step 5; Welsh Government 2019a). Therefore, I took these progression steps as a starting point to develop a task that aimed to measure the extent to which learners could decode and comprehend words that contained Romance-rooted and Ancient Greek-rooted bound word parts. To do this, I wrote questions which asked participants to explain how they thought the meanings of a list of words, which all contained the same Romance- or Ancient Greek-rooted bound word part, were related (for example, see Figure 22). Each question included a list three to five example words that contained the bound word part and were connected by the meaning of the word part. Participants were told that they had to help the team of forensic linguists work out the meaning of some word lists that the criminal had left at the crime scene.

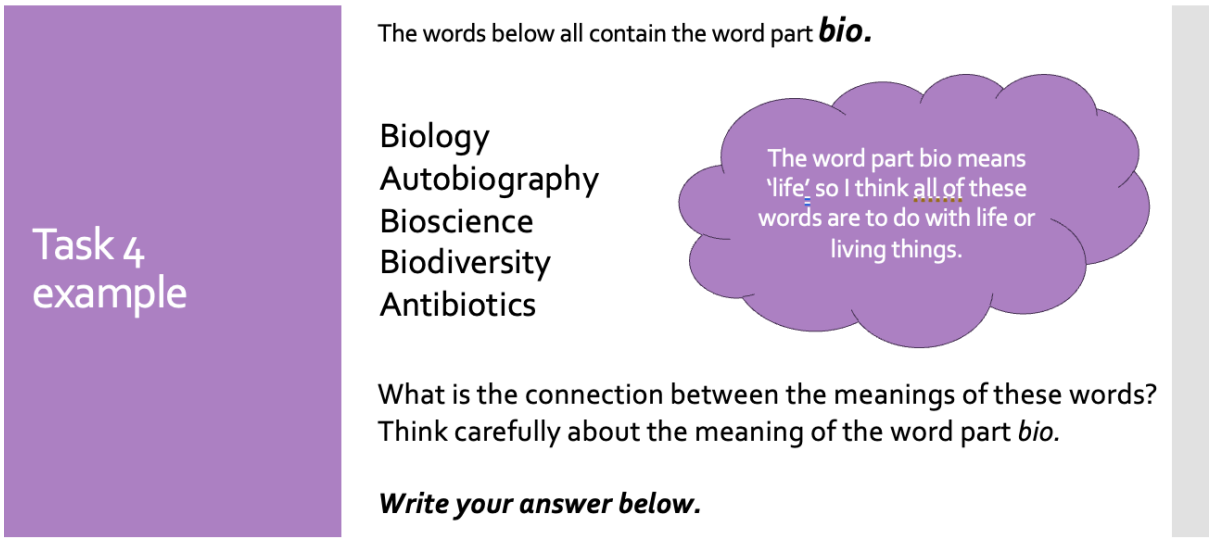


Figure 22: Task 4 example question

Task 4 comprised 15 questions in total: ten questions contained a Romance-rooted word part, and five questions contained an Ancient Greek-rooted word part. To measure the extent to which the explicit instruction in bound word part structures and meanings affected the

intervention group participants' etymological awareness scores, the same words and word parts were used in both challenges (see Table 21 below). Participants were given two marks for an accurate definition answer. They were given one mark if their answer contained one aspect of the word part's definition. For example, if a participant wrote something like 'they're all to do with words' in response to the word part *voc* (meaning 'voice' or 'to call'), they were given one mark. Participants received zero marks for an incorrect/absent definition. In total, there were 30 marks available for this task. Unlike the morphology tasks, participants were not shown answers at the end of this task because there were a variety of ways a participant could have accurately responded to the questions.

Table 21: Task 4 bound word parts

Bound word part	Example words	Bound word part meaning/word connection
ambi	Ambiguous Ambivalent Ambidextrous	both
dict	Dictator Contradict Prediction Verdict Dictionary	to speak
spect	Inspection Retrospection Spectacles Spectator Respect	to look
port	Transport Exportation Import Portability Deportation	to carry
struct	Construction Destruct Structure Reconstruct Infrastructure	to build

rupt	Erupt Disruption Corrupt Interrupt Bankrupt	to break
scrib	Describe Inscribe Scribble Subscribe Prescribe	to write
sens	Sensible Sensitive Sensual Sensation Sensory	to feel or to mean something
vis	Visual Invisible Revise Advisable Visibility	to see
voc	Vocal Vocabulary Vocative Advocate Vocalise	voice or to call
chron	Chronology Chronological Synchronisation Chronicle Asynchronous	time
dyna	Dynamics Dynamite Dynasty Aerodynamics	power
gram	Telegram Grammar Diagram Programme Gramophone	something that is written or drawn

scope	Microscope Telescope Stethoscope Periscope Kaleidoscope	a viewing instrument or tool
tele	Television Telecommunication Telegraph Telephone Telepathic	far off or far away

4.4.2 Task 5: Word definitions

In last of the challenge tasks, participants were provided with a list of multimorphemic words that contained bound Romance- or Ancient Greek-rooted word parts. Participants were asked to select a definition that described the meaning of the word most accurately. This task was included because it reflects some of the word definition GCSE-style questions asked in WJEC English language papers (for examples, refer back to Figure 5, Figure 6 and Figure 7 in Chapter 2, section 2.2). Like the GCSE past papers, the questions in this task were multiple choice—participants had three options to choose from—therefore, a binary scoring system was used. There was one mark available for each of the six questions. Participants were told that working out the meanings of these words would give them the final clues about who the criminal was. For every word, participants were given an accurate definition, a definition that matched the meaning of one of the bound word parts but not the other(s), and an incorrect definition. Table 22 (below) shows the words and multiple-choice options participants were given.[4] The same words were used in Challenges 1 and 2 as this allowed me to measure the extent to which the explicit instruction in prefixes and bound word parts had influenced learners' abilities to decode and comprehend the meaning of infrequent, complex words.

[4] Please note that in Table 22, the correct answer is always given first but, in the challenges, the answers appeared in a random order.

Table 22: Task 5 questions and answers

Target word	Multiple choice options	Score
Prospective	Looking forward to the future	1
	Looking backwards at the past	0
	Leading someone somewhere	0
Unbeneficial	Something that is not good for someone or something	1
	Something that is good for someone or something	0
	Something not important	0
Inaudible	Something that cannot be heard	1
	Something that can be heard	0
	Something that does not smell nice	0
Rejection	To throw away or give something back to someone	1
	To throw something forward to someone	0
	To break something apart	0
Abduction	To take or lead something or someone away from somewhere	1
	To look at something or someone far away	0
	To call for someone	0
Nonsensical	Something that does not mean anything	1
	Something that does have meaning	0
	Something that looks far away	0

4.5 Designing the tutorials

Upon completion of the pre-intervention challenge, the intervention group participants began the tutorials phase of the vocabulary skills development programme. This section presents the lesson plans that were designed for the programme's four tutorials. I have kept the plans in their original format to show the order of the learning episodes and which research/theories and Curriculum for Wales progression steps apply to each episode/task. The challenges/activities included in the tutorials increased in difficulty as a participant progressed. Hence, each tutorial started by targeting a primary school progression learning aim (i.e., progression stage 2 or 3) and ended by targeting a secondary school progression learning aim (i.e., progression stage 4 or 5). Broadly, the approach taken in each tutorial is based on Graves et al. (2012) vocabulary instruction work, which takes a constructivist approach to learning. Graves et al. (2012) adopted and adapted earlier explicit vocabulary instruction research by Pressley, Harris, and Marks (1992), to suggest the following:

1. Provide a description of the strategy and information on when, where, and how it should be used.
2. Model use of the strategy for students on a text the class can share.
3. Work with students in using the strategy on a text the class can share.
4. Discuss with students how the strategy is working for them, what they think of it thus far, and when and how they can use it in the future.
5. Guide and support students as they use the strategy over time. At first, provide a lot of support; later, provide less and less.
6. Give students opportunities to construct knowledge.
7. Motivate students to use the strategy by explaining and discussing its value.
8. Work overtime to help students use the newly learned strategy in various authentic in--school and out-of-school tasks.
9. Review the strategy and further discuss students' understanding of it and responses to it from time to time (Graves et al. 2012: 104).

Due to COVID-19 restrictions and the asynchronous nature of the current study, it was not possible to follow this structure exactly. In particular, steps three, five and eight were difficult to address fully. However, each tutorial aimed to cover the steps as fully as possible by providing clear descriptions of the targeted skills and learning strategies, modelling the use of

the strategies, and providing opportunities for reflections and reviews of the learning. As the programme progressed, the tasks required more independent work (i.e., fewer instructions were given/more memory recall skills were tested).

4.5.1 Tutorial 1

The PowerPoint slides and GoogleForm tasks are provided in Appendix XI: Tutorial 1.

Tutorial 1				
Session aims: □ To introduce core concepts about English etymology, including word families and the roles of Latin, French, Ancient Greek and Old English; □ To gain some understanding of how the English language developed; □ To identify some of the changes that have happened to the English language over time; □ To understand that our modern-day English vocabulary comprises lots of different languages.				
Learning episode **What do you want participants to learn?**	**Targeted skill(s) and targets**	**Instruction/video content** **How will the learning take place?**	**Research evidence/rationale and pedagogical rationale**	**Links to the Curriculum for Wales** (Welsh Government 2019a)
1. The history of the English language (15 minutes)	Development of awareness regarding the history of the English language and origins of English words.	**Video 1: History of the English language timeline and example words.** □ Celts/Celtic languages (Welsh, Gaelic, Breton etc.) □ Roman invasion □ Anglo-Saxons (Germanic dialects; Old English) □ Vikings (combining of Old Norse and Old English) □ Normans (French; the Norman conquest) □ Middle English (trilingualism: Latin, French and English; the	History of the English timeline developed using McIntyre (2008) and Durkin (2014).	***Languages Connect Us*** I can recognise that there is a relationship between languages, culture and my own sense of Welsh identity (PS2). I am beginning to understand that there are similarities and differences between our languages (PS2).

		language of business and academic study; expansion of vocabulary) - Early Modern English (influence of Latin and Ancient Greek; printing press; standardised English; influence of Shakespeare) - modern-day English (influence of colonialism and the British Empire). **Task 1: History of the English language quiz.** Learners answer a series of questions based on the timeline and example words (10 minutes). **Video 2: Task answers**		I can understand that there are connections between language, culture and identity and that these differ within Wales and around the world (PS3). I can understand how and why languages have evolved and are continually evolving (PS3).
2. What is etymology? Language families (15 minutes)	Understanding of the term 'etymology' Etymological language family awareness (i.e., the Proto-Indo-European language tree)	**Video 3: Definition of etymology.** **Task 2: Learners write their own definition of etymology.** **Video 4: Discussion of the Proto Indo-European language family tree:** - Anatolian - Proto-Celtic →Celtic (Welsh, Manx, Scottish, Irish, Breton) - Latin → Romance (French, Spanish, Italian, Romanian)	Proto-Indo-European tree illustration based on evidence from McIntyre (2008) and Durkin (2014).	I can recognise and discuss connections, commonalities and differences between the languages I speak and those that I am learning (PS3). I can understand how and why languages have

		• Germanic (English, Dutch, German, Danish, Swedish, Norwegian, Icelandic, Flemish) • Baltic (Latvian, Lithuanian, Old Prussian) • Slavonic (Bulgarian, Russian, Serbo-Croatian, Slovenian, Ukrainian, Polish, Czech) • Iranian (Persian, Pashto, Baluchi) • Sanskrit →Indic (Hindi, Bengali, Punjabi, Marathi) • Greek (5 minutes). **Task 3: Etymology dictionary challenge (hidden in a story). Differentiated for years 5 and 6, and years 7 and 8.** Learners are provided with a list of words written in their original language (i.e., *scientia* (Latin)) and have to try and identify which modern-day English word they relate to. The first letter of each word can then be taken to spell out the name of a missing dog (years 5/6) or one of the seven wonders of the world (years 7/8). Year 5/6 words:	Evidence shows that differentiating tasks to suit the age-related abilities of learners is important for both understanding and confidence development (see Gershon 2013; Valiandes 2015). Therefore, some challenge tasks were differentiated by year group. I used more complex target words in the years 7/8 tasks than the years 5/6 tasks. English as a foreign and/or second language research has shown that using stories, games and songs	evolved and are continually evolving (PS3).

		Raquette (French) *Oceanus* (Latin) *Nekke* (Early Modern English) *Aero* (Ancient Greek) + *planus* (Latin) *Lippa* (Old English) *Deor* (Old English) **Dog's name = Ronald** Year 7/8 words: *Palacium* (Latin) *Geong* (Old English; explanation of the 'g' to 'y' sound change) *Regalis* (Latin) *Audire* (Latin) *Mikros* + *phone* (Ancient Greek) *Ikon* (Ancient Greek) *Decoratus* (Latin) *Scol* (Old English) **Wonder = Pyramids** **Video 5: Task answers**	can support learners word awareness and vocabulary development. In particular, studies have shown that games can support memory retention, engagement and confidence development (e.g., (Uberman 1998; Wang et al. 2011; Derakhshan and Davoodi Khatir 2015; Bakhsh 2016). Therefore, task 3 used a story and game to support learners' language family awareness development.	
3. A Latin and Ancient Greek word part challenge (30 minutes)	Decomposition: Etymological root word recognition and identification.	**Video 6: Short discussion of the influence of Latin and Ancient Greek on modern-day English and root words.**	Numerous studies have shown the benefits of explicit Latin learning on English literacy skills (e.g., Henry 1993; Bell and Wing-Davey 2018; Bracke and Bradshaw 2020). Therefore, this	I can use my knowledge of connections, commonalities and differences between languages to support my

		Task 4: Latin words challenge. Learners provided with a list of words in Latin and asked to make connections between the original words and meanings, and modern-day English words. **Video 7: Task 4 answers.** **Task 5: Latin and Ancient Greek roots challenge.** Learners are provided with a list of common Latin roots and asked to think of as many modern-day English words as they can that contain the root. **Video 8: Some possible task 5 answers.**	task aimed to introduce participants to some closely related Latin and English words to help with awareness development regarding language connections and meanings. (McEwan-Adkins 2008) also suggested that awareness of Ancient Greek roots could be beneficial to learners' multimorphemic word awareness development. Therefore, the task also incorporated some high frequency Ancient Greek roots.	language learning skills (PS4). Through exploring the process of language evolution and *etymology*, I can improve my knowledge of language construction (PS4). I can use my knowledge of language evolution and *etymology* to deepen my understanding of language construction (PS5).
4. Etymology recap (5 minutes)		**Video 9: Tutorial summary.** **Task 5: Reflection questions:** • What does the word *etymology* mean? • Can you name two languages that have influenced modern-day English vocabulary? • Do you think learning about etymology is important? Given at least one reason for your answer.	Recent online learning studies have shown the importance of giving pupils opportunities to reflect on their learning. For example, Chang (2019) found that reflection time can increase depth of knowledge, develop understanding of areas for development, help to personalise/contextualise knowledge, develop comparative references in learning and build	I can understand how languages can provide a sense of belonging to a local and global community (PS4). I can explore and *analyse* how languages impact upon identity and culture, and understand that learning them offers enhanced opportunities in

		□ What new thing did you learn in today's tutorial? □ (Multiple choice) Did you enjoy today's tutorial? *Yes, no, maybe, not sure.* □ Why did/didn't you enjoy today's tutorial?	structural connections in learning. Therefore, several content- and learning-based reflection questions were included at the end of each tutorial.	Wales and in international contexts (PS4). I can show an open attitude towards learning about different languages and the different cultures of Wales and the world (PS5).

4.5.2 Tutorial 2

The PowerPoint slides and GoogleForm tasks are provided in Appendix XII: Tutorial 2.

Tutorial 2				
Session aims: □ To begin to understand what the term 'morphology' means; □ To understand how to identify and recognise prefixes, root words and suffixes; □ To identify and comprehend root words; □ To explore what compound words are.				
Learning episode **What** do you want participants to learn?	**Targeted skill(s) and targets**	**Instruction/video content** **How** will the learning take place?	**Research evidence/rationale and pedagogical rationale**	**Links to the Curriculum for Wales** (Welsh Government 2019a)
1. What is morphology? (10 minutes)	Developing awareness of what English morphology is and what it means.	**Video 1: What is morphology? Introduction to key terms,** □ Morphology □ Morphemes **Task 1: Learners write their own definition/understanding of what morphology is.** **Video 2: Task answers.**	Explanations and definitions of terms informed by various sources (e.g., Tyler and Nagy 1989; Carlisle 2003b; Fejzo et al. 2018; Rastle 2019).	I can develop my vocabulary through listening and reading and use these new words in a variety of contexts (PS2). I can understand and respond to a range of questions and multi-step instructions in a variety of familiar and unfamiliar contexts (PS3).

2. Recognising the parts of words (15 minutes)	Word decomposition: exploring the different parts of a word, the names for different word parts, where the parts sit in the structure of a word and the functions of the different word parts.	**Video 3: Introduction to the names of word parts and their functions:** - Root words - Prefixes - Suffixes The video also explains transparent root words vs. opaque root words. **Task 2: Name the word part.** Learners are given 10 multiple-choice questions and 10 free textbox questions. This is to prevent guessing in the multiple-choice options. Learners must name the part of the word that is bold and underlined to develop word part recognition skills. The words and word parts become increasingly longer and complex (i.e., more opaque) as the challenge progresses. **Video 4: Task answers.**	To build difficulty into the challenge, and to assess learners' knowledge development more accurately, I included a mixture of multiple-choice and explanation-based questions. Lee et al. (2011) found that in knowledge-based tests, using both multiple-choice and explanation in knowledge resulted in more accurate measurements of knowledge development. Therefore, a combination of question types was used here to explore and analyse learners' awareness and skills progression.	

3. What is a root word? (15 minutes)	Word decomposition: identifying and comprehending root words.	**Video 5: Root word recap and transparent/opaque root words.** **Video 6: Differentiated root word task instructions.** **Task 3: Differentiated root words challenge.** Learners select years 5/6 or years 7/8. Year 5/6 learners are asked to pull weeds prefix and suffix weeds away from carrots to see if they can identify the root of the words. Year 7/8 learners are asked to find the root of a word on tree images. The year 7/8 words are slightly more challenging than the year 5/6 ones. **Video 7: Differentiated task answers.** **Video 8: Root word identification challenge instructions.** **Task 4: Learners are asked to identify the root of numerous multimorphemic words.** Five root words are transparent and five root words are opaque. This is an extension of task 3 and uses slightly more challenging words, but allows for	Task 3 is based on Deacon et al.'s (2014) research, which demonstrated that the ability to decompose a word and identify both the root form and its attached affixes is key to comprehending unfamiliar multimorphemic words. This task tests whether participants are able to extract the root/base form of a word part. Images and pictures are used to add an almost kinaesthetic aspect to the learning (i.e., learners must 'physically' remove weeds from the root to identify the root word).	I can adapt and manipulate language and make appropriate choices about vocabulary, *idiomatic language* and *syntax* in order to express myself with fluency and clarity (PS3). I can employ a range of strategies to summarise, *synthesise* and *analyse* information to gain in-depth understanding of texts (PS4).

		additional root word identification practice. **Video 9: Task 4 answers.**		
4. Morpheme counting task (5 minutes)	Word decomposition: identifying and counting word parts	**Video 10: Counting morphemes.** Explanation of what morphemes are and how to break a word into parts and identify each of the parts. **Video 11: Task 5 instructions.** Participants are given a variety of words and asked to decompose the word into its relevant parts, identify how many morphemes/word parts exist within the word and identify what the root of the word is. **Video 12: Task answers.**	Task 5 is based on Deacon et al.'s (2014) research which demonstrated that the ability to decompose a word and identify both the root form and its attached affixes is key to comprehending unfamiliar multimorphemic words.	I can employ a range of strategies to summarise, *synthesise* and *analyse* information to gain in-depth understanding of texts (PS4).
5. What is a compound word? (10 minutes)	Word derivation: manipulating word parts to create new words.	**Video 13: Compound words explanation.** Discussion of how Old English made use of compound words. Make explicit connections back to tutorial 1. **Task 6: Old English compound word challenge.** Learners are provided with a dictionary of Old English words and asked	Little is known about the impact of developing awareness of Old English on	I can recognise and discuss connections, commonalities and differences between the languages I speak and those that I am learning (PS3). Through exploring the process of language evolution and *etymology*, I can improve

		to form new Old English compound words and provide a definition for the words. The aim of the task is to allow learners to practice constructing compound words, which may aid recognition and identification. This task also encourages them to think about how the meaning of words changes when we manipulate word parts.	modern-day English vocabulary skills development. Therefore, this task aims to explore whether explicit instruction in Old English words and structures supports progression.	my knowledge of language construction (PS4). I can use my knowledge of language evolution and *etymology* to deepen my understanding of language construction (PS5).
6. Reflection task (5 minutes)		**Video 14: Why is it important to know about compound words?** Short explanation of why understanding compound words is important and to demonstrate explicitly why learners have completed the above tasks. **Task 7: Recap and reflection questions.** - Which of the statements below describe the term 'morphology'? You can select more than one answer. - Which characteristics apply to a root word? You can select more than one answer. - Use the space below to explain what a compound word is.	Reflection rationale is the same as tutorial 1 (see section 4.5.1, above).	

		- Why do you think being able to spot a root word is important? What can a root word show us? - What new thing did you learn in today's tutorial? - (Multiple choice) Did you enjoy today's tutorial? *Yes, no, maybe, not sure.* - Why did/didn't you enjoy today's tutorial? **Video 15: Morphology recap question answers.**		

4.5.3 Tutorial 3

The PowerPoint slides and GoogleForm tasks for tutorial 3 are provided in Appendix XIII: Tutorial 3.

Tutorial 3				
Session aims: □ To build understanding of some Latin and Ancient Greek root word parts; □ To expand understanding of common English prefixes; □ To explore the im-, in-, il- and ir- prefixes and spelling patterns.				
Learning episode **What** do you want participants to learn?	**Targeted skill(s) and targets**	**Instruction/video content** **How** will the learning take place?	**Research evidence/rationale and pedagogical rationale**	**Links to the Curriculum for Wales** (Welsh Government 2019a)
1. Latin and Greek root word expansions (20 minutes	Word derivation and word meaning connections.	**Video 1: Recap of root words and the role of Latin and Ancient Greek on modern-day English.** **Task 1: Latin and Ancient Greek root words challenge.** Learners are given a variety of Latin and Ancient Greek root words that appear in numerous modern-day English words. They were asked to come up with at least one modern-day English word for each root. This task was designed as a challenge with levels to complete. The root words got progressively more challenging (i.e., less frequent) as the task progressed. This is	Evidence suggests that building semantic networks (i.e., a network where word nodes are connected by semantic relatedness; Griffiths et al. 2007) is key to building word comprehension in the mental lexicon (see also Mak and Twitchell 2020). Some words can act as 'hubs' as they possess semantic links to many other words (or nodes) in the network.	I am beginning to understand that there are similarities and differences between our languages (PS2). I can understand that there are connections between language, culture and identity and that these differ within Wales and around the world (PS3).

		supposed to be a slower challenge that tests word part recognition, comprehension and word connection skills.	However, Mak (2019) found that if a new link is attached to a well-connected word then the link may stand a higher chance of being learnt or remembered, compared with when it is attached to an isolated word node. Therefore, the aim of this task was to explicitly demonstrate to learners the semantic connections between etymological word roots and modern-day English words to help them begin to build semantic word hubs and networks.	Through exploring the process of language evolution and *etymology*, I can improve my knowledge of language construction (PS4).
2. Introduction to prefixes (15 minutes)		**Video 2: Introduction to prefix functions and common English prefixes.** **Task 2: Common English prefixes challenge.** Learners are given a prefix dictionary and asked to come up with one of their own words for each prefix. They also have to define their word using the dictionary examples.	The prefixes selected for this learning episode were based on those identified in the GCSE word corpus. This learning episode was informed by Graves et al.'s (2012) research into explicit prefix instruction. They suggest that to acquire prefix skills and awareness, learners should: 1. Answer multiple-choice questions about the meanings of familiar prefixed words.	I can adapt and manipulate language and make appropriate choices about vocabulary, *idiomatic language* and *syntax* in order to express myself with fluency and clarity (PS3).

			2. Analyse the answers to look for common meaning. 3. Make inferences about the prefix meaning. 4. Apply their inference to an unfamiliar prefixed word. I adapted these steps so that rather than matching prefixes and meanings themselves, learners used a prefix dictionary to explore the meanings of common English prefixes and come up with root words to which the prefixes could be attached. They then had to make inferences about the prefix meanings in relation to the affixed word they provided. This task also mapped onto Nunes et al.'s (2006) word definition task research, in which participants must define the meaning of an affixed word. This type of task tests participants' morphological knowledge in relation to their ability to interpret the meaning of derived words, as well as awareness of morphological	

			rules relating to the meaning of affixes.	
3. The im-, il-, ir-, and in- prefixes (15 minutes)		**Video 3: How to use the im-, il-, ir-, and in- prefixes.** **Task 3: Im-, il-, ir-, and in- prefixes challenge.** Learners are given a series of root words and they have to select which version of the negating suffix should be used. The aim of the task is to test awareness of how root word spelling can influence prefix choice. **Video 4: Im-, il-, ir-, and in- challenge answers.** **Video 5: Alien prefix challenge instructions.** **Task 3: Aliens prefix challenge.** Learners are asked to match the root word spaceship with the correct prefix alien. This task aims to test both recognition and comprehension. **Video 6: Alien prefix challenge answers.**	The rationale explained for learning episode two also applies here.	I can adapt and manipulate language and make appropriate choices about vocabulary, *idiomatic language* and *syntax* in order to express myself with fluency and clarity (PS3).

4. Reflection task (10 minutes)		**Video 7: Recap of key root word and prefix takeaways.** **Task 4: A short prefix and root word meanings quiz.** Learners answer a series of 'what does X mean?' questions, as well as reflective questions on their learning experiences.	Reflection rationale is the same as tutorial 1 (see section 4.5.1, above).	

4.5.4 Tutorial 4

The PowerPoint slides and GoogleForm tasks for tutorial 4 are provided in Appendix XIIII: Tutorial 4.

Tutorial 4				
Session aims: □ To expand understanding of common English suffixes and related spelling patterns; □ To practice manipulating words and word parts; □ To consolidate learning from the four tutorials and think more broadly about word families and word structures.				
Learning episode **What** do you want participants to learn?	**Targeted skill(s) and targets**	**Instruction/video content** **How** will the learning take place?	**Research evidence/rationale and pedagogical rationale**	**Links to the Curriculum for Wales** (Welsh Government 2019a)
1. Expanding awareness of suffixes (15 minutes)		**Video 1: Introduction to suffixes.** **Video 2: Task 1 instructions.** **Task 1: Differentiated complete the words story task.** Two stories used for this task. One for year 5/6 participants and one for year 7/8 participants. The suffixes included in the task are the same. However, compared to the year 5/6 story, the year 7/8 story is longer and contains fewer contextual clues that may help learners select a root word.	The suffixes selected for this learning episode were based on those identified in the GCSE word corpus. Nagy et al. (1993)explain that learning about derivational suffixes is complex because of the abstract nature of the suffix meanings. Therefore, I designed a task in which learners had to attach a root word to a suffix and think about the context with which the word was to be used in. The suffixed words learners need to decode often appear in decontextualised situations.	I can adapt and manipulate language and make appropriate choices about vocabulary, *idiomatic language* and *syntax* in order to express myself with fluency and clarity (PS3). I can employ a range of strategies to summarise, *synthesise* and *analyse* information to gain in-

		Years 5 and 6: The adventures of Gerald and Brenda. Learners told a story of two squirrels who live in an enchanted forest. They are given a common English suffix and must come up with a root word that the suffix could be attached to. Each part of the story had its own video so the story itself was read to learners and they had to fill in the blank missing word. Suffixes: -ous -ship -ment -ful -tion or -sion **Years 7 and 8: The adventures of Fenella and Felix.** Learners are told a story of two space robots. They are given a common English suffix and must come up with a root word that the suffix could be attached to. Each part of the story had its own video so the story itself was read to learners and they had to fill in the blank missing word. Suffixes: -ous -ship	However, exploring them within the context of a sentence seemed important as a start to developing derivational suffix awareness. Additionally, (Abdulhussein and Alimardani 2021) found that Iraqi EFL learners retained more vocabulary and stayed more motivated when developing their vocabulary through story-based online games. Therefore, I wrote two stories in which learners had to complete the narrative by filling in missing words.	depth understanding of texts (PS4).

		-ment -ful -tion or -sion		
2. Suffixes and root word spellings (10 minutes)		**Video 3: Suffixes and root word spelling patterns.** Recap of transparent/opaque root words and reminder of which letters are vowels and which are consonants. Explanation of how and when certain suffixes are used and how adding a suffix can affect the spelling of a root word. Topics covered: If a suffix starts with a consonant it is added to the root word with no spelling changes (i.e., -ment, -ness, -ful, less) **Task 2: Sort the suffixes.** Learners asked to pause the video and think about if a suffix can be added straight to a root word or whether the spelling of the root word needs to changes. -ive -ous -ful -ment -ant -ness	Bear and Templeton (1998) suggest that sorting games develops a critical eye that gets students used to categorising and explaining their categories. Therefore, this learning episode used a mixture of sorting and free text box questions.	I can adapt and manipulate language and make appropriate choices about vocabulary, *idiomatic language* and *syntax* in order to express myself with fluency and clarity (PS3). I can employ a range of strategies to summarise, *synthesise* and *analyse* information to gain in-depth understanding of texts (PS4).

		-less **Answers given when learners play the video again.** **Video 4 content:** Root words ending in consonant + *y* = change to an *i* (i,e., <merry> → <merriment>; <happy> → <happiness> etc.) **Task 3: Select the suffix for happy and beauty.** **Video 5 content:** -tion used if the root word ends *t* or *te* (i.e., considerate → consideration) -ssion used if root word ends in *ss* or *mit* (i.e., transmit → transmission) -sion used if the root ends in *d* or *se* (comprehend → comprehension). Some exceptions (attend → attention; intend → intention) -cian is used if root ends in *c* or *ce* (i.e., music → musician)		

		Task 4: Select the suffix for -tion, -ssion, -sion, -cian root words. **Video 6: Task 3 and 4 answers**		
3. Logomachy! (10 minutes)		**Video 7: Explanation of Logomachy!** I designed a game in which learners guess the meaning of a made-up word using their knowledge of common English prefixes, root words and suffixes. Each word has a 'game card' and learners select which definition they think matches the meaning of the made-up word most closely. The first seven words have a video that follows the script: "The word is [insert word]. [Repeat word]. Do you think the word _____ means A _____; B_____ or C _____." Learners then selected A, B, C or 'not sure'. The last three words did not have a video and learners had to read the word and answers for themselves.	Numerous studies have used pseudoword tasks to explore participants' levels of morphological awareness (e.g., (Mitchell and Brady 2014; Casalis et al. 2015). Therefore, to test learners' understanding of affix meanings, this task used a number of pseudowords and asked participants to select the most relevant/accurate definition of the made-up word.	I can adapt and manipulate language and make appropriate choices about vocabulary, *idiomatic language* and *syntax* in order to express myself with fluency and clarity (PS3). I can employ a range of strategies to summarise, *synthesise* and *analyse* information to gain in-depth understanding of texts (PS4).

		Task 5: Logomachy! Learners play the game. **Video 8: Logomachy answers**		
4. Becoming a word master (15 minutes)		**Video 9: Task instructions and Old English task.** **Task 6: Old English word.** Learners make-up their own Old English compound word and definition using the etymology and word parts dictionary. **Video 10: Latin instructions.** **Task 7: Latin word.** Learners make-up their own Latin-based word and definition using the etymology and word parts dictionary. **Video 11 Ancient Greek instructions.** **Task 8: Ancient Greek word.** Learners make-up their own Ancient Greek-based word and definition using the etymology and word parts dictionary.	This learning episode followed the same rationale as above, but also combined some etymological aspects to explore learners awareness of word connection meanings and word structures.	Through exploring the process of language evolution and *etymology*, I can improve my knowledge of language construction (PS4). I can use my knowledge of language evolution and *etymology* to deepen my understanding of language construction (PS5).

		Video 12: Story writing instructions. Learners take their three made-up words and are asked to write a short, creative story using at least one of their new words. They are to think carefully about the meaning of the words and how they may be used in a sentence. They are given two story settings to choose from. A mysterious magical forest or a castle in some remote hills. Example story opening provided as guidance. **Task 9: Story writing task.**	The story writing task aimed to explore the extent to which learners understood the meaning of the words they had created. Furthermore, Carlisle (1996) found that children's made-up stories allowed for analysis of how commonly and how accurately children used inflections, derivations, and compound words spontaneously in their writing. Carlisle's (1996) results suggest that the second and third (ages 7 to 9) grades may be a transitional period, in which children are consolidating their knowledge of inflected forms and just beginning to use derived forms in their spontaneous writing. Therefore, this task allowed me to explore in pseudoword story writing and whether similar patterns occurred for older children.	
5. Putting it all together and reflection		**Video 13: Course recap.** Brief discussion of what the course covered, why certain topics are covered and how learners may use the skills elsewhere.	Numerous studies/pedagogies suggest that active learning—i.e., understanding why you are learning a certain skills/about something,	

task (10 minutes)		**Task 10: Final reflection quiz and questions.** 20 content questions: A mixture of free text boxes and multiple choice. 7 reflection/attitudinal questions: A mixture of free text boxes and multiple choice.	and being involved with the reasoning behind learning and decision-making process—can support memory retention and engagement (for example, see Monk and Silman 2014). Reflection rationale is the same as tutorial 1 (see section 4.5.1, above).	

4.6 Chapter Summary

In this chapter, I have detailed the linguistic and educational rationale behind the research materials designed for this study. I have explained how the GCSE word corpus was used to select the words and word parts for both the morphological and etymological aspects of the pre- and post-intervention challenges, as well as the tutorials in the vocabulary skills development programme. I have then discussed how pre-existing research was used to design the morphological and etymological awareness tasks that were included in the pre- and post-intervention challenges. In particular, the chapter has shown how Berthiaume et al.'s (2018) review of morphological tasks was used as a framework from which to decide the types of morphological awareness task and skills development the programme would focus on. However, the etymological tasks were designed using the Curriculum for Wales and past GCSE English language papers. The aim of the pre- and post-intervention challenges was to measure participants' pre-existing levels of derivational morphology and English etymology awareness prior to explicit instruction. In order to allow for an analysis of the extent to which the tutorials in the vocabulary skills development programme had influenced the development of participants' derivational morphological and etymological awareness, the post-intervention challenge followed exactly the same format as the pre-intervention challenge.

The chapter continued by presenting the lessons plans that were used to create the tutorials for the vocabulary skills development programme. Each plan described the tutorial aims and morphological/etymological skills targeted, as well as an outline for each of the videos and tasks included in the programme. The plans showed how previous research underpinned the video/task designs and aimed to explore a specific aspect of learners morphological and/or etymological awareness development. Each task was also mapped onto one of the progression step statements from the new Curriculum for Wales.

Both this chapter and Chapter 3 have explained that, for data analysis, study results were categorised into two developmental stages: development of morphological awareness, and development of etymological awareness. Therefore, the next three chapters are presented in order of these stages. The next chapter (Chapter 5) analyses participants' morphological awareness pre- and post-intervention data. Chapter 6 then explores why some of the morphological awareness results may have occurred by examining which, if any, external factors influenced morphological awareness results. Chapter 6 also examines participants'

written feedback and presents findings on the key recurring themes that emerged from the qualitative dataset. The purpose of Chapter 6 is to understand how different factors may influence learning experiences in the classroom setting, as exploring the 'why?' aspect of the research may be key to considering how metalinguistic skills (i.e., morphological and etymological awareness) could be integrated into everyday classroom practice in Wales. As only two etymology tasks were included in the pre- and post-intervention challenges, the etymology dataset is notably smaller than the morphology dataset. Therefore, Chapters 7 presents both the pre- and post-intervention etymological awareness data, as well as the external factors data and findings from the thematic analysis.

5 Morphological awareness: Results and discussion of the challenge tasks

The main purpose of this study is to explore whether explicit instruction in English morphology and etymology could support children's word decoding and comprehension skills development. Chapter 2 has identified that, currently, there is a lack of understanding about how teachers in Wales may aid the development of children's metalinguistic skills in line with the new curriculum, particularly as they transition from primary to secondary school. Therefore, I designed an online vocabulary skills development programme to trial a variety of different explicit morphology and etymology teaching strategies. As is made clear by the three research sub-questions presented in Chapter 2, the overall purpose of the vocabulary skills development programme was to establish what levels of morphological and etymological awareness learners in Wales already have, whether explicit teaching in morphology and etymology may support the development of word decoding and comprehension skills, and whether external factors (i.e., languages spoken, reading habits, school year group etc.) may influence learners' morphological and etymological awareness development. Additionally, as explained in Chapter 3 (section 3.5), due to the complexity of the processes involved with the acquisition of derivational morphology, and the lack of understanding about the role of etymology in children's word decoding and comprehension skills, I have chosen to analyse the morphology and etymology results separately. In this chapter, I explore the morphological awareness results from the Challenge 1 (pre-intervention) and Challenge 2 (post-intervention) morphology-based tasks.

Firstly, I analyse and discuss the Challenge 1 morphological awareness results. The chapter continues with an exploration of the Challenge 2 results, and I present mixed-effects models that analyse the significance of the morphology task outcomes. To explore why the mixed-effects model result may have occurred, I then analyse both quantitative and qualitative data from the individual morphology challenge tasks. Throughout this chapter, I draw on studies which work to evaluate and critically discuss the study findings. Due to the imbalance in the number of participants in the control (n = 303) and intervention groups (n = 143), the tables and graphs in this chapter show the percentages of participants in each score category, as this allows for more accurate comparison.

5.1 Challenge 1: Morphological awareness pre-intervention results

To address part of one of the research sub-questions posed in Chapter 2—*To what extent do children in Wales already have an awareness of English morphology and etymology?*—firstly, this section explores participants' Challenge 1 (pre-intervention) morphological awareness scores. Table 23 (below) shows the average Challenge 1 morphological awareness scores of the two groups. The average scores indicate that most participants started the study with fairly high levels of morphological awareness,. There is a 0.4-mark difference between the average scores of the control and intervention groups. However, a paired t-test showed with 95% certainty that the difference is not statistically significant (p = 0.21). Consequently, the slight 0.4 average score difference is not likely to have impacted the Challenge 2 results/outcomes.

Table 23: Challenge 1 average morphological awareness scores

Control group average morphological awareness score (out of 42)	Intervention group average morphological awareness score (out of 42)
31.6	32

Table 23 (above) shows that the average scores for both groups fall between the 31-to-35-mark category; however, Figure 23 (below) shows that in Challenge 1 that there is wide variation in learners' levels of morphological awareness.

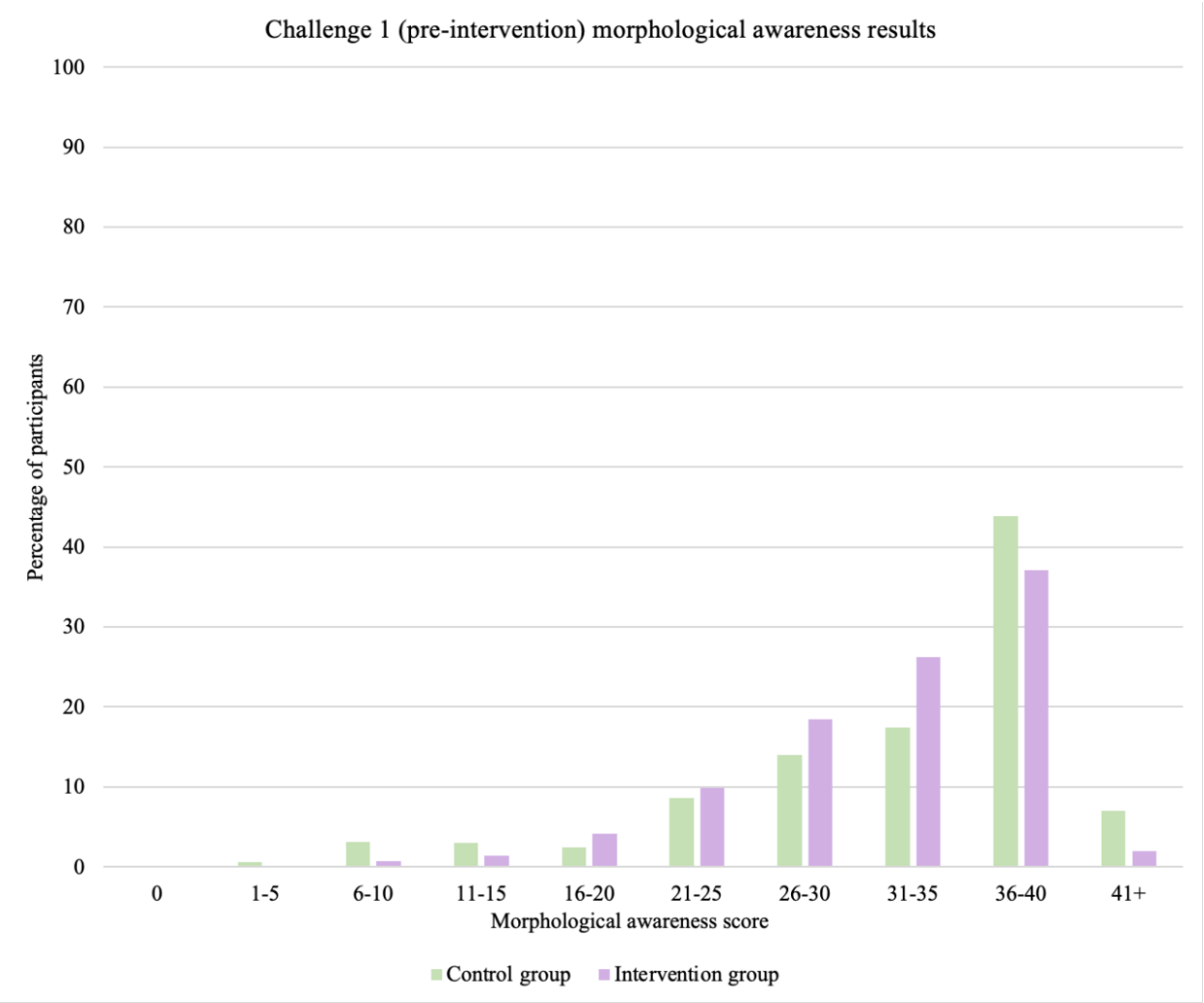


Figure 23: Challenge 1 (pre-intervention) morphological awareness results

Figure 23 shows that some that participants started the study with fairly low levels of morphological awareness. For example, 4.4% of participants did score 10 marks or below (control group n = 11 (3.7%); intervention group n = 1 (0.7%)). Additionally, 4.4% of participants scored between 11 and 15 marks (control group n = 9 (3%); intervention group n = 2 (1.4%)) A higher percentage of participants in the control group achieved scores in the lower ranges, which may provide one reason why the group's overall average Challenge 1 score was slightly lower than the intervention group's (31.6 compared to 32). These variations in participant percentages are, perhaps, to be expected. The more participants in a group, the higher the levels of score variation. However, these findings begin to suggest that some learners may benefit from additional input and support with developing their morphology-based awareness and skills. Table 24 (below) corroborates this claim, as feedback from individual participants, who all achieved a morphological awareness score of 50% or lower, shows that they found the Challenge 1 morphology-based tasks difficult.

Table 24: Written responses from participants who found Challenge 1 difficult[5]

it was to hard and I don't get how you are suppose to know what letters go with what
it was hard work and I don't think I did great I didn't know how to pt words in bits
it was very hard but also very fun which made me keep going but I think I did bad
the instrutons was clear but it was hard I did not understand all of the words
some questions were a bit hard fo me... :) but it was fun to discover facts about this criminal person and I liked the videos because we weren't thrown in a task without explanation.
it was a bit hard but a bit easy so i kinda enjoied it.
it was extremly hard but i liked it because i want to im trying to improve my spelling
i dont know anything about it and its boring becuse i dont know anything and its really hard
I found it different to the work I do and I really do feel like this would help more
Complicated v complicated some parts i was there forever
It was very long and some times very complicated but it was a different way to think about words

Although some participants found Challenge 1 hard, Figure 23 shows that most participants scored between 36 and 40 marks (control group n = 133, 43.9%; intervention group n = 53, 37.1%). Additionally, 21 out of 303 control group participants (7%) and 3 out 143 intervention group participants (2%) achieved 41 or 42 out of 42 marks in Challenge 1. These statistics suggest that, overall, many participants started the study with high levels of morphological awareness.

As explained in the introduction of this chapter, the purpose of this study was to explore whether an intervention (i.e., explicit instruction) could influence children's morphological and etymological skills development. Intervention studies are based on a perceived challenge (i.e., Welsh children's difficulties with recognising, deconstructing and comprehending complex academic words; see Chapter 1) and through data collection; accordingly, the challenge is explored and evaluated. Based on literature discussed in Chapters 1 and 2 (i.e., anecdotal

[5] Please note that throughout this thesis, I have not altered children's written quotations/feedback in anyway (i.e., I have not changed spellings, typing errors etc.).

experiences, recent Welsh child literacy statistics and findings from past studies on children's morphological awareness development), I hypothesised that many participants would start the programme with a relatively low ability to demonstrate explicit morphology-based skills. However, the above results indicate that this hypothesis was not entirely accurate.

Table 24 (above) shows that some participants did find Challenge 1 difficult. But the percentage of participants achieving 36+ marks in the Challenge 1 morphology tasks suggests that, in Wales, many children in Years 5 to 8 do have a foundation in morphological awareness. As shown in Chapter 4, past research evidence was used to design the challenges in the study; but a lack of research evidence that explores Wales's learners' morphological awareness abilities meant that it was difficult to know at what level to pitch the morphology-based challenge tasks. I aimed both to reflect the possibility that participants would find morphology-based tasks very challenging and to offer participants the opportunity to demonstrate more high-level morphology-based metalinguistic skills. However, the above results suggest that the baseline hypothesis underestimated many Welsh learners' morphology-based abilities, and this is also supported by some written comments made by participants (see Table 25).

Table 25: Participants' Challenge 1 written feedback on the morphology tasks

it was easy for me to complete and it was fun
it was a bit boring because it was so easy
I enjoyed the challenge because it challenged my mind to think of more interesting words but the one thing I did not like was how easy it was because I got through it fairly quickly.
This was too easy. I liked the detective story but it was quick to complete.
it was pretty easy :]
it was quite easy, but got me thinking
It was very easy and I was disappointed because I really enjoy a challenge.
I thought the challenge was quite easy
It was fun. I love doing challenges that test your brain, although I found this a little easy. Thank you!!
It was fun and relatively easy to complete.
it was fun and most questions where easy
It was okay, I guess, but it's a test. I don't like tests, it was easy thou so i can't say i hated it.

In total, 67 out of the 210 participants who scored 36+ marks in Challenge 1 wrote comments that included the idea that the morphological awareness challenge tasks were 'easy'. When combined with the above statistical results, the participant responses suggest that, for some learners, Challenge 1 may not have been difficult enough to demonstrate the extent of their pre-existing morphological awareness. The test participant did not comment that the challenges were too easy. However, as explained previously, I was only able to test the study on one primary school-aged individual. In their review of conducting literacy-based intervention research, Rogers and Graham (2008) found that many studies do underestimate the benchmark against which learners' skills are measured. Harris et al.'s (2006) US-based writing intervention study offers a clear example of this, as they found that the benchmark they were measuring students against—the ability to write an opinion, use linking words to connect opinions and reasons, and provide a clear concluding statement—underestimated what the third-grade participants could do. Instead, they found that students could achieve the

benchmark quite easily, and even students who were experiencing difficulties with learning to write could produce opinions with all the above elements, as well as explanations for each opinion given.

In reflexive, education-based intervention studies (i.e., in-person explicit teaching studies), underestimating a benchmark hypothesis is not always necessarily an issue. As discussed in Chapter 1, learning is not a static experience and part of a teacher's role is to respond to live-time feedback from learners and adapt/differentiate tasks as necessary. However, the online, asynchronous nature of this particular study meant this was not possible. Therefore, while it is possible to begin to answer the first research sub-question (see above) and state that, in Wales, prior to explicit input, many learners in Years 5 to 8 have fairly high levels of morphological awareness, the extent to which this claim is reliable remains somewhat unclear. In future, both teaching practice and morphology awareness-based studies may want to include a wider variety of high-level morphological skills-based tasks, as well as foundational morphology skills tasks, to assess the full extent of learners' pre-existing morphological awareness skills more accurately. While a small percentage of participants achieved 41 or 42 out of 42 marks on Challenge 1 (see Figure 23), it is important to note that many participants did have space to improve upon or increase their morphological awareness score, even if by just one or two marks. The vocabulary skills development programme aimed to explore which explicit instruction strategies, if any, may be effective in developing participants' morphological awareness. Thus, to analyse the impact of the vocabulary skills development programme, and address part of one of the other research sub-questions—*How does explicit instruction in English derivational morphology (word parts and structures) and etymology (bound word parts and word origins) affect children's abilities to comprehend complex school vocabulary?*—this chapter continues by providing an overview of the Challenge 2 (post-intervention) results.

5.2 Challenge 2: Morphological awareness post-intervention results

Table 26 (below) shows the average Challenge 1 and Challenge 2 morphological awareness scores of the two groups. The table shows that, on average, the Challenge 2 scores of the intervention group participants were 0.9 marks lower than the average control group participant scores. On average, the scores of participants in the intervention group only increased by 0.2 marks from Challenge 1 to Challenge 2. Conversely, the scores of participants in the control

group increased by an average of 1.5 marks from Challenge 1 to Challenge 2. Given that the intervention group received four weeks of explicit instruction in morphology and morphological awareness skills, these results are somewhat surprising.

Table 26: Average Challenge 1 and Challenge 2 morphological awareness scores

Group	Challenge 1 average morphological awareness scores (out of 42)	Challenge 2 average morphological awareness scores (out of 42)	Difference between the Challenge 1 and Challenge 2 scores
Control group	31.6	33.1	1.5
Intervention group	32	32.2	0.2
Difference between the control and intervention group averages	0.4	0.9	1.3

To explore the significance of the above findings, I built a mixed-effects model. The mixed-effects model analyses whether participating in the intervention was more likely to improve participants' morphological awareness or not.

The example below shows the R code for the mixed-effects model structure:

```
glmer(coding ~ condition*challengeNum +
                (1 | participantID) +
                (1 | School) +
                (1 | questionNum)
```

This model analyses three outcomes. Firstly, whether there were any significant differences between the morphological awareness scores of the control and intervention groups. Secondly, whether there were any significant differences between the Challenge 1 (pre-intervention) and Challenge 2 (post-intervention) scores generally. Thirdly, whether there were any significant differences between the intervention group's Challenge 1 and Challenge 2 morphological awareness scores. Table 27 (below) shows the results of this model.

Table 27: Morphological awareness mixed-effects model results

	Estimate (β)	Std. Error	z-Value	Pr(>|z|)	Signif.
(Intercept)	0.30243	0.06596	4.858	0.000453	***
Condition (Baseline: Control)					
Intervention	0.02396	0.02846	0.832	0.405	
Challenge (Baseline: Challenge 1)					
Challenge 2	0.08551	0.07206	1.187	0.235	
Intervention condition (Baseline: Challenge 1)					
Challenge 2	-0.03227	0.02523	-1.279	0.201	

Significance (Signif.) codes: . $p \leq 0.05$, * $p \leq 0.01$, ** $p \leq 0.001$, *** $p \leq 0$

Overall, the results of the statistical modelling show that participating in the intervention was not significantly more likely to result in a higher morphological awareness score (β = 0.02396, z = 0.832, p = 0.405). Additionally, the Challenge 2 morphological awareness scores of all participants were not likely to be significantly different from their Challenge 1 (pre-intervention) scores (β = 0.08551, z = 1.187, p = 0.235). This result maps onto the descriptive statistics discussed above, which indicated that, regardless of condition (i.e., control or intervention), there was little difference in the average Challenge 1 and Challenge 2 morphological awareness scores (see Table 26). Most notably, the results shown in Table 27 indicate that there is no significant difference between the intervention group's Challenge 1 and Challenge 2 morphological awareness scores (β = -0.03227, z = -1.279, p = 0.201). This result suggests that the vocabulary skills development programme did not support learners' morphological awareness development. Although not significant, the negative z-Value result (z = -1.279) predicts that, actually, the intervention group participants were more likely to achieve a lower Challenge 2 score than they did in Challenge 1. Figure 24 visualises the results shown in Table 27.

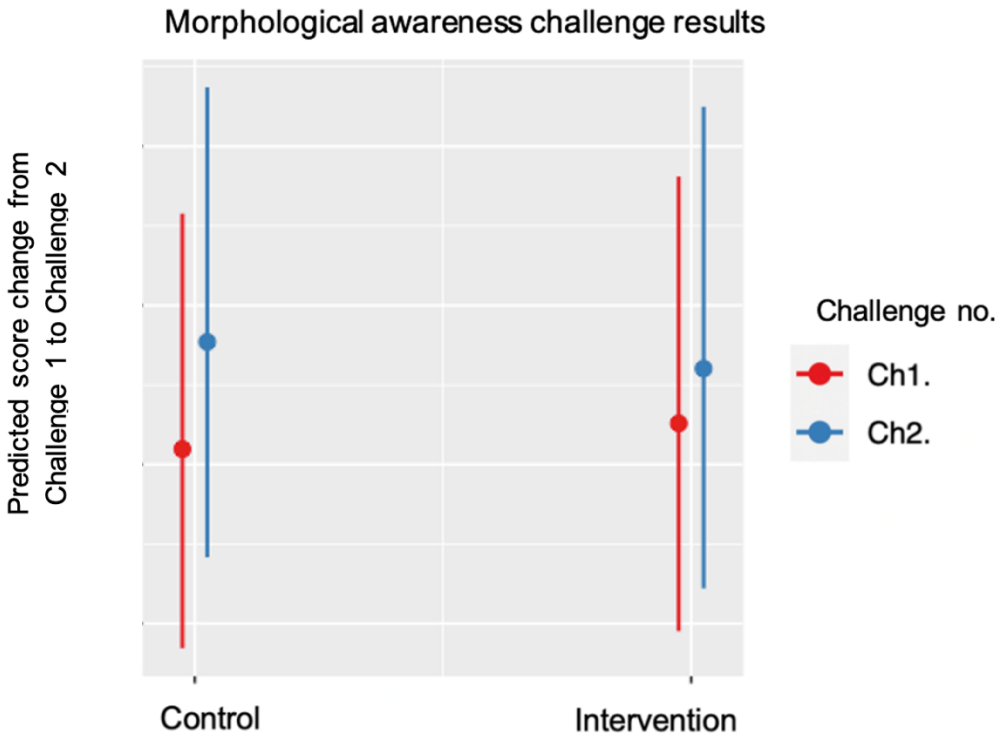


Figure 24: Morphological awareness mixed-effects model graph

Figure 24 reflects the earlier discussion (section 5.1) that, overall, control group participants started with a slightly lower average Challenge 1 score than intervention group participants. Additionally, the graph shows that there is a small difference between participants' Challenge 1 and Challenge 2 scores; both Challenge 2 data points are higher than the Challenge 1 data points. However, the graph also reflects the earlier discussion which explained that on average, control group participants' Challenge 2 scores increased by more marks than intervention group participants' Challenge 2 scores. The next sub-sections of this chapter illustrate that there are a number of reasons why the Challenge 2 results may have occurred.

5.2.1 Discussion of Challenge 2 results

Firstly, the control group completed Challenge 2 just one week after they completed Challenge 1. Past studies in vocabulary learning and memory research have shown that repeating tests near to each other can improve retention and memory recall (see Cepeda et al. 2006; Schell and Butler 2018). Different root words were used in the two challenges. However, repeating a test that followed the same structure (i.e., all the questions were worded in exactly the same way), that tested some of the same word parts (i.e., participants were repeatedly tested on the prefixes

un-, dis-, re-, etc.), and that tested the same word awareness skills (i.e., decomposition, derivation and word analogy) may have allowed some participants to remember and recall the expectations of the test. Some control group participants' written comments also state that completing the challenges one week after the other helped them answer some of the Challenge 2 questions (see Table 28, below, for examples).

Table 28: Participant written responses regarding test repetition

same thing as last time which helped!
It was very fun to complete due to the plot and it isn't just usual work. However, it was rather repetitive and I would like a larger variety of question types because the two tests felt the same.
boring and repetitive we did this before and i would like to do something better than this baby stuff.
same as the last one so I got it
it was the same as last time so it was a bit boring
It was almost the same thing as the last one so i found it quite boring but helpful.
I enjoyed the challenge because it was really fun and I understood more than last time and am excited to do the next challenge.
I thought it was two simular to the last one so boring but I did better
I feel like it was very repetitive to the last challenge but it was still fun.
I thought that the task was very similar to the last task so there weren't many exciting things happening and it made this one easy.

In contrast, the intervention group experienced a longer gap between challenges 1 and 2 (five weeks in total). Therefore, their memory and recall of the test could have been reduced. Interestingly, there were no comments about test repetition or the tests being the same in the intervention groups' feedback. Subsequently, one key limitation of this study is that there was not enough time between the control group participants completing Challenge 1 and Challenge 2. This was mainly because of COVID-19 restrictions. At the time of data collection, schools

were working in class 'bubbles', the isolation period for contracting COVID-19 was 10 days and children also had to isolate if they had been in contact with someone who had COVID-19. As such, it was important to collect data from participants in as short a timeframe as possible so that I did not have a large number of incomplete datasets. However, future research on children's morphological awareness development and/or repetitions of this study may look to leave longer between the repeated challenges to reduce the impact of test repetition on control participants' scores.

In addition to the impact of test repetition, it is also important to consider whether 'dynamic testing' influenced participant outcomes. In this study, participants were given the answers to morphology-based questions at the end of each task. This meant that the challenges were 'dynamic tests' rather than 'static tests' (Metsämuuronen and Mattsson 2013). Numerous language testing studies have found that final test results often increase more with dynamic testing compared to static testing (i.e., Butler et al. 2007; Metcalfe et al. 2009; Vojdanoska et al. 2010). As control group participants completed the two challenges in a short timeframe, they may have been able to retain and recall some of the correct answers they were given in Challenge 1 to help them in Challenge 2. In this study, dynamic testing was used to motivate participants to complete each of the challenges. Searches of the literature did not make clear the role of motivation in first language vocabulary development, but findings from second/foreign language acquisition studies have shown that motivation is a key factor in learner engagement, experience and attainment (for examples, see Gilakjani et al. 2012; Zheng 2012; Tanaka 2017; Erickson and Wharton-McDonald 2019). Furthermore, providing answers after each task built the 'word detective' narrative of the challenges (i.e., complete the task and the answers will provide you with a new set of clues to solve the mystery). Consequently, future morphological awareness development studies may consider using 'static tests' (i.e., providing task/test answers at the end of the whole test, rather than after each task) and/or using other methods, such as the development of a storyline, but not real answers, to maintain participant motivation and engagement.

5.2.2 Participant score changes

Table 27 (above) shows that, overall, the vocabulary skills development programme did not have a statistically significant impact on the morphological awareness of learners in the intervention group. However, I suggest that the results presented above do not account fully

for the nuances of the dataset. Figure 25 (below) shows the percentage of participants whose scores increased, stayed the same or decreased in the two groups.

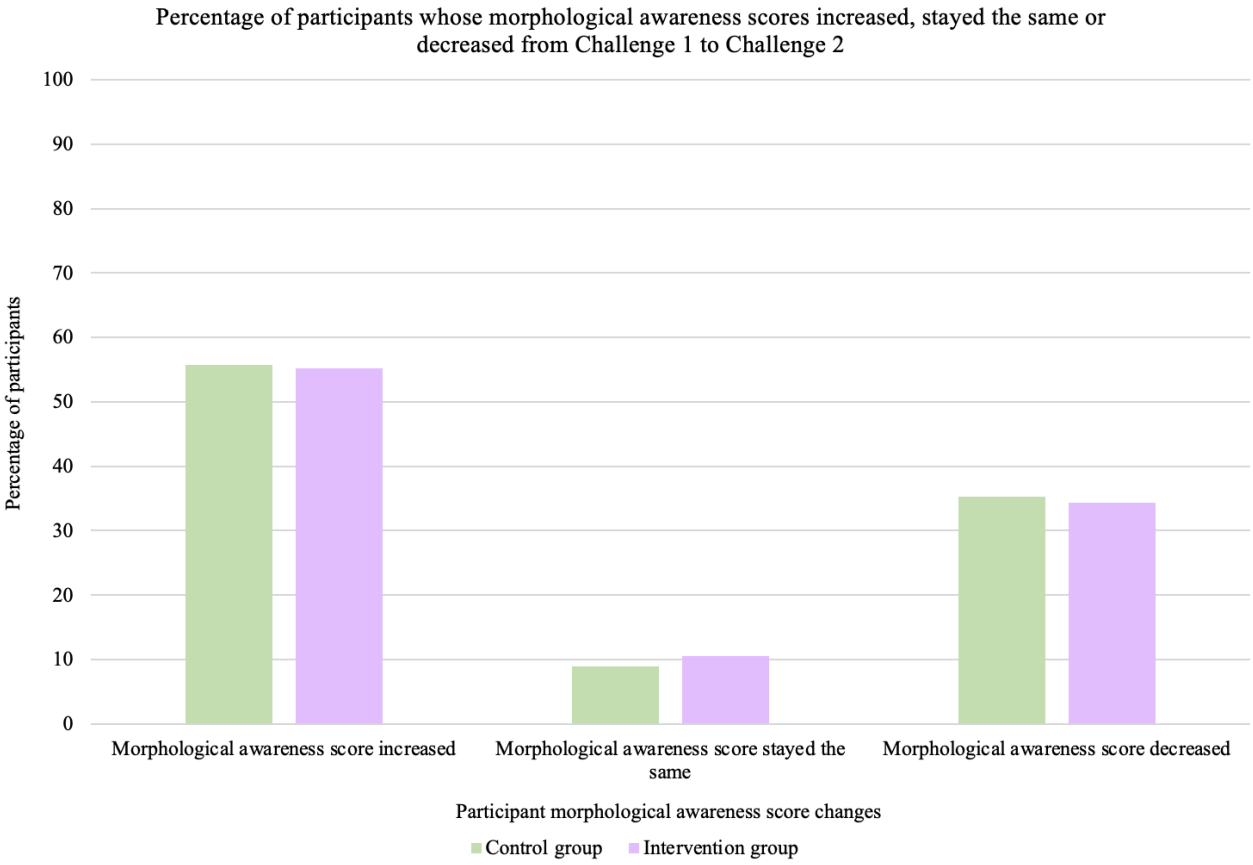


Figure 25: Distribution of participant morphological awareness score changes from Challenge 1 to Challenge 2

The graph shows that, overall, 55.2% of the morphological awareness scores of the intervention group participants increased from Challenge 1 to Challenge 2 (n = 79). This percentage is 0.6% lower than the percentage of control group participants whose scores increased (55.8%; n = 169), which is why the result is insignificant. Although there are not significant differences between the score changes of the two groups, analysis of individual datasets shows that, in Challenge 2, 12.6% of intervention group participants (n = 18) scored 41 or 42 out of 42 marks. This is a 10.6% increase in the percentage of intervention group participants achieving 41+ marks in Challenge 1 (n = 3). In total, 10 of the 18 participants who scored 41+ marks in Challenge 2 achieved between 31 and 35 marks in Challenge 1. This result begins to suggest that, for some individual intervention group participants who started the study with fairly high levels of morphological awareness, the explicit instruction did help to extend some word decoding and comprehension skills.

Further analysis of individual results also shows that the scores of all the intervention group participants who achieved 21 marks or below (i.e., 50% or less) on Challenge 1, increased in Challenge 2 (see Table 29). Therefore, although the mixed-effects model results indicate that the vocabulary skills development programme made no significant difference to learners' morphological awareness scores, the programme does seem to have supported some participants who started the programme with lower to middle levels of morphological awareness. This finding could have important implications for classroom practice as the results begin to suggest that, for learners who have lower levels of morphological awareness, explicit instruction in derivational morphology could support the development of word decoding and comprehension skills.

Table 29: Score changes of intervention group participants who achieved 50% or below in Challenge 1

Participant ID	Challenge 1 morphological awareness score (out of 42)	Challenge 2 morphological awareness score (out of 42)	Challenge 1 to Challenge 2 score difference
P1I	21	23	2
P21I	16	18	2
P55I	20	38	18
P65I	20	21	1
P78I	21	23	2
P117I	17	29	12
P121I	21	24	3
P125I	11	39	28
P126I	21	24	2
P128I	15	27	12
P131I	21	37	16
P136I	18	24	6
P137I	20	27	7
P139I	7	29	22
P142I	21	28	7

Table 29 (above) shows that some participants' morphological awareness scores increased by a notable number of marks. Further investigation into individual score changes demonstrates

that overall, 10 intervention group participants' marks increased by 11+ marks from Challenge 1 to Challenge 2. Table 30 (below) shows these participants' score changes.

Table 30: Intervention group participants with morphological awareness score increases of 11+ marks

Participant ID	Challenge 1 morphological awareness score (out of 42)	Challenge 2 morphological awareness score (out of 42)	Challenge 1 to Challenge 2 score difference
P45I	29	40	11
P117I	17	29	12
P128I	15	27	12
P22I	28	41	13
P114I	26	41	15
P131I	21	37	16
P55I	20	38	18
P133I	23	42	19
P139I	7	29	22
P125I	11	39	28

Interestingly, most of the participants shown in Table 30 achieved between 40% and 60% in Challenge 1. As such, these results indicate that the vocabulary skills development programme may have particularly supported the development of learners who started the programme with mid-levels of morphological awareness. Two participants did have lower Challenge 1 scores and analysis of participant P125I's results provides interesting insights into how the vocabulary programme influenced some learners' attitudes and skills development.

Participant P125I is a year 7 student who reports to be a monolingual first language English speaker who does not enjoy English at school and sometimes reads outside of school. P125I achieved a score increase of 28 marks from Challenge 1 to Challenge 2. They provided an answer for most of the Challenge 1 morphological task awareness questions (23 out of a possible 27 questions were answered). Therefore, the Challenge 1 to Challenge 2 score difference does not seem to be because they left answers blank. Instead, their comment at the

end of Challenge 2 provides some insight into why their score may have increased by so many marks. They explained:

> *I enjoyed the challenge. It was easier than some of the others. I can see connections between things nd I didnt know about prefixes before. It makes sense to look at words like this because I like maths and this is like word maths. You add parts take them away and it changes what things mean. I didnt know you could do that bfore.*

Across the four weeks of tutorials, participant P125I gave an answer for every morphology-based question they were asked. At the end of the tutorial 3 morphology-based practice activities, participant P125I also said:

> *I learnt about prefixes and suffixes. I enjoyed putting suffix's on the root words.*

At the end of tutorial 4, they also said:

> *the use of prefixes and suffix's is the most useful skill i've learnt.*

It seems that for this participant, the morphological instruction and tutorial practice tasks may have been effective in developing their level of morphological awareness.

Past morphological awareness-based studies have also found that explicit instruction may benefit learners who have lower levels of literacy and/or word comprehension skills. For example, Casalis and Sopo (2004) found that, while children who have poor phonological awareness (e.g., children with dyslexia) did not perform well in morphemic segmentation tasks (tasks in which they had to identify the root of a word), they performed the same as their non-dyslexic peers in derived word production tasks and word analogy tasks. Consequently, Casalis and Sopo (2004: 13) propose that dyslexic readers need to develop and rely on their morphological knowledge and awareness as a 'compensatory' reading strategy. Likewise, Tong et al. (2011) highlighted that developing the skills of leaners with reading comprehension difficulties is highly important. Participants in Tong et al.'s (2011) study did not have difficulties at the word reading level (i.e., they had no phonological awareness impairment such as dyslexia). However, they did have low reading comprehension test scores and had difficulties with understanding the meaning of texts. Tong et al. (2011: 523) name these learners 'unexpected poor comprehenders' because their weaknesses in reading were not

predictable based on their word reading skills. Tong et al.'s (2011) study results showed that, in line with earlier studies conducted by Nation et al. (2004, 2005), 'unexpected poor comprehenders' had weak morphological awareness skills, particularly in relation to derivational morphology. Studies have repeatedly shown that strong morphological awareness skills correlate directly with reading comprehension (i.e., Carlisle 2000; Deacon and Kirby 2004; Nagy et al. 2006) and Kieffer and Lesaux (2008) showed that awareness of derivational morphology makes a unique contribution to reading comprehension. As such, Kieffer and Lesaux (2008: 800) recommend targeting and developing the morphology-based skills of children who can read words, but who struggle to comprehend them. As demonstrated in Chapter 1 of this thesis, the ability to comprehend unfamiliar, complex vocabulary across a range of registers and contexts is key to success in Wales' education system. The results shown in Table 29 and Table 30 (above), as well as participant P125I's responses to the programme, suggest that some aspects of the vocabulary skills development programme could be used to support the word decoding and comprehension skills of learners who show weaker morphological awareness abilities. This, in turn, could support broader text comprehension abilities.

5.2.3 Participant score decreases

As shown in Figure 25 (above), while many participants do seem to have benefitted from taking part in the intervention, the scores of 49 intervention participants scores did decrease. The percentage of participants whose morphological awareness scores decreased from Challenge 1 to Challenge 2 was 1% lower in the intervention group than it was in the control group (the percentage of participants whose scores decreased was 34.5% and 35.5% respectively). However, the fact that a notable proportion of the intervention group participants' scores decreased is still surprising given the explicit instruction they received. Table 31 (below) shows a breakdown of the number of participants whose scores decreased and the number of marks the scores decreased by.

Table 31: Intervention group morphological awareness score decrease figures

Number of marks a morphological awareness score decreased by	Number of intervention group participants (out of 143 participants)
1-5	22
6-10	10
11-15	10
16-20	6
21+	1
Total	**49**

Table 31 shows that most participants' scores decreased by 1 to 5 marks (15.9%; n = 22) and, within this group, most participants' scores decreased by just one mark (6.3%; n = 9). As such, for many participants, some small inaccuracies regarding a specific word or word part meant that the Challenge 2 mark was lower than that of Challenge 1. The percentage of intervention group participants whose scores decreased is also 1% lower than the percentage of control group participants whose scores decreased. However, the extent of some participants' score decreases is surprising considering the explicit morphology-based input they received. Most notably, Table 31 (above) shows that 7 participants' scores decreased by 16+ marks. Table 32 (below) shows these participants' Challenge 1 and 2 scores and their written responses to the morphology-based tasks.

Table 32: Intervention group participants with morphological awareness score decreases of 16+ marks

Participant ID	Challenge 1 morphological awareness score (out of 42)	Challenge 2 morphological awareness score (out of 42)	Difference between Challenge 1 and Challenge 2 morphological awareness scores	Challenge 2 morphological awareness task comments
P83I	38	17	-21	*i dont like this because i dont understand any of this. I don't see why we have to do this.*
P80I	37	17	-20	*It's a test, i dont like tests they make me stressed, I try to use what I learnt but couldn't Kuf rluf gvjfbnas df dontgetit*
P58I	29	10	-19	*it was quite interesting but not to hard to the point that I got frustrate (but still challenging)*
P130I	35	16	-19	*This is stupid ffs. ITS WURK it frustrates me but i have to put not sure because i find it hard*
P90I	40	22	-18	*it was awful i couldn't get the the questions for half of them it was dissapointing as well.*
P95I	27	11	-16	*I got it before but hen I got cofused and now I don't know*
P104I	31	15	-16	*it could have been funner, Idk that was so hard I didn't get it*

The participants shown in Table 32 exemplify the written responses of 36 out of 49 learners whose scores decreased, and who also used swear words/abbreviations, clusters of keyboard letters, and/or references to finding the challenge hard and stressful in their comments. It is

important to question, therefore, whether frustration and anxiety may have influenced some participants' Challenge 2 results. The literature explored in Chapter 2 noted that there can be many stressful factors that impact a learners' experience of transitioning from primary to secondary school and Vogel and Schwabe (2016) found that stress can affect memory formation and retrieval. A recent study on the effect of frustration on school-aged children's cognitive control (defined in the study as 'the regulation of emotion'; Huang and Yeh 2019: 269) showed that, across both typically developing children and children with attention deficit hyperactivity disorder (ADHD), participants' frustration negatively impacted cognitive abilities. In Huang and Yeh's (2019: 274) study, the higher the participants' 'effortful control' (i.e., ability to self-regulate emotions), the better the child performed in the reading comprehension, written language and Chinese literacy skills tests. Seymour et al. (2019) also found that, in school-aged children, self-reported frustration was positively correlated with increases in test error rate. The findings from Huang and Yeh's (2019) and Seymour et al.'s (2019) studies offer important consideration for the role of frustration in children's school literacy skills. Likewise, Dewaele and MacIntyre (2014) and Dewaele et al. (2018) have demonstrated that anxiety can have a negative impact on participants' learning experiences. Both of the above studies explored the role of anxiety in the second language learning classroom. However, the participants shown in Table 32 were all monolingual English L1 speakers, which suggests that it is also important to consider the role of anxiety in first language development.

Due to the online, asynchronous nature of this study, it is not possible to determine whether the frustration is solely the result of the Challenge 2 test, or whether other, external factors may also have influenced their frustration levels and test-taking experiences. Thus, while not conclusive, the above findings indicate that further investigation into the influence of frustration and anxiety on morphological awareness development, and metalinguistic skills development more broadly, is an important avenue of enquiry for future research. Additionally, the above results suggest that, when implementing metalinguistic aspects of the new Curriculum for Wales, teachers may look to explore methods that could support learners who may become anxious and/or frustrated when trying to develop new vocabulary decoding and comprehension skills. The above discussions have demonstrated that there are complex, multifaceted reasons which explain why the vocabulary skills development programme was/was not successful for certain types of learners. Therefore, to extend this discussion, and to further explore why certain results may have occurred, this chapter continues with an

examination of the results from each of the different morphological awareness tasks: word decomposition, word derivation, and word analogy.

5.3 Task 1: Word decomposition results

As explained in Chapter 4 (section 4.3.2), the aim of the first morphology challenge task was to explore participants' decomposition skill which, as Levesque et al. (2021) explain, 'operates at the level of word form, providing a pathway from knowledge about morphemes to decomposition of morphologically complex words'. As such, the task required learners to remove a variety of productive English affixes to identify the root of a word. Each question was worth a maximum of two marks (the task was worth 14 marks in total).

Prior to the study, I predicted that, due to a lack of explicit instruction in word decomposition in current literacy classrooms, participants would not score highly in this morphological skill area. However, Table 33 (below) shows that in the Challenge 1 decomposition task, the average scores of the intervention and control groups were quite high (11.4 and 11.3 out of 14). Table 33 also shows that, on average, the control group decomposition task scores increased by 0.2 marks. But, despite receiving four weeks of explicit instruction on root word and affix identification, the average scores of the intervention group participants did not change (11.4 in Challenges 1 and 2).

Table 33: Task 1 average scores

Group	Challenge 1: Task 1 average score (out of 14)	Challenge 2: Task 1 average score (out of 14)	Difference between the Challenge 1 and Challenge 2 scores
Control group	11.3	11.5	0.2
Intervention group	11.4	11.4	0
Difference between the control and intervention group averages	0.1	0.1	0.2

Figure 26 (below) further demonstrates that, overall, many participants started the study with fairly high levels of root word identification skill. In Challenge 1, 76.2% of intervention group participants scored 10 to 14 marks (n =109) and 73.9% of control group participants scored 10 to 14 marks (n = 123). Figure 26 (below) also shows that, in Challenge 2, the percentage of

control group participants who achieved 10 to 14 marks increased by around 5%. Conversely, the percentage of intervention group participants who achieved 10 to 14 marks decreased by 2.1% from Challenge 1 to Challenge 2.

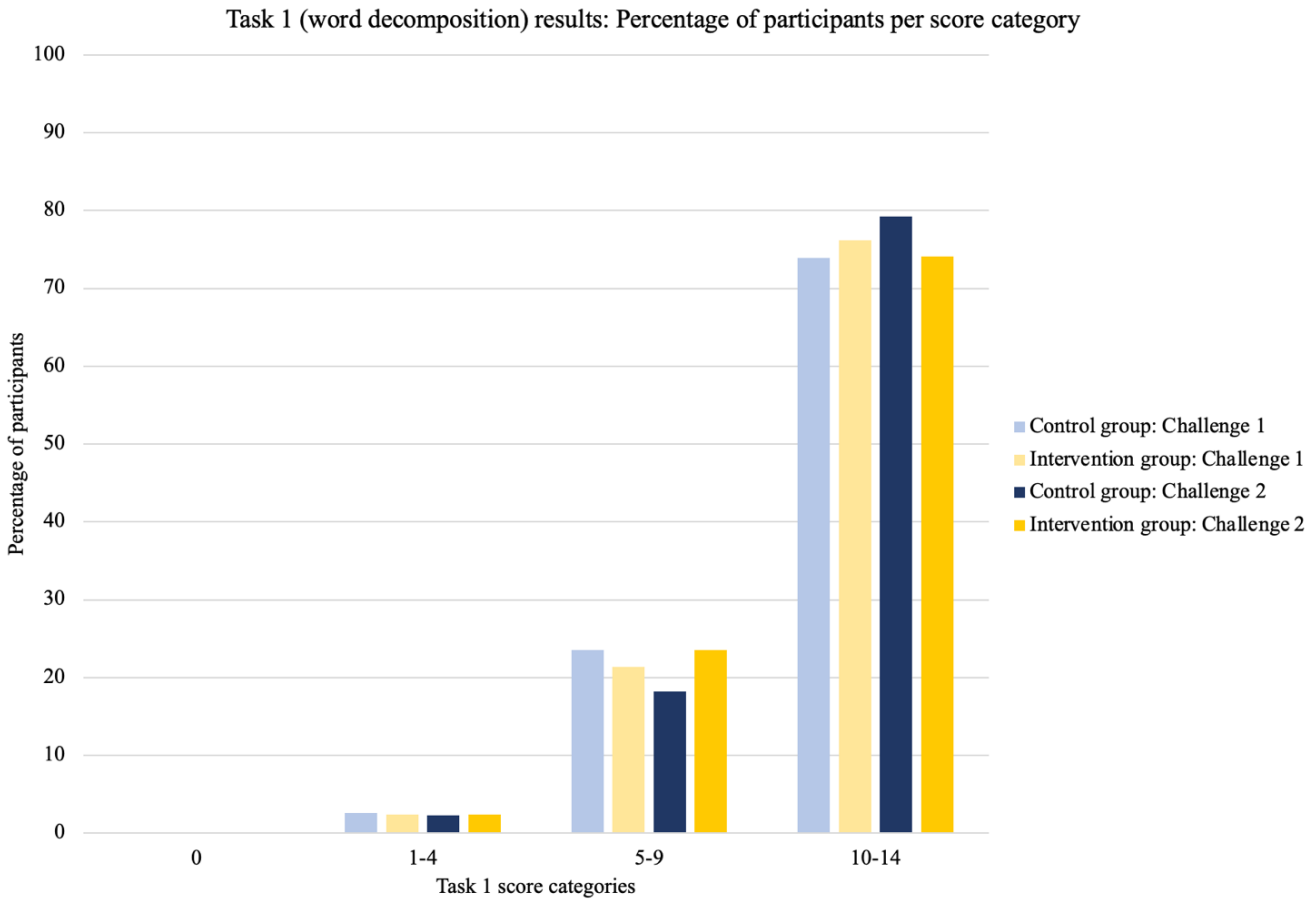


Figure 26: Task 1 (word decomposition) results: Percentage of participants per score category

Analysis of the individual decomposition task questions provides some insight into why the above results may have occurred. Table 34 (below) shows the decomposition task target words (i.e., the word forms participants were aiming for), and the average number of marks given (out of 2) for each question. All the target words were of low frequency in the GCSE word corpus.

Table 34: Task 1 average scores per question

Challenge	Question number and type	Target word	Control group average score (out of 2)	Intervention group average score (out of 2)	Control to intervention group score difference
Challenge 1, task 1	Question 1 (transparent)	Criminal	1.9	1.9	0
	Question 2 (transparent)	Predict	1.8	1.8	0
	Question 3 (opaque)	Compete	1.5	1.4	-0.1
	Question 4 (opaque)	Comprehend	1.7	1.7	0
	Question 5 (transparent)	Thought	1.2	1.3	0.1
	Question 6 (transparent)	Inform	1.8	1.8	0
	Question 7 (opaque)	Decide	1.4	1.5	0.1
	Average total		**11.3**	**11.4**	**0.1**
Challenge 2, task 1	Question 1 (transparent)	Act	1.8	1.8	0
	Question 2 (opaque)	Possess	1.5	1.5	0
	Question 3 (opaque)	Concentrate	1.5	1.5	0
	Question 4 (opaque)	Conclude	1.5	1.5	0
	Question 5 (transparent)	Tense	1.6	1.5	-0.1
	Question 6 (transparent)	Care	1.8	1.8	0
	Question 7 (transparent)	Detect	1.8	1.8	0
	Average total		**11.5**	**11.4**	**-0.1**

Table 34 demonstrates that, the average scores for each of the target words are fairly high and, between the two groups, there is no more than a 0.1-mark difference for any of the target word averages. In Challenge 1, both groups had the lowest average scores for the target words

comprehend, decide and *compete.* Participants had to identify these root words from opaque derivations (i.e., *incomprehension, indecision, uncompetitive*) and it seems that they found this more challenging than identifying the roots of transparent derivations (i.e., *thought* from *unthoughtful* etc.). These findings map on to the earlier discussion in Chapter 2 (section 2.6.1), which explained that both Carlisle and Nomanbhoy's (1993), and Fowler and Liberman's (1995) results showed that, when reading, children were more accurate at extracting root words from phonologically transparent items than phonologically opaque ones. Furthermore, Carlisle and Stone (2005: 431) found that 'the transparency of the structure of a word with more than one morpheme plays a role in word identification'. The average scores for the Challenge 2 opaque words are slightly higher than that of Challenge 1. However, overall, the averages are still lower for the opaque root words than the transparent root words, and there is no difference between the control group and intervention group average marks, despite the intervention group receiving explicit instruction on identifying both transparent and opaque root words. This suggests that the programme did not support the development of the intervention group participants' word decomposition skills, particularly in relation to opaque root words derivations.

While the overall intervention group average score for the decomposition task did not change from Challenge 1 to Challenge 2, a higher percentage of participants achieved 14 out of 14 marks in Challenge 2 (43.4; n = 62) than in Challenge 1 (32.2%; n = 46). Furthermore, 37.8% of the intervention group participants decomposition task scores did increase from Challenge 1 to Challenge 2 (n = 54) and 7.7% of participants' scores increased by 5 marks or more (n = 11). Analysis of individual participants' score changes shows that, out of the 54 intervention group participants whose decomposition scores increased, 36 participants scored between 21 and 25 marks in Challenge 1. This result indicates that the vocabulary skills development programme may have supported the word decomposition skills of some learners who started the study with mid-levels of morphological awareness.

Table 35 (below) shows the challenge and task 1 scores of the 11 participants whose scores increased by five marks or more. The participant who achieved the highest decomposition task score increase (P131I; 11 marks), scored 21 out of 42 marks (50%) in Challenge 1, but 37 out of 42 (88%) in Challenge 2. Albeit just one participant, this finding extends the above claim that the vocabulary skills development programme may have particularly supported the

decomposition skills of middle-ability learners (i.e., those who achieved between 50-60% in the Challenge 1 morphology tasks).

Table 35: Scores of participants whose decomposition task results increased by 5+ marks

Participant ID	Challenge 1 morphological awareness score (out of 42)	Challenge 2 morphological awareness score (out of 42)	Challenge 1 decomposition task score (out of 14)	Challenge 1 decomposition task score (out of 14)	Difference in marks between Challenge 1 and Challenge 2 decomposition task scores
P128I	15	27	9	14	5
P136I	18	24	6	11	5
P131I	21	37	3	14	11
P133I	23	42	5	12	7
P54I	24	20	8	14	6
P127I	24	26	7	12	5
P107I	25	31	5	11	6
P129I	30	37	5	14	9
P16I	38	38	7	12	5
P41I	39	38	7	14	7
P75I	39	42	4	13	9

Additionally, Table 35 shows that 2 of the 3 participants whose scores increased the most, achieved 30 marks (P129I) and 39 marks (P75I) in Challenge 1. Although just two participants, these results raise questions about whether the vocabulary skills development programme also supported the development of some higher-ability participants' word decomposition skills. In relation to one of the decomposition tasks included in tutorial 2, participant P129I explained:

> *I did have an understanding of word parts before, but I hadn't really thought about how you could break down a word to think about how each part has meaning. I really hadn't thought of prefixes as mini words that have definitions and that knowing these definitions can help you understand what a word means and taking it away can help you find the root of the word and then how the prefix changes the meaning. I didn't really know much about suffixes before either and its really*

good knowing how to take them away to find the root of a word. Particulary when the end of the root bit has changed.

The above quotation suggests that for some learners, the instruction did deepen their understanding of the functions of prefixes and suffixes and this, in turn, developed their word decomposition skills. A recent Estyn report (2021: 10, 27, 39) explained that one of the main challenges Welsh educators face is ensuring that high-ability learners achieve their full potential as, historically, this has been an issue. However, the findings in Table 35 suggest that explicit instruction in morphology could help to ensure that both middle- and high-ability learners increase their word comprehension skills which could, in turn, contribute to them reaching their full literacy ability potential.

While some participants' decomposition task scores did increase, 30% of the intervention group participants' scores decreased from Challenge 1 to Challenge 2 (n = 43). Many participants' scores decreased by just one mark (n = 24). Nonetheless, 14 participants' scores did decrease by five marks or more. For example, participant P90I scored 14 out of 14 on Challenge 1, but 4 out of 14 on Challenge 2. They answered all the Challenge 2 questions but did not correctly identify any of the target root words in full. Participant P90I's responses demonstrate a pattern that occurred across the dataset for participants' whose scores decreased; learners removed one but not all of the affixes required to identify the root of a word (for examples, see Table 36).

Table 36: Participant P90I's Challenge 2 task 1 responses

Question	Participant response	Target word	No. of marks given (out of 2)
1	criminally	Criminal	1
2	unpredict	Predict	1
3	compe	Compete	0
4	I do not know	Comprehend	0
5	thoughtless	Thought	1
6	information	Inform	1
7	I do not know	Decide	0

Dawson et al.'s (2018) findings on morphological effects in visual word recognition suggest that one reason for score decreases, and responses like participant P90I's, could be that, during

adolescence, there is a transition in how morphologically structured letter strings are processed. In their investigation of response times and accuracy in nonword versus real word recognition, Dawson et al. (2018) found that adults and older adolescents process morphologically structured words and nonwords as recognisable root and affix units. Dawson et al. (2018) also found that adults and older adolescents store complex words in their root form in the lexicon, allowing the individual to 'strip' away any affixes. Average response times illustrated that adults and older adolescents can do this quickly and it appears to be an embedded skill at a later stage in the word recognition process (Dawson et al. 2018: 648). However, rather than using morphological units like adults/older adolescents, younger adolescents and children may still be relying on the 'chunking' of grapheme-phoneme sound correspondences to recognise words or word parts.

In light of their results, Dawson et al. (2018) propose that it is likely that one's morphological decoding skill increases with word reading and vocabulary experience across different contexts (see also Reichle and Perfetti 2003). As such, the age of the participants in this study (8 to 13 years old) may give reasons as to why some found it difficult to identify the root of words and accurately remove affixes. Chapter 6 offers a detailed exploration of whether age is a significant predictor of the morphological awareness study results. However, it is important to note that the above findings from Dawson et al.'s (2018) research map onto the discussion in Chapter 2, which explained that, even in the later stages of reading development, in Wales, the teaching of morphology is inconsistent and the main focus remains how to decompose words in relation to phonics (i.e., how to 'chunk' words according to grapheme-sound patterns), rather than morphemes. To further understand why some participants scores decreased, this section continues with an analysis of data from one of the tutorial tasks that targeted the development of the intervention group participants' decomposition skills.

5.3.1 Decomposition tutorial data

Tutorial 2 focussed on developing participants' word decomposition skills (see lesson plan in Chapter 4, section 4.5.2). In particular, tasks 3, 4 and 5 aimed to support learners with breaking words into their relevant morphemes. Firstly, tasks 3 and 4 required participants to remove affixes to identify the root of a word. Table 37 and Table 38 (below) represent responses of many participants who included letters from the prefixes and/or suffixes in their root word responses and divided words by their blended phonetic sounds, rather than by their morphemes.

Table 37: Task 3 example answers

Participant ID	Target word	Participant answer
P27I	unthinkable	thin
P61I	unsteady	stead
P108I	translation	sla
P136I	disagreement	agreem

Table 38: Task 4 example answers

Participant ID	Target word	Participant answer
P4I	disorganise	organ
P16I	immeasurable	meash
P29I	submarine	mar
P34I	indecision	decish
P61I	misinform	inf
P100I	international	nash

Although the tables only show the responses of a few participants, the above word decomposition patterns were repeated across the dataset. Like participant P100I, 68 out of 143 other participants gave at least one answer in which the target root word was spelled phonetically and included some letters from the derivational suffix. These findings are consistent with the concerns raised in Chapter 2 (section 2.3.1) regarding the possible issues and limitations of the phonics-only approach to vocabulary instruction currently used in Wales. Additionally, 79 out of 143 participants gave at least one answer in which they had overextended the removal of affixes and removed some root word letters, too (i.e., they thought that the root of *unthinkable* was *thin*). According to Verhoeven and Perfetti's (2003: 210) decomposition hypothesis, the meanings of morphologically complex words are understood by their morphemes in two phases: 1) an analysis of their constituent components; 2) a look-up of the meaning of the base word in the mental lexicon. It could be, therefore, that in the above tasks, learners were overextending their understanding of how to remove affixes from a root

word and identifying the smallest possible root word (i.e., *thin* or *organ*) that had meaning in the mental lexicons. Participants were not necessarily thinking about the meaning of the whole word. Despite extensive searches of the literature, I could not find a study which had found a similar recurring pattern in the dataset. As such, repetitions of the above tasks with a larger number of participants may be able to confirm or disprove the above claim. However, the above results suggest that, to ensure learners develop accurate word decomposition skills, extended explicit instruction may be required in identifying the roots words of multimorphemic words.

Results from task 5 in tutorial 2 add gravitas to the above claim. Following an instructional video about how to decompose words into morphemes, participants were asked to answer questions about how many morphemes were in certain target words/how the target words should be divided into parts. Each question was worth three marks: one for correctly decomposing the word into its relevant morphemes, one for correctly counting the number of morphemes in the word, and one for identifying the word's root. Participants could have scored a maximum of 15 marks for this task. Table 39 shows that most participants (n = 92) scored between 1 and 5 marks in the word decomposition tutorial task. A further 30 intervention group participants scored zero marks. Moreover, no participants scored in the top marks category.

Table 39: Tutorial 5, task 2 results

Tutorial 2, task 5 scores	**Number of intervention group participants**
0	30
1-5	92
6-10	21
11-15	0
Total	143

Table 40 and Table 41 show some examples of responses from participants who scored zero marks in the tutorial task. Here, the target words were *furious* (correct answer = *fur(i) + ous,* 2 morphemes) and *uncomfortable* (correct answer = *un + comfort + able,* 3 morphemes).

Table 40: Participant responses to counting morphemes in the target word 'furious'

Participant ID	Decomposed word response	Number of morphemes response	Root of the word response
P57I	F u r i o u s	7 morphemes	Uri
P63I	Furious	1 morpheme	Furious
P72I	Fu ri o u s	6 morphemes	Furio
P95I	Fur ous	2 morphemes	Fur
P102I	furyous	1 morpheme	Not sure
P116I	Fur i ouse	3 morphemes	Don't know

Table 41: Participant responses to counting morphemes in the target word 'uncomfortable'

Participant ID	Decomposed word response	Number of morphemes response	Root of the word response
P2I	Un com fort able	4 morphemes	Comf
P11I	Un co mf or ta ble	6 morphemes	Uncomfort
P39I	Uncomfortableness	3 morphemes	Comfortable
P106I	Un comfor table	3 morphemes	Comfor
P121I	Un comf or table	4 morphemes	Uncomf
P137I	Un comfortable	2 morphemes	Com

The tables above illustrate that, despite receiving explicit instruction on how to decompose and identify the root of a word, many participants found it highly challenging. This could, of course, be a result of how I explained the decomposition processes. However, a review of participants' written feedback on tutorial 2 did not show any particular concerns/issues with the video explanations. In fact, multiple participants made comments in line with P11I's feedback, which explained:

> *I found the videos in this tutotial helpful because the person explained the way to break words down really clearly. I learnt about morphemes which I didn't know before and I tried to use the pictures she showed to think about how to do the tasks.*

Instead, many participants seemed to have counted the number of letters in *furious,* rather than the number of morphemes (see participant P57I Table 40 for example). Additionally, despite their written feedback, participant P11I (Table 41) seems to have decomposed the target word

uncomfortable by the sounds that are blended together to produce the word, rather than the number of morphemes. Similarly to tasks 3 and 4 discussed above, some participants seem to have understood that the root of a word is often situated in the middle of the structure and, therefore, have given responses such as 'uri' for *furious* or 'comf' for *uncomfortable* (i.e., participants P57I and P2I). Most of the participants shown in Table 41 seem to have understood how to remove a suffix from a root word, but many have overextended the affix removal to include some letters that are part of the root (for examples, see P106I and P121I). As such, it seems that some intervention group participants developed an understanding of the need to decompose a word into parts, but still did not understand that morphemes also carry meaning. These findings are consistent with Carlisle and Stone's (2005) findings, which indicated that some children need additional support with developing their awareness of how morphemes carry meaning within a word.

In future, it would be interesting to see whether learners' morphological decomposition skills could develop further if instruction was given over a longer period. It may be that, due to the timescale of the project, some participants completed Challenge 2 at a mid-way point in the decomposition skills development process. They understood the need to divide the word into parts and remove affixes, but had not mastered yet how to do this accurately. As Carlisle and Stone (2005: 319) explain, the acquisition of derivational morphology and its relevant skillsets is a prolonged aspect of the language development process. A lack of awareness about how to decompose words according to morphemes, rather than phonemes, may also give reason as to why some of the intervention group participants' Challenge 2 decomposition task scores decreased. Thus, to increase word decoding and comprehension skills, and achieve some of the morphology-based progression steps in the new Curriculum for Wales, some lower-ability learners might require extended explicit instruction in recognising and identifying root words, particularly when the root word is opaque within a derived word. The above results also begin to indicate that many learners in Wales do already possess fairly high levels of word decomposition ability. However, explicit instruction in word decomposition could further extend middle- and higher-ability learners' word decoding and comprehension skills and, thus, ensure that they reach the higher-level progression steps in the new Curriculum for Wales and, therefore, fulfil their literacy skills potential.

5.4 Task 2: Word derivation results

As explained in Chapter 4 (section 4.3.3), the second of the morphology-based tasks focussed on derivation, specifically, participants' abilities to identify and comprehend the meaning of productive English prefixes. In this task, participants were asked to produce a derived form of a word by adding a prefix, or to identify the root word by removing the prefix. Participants answered eight questions and each question was worth a maximum of two marks (16 marks available in total).

Table 42 (below) shows that, in Challenge 1, both groups had fairly similar word derivation task averages (10.9 and 10.3 respectively). The control group's average was 0.6 marks higher than the intervention group's average. However, the scores of both groups illustrate that participants started the study with fairly high levels of word derivation skill (i.e., both groups achieved average scores between 60-70%).

Table 42: Task 2 average scores

Group	Challenge 1: Task 2 average score (out of 16)	Challenge 2: Task 2 average score (out of 16)	Difference between the Challenge 1 and Challenge 2 scores
Control group	10.9	12.3	1.4
Intervention group	10.3	11.9	1.6
Difference between the control and intervention group averages	0.6	0.4	0.2

Figure 27 (below) corroborates the above claim, as the graph shows that around 75% of all participants scored 9 marks or above (55%+) in the Challenge 1 word derivation task. These results are somewhat surprising when considering that informal discussions with teachers suggested that explicit teaching of word derivation/the manipulation of productive prefixes does not form a regular part of classroom practice. However, Table 42 (above) shows that the average scores of both groups increased from Challenge 1 to Challenge 2 (control group m = 1.4; intervention group m = 1.6). Additionally, Figure 27 (below) shows that, in Challenge 2, the percentage of control group participants achieving 9+ derivation task marks increased by 11%, whereas the percentage of intervention group participants scoring 9+ marks only increased by 4.2%. Overall, 86.2% of the control group participants and 78.4% of the intervention group participants scored 9+ marks in the Challenge 2 derivation task. Given that

the control group received no explicit instruction in English prefixes or word derivations, it is surprising that their average score increase is only 0.2 marks lower than the intervention group average.

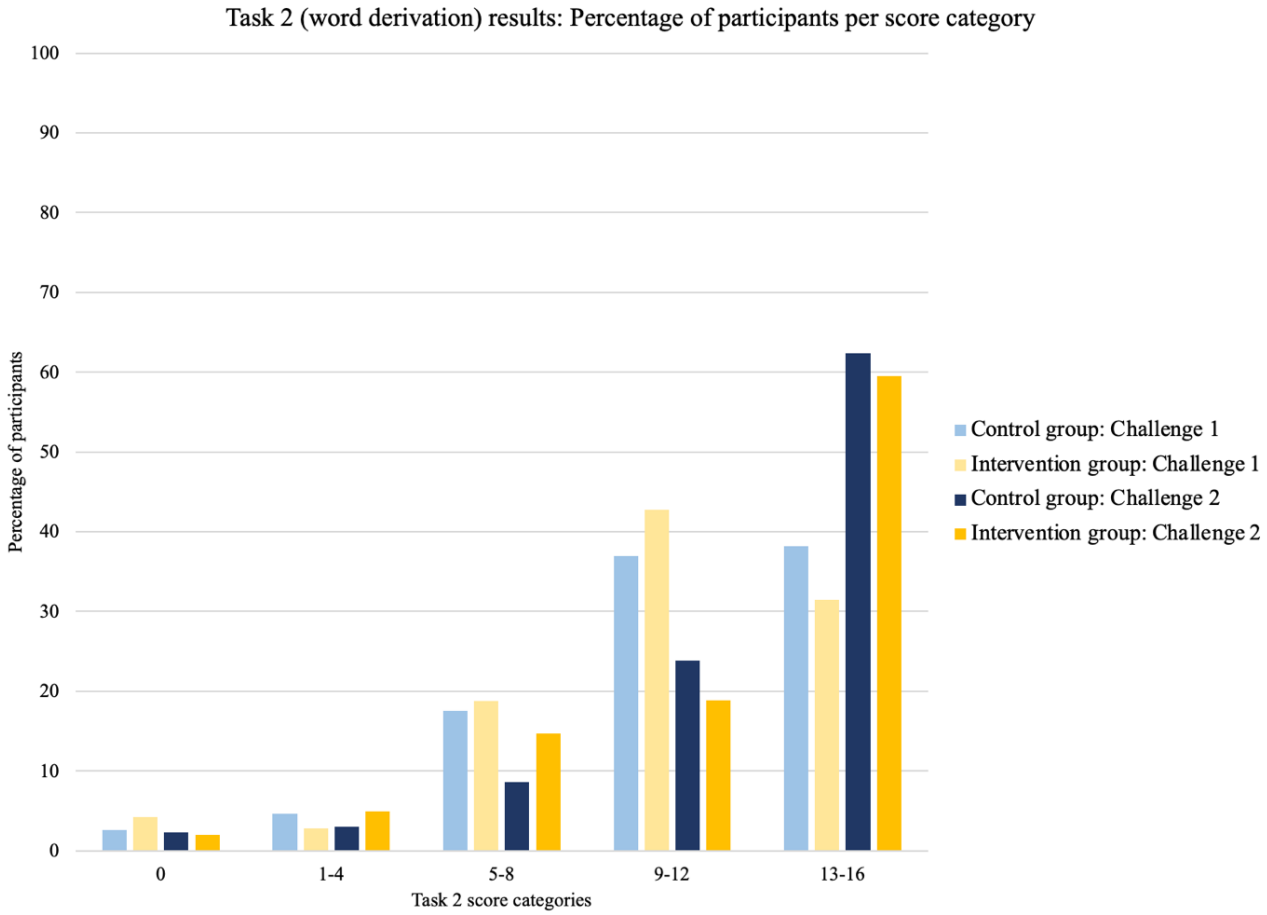


Figure 27: Task 2 (word derivation) results: Percentage of participants per score category

As discussed in section 5.2, test repetition and dynamic testing could have influenced the control group's scores. However, analysis of the individual questions asked in task 2 of the challenges provides some insight into why the above results may have occurred. Table 43 (below) shows the derivation task target words, and the average number of marks given (out of two) for each question. In the table, the questions are ordered by the frequency of the target word in the GCSE word corpus. All the target words were of low frequency in the GCSE word corpus and word frequencies were matched across the two challenges.

Table 43: Task 2 average scores per question

Challenge	Question number and type	Target word	Freq. in the GCSE word corpus	Control group average score (out of 2)	Intervention group average score (out of 2)	Control to intervention group score difference
Challenge 1, task 2	Question 1 (prefix removal)	Organised	5	1.7	1.8	0.1
	Question 4 (prefix addition)	Independent	3	1.5	1.3	-0.2
	Question 5 (prefix removal)	Envious	2	1.3	1.1	-0.2
	Question 8 (prefix addition)	Impractical	2	1.3	1.2	-0.1
	Question 2 (prefix removal)	Committed	1	1.8	1.9	0.1
	Question 3 (prefix addition)	Disrespectful	1	1.6	1.4	-0.2
	Question 6 (prefix addition)	Sincere	1	0.9	0.9	0
	Question 7 (prefix removal)	Eloquent	1	0.8	0.7	-0.1
	Average total			**10.9**	**10.3**	**-0.6**
Challenge 1, task 2	Question 4 (prefix removal)	Persuasive	5	1.7	1.7	0
	Question 3 (prefix addition)	Unhelpful	3	1.8	1.8	0
	Question 1 (prefix addition)	Disgraceful	2	1.5	1.6	0.1
	Question 5 (prefix addition)	Intolerant	2	1.4	1.3	-0.1
	Question 2 (prefix removal)	Competent	1	1.4	1.3	-0.1
	Question 6 (prefix removal)	Daring	1	1.7	1.6	-0.1
	Question 7 (prefix removal)	Decisive	1	1.6	1.5	-0.1
	Question 8 (prefix addition)	Impolite	1	1.2	1.1	-0.1
	Average total			**12.3**	**11.9**	**-0.4**

Table 43 shows that, in both groups, participants were fairly accurate with deriving the target forms of the words. There was also very little difference between the averages of the two groups. However, in Challenge 1, both groups had the lowest average scores for the target word

eloquent; many participants did not accurately remove the *in-* prefix. Although the *in-* prefix is common in English, the table shows that the root word *eloquent* only occurred once in the GCSE word corpus. Furthermore, *eloquent* only occurs 3.08 times per million words in the BNC (BNCweb, Hoffman and Evert 2018).[6] As such, *eloquent* may not be a word that children experience often. The idea that the frequency of a root word may have influenced participants' derivation accuracy levels correlates with Carlisle and Stone's (2005) results, which illustrated that the frequency of a root word (i.e., how common it is in everyday language and, therefore, how familiar an individual is with the root word) contributes significantly to the accuracy with which children can read low frequency derived words (e.g., *queendom*). Interestingly, Duncan et al. (2009) and Singson et al. (2000) found that, initially, children's ability to manipulate less common morphemes is low but it improves with years of schooling.

As mentioned above, Chapter 6 analyses the role of school year group in the morphological awareness results. However, analysis of other target words used in task 2, such as *committed*, also supports the above claims. Although *committed* only appeared once in the GCSE word corpus, in the BNC there are 53.24 occurrences per million words (Hoffman and Evert 2018). These statistics show that the word *committed* is more common in everyday language, and children's ability to manipulate the morpheme and its relevant affixes appears to be higher (averages of 1.8 and 1.9 out of 2 marks). Interestingly, because this task focussed on prefixes rather than suffixes, all of the root words used remained transparent (i.e., they underwent no phonological or orthographical changes when the affix was added). It seems, therefore, that when root word transparency is not an aspect that requires consideration, word familiarity plays an important role in participants' word decoding abilities. When considered in conjunction with the task 1 challenge results, this finding suggests that both word transparency *and* word familiarity should be considered and accounted for in explicit morphology-based instruction.

Overall, the question averages for the Challenge 2 derivation task are slightly higher than for Challenge 1. Nonetheless, in Challenge 2, the word *polite* has the lowest average score. For this question, participants were required to remove the *im-* prefix to find the root word *polite*.

[6] The BNC comprises 100 million words collected from samples of written (90% of the corpus) and spoken (10% of the corpus) language from a range of sources, such as extracts from regional/national newspapers, periodicals, journals for all ages, academic books, popular fiction, school and university essays, informal conversations, etc (University of Oxford 2022). I selected this corpus as it is designed to represent a wide cross-section of current British English and, therefore, the frequency of a word in the corpus is highly likely to reflect how commonly it is or is not used in everyday English reading/writing and speaking/listening interactions.

It is interesting that the control group still had a slightly higher average mark for this word than the intervention group, as one of the learning episodes in tutorial 3 specifically focussed on the use of the *in-, il-, ir-* and *im-* prefixes (see Figure 28 for example).

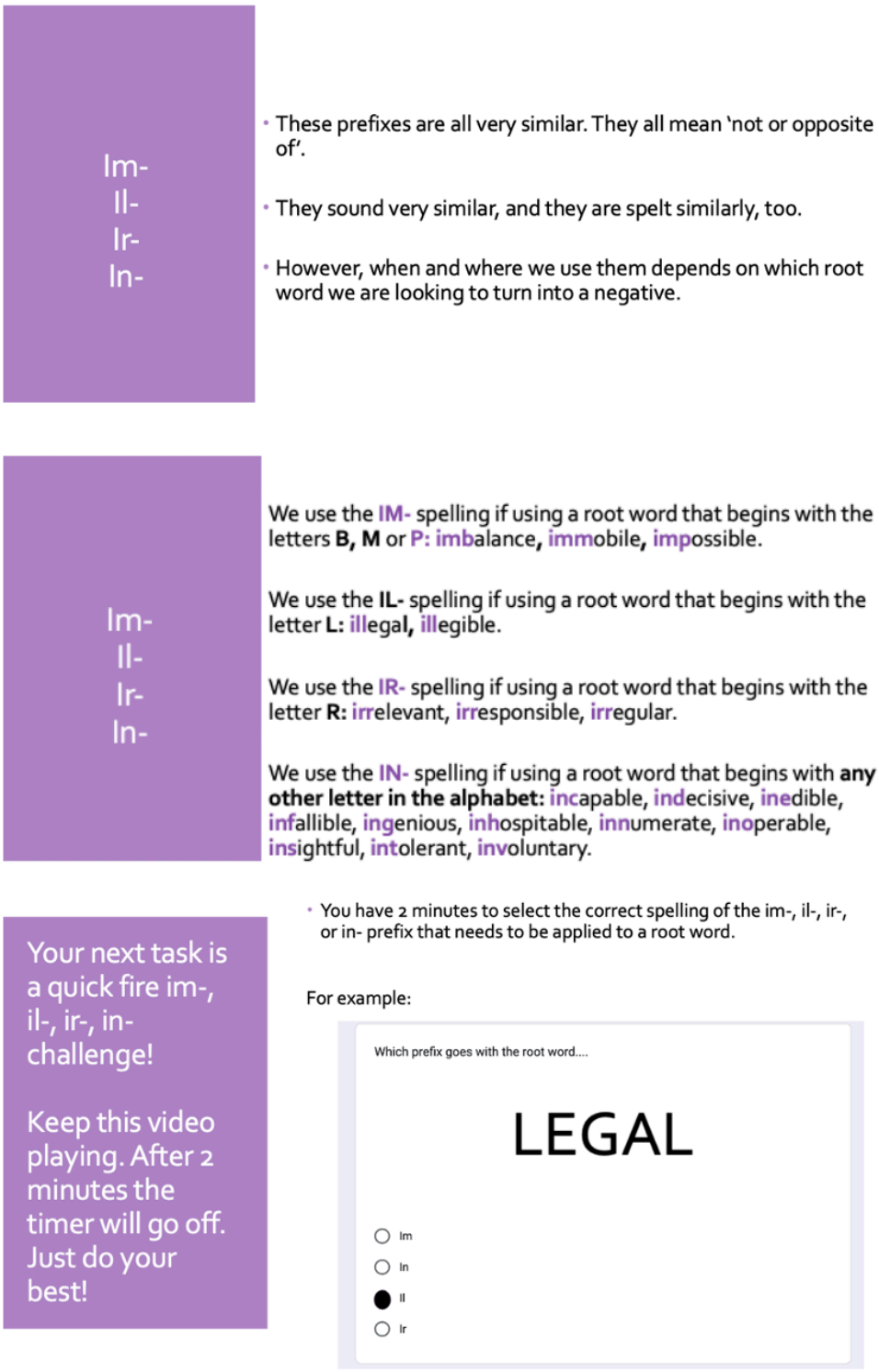


Figure 28: Tutorial 3: n-, il-, ir- and im- prefix explanation and task

As explained in Chapter 4 (section 4.1.1), in this research, I treated the *in-, ir-, il-* and *im-* prefixes as four distinct prefixes, as I suggested that children need to develop awareness of when and why each of these different prefixes are used, even though they have shared meaning. The results in Table 43 (above) support the earlier suggestion of treating each prefix as an individual word part, as even after the intervention group received explicit instruction on when and how to use the different negating prefixes, practice task scores were low. The average score for the task shown in Figure 28 was 4 out of 9. Individual responses exemplify the difficulties learners had with this task, as 56 out of 143 intervention group participants attached the *ir-* prefix to the root word *logical,* resulting in the formation of the nonword *irlogical.* Additionally, 87 intervention group participants added the *in-* prefix to the root word *balance* and 106 participants added the *in-* prefix to the root word *perfect.* Participants were most accurate with identifying that the root word *different* requires the addition of the *in-* prefix (92 out of 143 participants answered this question correctly). The average score and formation of some non-words (i.e., *irlogical, inbalance, inperfect*) suggests that neither the explanation given in the video, nor the tutorial practice task, developed learners' understanding of the four negating prefixes.

Analysis of individual participants' responses can help explain why the *polite* target word score was particularly low for participants in the intervention group. Overall, 18 intervention group participants formed the opposite of *impolite* by adding another prefix (i.e., *unimpolite*). Interestingly, this trend of creating a double negative occurred 389 times across the task 2 dataset (the task 2 dataset comprised 1144 words in total; 143 participants x 8 questions). In Challenge 1, no instances of double negatives occurred in the intervention group dataset. Additionally, in the control group, only four participants gave double negative responses in Challenge 1, and three participants in Challenge 2. Table 44 shows the responses of one intervention group participant (P17I) who repeatedly used double negatives in Challenge 2, task 2.

Table 44: Task 2 responses that use double negatives

Question	Participant response	Target word	No. of marks given (out of 2)
1	undisgraceful	Disgraceful	0
2	uncompetent	Competent	0
3	Unhelpful	Unhelpful	2
4	Persuasive	Persuasive	2
5	unintolerant	Intolerant	0
6	undaring	Daring	2
7	dk	Decisive	0
8	disimpolite	Impolite	0

It is complex to interpret what might be happening for the learner when they use a double negative as part of the word derivation process and why, only after explicit instruction in derivational morphology, participants provided these sorts of responses. Semantically, the use of two negating prefixes does form a word that has the opposite meaning to the target word (i.e., the word *unintolerant* does mean *tolerant* and, therefore, is the opposite of *intolerant*). As such, one could argue that participants who provided these types of answers have developed a strong awareness of the meaning(s) of negating prefixes. However, structurally, the use of two negating prefixes is not what would be expected and, consequently, it is ambiguous the extent to which the learner recognises and understands that a prefix (i.e. *in-*) is already attached to the root word they are analysing. Here, it is important to reflect upon my approach to providing instruction on the *in-, il-, im-* and *ir-* prefixes. Overall, 9 participants made comments about how I spoke too fast in this particular video and that they understood the meaning of the *in-, il-, im-* and *ir-* prefixes, but not when, where or how to use them. For example, one intervention group participant commented:

> *It's really helpful to know the meanings of these prefixes and that they can be used in diffrant places but the tutor spoke really fast and I didnt have time to proply understand what she ws saying. I don't really know what a continants* [consonant] *is and I think this was important.*

Additionally, participant P20I, who gave four responses that contained double negatives in task 2, Challenge 2, explained:

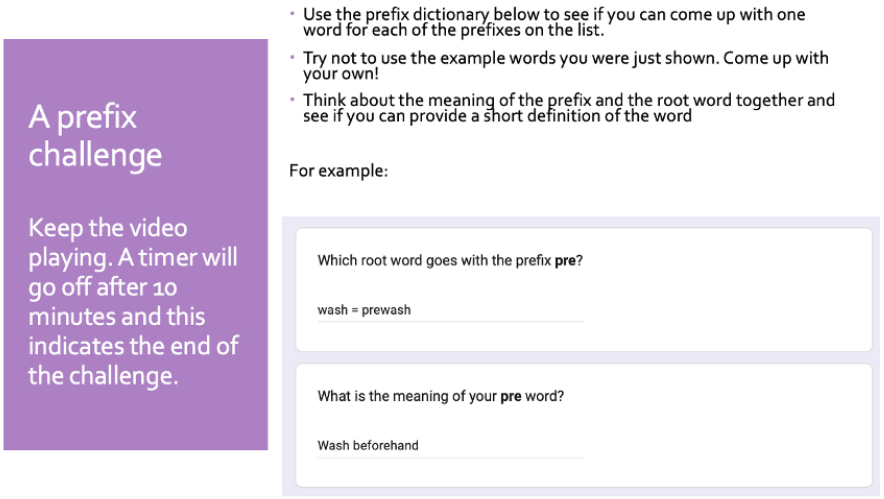
> *I tried to take on what she was saying but iyt was toooooo fast is annoyin because I cant spell and I thought this woild be helpful. I do get that they all mean not so maube that will help.*

The asynchronous nature of the programme meant that I was not aware that participants found this particular video/aspect of the programme challenging. However, in-person, reflexive practice would be able to respond to the questions and needs of the learners. This highlights one key limitation of the vocabulary skills development programme: the opportunity to engage learners in meaningful conversations about their learning was lost because of COVID-19 restrictions. When it comes to the development of learners' awareness of negating prefixes, a differentiated and reflexive approach seems particularly important because Clark and Carpenter (1995: 635) found that, while the prefix *un-* is one of the most productive affixes for indicating the reversal of something, children must learn that this prefix applies primarily to verbs for change-of-state (i.e., transitive verbs) and often, *un-* is used to indicate the enclosing, covering or attaching of something (i.e. *covered* vs. *uncovered; wrapped* vs. *unwrapped* etc.). The prefix *un-* can also be added to adjectives and past participles that serve as adjectives (e.g. *untidy, unseen, unbroken* etc.), but where there is no change-of-state, the verb cannot take *un-* (i.e., one cannot *unswim, ungo, unlook* etc.). In other words, developing an awareness of negating prefixes cannot be rushed; it is a complex and multifaceted process.

Furthermore, as discussed in Chapter 2 (section 2.6.1), Clark and Carpenter (1995) also found that children use double negatives to turn a word into its opposite meaning, as a child in their study used the word *undisappear* to mean *reappear.* As such, it seems that participants in the current study who used *un-* to indicate the opposite of target words that already contained a negating prefix overextended their understanding of how the *un-* prefix can be used. This finding regarding the use of overextension in the later stages of derivational morphology awareness development is interesting because overextension plays a key part in children's early word morphological awareness acquisition. As Clark (2016: 288) explains, in the early stages of typical vocabulary development, children have to 'make do' with the limited resources they have access to. For example, when trying to form the past tense of the irregular verb *break,* children often say *breaked* rather than *broken* because they overextend their use and understanding of the *-ed* suffix. Rescorla (1980) suggested that between the ages of one year

six months and two years six months, overextension may involve 40% of a child's vocabulary until they have about 100 productive words. The vocabulary and morphemes used in the current vocabulary skills development programme study are clearly much more advanced, and typically developing older children have many more lexemes stored in the lexicon. However, as derivational morphology acquisition is a prolonged aspect of the language learning process (Carlisle and Stone 2005), it is important to question whether the older learners who used the double negative prefixes in task 2 were still 'making do' with what they understood and had access to.

To explore how participants responded to some of the other prefix-based instructional videos and tasks in the tutorial aspects of the vocabulary skills development programme, I analysed task 2 from tutorial 3, which, following explicit instruction on common English prefix meanings and functions, asked participants to come up with one of their own words for each prefix they were given. They had a 'prefix dictionary' (see Figure 29) to help them.



Prefix	Meaning	Example words
In-, Im-, Il-, In-	Not or opposite of	Inappropriate: Not appropriate Impossible: Not possible Illegal: Not legal Indecisive: Not decisive
Un	Not or opposite of	Unhappy: Not happy
Dis	Not or opposite of	Disrespectful: Not respectful
Non	Not or opposite of	Nonrenewable: Not renewable
Mis	Bad or wrong	Mismanage: Badly managed
Mal	Bad or wrong	Malnutrition: Bad nutrition or not
Re	Go back or again	Rebuild: Build again
Co	With or together	Cooperate: Operate together
Inter	Between, among or during	International: Between nations
En	In or into	Enforce: Force into
Hyper	Over, above or beyond	Hyperactive: Over active
Sub	Under	Submerge: Merge under
Anti	Against	Antisocial: Against being social
Pre	Before	Preheat: Heat beforehand
Pro	Forward or toward the front	Protest: Put ideas forward
Ex	Out of or without	Extract: Take out
Ab	Away from or down from	Abnormal: Away from the norm
Trans	Across or beyond	Transport: Carry across

Figure 29: Tutorial 3, task 2: Word derivation task example

This task offered participants an opportunity to experiment with creating and producing derived words using common English prefixes. Overall, 86% of participants (n = 123) produced a real English word that could be used with the target prefix. Of these participants, 65% produced responses that could be considered accurate to the 'what is the meaning of your word?' question. Table 45 (below) shows five participants' answers to the first five questions in the tutorial 3 task 2 challenge. Each of these participants' word derivation task scores increased by 5 marks or more from Challenge 1 to Challenge 2.

Table 45: Tutorial 3 task 2 participant responses

Prefix given	Participant code	Participant responses to 'which root word goes with this prefix?	***Participant responses to 'what is the meaning of your [insert prefix here] word?'***
Pre	P12I	Preoccupy	*Before its occupied*
	P53I	Preown	*Having had it bfore*
	P62I	Preschool	*It's like the school you go to befor school*
	P78I	Preview	*Seeing something before you do it*
	P129I	Preheat	*Warming somethinh up before you need it*
Re	P12I	Redo	*Do it again*
	P53I	Review	*Look at something agan*
	P62I	Remix	*Mix it all again like a DJ makes a new song from a old one*
	P78I	Replay	*Play again like on repeat*
	P129I	Rewind	*Go back in a video or time or something*
Un	P12I	Unchanged	
	P53I	Understand	*I know it's wrong because its under not just un snd understanding something doesn't mean not but I can think of something*
	P62I	Undo	*Not do something or go back on something you done*
	P78I	Unsee	*Not see something but like go back and not see it agan*
	P129I	Unwind	*Not wind up or like relax to stop being stressed*
Dis	P12I	Displease	*Not pleasing someone*
	P53I	Disobey	*Not listening to someone*
	P62I	Dismiss	*Sending someone away like asking them to leave*
	P78I	Dissect	*Im not sure abouyt his but I couldn't think of another one. I don't think it does mean not or away in dissect because its cutting something up or putting it in pieces. We do it with plant leafs in biology. May it means not whole or something.*
	P129I	Disown	*Not own something anymore*

Co	P12I	Cooperate	*Work with people or go along with things*
	P53I	Colleague	*A person you work wiuth*
	P62I	Connect	*I don't know because nnect isn't a word but the whole word connect means linking things together or making things work together*
	P78I	Cooperate	*Going along with*
	P129I	Not sure	*Don't kniow sorry*

Table 45 shows that many participants were able to accurately create new prefixed words, and their word meaning responses demonstrate that they understood how a prefix can influence the meaning of a root word. Participant P53I's response to the prefix *un-*, and participant P78I's response to the prefix *dis-*, offer interesting insight into the learning process some participants experienced. Both participants did produce a word that contained the letters of the prefix, but they both explicitly identified that there was a discrepancy between the word they had produced, the meaning of that word, and the meaning of the prefix. Both cases indicate that some aspects of the instructional videos did support learners with developing an awareness of when and how some prefixes apply, and where they do not. Similarly, participant P62I's response to the *co-* prefix question illustrates that they were beginning to develop awareness of when prefixes are productive and when they are not. They do not have the metalanguage required to explain that the prefix *co-* is not free in the root word *connect*, and that the meanings of *co-* and *connect* are related, but their answer suggests they are beginning to understand this principle.

A lack of research into the development of older children's derivational morphological awareness, particularly in relation to prefixes, makes it difficult to verify whether the patterns of overextension are unique just to this dataset or whether this may be a broader phenomenon that occurs as part of children's later language development. It would also have been interesting to see if and how the task 2 results changed/developed if the vocabulary skills development programme had been longer. It is possible that, for participants in the intervention group, I captured data at a half-way point in the prefix awareness development process. However, overall, the task 2 results indicate that learners in Wales do have fairly high levels of word derivation and prefix awareness. Nonetheless, some learners may still benefit from prolonged,

targeted support with developing an understanding and awareness of how productive English prefixes can be used, particularly in relation to negating prefixes.

5.5 Task 3: Word analogy results

The aim of the third morphology-based task was to test participants' abilities to identify the structural relationship between pairs of words by assessing their understanding of derived forms that can be produced from root words. For task 3, participants answered twelve questions and each question was worth one mark. Table 46 (below) shows that, participants in both groups scored highly in the word analogy tasks. In Challenge 1, the intervention group demonstrated slightly stronger word analogy skills than the control group (intervention m = 10.1; control m = 9.6). However, in both groups, average word analogy scores decreased from Challenge 1 to Challenge 2. The control group's average score decrease is notably lower (-0.4) than that of the intervention group (-1.1), which is surprising when we consider that the intervention group received explicit instruction on decomposing words, identifying word patterns and applying them to new/different target words. It seems, therefore, that the vocabulary programme was not successful in supporting the development of learners' word analogy skills.

Table 46: Task 3 average scores

Group	Challenge 1: Task 3 average score (out of 12)	Challenge 2: Task 3 average score (out of 12)	Difference between the Challenge 1 and Challenge 2 scores
Control group	9.6	9.2	-0.4
Intervention group	10.1	9	-1.1
Difference between the control and intervention group averages	-0.5	-0.2	-0.7

One of the primary reasons for the score decreases seems to be participants' awareness and ability to manipulate phonologically opaque root words. In both challenges, participants were given six pairs of transparent words (i.e., no phonological or orthographical changes occurred to the root word) and six pairs of opaque words (i.e., words in which a phonological or orthographical shift occurred). In both tasks, participants in both groups had slightly lower average scores for the opaque derived words. However, as shown in Table 47, the average scores for the opaque pairs were lower in Challenge 2 than they were in Challenge 1.

Table 47:Task 3 average scores per question

Challenge and task number	Question number	Target answers	Control group average score (out of 1)	Intervention group average score (out of 1)	Control to intervention group score difference
Challenge 1, task 3	Question 1 (transparent)	Astonish → Astonishment	0.9	0.9	0
	Question 2 (opaque)	Elude → Elusive	0.6	0.7	0.1
	Question 3 (transparent)	Predict → Predictable	0.9	0.9	0
	Question 4 (transparent)	Destruct → Destructive	0.9	0.9	0
	Question 5 (opaque)	Science → Scientist	0.8	0.8	0
	Question 6 (opaque)	Music → Musician	0.7	0.8	0.1
	Question 7 (opaque)	Horrible → Horribly	0.8	0.9	0.1
	Question 8 (opaque)	Explode → Explosion	0.6	0.8	0.2
	Question 9 (transparent)	Flexible → Flexibility	0.9	0.9	0
	Question 10 (transparent)	Hard → Hardness	0.9	0.8	-0.1
	Question 11 (transparent)	Heart → Heartless	0.9	0.9	0
	Question 12 (opaque)	Confuse → Confusion	0.7	0.8	0.1
	Average total		**9.6**	**10.1**	**0.5**
Challenge 2, task 3	Question 1 (transparent)	Consist → Consistent	0.8	0.8	0
	Question 2 (opaque)	Revise → Revision	0.5	0.5	0
	Question 3 (transparent)	Adapt → Adaptable	0.9	0.9	0
	Question 4 (transparent)	Product → Productive	0.9	0.9	0
	Question 5 (opaque)	Biology → Biologist	0.7	0.5	-0.2
	Question 6 (opaque)	Statistic → Statistician	0.5	0.5	0

	Question 7 (opaque)	Terrible → Terribly	0.8	0.8	0
	Question 8 (opaque)	Apprehend → Apprehensive	0.8	0.8	0
	Question 9 (opaque)	Responsible → Responsibility	0.8	0.8	0
	Question 10 (transparent)	Dark → Darkness	0.8	0.8	0
	Question 11 (transparent)	Fear → Fearless	0.8	0.8	0
	Question 12 (transparent)	Develop → Development	0.9	0.9	0
	Average total		**9.2**	**9**	**-0.2**

The issues with a phonics-only approach to reading comprehension were discussed in depth in Chapter 2 of this thesis (section 2.2.1), and as discussed in section 5.3 (above), past research findings (e.g., Fowler and Liberman 1995; Mann and Singson 2003; Carlisle and Stone 2005) have shown that children find it more difficult to recognise a morphological relationship between words when there is a phonological shift. Additionally, in their study of children's awareness of infrequent root words (i.e., *stipulate*) and their derivations (i.e., *stipulation*), Freyd and Baron (1982), found that only the eighth-grade students consistently recognised the relationship between the suffixed derivatives and the words they had been taught. Even then, responses were only accurate for one third of the given derived words. These findings imply that age could be an important factor in the task 3 results. However, broadly, the task 3 findings are consistent with past findings which show that children are more accurate with decoding and comprehending the relationship between phonologically transparent word pairings. Even though the intervention group received explicit instruction on how to identify and manage root words that undergo a phonological shift when a suffix is added (see tutorial 4, Appendix XIII, p. 682, for examples), the average scores for phonologically opaque root words decreased from Challenge 1 to Challenge 2.

It seems, therefore, that the word analogy task results may be the primary reason that there was no significant difference between the intervention group's Challenge 1 and Challenge 2 morphological awareness scores. Additionally, the results suggest that the explicit instruction provided in the vocabulary skills development programme was not successful in developing

learners' understanding and awareness of the influence different suffixes can have on the sound/spelling of root words. Both groups did score highly in Challenge 1, which could explain why there is a small decrease in Challenge 2; it is hard to repeat such a high level of achievement when the root words change. Nonetheless, the Curriculum for Wales makes clear that learners need to be able to transfer and use their metalinguistic skills across a variety of vocabulary registers. Thus, while many learners did demonstrate a high level of word analogy awareness, many showed that to ensure consistency across different words and word types, further explicit instruction is important, particularly in words that contain opaque derived roots,

Analysis of one of the suffix-based tutorial 4 tasks supports the above claim. In tutorial 4, participants watched a series of videos which explained how root word and suffix spellings influence the word derivation process (for examples, see Figure 30 below). Following the instructional videos, participants were asked a series of multiple-choice questions in which they had to select the correct suffix to form a derived version of the target root word (see Figure 30, below). There were 10 marks available for this task and, overall, the average task score was 6 out of 10.

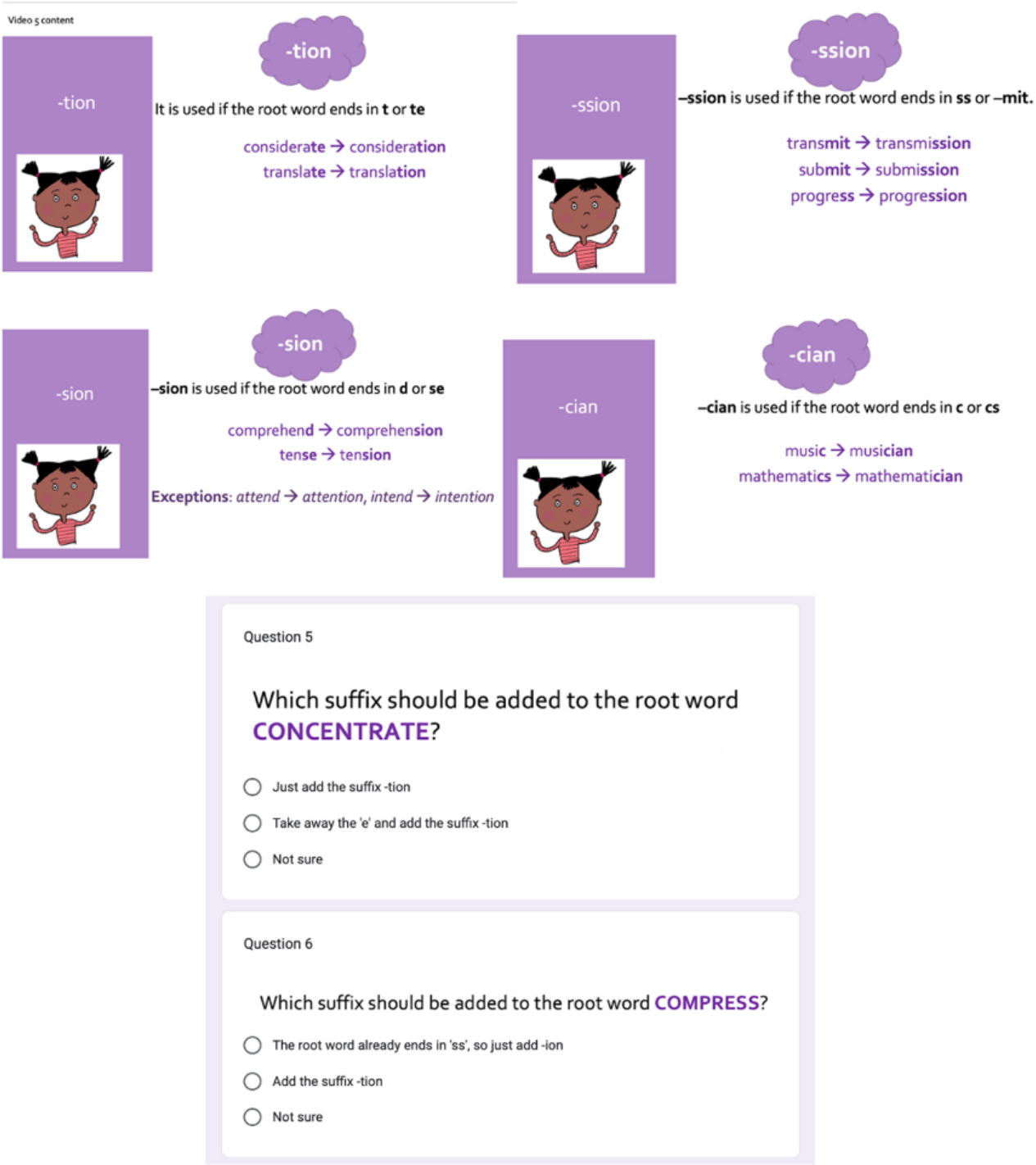


Figure 30: Tutorial example: The effect of suffixes in root word derivation

Analysis of individual questions shows that there is little consistency in which questions participants got right or wrong i.e., no one question had a particular higher/lower average than

another. However, participants' written feedback, shown in Table 48, shows that they needed more time to process and practice when and how to use these derivational suffixes.

Table 48: Intervention group participants' responses to a derivational suffix challenge in tutorial 4

I didn't know that suffixes could change a root word so much and that's really helpful because I don't really get spelling but this was too fast and I didn't get it :(
I got really confused from the start, it was fast and i couldt take it in
I just don't get it because I get that some words change when you add the ending but there wasn't enough time to think about which one is used where and their basically all the same
I diodnt know this before so thats helpful but I don't think did well because it was quick
Id like more time to do this again
I found it really helpful to go through these spelling rules for adding a suffix but I don't think I did very well because it was a lot to remember at once. I have asked my teacher if I can do it again.

As such, similarly to some of the prefix task responses, it seems that participants needed more time to process some of the morphology-based instructions. Chapter 3 explained that, because of COVID-19 restrictions, the vocabulary skills development programme was much shorter than I had intended. To adjust to the new timescale of the project, I did exclude some concepts that, originally, were going to be included in the programme. However, the participant responses shown in Table 48 indicate that they needed more time to process and practice their opaque word derivation skills using the above suffixes. As such, to ensure consistency in the decoding and comprehension skills associated with word analogies, future teaching practice may look to focus on opaque word derivations and may look to provide instruction over a longer sustained period of time.

5.6 Chapter summary

The first sections of this chapter have worked successfully to answer part of one of the research sub-questions posed in Chapter 2: *To what extent do children in Wales already have an awareness of English morphology and etymology?* Based on literature discussed in Chapters 1

and 2 (i.e., anecdotal experiences, recent Welsh child literacy statistics and findings from past studies on children's morphological awareness development), I hypothesised that many participants would start the programme with a relatively low ability to demonstrate explicit morphology-based skills. Section 5.1 has demonstrated that there is some variation in the percentage of participants in each of the score pre-intervention score categories, and some participants did find Challenge 1 difficult. However, the percentage of participants achieving 36+ marks in the Challenge 1 morphological awareness tasks has suggested that in Wales, many children in school Years 5 to 8 do have a foundation in morphological skills, as well as the ability to explicitly demonstrate the skills associated with morphology-based tasks. Numerous participants made comments which indicated that they found the morphological awareness challenge tasks 'easy', although many participants could have improved their morphological awareness scores, even if by just one or two marks. Some participants did achieve lower pre-intervention challenge scores and made comments about how they found the morphological awareness tasks highly challenging (see Table 24). As such, I argue that the variety in responses, and challenge scores, indicates that there is a place for explicit morphological awareness instruction in Wales's classrooms. As discussed below, the post-intervention results show that explicit instruction could be particularly important for those who demonstrate lower morphological awareness abilities. The next chapter of the thesis uses qualitative data to explore which other factors may have contributed to certain score outcomes in more detail. However, I suggest that, in the future, both teaching practice and morphology awareness-based studies could look to include a wider variety of high-level morphological skills-based tasks, as well as foundational morphology skills tasks, to assess the full extent of learners' pre-existing morphological awareness skills more accurately.

Having explored the pre-intervention results, the chapter continued by successfully addressing part of another of the research sub-questions: *How does explicit instruction in English derivational morphology (word parts and structures) and etymology (bound word parts and word origins) affect children's abilities to comprehend complex school vocabulary?* Analysis of the post-intervention challenge results has demonstrated that the intervention group's average challenge score only increased by 0.2 marks from Challenge 1 to Challenge 2. Conversely, the control group's average score increased by 1.5 marks from Challenge 1 to Challenge 2. Overall, the results of the mixed-effects statistical modelling have showed that taking part in the intervention was not likely to significantly affect participants' morphological awareness scores. There were no significant differences between the control group and

intervention group morphological awareness scores. Likewise, participants' Challenge 2 (post-intervention) morphological awareness scores were not likely to be significantly different from their Challenge 1 (pre-intervention) scores. Therefore, despite receiving four-weeks of explicit instruction that targeted different aspects of derivational morphology awareness, the intervention group participants' results did not differ significantly from their control group peers who received no explicit input. Written comments from some control group participants have suggested that completing the challenges one week after the other helped them (see Table 28 for examples). Consequently, future research on children's morphological awareness development and/or repetitions of this study may look to leave longer between the repeated challenges to reduce the impact of test repetition on control participants' scores. However, analysis of the individual morphological awareness tasks has demonstrated that the mixed-effects models do not account for some of the nuances in the dataset, as the vocabulary skills development programme does seem to have supported the development of some aspects of some intervention group learners' morphological awareness.

An examination of the individual morphological awareness challenge tasks has confirmed that many participants started the study with high levels of morphological awareness. However, data illustrated that some aspects of the explicit morphology-based instruction, particularly in word derivation (section 5.4), were successful in developing some aspects of participants' broader word recognition and comprehension skills. For example, the explicit instruction in the identification and meaning of common English affixes has seemed to increase some intervention groups' awareness of how to decode and comprehend multimorphemic words that contain free root words. As such, elements of these tutorial tasks, such as approaches to teaching affix meanings and opaque word derivations, could be used as a foundation from which to build new instructional practices in Wales's literacy classrooms. Additionally, section 5.3 has illustrated that the word decomposition instruction supported the development of some higher-ability participants' word decoding and comprehension skills. Nonetheless, some middle- and lower-ability participants found breaking words apart according to morphemes, rather than phonemes, highly challenging. Overall, the word decomposition results have highlighted the importance of providing instruction in morphology, as well as phonology, in the later stages of children's vocabulary development. Thus, I propose that, in line with the studies reviewed in Chapter 2 (section 2.3.1), a 'phonics-only' approach to vocabulary instruction is not enough to support the development of learners' later word decoding and comprehension skills.

Finally, section 5.5 has shown that the programme did not seem to have supported word analogy and suffix derivation skills development, as both the percentage of intervention participants achieving 75+% in the task and the average score for the task decreased. These decreases could have been a result of the high averages participants achieved in Challenge 1; just a few small inconsistencies in Challenge 2 lowered the overall scores. However, analysis of individual questions has demonstrated that participants found decoding and comprehending word pairs that contained opaque derivations particularly challenging. These results are consistent with past research findings, which have also demonstrated that children find opaque derived words challenging to analyse (e.g., Fowler and Liberman 1995; Mann and Singson 2003; Carlisle and Stone 2005). Moreover, numerous participants explained that they found the instruction provided in the vocabulary skills development too fast and they felt that they needed longer to fully understand the concepts discussed. As such, I explained that, for participants in the intervention group, the instruction provided may not have been long enough and, as a result of the short timescale of the project, I have captured data at a half-way point in learners' derivational morphology awareness development process.

As a result of the challenge, and individual task outcomes, I contend that prolonged and sustained instruction in how to recognise, decode, and comprehend the roots and affixes of opaque derived words could support learners' broader word recognition and comprehension skills. Furthermore, the findings presented in this chapter have indicated that, rather than focussing only on learners' word familiarity (i.e., exposing learners to lots of words and making them very familiar with specific sets of words), it is important to build depth in word skills (i.e., the ability to recognise and identify root words, even when the root word is opaque within a derived word). This chapter has begun to explore the idea that different types of morphology-based instruction could support the development of different types of learners i.e., high-ability, middle-ability, or lower-ability learners. However, the extent to which the claims made about the impact of explicit morphology-based instruction on different types of learners may be applicable to a larger population remains unclear. Furthermore, some of the above results have implied that some factors, such as age and learning attitudes/experiences, could have influenced participant outcomes. Therefore, the next chapter of this thesis uses more mixed-effects models, and thematic analysis of qualitative data, to examine which, if any, external factors may have influenced the morphological awareness results. The aim of the analysis is to

provide insight into which external factors may require consideration in future studies and classroom practice.

6 Morphological awareness: External influential factors

The results presented in Chapter 5 demonstrated that there were no significant differences between the morphological awareness scores of the control and intervention groups. Likewise, regardless of condition (i.e., control or intervention), there was no significant difference between participants' Challenge 1 and Challenge 2 scores. However, analysis of the results of individual tasks and participants illustrated that there are nuances to the dataset that are not captured in the statistics-based overviews. The vocabulary programme did support the development of the morphological awareness skills of some intervention group participants, and some discussion points hinted at the notion that other factors, such as frustration and learning environment, may have influenced the study results. Additionally, the literature reviewed in Chapter 2 of this thesis highlighted that a number of additional, external factors could influence individual learners' morphological awareness development. Therefore, in line with research sub-question 3— *To what extent do external factors, such as age, mono/bi/multilingual status, languages spoken, enjoyment, perceptions of task/subject difficulty and out-of-school reading habits, affect the development of morphology- and etymology-based vocabulary decoding and comprehension skills?* (see Chapter 2)—this chapter starts by analysing the data collected in the pre-intervention questionnaire in conjunction with the morphological awareness scores to explore which, if any, external factors may have influenced the results. The chapter then continues by presenting findings from the thematic analysis of qualitative data in order to further advance understanding of the additional factors that may influence learners' morphological awareness development. The purpose of this chapter is to explore which additional factors may require consideration if and when teachers design and integrate explicit morphology-based instruction into aspects of their Languages, Literacy and Communication (LLC) curriculum.

6.1 Building the morphological awareness external factors mixed-effects model

In order to explore which, if any, external factors may have influenced the morphological awareness results, I built a mixed-effects model that added one fixed effect factor to the model at a time. Table 49 (below) shows the order in which the factors were added into the model. There was no particular reason for this order and the order in which they were added did not affect the model results.

Table 49: Mixed-effects models and factors

Model number	Fixed effect factor added to the model
Model 1	Condition (i.e., control or intervention group) Challenge number (i.e., Challenge 1 or Challenge 2)
Model 2	School year group
Model 3	Enjoyment of school English lessons
Model 4	Difficulty rating of English lessons at school
Model 5	Out-of-school reading habits
Model 6	Morphology task difficulty ratings
Model 7	English language status

To test the effectiveness of each new model, I used the *anova* function in RStudio. This function shows whether the new model is more effective than the previous model or not. If the *p*-value (column Pr(>Chisq) in Table 50) was greater than 0.01, the model was deemed more effective than the model that had gone before. Table 50 shows the *anova* test results for each model.

Table 50: Mixed-effects model anova test results

	AIC	BIC	logLik	Pr(>Chisq)	Signif.
Model2	49275.06	49353.43	-24627.53	0.149505790141691	
Model3	49266.65	49345.01	-24623.32	0.00328003135683012	**
Model4	49144.15	49261.67	-24557.08	0.0000235051843171911	***
Model5	48691.99	48832.85	-24328.00	0.00010229335833235	***
Model6	23837.71	23987.02	-11897.86	0.000000000004016449733962 77	***
Model7	23839.90	24003.43	-11896.95	0.404258089449725	

Signif. codes: . $p \leq 0.05$, * $p \leq 0.01$, ** $p \leq 0.001$, *** $p \leq 0$

Table 50 illustrates that the mixed-effects models were not as accurate when school year group (Model 2) and English language status (Model 7) were included. As such, both of these factors were excluded from the final model (discussed in section 6.2, below). However, based on findings from previous studies, it is surprising that neither of these factors influenced

participants' results. Therefore, before examining the significant factors, this chapter offers a short discussion of the school year and mono/bi/multilingual factor findings.

6.1.1 School year group

Firstly, based on the literature discussed in Chapter 2 (section 2.1), which found a noticeable difference between the academic language used in primary and secondary schools (e.g., Braund and Driver 2005; Nagy et al. 2012; Meston et al. 2021), and that derivational morphological awareness seems to develop with age (e.g., Carlisle and Stone 2005; Goodwin and Ahn 2013), I predicted that school year group may be an influential factor on participants' morphological awareness outcomes. The model does predict that there is a small but significant likelihood that Year 8 participants would achieve a morphological awareness score that is 2 marks higher than the Year 5 participants' scores ($\beta = 0.13516$, $z = 2.139$, $p = 0.032$). Nonetheless, given the extent to which previous research has found age to be a significant factor in morphological awareness studies, it is surprising that overall, the school year group results were not a reliable predictor of morphological awareness score results.

It is difficult to determine the specific reasons for this result. However, the written responses shown in Table 51 (below) suggest that some primary school learners might be more used to completing decontextualised word-based challenges (i.e., spelling tests, grammar tests etc.) than their Year 7 and 8 counterparts. The secondary school participants seem to be more used to exploring and learning about vocabulary in relation to a bigger topic (i.e., Dickens, poetry etc.), and with the purpose of completing an assessment. One of the Year 8 participants (Table 51) even commented on the fact that thinking about vocabulary in this more holistic way is 'like something youd do in year 4'.

Table 51: Participant responses to the Challenge 2 morphology tasks

Participant year group	Response to the Challenge 2 tasks
5	*I like this becos is really simila to the gramma challenges we do in class where you have to work out bits of a sentance and fill in the gaps*
5	*This is like the reading challenge tests we do but I enjoyed it more because there was a point to the storyu*
6	*I didn't like this becouse it was a bit boring and it was like the term tests we have to do to show our levels and spellings to Miss [name removed]*
7	*I enjoyed thinking about words in this word and liked the detective challenge but it was a bit random because we're in the middle of other work*
8	*I can see its helpful to look at words like this but usually we look at words that actually relate to what we're doing. Like Miss gives us a vocabulary booklet that goes with the class book we're reading and that just seems more helpful because then you learn the words you actually need. Weve just done that for Christmas carol and then it helps for the assessment.*
8	*I don't really see the point in this because you cant know all the words ever. The words in the detective thing were random and we just need to know the ones we need for understanding the assessment we do at the end of term. Like I learn my poetry words to write the essay and then that's fine. It feels like something youd do in year 4.*

The responses in Table 51 imply that the often more prescriptive, assessment-driven approach taken to teaching secondary school-based vocabulary may have influenced some participants' results. I postulate, though, that the findings above further emphasise the need to support learners' morphological awareness development through the school transition. One might predict that, based on increased learning experiences and the number of words encountered, Year 8 learners would have outperformed Year 5 learners in the pre- and post-intervention challenges. But, analysis of the study results shows that this was not the case. Year 8 learners were not significantly more likely to have higher morphological awareness score than Year 5

learners. These age-based results indicate that some learners' literacy skills may not be progressing in line with their relevant ages. The discussions presented in Chapter 1 highlighted that limited skills development could have negative impacts on learners' GCSE and post-school outcomes. As such, I contend that more research is required to understand fully how best to sustain learners' vocabulary skills development through the primary to secondary school transition. It is important to note that, as explained in Chapter 3 (section 3.4.2), there were notably fewer primary school-aged participants than secondary school-aged participants. Chapter 3 explained that linear mixed-effects models account for the imbalances in a dataset by predicting interactions between specified factors, but future research may look to recruit more primary school participants in order to re-evaluate and clarify the extent to which school year group is a significant predicting factor on morphological awareness skills development. This could provide valuable insight into how to develop explicit morphology-based teaching practices through the school transition years.

6.1.2 English language status

In addition to school year group, the results in Table 50 (above) also show that participants' English language status (i.e., whether they had English as a first language, were bi/multilingual with English as a main language or had English as an additional language) was not a significant predictor of morphological awareness results. Some participants' written responses suggest that the reason for this insignificant result might be that there are high levels of variation in how individuals perceive English as a language.

Table 52 (below) shows a series of language perception-based responses from participants who have different English language statuses. In the table are responses from two monolingual English-speaking participants who made comments about how they had not thought of English as a 'language' before. To them, English in school equates to literature. Additionally, the table shows that two bilingual participants had not realised that they may be able to use some of the skills and knowledge from one language to support them in the other. In particular, one participant commented that they do think of their other language (Welsh) in 'parts' because of the mutation system the language uses, but they did not transfer this perception of language across to English. These results correlate with some previous research findings discussed in Chapter 2 (section 2.7) which illustrated that after receiving explicit instruction in morphology, bilingual English-Spanish children were more aware of how the awareness and skills in one

language could support their metalinguistic skills in the other (see Kuo et al. 2017). Finally, another participant, who has English as an additional language, explained that they try to break words down into parts because it helps them read and understand words they have not seen before. It seems, therefore, that there are notable variations in how learners approach decoding and comprehending English as a language, and it could be that this diversity in perceptions means that English language status is not a significant factor in this research.

Table 52: Perceptions of English as a language

Participant mono/bi/multilingual status	Participant written feedback
Monolingual English speaker	*Ive not thought of English like a language with parts you have to learn before as in within actual words. I know about grammar and stuff but actually what I know about grammar is from out welsh classes not our English ones.*
Monolingual English speaker	*I think its interesting to learn English like this because when you speak it you don't think of it like a language you have to learn about. In school, English is poetry and plays and novels, not words.*
Bilingual (English + 1 Romance language)	*before doin these lessons I hadn't thought about how I could use [Romance language] to help me look at word parts and how the meanings change. In my other language there are lots of gender rules like stuff being amle or female with endings and English is diffrent but I guess it could help em to break it down and think about ti more*
Bilingual (English + 1 Celtic language)	*I don't think about English in parts. I speak welsh to and that has complicated mutation systems that mean I think about word parts more. But I guess English is the same really but its just not something we do.*
English as an additional language (first language of Romance origin)	*I found these tasks easy even though I think English is hard. It is not my first language but that means I always break up words into parts, try to spot the bits I know and then word out how to read it and what it means.*

While not conclusive, the findings above do raise important questions about how schools approach thinking about and teaching English as a language, not just a humanities-based subject (see Table 52). Additionally, Chapter 1 showed that the new Curriculum for Wales advocates a more holistic approach to Languages, Literacy and Communication teaching and pedagogies. Thus, in future, it could be important to consider the role that language perceptions play in the development of learners' metalinguistic skills. It seems highly important to develop learners' awareness of how their linguistic diversity, and the skills that being bi/multilingual can give an individual, can be capitalised on and celebrated.

Due to the time limitations of the current study, and because English language status was not deemed a significant predicting factor, I did not conduct subsequent investigation into whether the typology of an individual's language(s) influenced the morphological awareness results. However, a recent study by Wu and Juffs (2022) found that L1 morphological type did have a significant effect on L2 morphological awareness. Wu and Juffs' (2022) results showed that, in tests of English derivation, morphological relatedness, and suffix-ordering, those whose L1 was Turkish (a morphologically agglutinative (complex) language), significantly outperformed participants whose L1 was Chinese (a morphologically isolating language in which, typically, each word consists of one morpheme). Moreover, the Turkish group significantly outperformed the native English group in the morphological relatedness task even without accounting for English proficiency. As such, future UK-based morphological awareness research may look to investigate the role of English language status and language typology further. This could help both to substantiate the above claim—that in Wales's schools, the morphological awareness skills of bi/multilingual learners are not capitalised on explicitly and, therefore, these learners do not always transfer skills between languages—and help to develop understanding about how different language typologies could be used to support morphological awareness development. School practice may also look to consider whether discussions of English as a language, not just a medium through which to explore novels and plays etc., could support teachers and learners with engaging in more explicit discussions about vocabulary and metalinguistic skills.

6.2 Significant external factors

Having discussed the external factors that were not significant predictors of participants' morphological awareness results, this chapter continues with an exploration of the factors that are significant predictors. Table 50 shows that Model 6 was the most effective mixed-effects

model (p = <0.001). Therefore, the results discussed in this section are based on outcomes from this model. Below is the R code for the most effective, maximal mixed-effects model structure:

```
glmer(coding ~ condition*challengeNum +
                Do.you.enjoy.English.at.school. +
                How.difficult.or.easy.do.you.find.English.at.school. +
                How.often.do.you.do.you.read.outside.of.school. +
                 How.did.you.find.this.task..1 +
                (1 | participantID) +
                (1 | School) +
                (1 | questionNum)
```

The model above predicted the likelihood that condition (i.e., control group or intervention group), challenge number (Challenge 1 or Challenge 2), enjoyment of school English lessons, difficulty rating of English lessons at school, out-of-school reading habits, and morphology task difficulty ratings influenced participants' morphological awareness challenge scores. The model reports on all participants, regardless of whether they were in the control or intervention groups. The results of the statistical modelling are shown in Table 53 (below). The model suggests that some responses to enjoyment of school English lessons, difficulty rating of English lessons at school, out-of-school reading habits and morphology task difficulty ratings are significantly more likely to influence morphological awareness score outcomes. Thus, this chapter continues by discussing each of these factors in turn.

Table 53: Morphological awareness external factor mixed-effects model results

	Estimate	Std. Error	z-Value	Pr(>|z|)	Signif.
(Intercept)	-0.044983	0.085641	-0.525	0.59941	
Condition (Baseline: Control)					
Intervention	0.019736	0.034034	0.580	0.56199	
Challenge (Baseline: Challenge 1)					
Challenge 2	0.079869	0.074810	1.068	0.28569	
Enjoyment of school English lessons (Baseline: Yes)					
No	-0.469514	0.143226	-3.278	0.00104	**
Sometimes	-0.271036	0.111248	-2.436	0.01484	*
Not sure	-0.063276	0.067592	-0.936	0.34919	
Difficulty rating of English lessons at school (Baseline: Very hard)					
Somewhat hard	0.027130	0.080590	0.337	0.73639	
Sometimes easy, sometimes hard	-0.152796	0.077782	-1.964	0.04948	*
Not sure	0.048312	0.060824	0.794	0.42702	
Somewhat easy	-0.125521	0.055671	-2.255	0.02415	*
Very easy	-0.053922	0.063870	-0.844	0.39853	
Out-of-school reading habits (Baseline: I never read outside of school)					
I sometimes read outside of school	0.117308	0.039301	2.985	0.00284	**
I read quite often outside of school	-0.006235	0.032139	-0.194	0.84618	
I read outside of school all the time	0.032070	0.023487	1.365	0.17211	

Morphology task difficulty ratings (Baseline: Really hard)					
Fairly hard	0.183749	0.041164	4.464	0.00000805	***
Not sure	0.065218	0.053566	1.218	0.22340	
Fairly easy	0.188724	0.064050	2.947	0.00321	**
Intervention condition (Baseline: Challenge 1)					
Challenge 2	-0.039026	0.041878	-0.932	0.35138	

(Signif.) codes: . $p \leq 0.05$, * $p \leq 0.01$, ** $p \leq 0.001$, *** $p \leq 0$

6.2.1 Enjoyment of school English lessons

In the pre-intervention questionnaire, participants were asked, 'Do you enjoy English at school?' and could respond with the options 'yes', 'no', 'sometimes' and 'not sure'. The mixed-effects model predicts that participants who responded 'no' were significantly more likely to get a lower morphological awareness score in Challenge 2 than those who said 'yes' (β = -0.469514, z = -3.278, p = 0.00104). Similarly, participants who responded 'sometimes' were also significantly more likely to get a lower morphological awareness Challenge 2 score than those who said 'yes' (β = -0.271036, z = -2.436, p = 0.01484). These findings are visualised in Figure 31 (below).

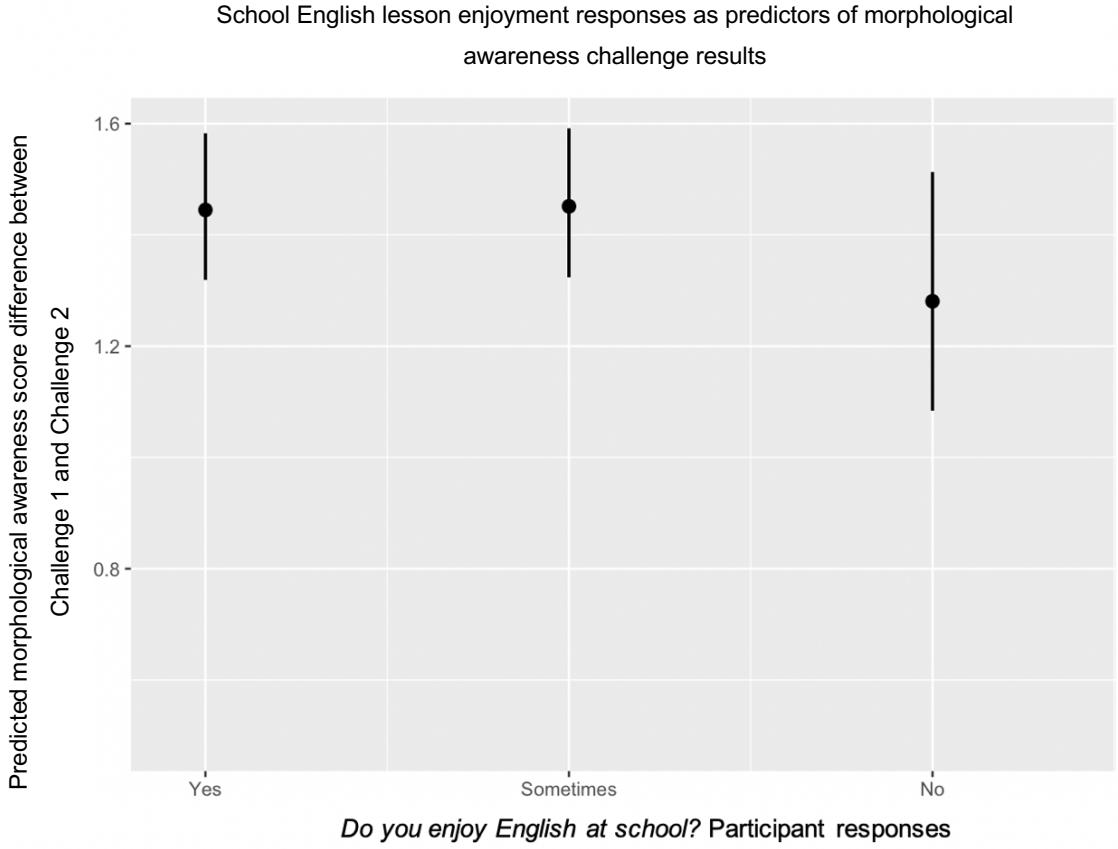


Figure 31: School English lesson enjoyment responses as predictors of morphological awareness challenge results

Overall, the above results suggest that school English lesson enjoyment is a good predictor of morphological awareness development. The more a participant enjoys school English lessons, the more likely they are to get a higher morphological awareness score. As discussed in Chapter 2 (section 2.3), the role of enjoyment plays in first language development is under-researched and undervalued. However, the findings above are consistent with past foreign language

acquisition studies, which have demonstrated that enjoyment plays an important role in learners' language development experiences and skills attainment (i.e., Dewaele 2022). Many participants also gave written feedback about how much they had enjoyed aspects of the challenges and/or tutorials, therefore section 6.4 explores the influence of enjoyment on learners' morphological awareness skills development in more detail.

6.2.2 Difficulty rating of English lessons at school

Participants were also asked 'How difficult or easy do you find English at school?' and could respond with the options 'very hard', 'somewhat hard', 'sometimes easy, sometimes hard', 'not sure', 'somewhat easy' and 'very easy'. The mixed-effect model results in Table 53 show that participants who responded 'sometimes easy, sometimes hard' were significantly more likely to get a lower morphological awareness score than those who said 'very hard' (β = -0.152796, z = -1.964, p = 0.04948). This result is somewhat surprising, as one might predict that the harder a participant found the challenge, the lower their morphological awareness score. Similarly, participants who responded that they find English lessons at school 'somewhat easy' were also significantly more likely to get a lower morphological awareness score in Challenge 2 than those who said 'very hard' (β = -0.125521, z = -2.255, p = 0.02415). Again, this is not what one might predict. However, Figure 32 (below) helps to illustrate why it is the 'sometimes easy, sometimes hard' and 'somewhat easy' responses that have elicited significant results, as the graph shows that there was wider variation in scores from participants who selected the other response options. None of the other responses to the above question were deemed significant predictors of morphological awareness results.

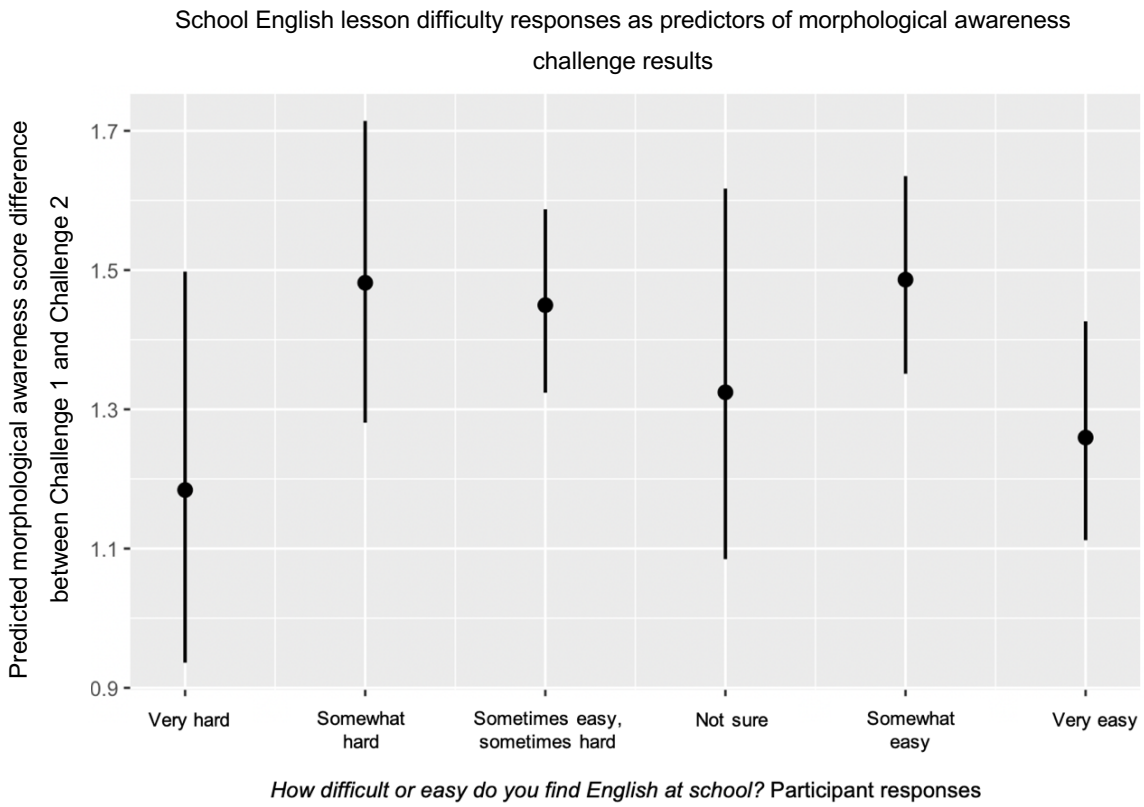


Figure 32: School English lesson difficulty responses as predictors of morphological awareness challenge results

Although extensive searches of the literature did not help to identify whether there is a relationship between self-reported ratings of school lesson difficulty and skills achievement, past studies have shown that there is a positive correlation between literacy difficulties and negative test outcomes (for example, see Hirvonen et al. 2010). As such, one might hypothesise that the easier a learner finds school English lessons, the more their morphological awareness skills may have increased. However, the findings from this study are inconsistent with the above hypothesis. This could be, in part, because the meaning of 'difficult' is highly subjective and I did not provide participants with any definitions and/or a sliding scale to support/create shared meaning of the term. This lack of definition is a limitation of the current study and future research/classroom practice may look to clarify and/or quantify this term to add clarity to participants' responses. Secondly, analysis of the qualitative data collected suggests that participants' written responses to English/task difficulties provides more in-depth, reliable insight into their learning experiences, and how these experiences may have impacted their morphological awareness development. Therefore, rather than providing conclusive evidence,

I suggest that the above statistical findings only offer a foundation from which to begin to consider the role of self-reported ratings of school English lesson difficulty.

6.2.3 Out-of-school reading habits

In the pre-intervention questionnaire, participants were asked, 'How often do you read outside of school?*'* and could respond with the options, 'I never read outside of school', 'I sometimes read outside of school', 'I read quite often outside of school', or 'I read outside of school all the time'. The mixed-effects model predicts that participants who responded, 'I sometimes read outside of school' were significantly more likely to get a higher morphological awareness score than those who said 'I never read outside of school' ($\beta = 0.117308$, $z = 2.985$, $p = 0.00284$). This was the only out-of-school reading habit response that was deemed statistically significant. Figure 33 (below) suggests that the other responses may not have been statistically significant because there is more variation in the morphological awareness scores of those who said they read outside of school 'quite often' or 'all the time'.

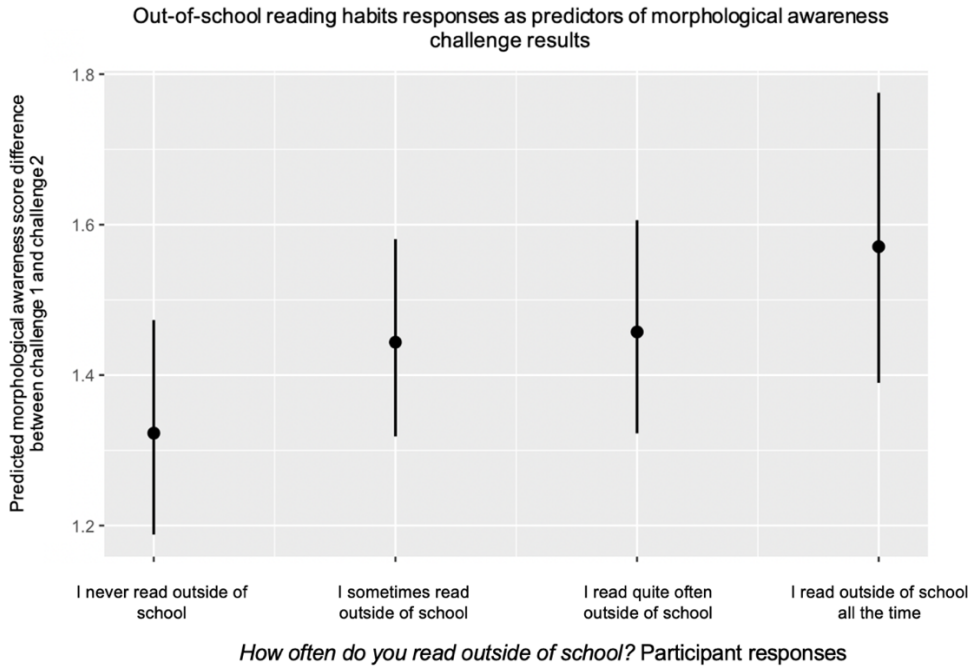


Figure 33: Out-of-school reading habits as predictors of morphological awareness challenge results

Although only the 'I sometimes read out of school' response was statistically significant in relation to participants' morphological awareness outcomes, the literature reviewed in Chapter

2 (section 2.2) demonstrated that the amount that children read for enjoyment can be a major contributor to their reading achievement (e.g., Cox and Guthrie 2001; Clark and Rumbold 2006; Sullivan and Brown 2015). In a 1992 study, Elley (1992) found that for nine-year-old students, in 32 countries, frequency of silent reading (i.e., reading alone and for pleasure) significantly contributed to reading achievement. A past OECD 'Reading for change' study (Kirsch et al. 2002) also found that reading enjoyment (i.e., reading outside of school) is more important for children's educational success than their family's socio-economic status. Thus, Pressley (2000) proposes that the 'frequent admonition for children to 'Read, read, read' makes sense in that extensive reading promotes fluency, vocabulary, and background knowledge'. Conversely, children who read very little, both in and outside of school, do not have the benefits that come with reading, and studies show that, when struggling readers are not motivated to read, their opportunities to learn decrease significantly (Baker and Wigfield 1999). Although the result is not statistically significant, the model does also predict that participants who responded 'I read outside of school all the time' were also more likely to get a higher score in the morphological awareness tasks of Challenge 2 than those who said they 'never read outside of school' ($\beta = 0.032070$, $z = 1.365$, $p = 0.17211$). This result maps onto findings from the previous studies discussed above and, although not conclusive, suggests that out-of-school reading habits may be an important factor to consider in future morphology-based studies and classroom practice.

6.2.4 Morphology task difficulty ratings

In the challenges, participants were asked to rate how easy or difficult they found the morphological awareness tasks. The options they could select included, 'really hard', 'fairly hard', 'somewhat easy, somewhat hard', 'not sure', 'fairly easy', and 'very easy'. Overall, no participants responded with 'somewhat easy, somewhat hard' or 'very easy'. Therefore, these options are not represented in the model. This is surprising given the earlier discussion in Chapter 5 (section 5.1), which demonstrated that a notable number of participants wrote comments about how 'easy' they found the morphological challenge tasks. This finding adds gravitas to the earlier concern about the subjectivity of the terms 'difficult' and 'easy', and also questions whether confidence levels/self-esteem may play a role in participants' responses (i.e., participants did not want to appear overly confident). However, the mixed-effects model predicts that participants who responded with 'fairly hard' as their task difficulty rating were significantly more likely to achieve a higher morphological awareness score than those who

said ‘really hard’ (β = 0.183749, z = 4.464, p = 0.00000805). Likewise, the model predicted that participants who gave a rating of ‘fairly easy’ were significantly more likely to achieve a higher morphological awareness score than those who said ‘really hard’ (β = 0.188724, z = 2.947, p = 0.00321; see Figure 11).

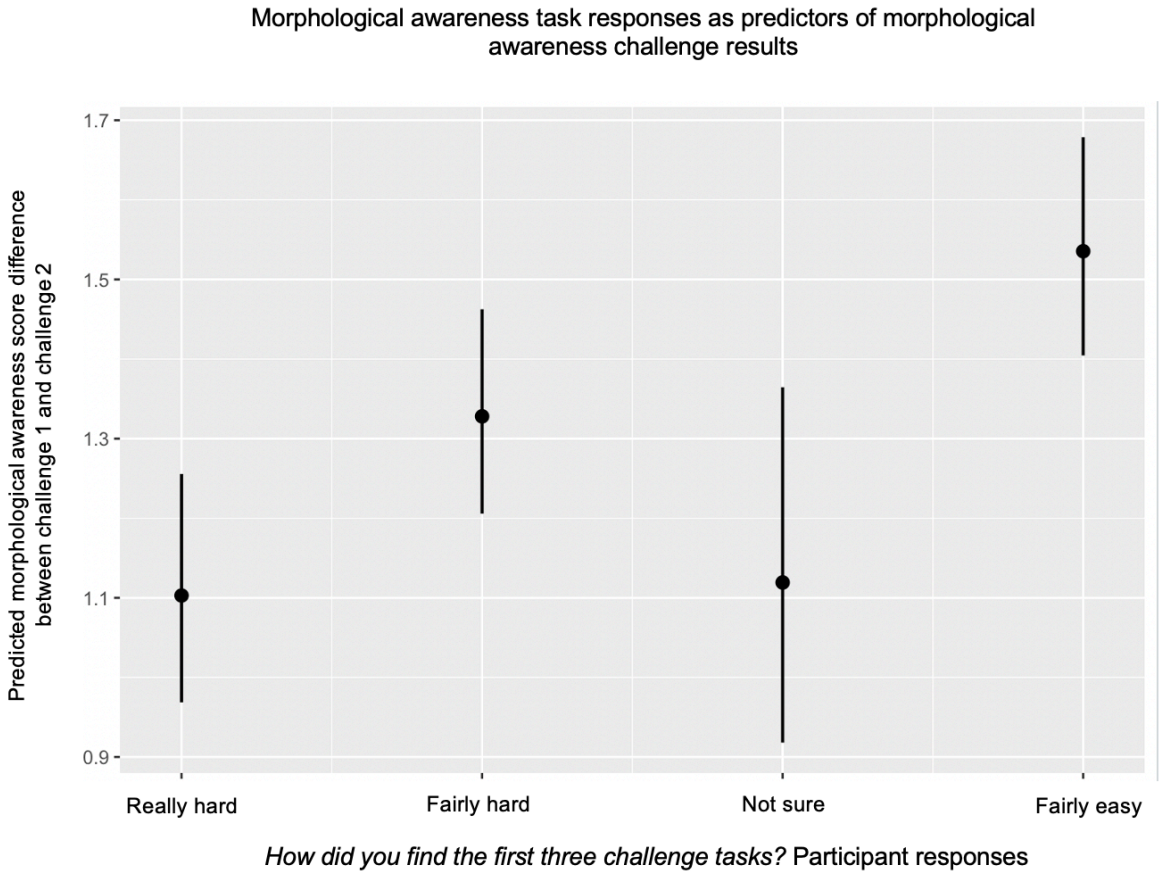


Figure 34: Morphological awareness task responses as predictors of morphological awareness challenge results

The above results indicate that how difficult or easy a participant finds a task may be a good predictor of their morphological awareness score. However, because no participants selected the ‘very easy’ or ‘somewhat easy, somewhat hard’ options, and the terms are highly subjective, it is unclear the extent to which this claim is reliable.

6.2.5 Summary of quantitative external factor predictors

Overall, the results from the mixed-effects models show that enjoying school English lessons, sometimes reading outside of school, and finding the morphology-base challenge tasks ‘fairly easy’ meant that a participant was more likely to get a higher morphological awareness score.

However, some of the above results are inconclusive, either because of subjectivity and a lack of definitions around key terms (i.e., difficulty), or because of variation in the scores of participants who provided a certain response. Subsequently, it is unclear the extent to which some of the results are reliable and may recur in future morphological awareness studies. As explained in Chapter 3 (section 3.5), to explore some external factors further, and to examine external factors that the pre-intervention questionnaire did not account for, I conducted a thematic analysis of participants' written responses to both challenge and, in the intervention group, tutorial tasks. Overall, I found three primary recurring themes within the morphological awareness dataset: enjoyment, confidence, and setting and environment. Therefore, this chapter continues with critical discussions of each of these themes.

6.3 Thematic analysis results

Throughout the vocabulary skills development programme, participants were given time and space to reflect upon their learning experiences. At the end of each task, they were asked: 'How did you find this task? Is there anything in particular you will take away from this task? Do you have any other comments?'. I collated this data and, as outlined in Chapter 3, followed Braun and Clarke's (2022) six phase process to thematic analysis to explore key themes that emerged from the morphological awareness dataset. The aim of conducting a thematic analysis was to identify any particular factors that were not accounted for in the quantitative analysis that might provide additional areas of consideration for teachers/future research into explicit morphological awareness and explicit instruction in derivational morphology. Across the six weeks of the programme, participants in the intervention group made a total of 5689 comments in relation to the morphology-based tasks. As explained above, responses relating to enjoyment, confidence, and setting and environment occurred repeatedly throughout the dataset. Overall, 1225 responses referred to 'enjoyment' in some way, 786 responses referred to 'confidence' in some way, and 624 responses referred to setting and the environment in some way. Some individual responses referred to more than one of the primary themes, therefore these responses were coded under both themes. As such, the next sub-sections of this chapter explore each of these key themes.

6.4 Enjoyment

> *I've never done something like this before and I really really enjoyed it. Its so cool to think about the way words work and I didn't realise*

that there are ways to break things down like this. Its much better than writing like we normally do.

Analysis of the intervention groups' written responses to the morphology-based tasks demonstrated that one of the primary recurring themes was enjoyment. Overall, 83 out of 143 participants made at least one comment about how much they had enjoyed an aspect of the morphology-based challenge or tutorial tasks. In particular, learners whose scores increased from Challenge 1 to Challenge 2 wrote comments about how much they had enjoyed both the tasks and challenges. Table 54 (below) shows the feedback of four participants whose scores all increased from the 26 to 30-mark category to the 31 to 35-mark category. All the quotations below were given at the end of the programme in tutorial 4.

Table 54: Examples of participants' enjoyment-based responses

Great job in this tutorial because your videos were really interesting and I enjoyed learning about something new. I didn't really think about how words are put together before but this makes a lot of sense!
My feedback on how I found this task is that it was fun i enjoyed doing the tasks and it was good that the videos werent to long because that kept me interested
I consider myself more of a science person than an English person but this was really interesting to me because it's the construction of how things work and you can add and takeaway parts as if it's a puzzle.
I think I will takeaway what I've learnt about derivational morphology. I knew about word roots before but I didn't know about how to spot patterns in words. I think doing more things like this would help me understand more complicated words in the future. I learnt about lots of words and word parts I hadn't seen before.

When considered in conjunction with the participants' morphological awareness score increases, the responses listed above begin to suggest that enjoyment should be a factor considered in future literacy/word awareness studies. Examination of participants whose scores increased within the 21 to 25 category strengthens the above claim. For example, at the end of tutorial 4, participant P3I commented:

> *I really enjoyed the root word tree task because id not thought about words working like that before. I didnt think id find it interesting but I do. It got me to think of more words that I don't often use.*

Likewise, participant P1I, whose score increased from 21 (Challenge 1) to 23 (Challenge 2), explained:

> *I enjoyed the space robots story because it made me think of different and unusual vocabulary. This was actually fun! I like doing the alien task as well. This has given me loads of help with using these type of words and now undertand how to make them. Well done. I usually find English booooooooring (dont tell miss)*

Similarly, participant P126I, whose score increased from 21 (Challenge 1) to 24 (Challenge 2), wrote:

> *I didn't know morphology was a thing before, it sounds like a made up word but its not it means the structure of words and I really enjoyed thinking about how to count word parts to make a whole word. I prefer maths to English and this was like word maths. I enjoyed trying to find words that begin with 'mis' and others.*

Finally, participant P78I, who scored 21 in Challenge 1 and 23 in Challenge 2, said:

> *i learned many skills and new words/facts about How to use morphomology which was really fun**.** I enjoyed it because it taught me some new words i dident know like what a suffix is. i enjoyed the storyline and the type of questions*

Collectively, the above participants' feedback suggests that they enjoyed the approach taken to explicit morphology-based instruction in the vocabulary skills development programme. In particular, there were three morphology-based tasks that seemed to elicit enjoyment-based feedback/responses: the compound words task (tutorial 2, task 6), the *Logomachy!* game (tutorial 4, task 5), and the story-telling task (tutorial 4, task 6).

For example, one intervention group participant said:

> *i liked how there was lots of creative options like the alien guestions making up our own new words and telling storys. It was pretty cool to play so many games I learnt a lot from that. I really liked that game where we had to guess the meaning of a madeup word.*

Overall, 41 participants made comments about how much they had enjoyed the pseudo-word-based games. These tasks allowed learners to demonstrate high levels of awareness regarding how the construction of a word can contribute to a word's meaning. The above findings are consistent with previous second language acquisition research which has shown that using games in the language learning classroom can increase vocabulary recognition and comprehension, as well as confidence with using unfamiliar words (see (Uberman 1998; Wang et al. 2011; Derakhshan and Davoodi Khatir 2015; Bakhsh 2016; Abdulhussein and Alimardani 2021). Furthermore, numerous morphological experiments have used pseudowords to test children's morphological awareness levels (e.g., Berko 1958; Nunes et al. 2003; Mitchell and Brady 2014; Casalis et al. 2015). However, despite extensive searches of the literature, I was unable to find any studies that had used pseudoword tasks as a task within explicit morphological instruction. Consequently, the above participant's quotation also raises questions about whether integrating games that include pseudo- or made-up words, could form part of teachers' Languages, Literacy and Communication curricula designs. These types of activity may have the potential to support learners' enjoyment, and development of, the morphology-based metalinguistic skills listed in the new Curriculum for Wales.

In total, only 10 intervention group participants made at least one comment about how they had not enjoyed the morphology aspects of the vocabulary skills development. Interestingly, the scores of 7 of the 10 participants who made negative enjoyment comments decreased from Challenge 1 to Challenge 2. The scores of the other three participants stayed the same. For example, participant P14I, whose score decreased from 25 (Challenge 1) to 21 (Challenge 2), explained:

> *I'm, not sure it just wasn't very enjoyable i didn't like it because i dont rally like writing i didnt enjoy because it wasnt that fun i found very boring and do not enjoy this type of work*

Similarly, participant P26I, whose morphological awareness task scores decreased from 15 (Challenge 1) to 10 (Challenge 2), said:

> *i did NOT enjoy ITTTT becasue it was boring tryne brak up words Yosin old langwig*

The spelling and language used in participant P14I's and P26I's responses suggests that they might find writing/literacy-based tasks challenging. However, broadly, the qualitative enjoyment-based findings are consistent with the statistical mixed-effects model results discussed in section 6.2.1 (above), which showed that the more a participant enjoys school English lessons, the more likely they are to get a higher morphological awareness score. Additionally, both the quantitative and qualitative results from this study are similar to findings from a number of past studies which have shown that both anxiety and enjoyment can influence literacy-based attainment. For example, Dewaele et al. (2018) used Dewaele and MacIntyre's (2014) foreign language enjoyment (FLE) scale to analyse data from 1746 British secondary school participants and show that enjoyment reduced classroom anxiety and increased performance in the additional language (see also Dewaele 2022).

Nevertheless, the role of enjoyment in UK first language classrooms and, more specifically, Welsh school English/literacy classrooms has not been explored in depth. UK-based studies that have explored the role of enjoyment in literacy primarily do so in relation to enjoyment of literacy in the home environment and shared child/parent reading (for example, see Preece and Levy 2020). The literature review offered a short discussion on the role of reading for pleasure in children's literacy skills development (see Chapter 2, section 2.2). However, responses from the intervention group participants indicate that, currently, the role of enjoyment in metalinguistic skills development is undervalued and underexplored in the UK education context. In particular, participants seemed to enjoy the creative, interactive nature of some of the morphology-based activities. Consequently, this study offers new important insight into the role of enjoyment in the school English language classroom. The results indicate that future studies and teaching practice, which explore explicit instruction in derivational morphology, might look to include a variety of interactive tasks that foster a culture of enjoyable learning in the literacy classroom. This, in turn, could lead to increased metalinguistic skills development.

6.5 Confidence

> *I'm really sorry I don't understand what we'r supposed to do im just not very good at English :(*

In addition to learning enjoyment, participants' written responses also showed that it is important to consider the impact of confidence on individual's abilities to demonstrate and develop metalinguistic skills. Table 55 (below) shows responses taken from both control and intervention group participants at the end of Challenge 1. The participants quoted in Table 55 (below) all scored 40% or lower in Challenge 1.

Table 55: Examples of participants' confidence-based responses

I really am not sure if im doing what we're supposed to. I haven't done anything like this befor
I sort of gave up tbh I just think I was doing rubbish and I don't now how to improve
I really wanted to do well on this sorry but I just don't think im very gooda t it
I give up another thing I cant do
Dunno sorry I tried but did really bad
Im just rubbish at stuff like this and I was trying but your gonna think I wasn't :(
I cant be good at reading or wrighting so i dont think i done well
carnt say i did well but I suck at readin
Very edgucashunal and interesting that English is made of difrant parts but I did bad

The above quotations begin to suggest that there could be a correlation between low morphological awareness skills/test performance and confidence/self-esteem. It is difficult to determine the relationship between confidence and morphological awareness ability. Does a lack of morphological awareness skill contribute to low self-esteem in the task reflection? Or does a lack of self-esteem contribute to a low morphological awareness score? Previous

research has shown that, in the English/literacy classroom, confidence levels can be a barrier to learning for school-aged EAL students (see Arnot et al. 2014; Zhang 2022). However, an examination into the profiles of the participants quoted in Table 55 showed that they are all monolingual English speakers. This finding does not diminish the need to ensure that EAL learners are supported with developing confidence in their English literacy skills. But it does raise important questions about how teaching practice can support the development of confidence in monolingual English speaking-students, too. A study by Bouffard et al.'s (2003) supports this claim, as their results illustrated that a child who feels they are an able and 'competent' reader is more likely to read and persevere with a challenging text, whereas a child who feels they are lacking in skills or ability will more likely avoid the task and/or choose to invest less in the task. Some of the Challenge 2 scores of the participants quoted above helps to understand the relationship between morphological awareness skill and confidence/self-esteem more clearly. The challenge scores of 6 out of the 9 participants did not change from Challenge 1 to Challenge 2. Four of the participants whose scores did not change were in the control group and the other two were in the intervention group. These results suggest that confidence levels may not necessarily negatively impact individual's morphological awareness development, but a lack of confidence does not support improvement, either. The three participants whose scores did change were all in the intervention group. Table 56 (below) shows these three participants' Challenge 2 feedback.

Table 56: Feedback from participants whose morphological awareness scores and confidence levels increased

This time i found it quite easy and injoyable because the lessons gave us a chace to learn new things and if we were stuck we could watch tutorials to help us along the way
i thick i did my best and maybe better than befour
it was intresting because i would never think i would do this good and this far

While the above participants' Challenge 1 to Challenge 2 scores only increased by one to three marks, and they still achieved fairly low morphological awareness scores, their written comments illustrate that their confidence in morphology-based tasks improved. As a result of these findings, I propose that further investigation into the role of confidence in the development of metalinguistic skills could be an important avenue of enquiry in future research.

Additionally, analysis of responses from participant P139I, who had the second highest Challenge 1 to Challenge 2 score difference (+22 marks) gives further reason for why confidence requires consideration in literacy and metalinguistic-based research and teaching. Participant P139I scored 7 out of 42 in Challenge 1 and 29 out of 42 in Challenge 2. In Challenge 1, Participant P139I responded 'not sure' to 18 out of the 27 questions. A further 4 questions were left completely blank, and an answer was given for the remaining 5 questions. Not all the answers they gave were entirely accurate (i.e., for task 1, question 2 they said that the root of the words *unpredictive, unpredictable* and *unpredictability* was *predictable* rather than *predict*). However, the fact that they answered at least 2 questions from each task and filled in the majority of questions with 'not sure' suggests that they did not experience any technical problems with submitting answers and they were somewhat engaged with the programme. The timestamp on the GoogleForm also shows that they had the form open for 42 minutes in total. Participant P139I rated the Challenge 1 morphology-based tasks 'really hard' and wrote:

> *I really enjoyed the challenge but it was extremealy tricky im rubbish at this stuff. I just dont get english.*

On the other hand, for Challenge 2, participant P139I only responded 'not sure' to 2 out of 27 questions and provided an answer for all the others. Again, there were some errors in accuracy; however, they also said that they found the morphological awareness tasks in Challenge 2 'fairly easy' and, at the end of the morphological awareness Challenge 2 tasks, commented:

> *I really enjoyed the challenge because I tought the chalanges were fun. I was better this time because id done practis in the tutroials. I felt better about how I done.*

The above responses indicate that the vocabulary skills development programme not only supported the development of this participants' morphological awareness skills, but also their word confidence. The number of 'not sure' responses in participant P139I's Challenge 1 morphological awareness tasks suggests that a lack of confidence and worrying about being wrong may have prevented them from persevering and/or fully engaging with the tasks. Nonetheless, following some explicit instruction in morphology, they felt more able to try to answer the questions. This resulted in a notable increase in their morphological awareness score.

Overall, I argue that the findings discussed in this section show that the role confidence plays in learners' engagement with and performance in metalinguistic-based learning should not be underestimated. This claim is supported by a substantial body of literature has shown that there is a positive correlation between children's reading attitudes, confidence and attainment (e.g. Anmarkrud and Braten 2009; Becker et al. 2010; McGeown et al. 2012; Clark and Andreasen 2014). Furthermore, confidence-based findings have important implications for future teaching practice, particularly when the results are considered in conjunction with statements included in the new Curriculum for Wales. In the explanations of the 'four purposes' of the new curriculum (for full discussion of the purposes, refer to Chapter 1, section 1.1.3), the Welsh Government (2022a) explain all learners should:

- […] have appropriate pathways for learning Welsh and English to enable them to develop the confidence to use both languages in everyday life.
- […] have the confidence to participate in performance.
- […] be supported and challenged so that they are prepared to confidently meet the demands of working in uncertain situations.

The words 'confident' or 'confidence' are used 11 times in the 'developing a vision for curriculum design' document for schools (see Welsh Government 2022a). Furthermore, the 'designing your curriculum' guidance that is specific to the Languages, Literacy and Communication (LLC) Area of Learning and Experience (AoLE) states that learning in this area should inspire and enable learners to: 'enjoy learning languages and develop a positive perception of themselves as users of those languages' (Welsh Government 2019a). This AoLE statement ties together the thematic findings discussed so far in the thesis. Both the quantitative

and qualitative data collected in this research project demonstrates that considering learners' enjoyment levels and confidence levels matters in the LLC classroom. Both factors appear to contribute to the development of derivational morphology awareness and skills. As such, I recommend that future morphological awareness research and teaching practice should consider how opportunities for enjoyment and confidence development could be built into learning episodes and activities.

6.6 Setting and environment

> *Its a lot being back in school with covid and masks and not being able to talk to friends properly but I suppose this was quite a good balance of getting back into things after so long away from school. I liked the logic of working with words in parts and liked putting my headphones in and focusing on the work.*

Some of the quantitative results and discussions have hinted at the idea that the COVID-19 pandemic impacted the results of this study. However, the results of the thematic analysis demonstrate the extent to which taking part in a research intervention during social restrictions really affected some participants' learning experiences. The responses discussed in this section of the chapter were made at the end of morphology-based tasks, but not all the comments relate to morphology learning directly. Instead, they are included in this chapter and discussion because as yet, no Wales-specific studies have been published in relation to children and young people's school experiences during the COVID-19 pandemic. Consequently, the data collected as part of this study offers crucial insight into how the pandemic learning environment was affecting children's school experiences and perspectives of literacy-based learning.

Firstly, it is important to note that, in total, 18 intervention group participants commented on the idea that completing the programme online during school time was 'calming'. Interestingly, most participants who made these sorts of comments achieved a 1-to-10-mark increase in the morphological awareness tasks from Challenge 1 to Challenge 2. For example, one participant, whose score morphological awareness score increased from 23 (Challenge 1) to 27 (Challenge 2), commented:

> *since covid ive found school really stressfull. I don't like the masks and not seeing my friends and I preferred being at home but I really*

> *enjoyed sitting by myself and having my airpods in to learn about something new. It was much calmer than when we have to talk lots or talk online and I flound it less anxious. I found it helpful to have short videos and time to pause to put the words into parts. It was just Kinda Calm*

Another participant, whose score increased from 33 (Challenge 1) to 35 (Challenge 2), explained:

> *I loved putting in my headphones and doing something calm where I could work through at my own pace, pause the videos, make notes and go back to instructions if I needed to. I really liked having things to look at while the lady was talking because we've had to do so much independent work at home without help from anyone. It made me understand what prefixes, root words and suffixes are and I dint know about this before. I would like to learn like this more.*

Finally, one participant whose score increased from 21 (Challenge 1) to 25 (Challenge 2) wrote:

> *This was good because it gives you a chance to learn about the langouge we speak in a fun and exiting way. It also gives your hands a rest from writing in your book all day. I like learning on the computer because I can pause and go at my speed. This was really good for the challenges on suffefexs because I thought this was hard. The pictures and voiceover helped me see what I needed to do and I honestly just found it relaxing because some lessons have been so stressful with all the covid changes.*

The negative role that anxiety can play in the language learning classroom is well-documented (see Dewaele and MacIntyre 2014; Dewaele et al. 2018). However, the responses above illustrate that, for some participants, learning online during COVID-19 restrictions was a positive experience, both in terms of stress-levels and morphological awareness development. Some comments, particularly those about video length, visual aids, and being able to pause to process parts of the learning, suggest that the adaptations made to Guo et al.'s (2014) research on effective practices for adult online learners (discussed in Chapter 3, section 3.1.4) were successful with enhancing school-aged participants' learning experiences. As such, these findings may be useful for the future use/integration of online learning in schools in Wales.

Nevertheless, participant P5I's response to Challenge 1 shows that not all participants found the online learning 'calming', as they explained:

> *I don't always get words and word parts becos we don't do it much and its really noisy in the class today too because the teacher isn't here and she keeps it quiet so that I can concentrat on things that I find hard. I think reading on the screen is hard aand I would rather not watch videos fpor the instructions.*

Overall, 35 intervention group participants made at least one comment about how the environment had impacted their learning experience(s) negatively. Although not specific to the morphological awareness tasks, Table 57 shows some examples of responses where participants had become bored of/disengaged with online learning.

Table 57: Participants' negative responses to online learning

I don't like online learning any more we done so much of it and this is just another thing
I dont like having to sit with screens between me and my friends when were working because it makes it hard to talk about the things in thte tutorials. I think talking about some things with someone might have helped me more.
Honestly I just didn't take much in because its really stressfull learning like this with masks and headphones and were only just back in school after so long away
Im just so bored of online learning I thought being back at school would mea less of this but now we're just doing it in class. We could be doing this at home and actually learning from our teacher.
Doing the programme all at once means the wifi is so slow so its just hard to stay focused because theres so much waiting
it was boring and hard and I don't like reading on the screen
I'm stressed. Cant take it in.
The videos were to long . done with it

The above comments map onto findings from a UK Government-funded study that was conducted with students aged 16 to 19 who attended a school in England during the Covid-19 pandemic. The study found that the majority of learners found online learning 'demotivating and stressful', and that online lessons were not as effective because, according to one sixteen-year-old participant, '[…] you understand lessons a lot better once you're in the classroom and you've got a teacher talking to you in person' (Family Kids & Youth 2022: 10). Furthermore, Family Kids & Youth's (2022: 11) enquiry showed that some additional learning needs participants needed to ask the tutor questions, as this made the difference between them understanding and not understanding content. Due to the asynchronous nature of the current study, participants were unable to ask me any questions. On the one hand, this ensured that all participants received exactly the same learning experience. But on the other hand, for some participants, a lack of tutor-learner interaction may have resulted in a lack of opportunities to expand their morphological awareness levels as they might have done if the programme had been delivered in-person.

Similar to the comments made about pandemic restrictions and isolation in this study, the Family Kids & Youth (2022: 28) enquiry also found that learners struggled with the social anxieties of returning to the classroom. One sixteen-year-old participant explained that they had become uncomfortable being around people and found that restrictions such as social distancing, mask-wearing and 'learning bubbles' meant that it was harder to connect to peers (Family Kids & Youth 2022: 28). Additionally, a study conducted with Hong Kongese primary and secondary school students showed that only 49.6% regarded the online learning as an effective learning mode (Zheng et al. 2022). Only 12.8% of students preferred online learning, while 67.2% of students preferred in-person schooling (Zheng et al. 2022: 4). Currently, there is no research available that is specific to the experience/perspectives of Welsh school learners' experiences of school during the pandemic. However, the participant responses in Table 57 demonstrate that learning online, and the school environment during Covid-19 restrictions, had a diverse range of effects on learners' abilities to engage with the study and, potentially, develop their morphological awareness skills.

6.7 Chapter summary

Overall, the morphological awareness findings discussed in this chapter and Chapter 5 have painted a complex and varied picture. Broadly, the data analysed has shown that explicit instruction in word decomposition and word derivation could support some learners'

morphological awareness development and, in turn, vocabulary decoding and comprehension skills. Furthermore, some external factors, such as out-of-school reading habits, enjoyment levels, confidence levels and the learning environment should be considered carefully in relation to morphological instruction progression steps in the new Curriculum for Wales. However, the conclusions drawn in these chapters are limited in scope due to the short nature of the intervention study. Additionally, it seems that for some participants, the COVID-19 restrictions in place at the time of data collection, as well as experiences of and attitudes towards online learning, had a notable impact on the study results. As such, it would be interesting to see whether the study results may change now that the pandemic restrictions have lifted, and school classrooms have returned to full-time in-person classes. Nonetheless, this study has provided insight into learners' experiences of learning during the pandemic which, currently in Wales, largely remains unknown. The COVID-19 restrictions meant that it was not possible to pilot the data collection materials or extend the length of the intervention programme but some learners' responses to the morphology-based tasks indicates that future studies, and classroom practice, may benefit from investigating the effects of explicit instruction in derivational morphology over a longer period of time.

Overall, I propose that the results presented in this chapter have shown that, currently, the roles of enjoyment and confidence are undervalued in Wales's literacy classrooms. However, one of the primary aims of the new curriculum is to provide teachers with the autonomy to design a Languages, Literacy and Communication curriculum that suits the diverse needs of the learners in their contexts. As such, teachers have an exciting opportunity to take new, innovative approaches to vocabulary and literacy skills instruction. The results of this study have indicated that teachers may want to consider whether integrating games that target the development of learners' morphological awareness, such as pseudo-word creations and story-telling, could increase learners' word decoding and comprehension abilities, as well as their language learning enjoyment and confidence levels. In particular, the discussions in sections 6.1.1 and 6.1.2 have suggested that explicit instruction in derivational morphology could offer monolingual English speakers, and secondary school pupils, the opportunity to broaden their perceptions of English as a language, rather than just a subject through which to explore novels, plays and poetry etc. Consequently, I have argued that broadening these perspectives could help learners understand why developing metalinguistic skills is an important aspect of their school English learning, and how these metalinguistic skills could be used to support comprehension in a variety of different contexts. Furthermore, although English language

status has not been deemed a significant factor in the statistical analysis, the qualitative data indicated that explicit instruction in morphology could offer teachers and learners alike the opportunity to celebrate and capitalise upon the linguistic skills of bi/multilingual individuals. But, to do this, further research into how to support learners with exploring and understanding the relationship between language typologies and English morphology may be required.

The aim of this research was not to compile a list of 'what works' strategies in relation to morphological instruction but, rather, to begin to explore which, if any, approaches to explicit instruction in derivational morphology *could* increase learners' word decoding and comprehension skills. Although some aspects of the vocabulary skills development programme have not been successful in developing learners' morphological awareness (i.e., the instruction in derivational suffixes, word analogy tasks, etc.), I suggest that, broadly, the approach taken to the research design and analysis has allowed for a successful exploration of each of three research questions established in Chapter 2. Overall, the results have shown that learners in Wales do have a foundation in morphological awareness; however, multiple results have indicated that many learners could benefit from explicit instruction that extends awareness of derivational morphology further. Additionally, the variation in participants' responses to learning online and going back to school during the COVID-19 pandemic have illustrated that individuals experience the same learning experiences very differently and, therefore, individual learners' needs should be taken into account when designing and implementing new pedagogical approaches to vocabulary skills development. Teachers are best placed to know what is best for their learners in their contexts, not an asynchronous, external researcher. However, I argue that this research has shown that equipping teachers and learners with an explicit awareness of English derivational morphology—i.e., an understanding of productive English prefixes, root words, suffixes, and transparent/opaque derivation patterns—is highly important for ensuring that Welsh pupils have a foundation upon which to develop crucial word decoding and comprehension skills.

7 Etymological awareness results and discussion

Having analysed and discussed results from the morphological awareness aspects of this study, this thesis continues with an exploration of the etymological awareness results. As explained in Chapter 4, the etymological awareness dataset is smaller than the morphological awareness dataset, because only two etymology-based tasks were included in the pre- and post-intervention challenges. Therefore, in this chapter, I present all of the etymology findings (i.e., the pre- and post-intervention results, the external factor results and the thematic analysis findings) and offer critical evaluations of the results throughout. For orientational purposes, the etymology-based 'statements of what matters' and progression steps are repeated in Figure 35 and Figure 36 below.

Figure 35: Primary school etymology-based progression steps from the Curriculum for Wales (Welsh Government 2019a)

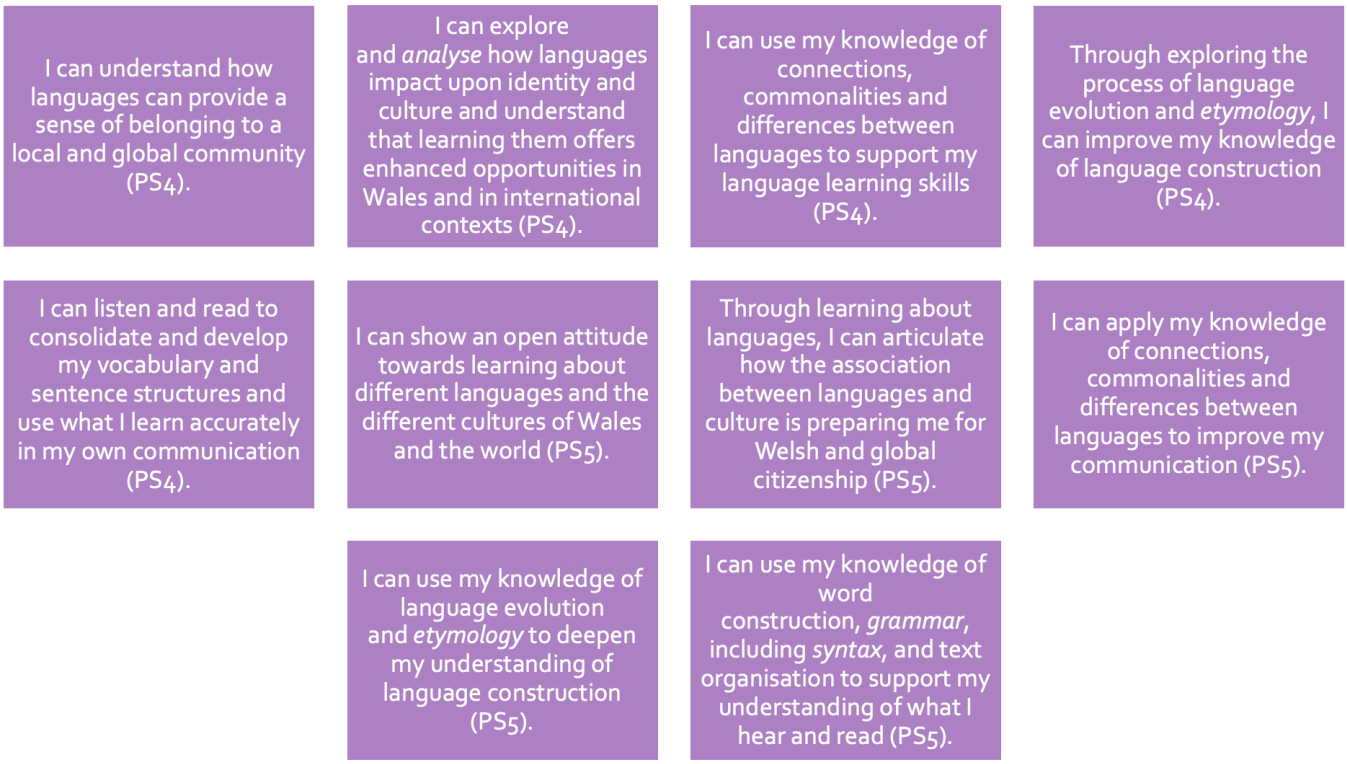


Figure 36: Secondary school etymology-based progression steps from the Curriculum for Wales (Welsh Government 2019a)

The progression steps above, and the discussions presented Chapter 1 of this thesis, make clear that children should be able to use an awareness of etymology to understand how languages are connected and how to comprehend complex academic words. However, Chapter 2 identified that, currently, there is a lack of understanding about the role of etymological awareness—the ability to use knowledge of the history of the English language, word connections and word families to recognise and comprehend words containing bound word parts—in children's broader vocabulary decoding and comprehension skills. Therefore, as part of the vocabulary skills development programme, I collected data regarding learners' pre-existing levels of etymological awareness. I then measured the extent to which explicit instruction in English etymology influenced the development of participants' word decoding and comprehension skills. This chapter begins by exploring participants' pre-existing levels of etymological awareness, before examining if and how the vocabulary skills development programme influenced etymological awareness results.

7.1 Challenge 1: Etymological awareness pre-intervention results

To address the final part of one of the research sub-questions posed in Chapter 2—*To what extent do children in Wales already have an awareness of English morphology and etymology?*—firstly, this section explores participants' Challenge 1 (pre-intervention) etymological awareness scores. Table 59 (below) shows the average Challenge 1 etymological awareness scores of the two groups. Participants could have scored a maximum of 36 marks. The results show that, on average, the intervention group scores were 0.6 marks higher than those of the control group. However, the average challenge scores of both groups are below 50% which suggests that, in Wales, learners' pre-existing levels of etymological awareness are fairly low. To establish whether the average score difference between the two groups was significant, I conducted a paired t-test. The t-test showed with 95% certainty that there was no significant difference between the average challenge 1 scores of the two groups ($p = 0.35$). As the result of the t-test is insignificant, the 0.6 average score difference between the two groups is not likely to have impacted the Challenge 2 results/outcomes.

Table 59: Challenge 1 average etymological awareness scores

Control group average etymological awareness score (out of 36)	**Intervention group average etymological awareness score (out of 36)**
15.7	16.3

Like Chapter 5, due to the imbalance in the number of participants in the control ($n = 303$) and intervention ($n = 143$) groups, and to allow for a more accurate comparison, the tables and graphs in the next sections of this chapter show the percentages of participants in each score category. In line with the average scores shown in Table 59, Figure 37 (below) shows that, in Challenge 1, the majority of control group participants scored between 11 and 20 marks. The graph also shows that in both groups, the lowest etymological awareness scores were between 1 and 5 marks (control group $n = 2$; intervention group $n = 2$). However, two control group participants and two intervention group participants scored between 31 and 36 marks. Overall, Figure 37 illustrates that, in Wales, pre-existing levels of etymological awareness are varied, but that in Challenge 1, many learners scored 60% or less. When compared to the morphological awareness results, these figures show that, in Wales, levels of etymological awareness levels are lower than levels of derivational morphological awareness.

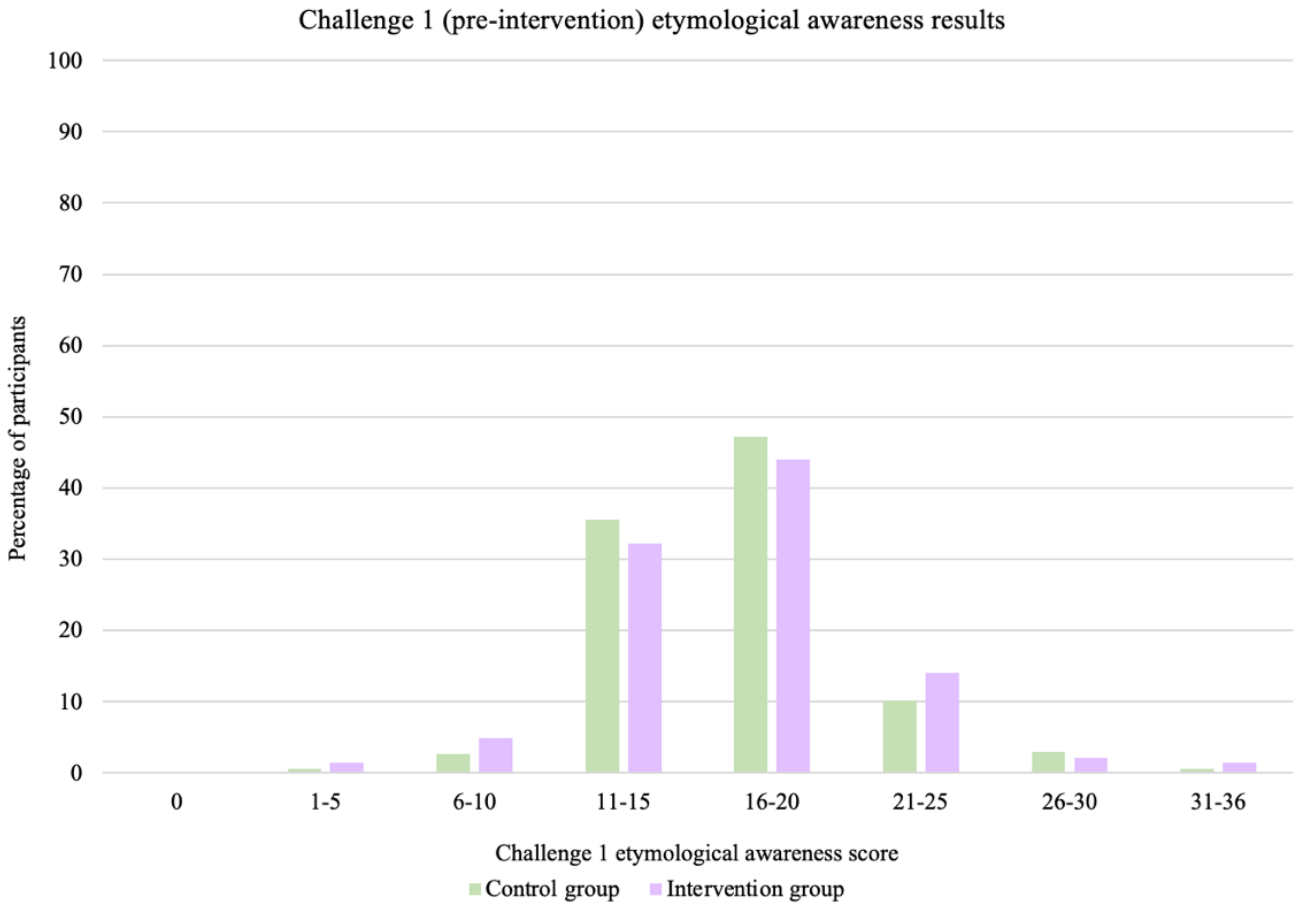


Figure 37: Challenge 1 (pre-intervention) etymological results by score category

The Challenge 1 findings map onto the discussion presented in Chapter 1 (section 1.3), which demonstrated that, in Wales, learners' exposure and access to etymology-based instruction is varied and inconsistent. This claim correlates with some participants' written feedback and survey responses. At the end of Challenge 1, 289 out of 446 participants said that they found the two etymology challenges 'fairly hard' or 'very hard'. Furthermore, 182 out of 446 participants wrote feedback which explained that analysing words in terms of etymological roots and shared meanings was a 'new' approach for them (see Table 60 below).

Table 60: Participants' Challenge 1 written feedback on the etymology tasks

I found these challenge tasks really hard because I don't know the word root things in the challenge. We don't really look at words like this and I don't know anything about the latin and greek so it was new to me
the video said that these tasks was about language originations but I haven't done that bedfore and thout it was hard to find the connections
I think this is a new mindset on words and I dont know how that works
i struggled a lot ith the meaning and when writing it out having the corect spelling , and reading the qeston corectly becos we have not done making words together like this bfor
It tested my identifying skills because its new to do word connections and it was hard I did not understand all of the words
it was different from what we normally do and that was interesting but I think I need help in this before I csn do well id like to know more
it was ingaging and i enjoyede working out th answers but I never done words an linkede them befo

The above responses exemplify numerous comments which showed that using etymology to decode and comprehend the meaning of words was a new experience. The responses shown in Table 60 indicate that, to develop the above vocabulary skills and to meet the *Languages Connect Us* progression steps in the new Curriculum for Wales, learners may benefit from a more sustained, consistent approach to explicit instruction in the history of the English language, word connections and word families. The vocabulary skills development programme aimed to explore whether explicit instruction in the aforementioned areas of etymology could support the development of learners' broader vocabulary decoding and comprehension skills, particularly in relation to bound word parts. Therefore, to analyse the effectiveness of the vocabulary skills development programme, and to address the last part of one of the other research sub-questions—*How does explicit instruction in English derivational morphology (word parts and structures) and etymology (bound word parts and word origins) affect*

children's abilities to comprehend complex school vocabulary?—this chapter continues by providing an overview of the Challenge 2 results.

7.2 Challenge 2: Etymological awareness post-intervention results

Table 61 (below) shows the average Challenge 1 and Challenge 2 etymological awareness scores of the two groups. The table illustrates that, on average, the intervention group participants' Challenge 2 scores were 6.1 marks higher than the control group scores. Further analysis indicates that, on average, the scores of participants in the control group increased by an average of 3.5 marks from Challenge 1 to Challenge 2. Conversely, the scores of participants in the intervention group increased by 9 marks from Challenge 1 to Challenge 2. These initial results suggest that the vocabulary skills development programme was successful with developing the etymological awareness skills of participants in the intervention group.

Table 61: Overall etymological awareness average scores

Group	Challenge 1 average etymological awareness scores (out of 36)	Challenge 2 average etymological awareness scores (out of 36)	Difference between the Challenge 1 and Challenge 2 scores
Control group	15.7	19.2	3.5
Intervention group	16.3	25.3	9
Difference between the control and intervention group averages	0.6	6.1	5.5

To explore the significance of the above findings, I built a mixed-effects model. The mixed-effects model analyses whether participating in the intervention was more likely to improve participants' levels of etymological awareness or not.

The example below shows the R code for the mixed-effects model structure:

```
glmer(coding ~ condition*challengeNum +
                    (1 | participantID) +
                    (1 | School) +
                    (1 | questionNum)
```

This model analyses three outcomes: firstly, whether there were any significant differences between the etymological awareness scores of the control and intervention groups; secondly, whether there were any significant differences between the Challenge 1 (pre-intervention) and Challenge 2 (post-intervention) scores generally; and thirdly, whether there were any significant differences between the intervention group's Challenge 1 and Challenge 2 etymological awareness scores. Table 62 shows the results of this model.

Table 62: Etymological awareness mixed-effects model results

	Estimate (β)	**Std. Error**	**z-Value**	**Pr(>|z|)**	**Signif.**
(Intercept)	0.053444	0.077245	0.692	0.489	
Condition (Baseline: Control)					
Intervention	0.003029	0.027530	0.110	0.912	
Challenge (Baseline: Challenge 1)					
Challenge 2	0.111038	0.019275	5.761	0.00000000837	***
Intervention condition (Baseline: Challenge 1)					
Challenge 2	0.209460	0.032980	6.351	0.000000000214	***

Significance (Signif.) codes: . $p \leq 0.05$, * $p \leq 0.01$, ** $p \leq 0.001$, *** $p \leq 0$

Overall, the results of the statistical modelling show that participating in the intervention was not significantly more likely to result in a higher etymological awareness score (β = 0.00329, z = 0110, p = 0.912). This could be because the model shows that, in Challenge 2, regardless of condition (i.e., control or intervention group), all participants' etymological awareness scores were significantly more likely to be 5.761 marks higher than their Challenge 1 score (β = 0.111038, z = 5.761, p = 0. 00000000837). This result maps onto the descriptive statistics discussed above, which indicated that there was a notable difference between the Challenge 1 and Challenge 2 scores of all participants (see Table 61).

Although there is not a statistically significant difference between participants' overall etymological awareness scores, the results shown in Table 62 illustrate that there is a significant difference between the intervention group's Challenge 1 and Challenge 2 etymological awareness scores (β = 0.209460, z = 6.351, p = 0. 000000000214). In fact, the model predicts that the intervention group participants were significantly more likely to get a Challenge 2 score

that was 6.351 marks higher than their Challenge 1 score. Consequently, I suggest that the vocabulary skills development programme did support some aspects of learners' etymological awareness development. Figure 38 (below) visualises the results in Table 62.

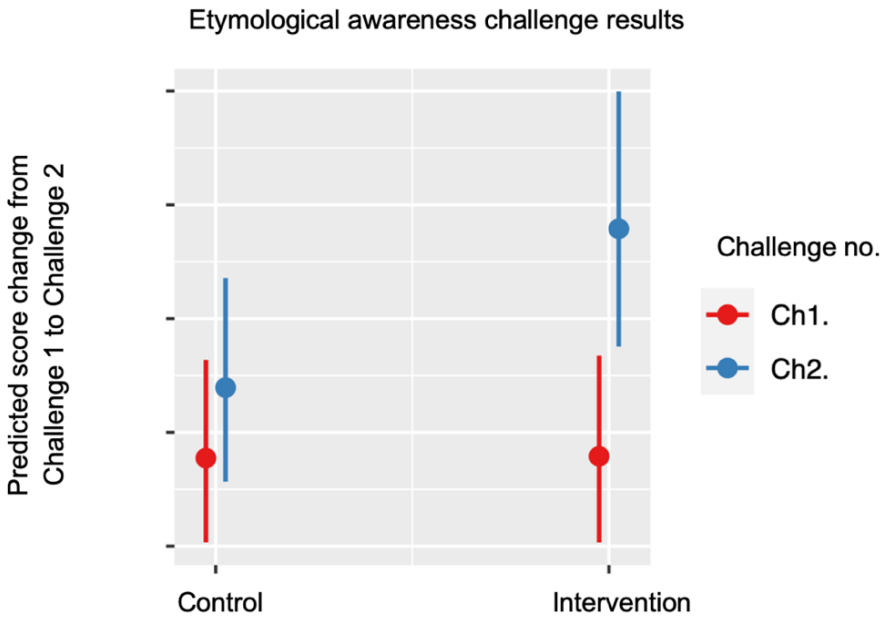


Figure 38: Etymological awareness mixed-effects model graph

Figure 38 shows that, while the control group's scores did increase from Challenge 1 to Challenge 2, there is a more significant difference between the Challenge 1 and Challenge 2 scores of the intervention group participants.

Figure 39 (below) shows the percentages of participants whose etymological awareness scores increased, stayed the same, or decreased from Challenge 1 to Challenge 2. The graph shows that, overall, the etymological awareness scores of 82.5% of the intervention group participants increased from Challenge 1 to Challenge 2 (n = 118). This percentage is 12.2% higher than the proportion of control group participants whose scores increased (70.3% n = 213). Additionally, Figure 39 shows that the percentage of participants whose etymological awareness scores decreased from Challenge 1 to Challenge was 13.4% lower in the intervention group than it was in the control group (14% and 27.4% respectively). Therefore, while many control group participants' scores increased, a notable percentage of participants scores decreased, too.

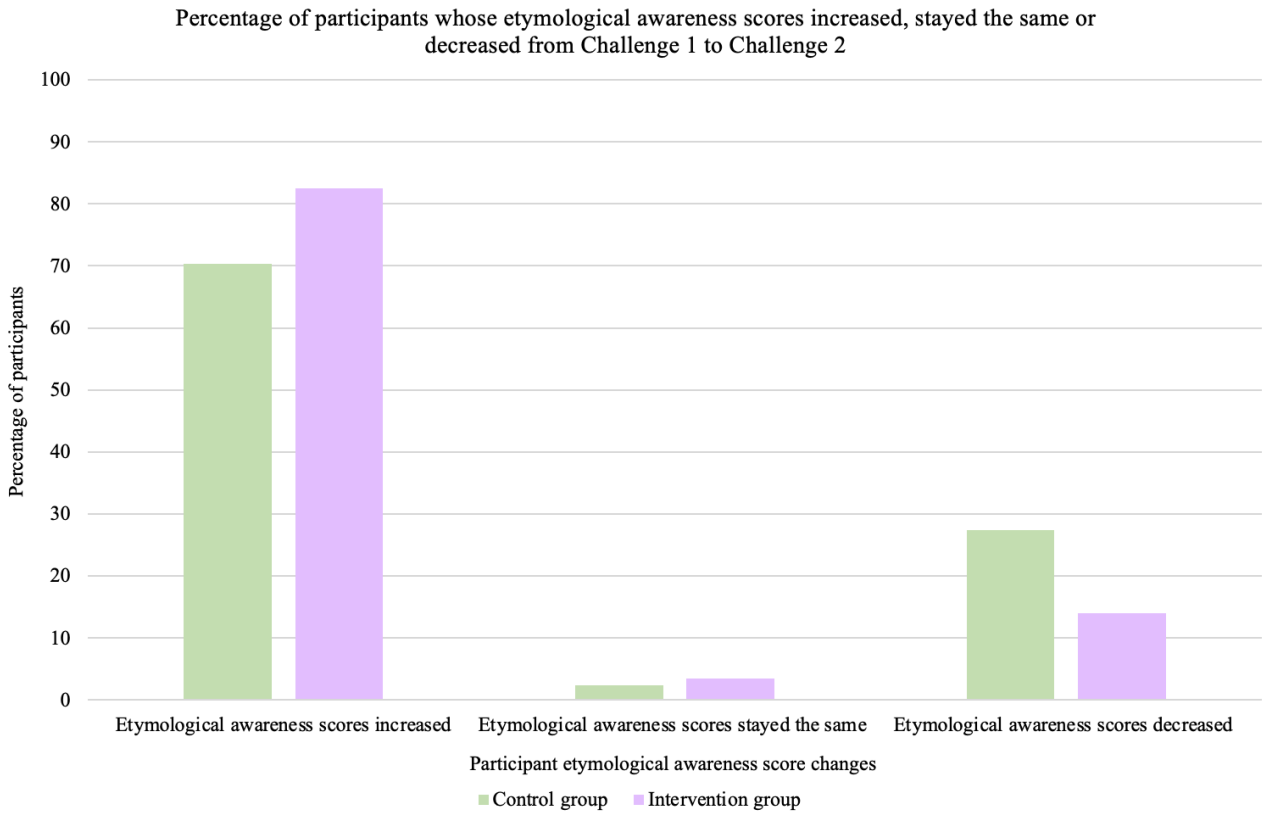


Figure 39: Distribution of participant etymological awareness score changes from Challenge 1 to Challenge 2

The 70.3% control group figure is surprising given that these participants received no explicit instruction in etymology. However, the high percentages help to explain why the difference between the two groups was not enough to have been statistically significant in the mixed effects model. As explained in relation to the morphological awareness results (Chapter 5, section 5.2.1), there was only one week between the control group participants completing Challenge 1 and Challenge 2, and the short timeframe could have affected the control group participants memory retention and recall of the words and word parts used in the etymology challenge tasks. Like with the morphological awareness tasks, to assess the extent to which explicit instruction impacted the intervention group's etymological awareness results, the same word roots/parts were used in both challenges; participants could have remembered some aspects of the tasks from one week to the next.

Furthermore, should they have wanted to, participants in the control group could have looked up the bound word parts and learnt their meanings. This could have helped increase their scores in Challenge 2. However, these tasks were embedded in a one-hour long challenge, and participants could not go back to look at previous questions once they had moved on to the

next tasks. Therefore, unless they were making notes on paper, it is unlikely that a participant would have remembered all the word parts used, learnt them, and then used this knowledge in Challenge 2. Written feedback from the control group participants also implies that test repetition did not play such a role in learners' responses to the etymology tasks. Unlike the morphology tasks, no participants made comments about how completing the challenges one week after the other had helped them answer some of the Challenge 2 questions (refer back to Chapter 5, section 5.2.1 for examples). Additionally, in contrast to the morphological awareness tasks, for the etymological awareness tasks, participants were only provided with the answers to task 5 (the second etymological awareness task). This was because in task 4 there were many ways that participants could have responded to the questions. As such, the effects of dynamic testing (discussed in detail in Chapter 5, section 5.2.1) were slightly reduced for the etymological awareness tasks and the reasons for the control group's score increases remain unclear.

7.2.1 Participant score changes

Analysis of individual datasets shows the reasons why, overall, there was no significant differences between the two groups, but why the intervention group participants' scores were significantly more likely to be higher in Challenge 2 than in Challenge 1. Table 64 (below) shows that all of the intervention group participants whose scores increased did so by five marks or more. However, in the control group, the majority of participants scores only increased by one to six marks. Additionally, Table 64 below shows that 16.8% of participants in the intervention group scores increased by 10 marks or more (n = 24). These findings map onto the results of the mixed-effects model which predicted that the Challenge 2 scores of participants in the intervention group were significantly more likely to be higher than their Challenge 1 scores.

Table 64: Distribution of increased etymological awareness scores

Etymological awareness score increase category	Percentage of control group participants (out of 303)	Percentage of intervention group participants (out of 143)
1-4	54.4	0
5-9	15.9	65.7
10-14	0	11.2
15-20	0	5.6
Total number of participants	**213**	**118**

The findings above indicate that explicit instruction in etymology could offer learners in Wales the opportunity to develop word decoding and comprehension skills. The current research shows that most learners, regardless of English language status, could benefit from explicit instruction in etymology and bound word parts. These findings begin to extend Crosson et al.'s (2019) study outcomes, which indicated that, for learners who have English as an additional language, explicit instruction in Latinate bound word roots significantly increased participants' abilities to decode and comprehend the meanings of unfamiliar words. Feedback from some control group participants also supports this claim, as some written responses suggest that even though their etymological awareness score increased a little, they did not understand the concept of identifying and defining bound word parts. For example, in response to task 4, participant P65C, a monolingual English L1 speaker whose score increased from 11 in Challenge 1 to 13 in Challenge 2, explained:

> *I didn't really understand this task last time and I still don't this time because its really hard to look and see the bit your supposed to write a meaning for. It was a good way to test my English I guess but I think I need more help with this to do better. I don't know anything about language orogins*

Likewise, participant P190C, a monolingual English L1 speaker whose score increased from 10 in Challenge 1 to 12 in Challenge 2 said:

> *It was fun guessing the words but I don't think I done vetter on root task thing than last week because I took my time on the multichoice but*

I think its something to do more in class with miss as she helps u work on your literasy and I don't know how to find the meanin of the words

Although the above quotations come from just two participants, many of the control group echoed the idea that identifying and defining the bound word parts was something they were unsure about and wanted more instruction on. This reiterates the findings from Challenge 1 (section 7.1) which showed that, for many participants, analysing words in this way is a 'new' concept.

The idea that using etymological awareness to decode and comprehend the meaning of words is unfamiliar, may explain why some participants' scores decreased from Challenge 1 to Challenge 2. As mentioned in section 7.2, overall, the scores of 14% of participants in the intervention group decreased (n = 20) and, in the control group, 27.4% of participants etymological awareness scores decreased (n = 83). Analysis of individual results shows that, in the intervention group, all participants scores decreased by one to five marks. However, in the control group, 7 participants' scores decreased by five marks or more. Sections 7.3 and 7.4 analyse the intervention group's individual task responses in detail but, broadly, the analysis demonstrates that participants whose scores decreased made small errors in the definitions they provided in task 4. But, in the control group, similar to the morphological awareness tasks, numerous participants made comments about how frustrated they had become with the etymology tasks. Table 65 shows the results and written feedback of the 7 participants whose scores decreased by 5+ marks.

Table 65: Control group etymological awareness score decreases and frustration-based comments

Participant ID	Challenge 1 score (out of 36)	Challenge 2 score (out of 36)	Difference between Challenge 1 and Challenge 2 scores	Challenge 2 etymological awareness task comments
P16C	15	9	-6	*its like the samer as last time and I just don't get it its so anooooooooyin*
P34C	22	14	-8	*i did enjoy it but not all because i have to re check my answers multiple times and still didn't get it fgs*
P76C	20	13	-7	*I didnt enjoy this because its not something i was to learn about its just stupid*
P98C	17	12	-9	*didn't understand and its so frickin stupid*
P129C	19	14	-5	*I've never done something like this before didnt find it fun just don't get it ffs*
P230C	20	14	-6	*idkkkkkkkkk*
P301C	26	16	-10	*askjhdf dunno*

Chapter 5 (section 5.2.3) discussed the impact that frustration could have on learners' learning experiences (also see Huang and Yeh 2019; Seymour et al. 2019). As such, it is important to question whether the above participants etymological awareness scores may have decreased because of how frustrated and/or disengaged they had become with the tasks. Like the morphological awareness results, it is not possible to determine whether frustration is solely the result of the Challenge 2 test, or whether other, external factors may also have influenced their frustration levels and test-taking experiences. While not conclusive, the above findings add gravitas to the suggestion made in Chapter 5, which explained that investigating the impact

of frustration on children's metalinguistic skills development is an important avenue of enquiry in future research.

In contrast to the above discussion, Table 66 (below) shows the etymological awareness results of the intervention group participants whose scores increased by 10 marks or more. Interestingly, most of these participants achieved between 20-40% in the etymological awareness tasks in Challenge 1. This finding indicates that the vocabulary skills development programme particularly supported the development of learners who started the study with fairly low levels of etymological awareness.

Table 66: Etymological awareness results of intervention group participants whose scores increased by 10+ marks from Challenge 1 to Challenge 2

Participant ID	Challenge 1 score (out of 36)	Challenge 2 score (out of 36)	Difference between Challenge 1 and Challenge 2 scores
P1I	7	17	10
P2I	9	20	11
P5I	13	23	10
P11I	17	29	12
P12I	12	28	16
P17I	13	27	14
P26I	21	32	11
P35I	11	29	18
P38I	8	24	16
P41I	7	22	15
P44I	10	20	10
P69I	17	29	12
P77I	12	25	13
P89I	9	20	11
P97I	13	23	10
P102I	12	28	16
P104I	9	23	14
P107I	7	18	11
P117I	12	25	13
P125I	9	21	12
P132I	10	20	10
P137I	12	22	10
P139I	11	23	12
P142I	8	19	11

Table 66 (above) shows that two participants (P26I and P69I) did have slightly higher Challenge 1 scores. However, past research has shown that direct instruction in Latin can have the most notable impact on learners who have lower literacy levels (for examples, see Sparks et al. 1995; Pelling et al. 2010; Bell and Wing-Davey 2018; Bracke and Bradshaw 2020; Holmes-Henderson and Kelly 2022; Holmes-Henderson 2023). Due to wide variation in the methods Welsh schools use to collect pupil data, in this study, I did not collect children's pre-

existing reading ages or school literacy grades. Nonetheless, the above findings raise questions about whether explicit instruction in etymology could be particularly beneficial for learners who find reading, literacy and/or English challenging at school.

Overall, out of the 118 intervention group participants whose etymological awareness scores increased, 86 made comments about how they had found the etymology aspects of the programme interesting and enjoyable. For example, at the end of the etymology tasks in Challenge 2, participant P142I, who scored 8 in Challenge 1 and 19 in Challenge 2, wrote:

> *I enjoyed it because it allowed me to test my limit on my vocabulary and allowed me to appreciate the skills I've learnt. It was fascinating to learn the origins of our words/languages and I really tried to use that to help me this time. I think I did do better because I remembered that timeline we did and those word maps and that helped me figure out more of the word detective clues. I love history and just want to do this more. I think it would actually make me like English haha*

Similarly to the morphological awareness results discussed in Chapter 6 (section 6.4), these findings raise important questions about the role of enjoyment in the English/literacy school classroom. However, as discussed in Chapter 2 (section 2.7), despite extensive searches of the literature, I have been unable to find studies that have explored the impact of explicit teaching in etymology on children's word decoding and comprehension abilities. As such, the results from the mixed-effect model, and participants' written feedback on the etymology aspects of the vocabulary skills development programme, contribute new insights to the field of children's language development and vocabulary teaching and learning studies. The findings discussed above begin to illustrate that developing learners' awareness of English word histories, word families and word connections could increase metalinguistic skills and enjoyment levels in the literacy classroom. In order to assess which, if any, particular aspects of the vocabulary skills development programme seem to have supported/not supported some participants' etymological awareness development, this chapter continues with analysis of the individual etymology tasks.

7.3 Task 4: Word connection results

As explained in Chapter 4 (section 4.4.1) the first etymological awareness task (labelled task 4 in the challenges), asked participants to explain how they thought the meanings of a list of

words, which all contained the same Romance- or Ancient Greek-rooted bound word part, were related (for example, see Figure 39). The aim of this task was to explore learners' abilities to decode and comprehend the meaning of common bound word roots.

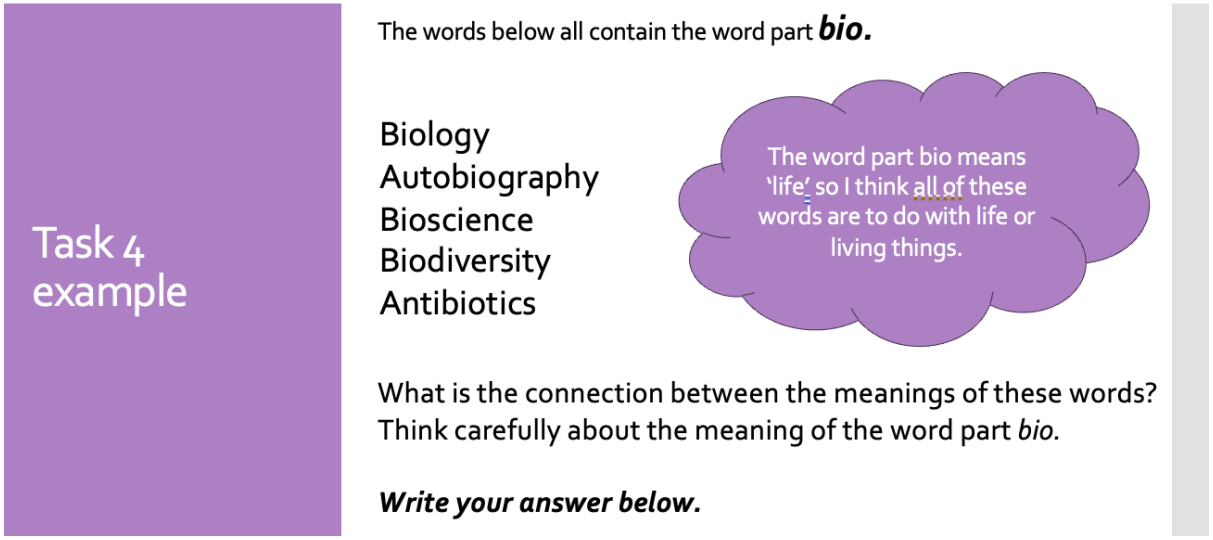


Figure 40: Task 4 example question

There were fifteen questions in total and a maximum of two marks available per question. Table 67 shows the average number of marks participants received for each bound word part in Challenge 1 and Challenge 2.

Table 67: Average score per bound word part used in task 4

Word part	Control group: Challenge 1 average score	Control group: Challenge 2 average score	Control, group: Challenge 1 to Challenge 2 score difference	Intervention group: Challenge 1 average score	Intervention group: Challenge 2 average score	Intervention group: Challenge 1 to Challenge 2 score difference
ambi	0.4	0.6	**0.2**	0.4	1.4	**1**
dict	1.1	1.2	**0.1**	1	1.8	**0.8**
spect	0.8	1	**0.2**	0.8	1.5	**0.7**
port	1.5	1.5	**0**	1.6	1.8	**0.2**
struct	1	1.1	**0.1**	1	1.4	**0.4**
rupt	0.3	0.3	**0**	0.3	1.5	**1.2**
scrib	0.7	0.8	**0.1**	0.8	1.7	**0.9**
sens	1	0.9	**-0.1**	1	1.7	**0.7**
vis	0.4	0.4	**0**	0.3	1.5	**1.2**
voc	0.7	1	**0.3**	0.7	1.3	**0.6**
chron	0.2	0.3	**0.1**	0.2	0.8	**0.6**
dyna	0.1	0.3	**0.2**	0.1	0.8	**0.7**
gram	1	1.3	**0.3**	1	1.6	**0.6**
scope	1	1	**0**	1	1.3	**0.3**
tele	1.6	1.6	**0**	1.5	1.6	**0.1**
Average total	**11.8**	**13.3**	**1.5**	**11.7**	**21.7**	**10**

Table 67 shows that in Challenge 1, both the control and the intervention group participants had fairly low levels of pre-existing etymological awareness in relation to the meaning of bound word parts (control *m* = 11.8; intervention *m* = 11.7). These findings are consistent with Crosson and McKeown's (2016) research which found that, prior to instruction, middle-school children (ages 9 to 11) did not use awareness of bound Latin roots to infer meanings of words. In both groups, participants had the lowest accuracy for the Ancient Greek word root *dyna* (*m* = 0.1). The Ancient Greek word root *chron* also had a low average accuracy score (*m* = 0.2). These findings indicate that learners had particularly low awareness of the Ancient Greek word roots. The low awareness levels are not surprising given the earlier discussions in Chapter 1 (section 1.4) and Chapter 4 (section 4.1.3) which illustrated that, in the GCSE word corpus, Ancient Greek-rooted words were infrequent, multimorphemic and semantically complex. However, in both groups, one of the highest averages was for the Ancient Greek root *tele* (*m* = 1.6). Some participants' written feedback suggests that, prior to participating in this study, they had received explicit instruction on this word root. For example, participant P6C explained:

> *I found this task really hard but I think I did get the explanation for tele because we'd done that in class before. Miss told us about how to look for that in words because we done a scifi novel for group reading last term so I knew it was in television telescope and telekonnetick and they are all looking at stuff far away*

Although the above quotation is from just one participant, it seems that *tele* may be a word root that is already explicitly taught and discussed in some school English lessons. This could explain why the average score is higher for *tele* than for other roots. Participants' written feedback that relates to the word root *port* extends this claim, as several learners commented that prior to the study, they had received explicit instruction on this word part. For example, participant P91I explained:

> *Most of these I had no idea but I did know port because we've done that in class before with like the word of the day and like transport and portable and also I speak French and porter means carry so I know it connects. We also use portefeuille for like a wallet so that's like carrying around your things so then in I thought it was like carry and carrying*

Overall, *port* had the highest average score (*m* = 1.7). Both of the comments above demonstrate that previous explicit instruction in certain bound word parts may have influenced some Challenge 1 results but, also, that direct teaching of a bound word part in schools can support increased levels of awareness. Additionally, participant P91I's response raises important questions about the role of bi/multilingualism in etymological awareness. It seems that this participant had increased awareness of the *port* root because they also speak French. Previous research has also found that, when inferring the meaning of unknown words, English-Spanish bilingual children were able to use their awareness of the structural characteristics of cognate pairs to support word recognition and comprehension (see Kuo et al. 2017). Further analysis shows that, in Challenge 1, bi/multilingual participants (who have English as one of their main languages) scored an average of 14 out of 30. As such, the scores of bi/multilingual participants were slightly higher than the whole group Challenge 1 averages (control *m* = 11.8; intervention *m* = 11.7; see Table 67). Likewise, in Challenge 2, the scores of bi/multilingual participants in the intervention group increased by an average of 10.7 marks which is higher than the 6.351 marks predicted by the mixed-effects model. These results illustrate that making connections between language families and word part meanings explicit can support the development bi/multilingual learners English word decoding and comprehension abilities. Section 7.5 of this chapter examines the role of external factors, such as English language status and languages spoken, in more detail. However, these descriptive findings begin to suggest that, like the participants in Kuo et al.'s (2017) research, some bi/multilingual learners may draw upon their awareness of other their language(s) and cognate pairs to help them decode the meanings of bound word parts.

Further analysis of participants' responses to task 4 in Challenge 1 shows that, prior to explicit instruction, some learners tried to explain the meanings of the bound roots by providing their own examples of words that contained the word part. For example, in relation to the word part *tele* in Challenge 1, one participant said:

> *I can't really get how those words are linked but its also in teletubbies lol*

Additionally, in relation to the word part *chron,* one participant wrote:

> *These words all have a connectio but I don't know the meaning. But chron is in the chronicles of Narnia but I don't actually know what is a chronicle. I think if I knw that I could get it.*

Another participant explained:

> *I got no clue how they are linked but we all love the gram and its there in that* [7]

However, the above examples show that, even when participants could think of other words that were relevant to the word part, many still did not have the ability to decode, comprehend and explain the meaning of the word root and connections. As a result of the Challenge 1 findings, I argue that a more consistent approach to explicit instruction in etymology is required to develop learners' awareness of bound word roots.

The Challenge 2 results support the above claim, as Table 67 shows that, on average, the scores of participants in the control group increased by 1.5 marks, whereas the scores of the participants in the intervention group increased by 10 marks. These findings illustrate that the vocabulary skills development programme was successful in developing the intervention group participants' awareness of the meanings of bound word roots. In particular, awareness of the word parts *ambi, rupt,* and *vis* increased by an average of 1 or 1.2 marks (see Table 67 above). Table 68 (below) shows six intervention group participants' responses to the *ambi, rupt* and *vis* word parts to exemplify how some participants' awareness of bound word parts and word part meanings changed from Challenge 1 to Challenge 2. All the participants shown in Table 68 scored zero out of a possible two marks for the word parts in Challenge 1 but scored two out of two for defining the word parts in Challenge 2.

[7] Here, 'the gram' refers to the social media site 'Instagram', the name of which literally means 'instant picture' and, thus, the meaning does relate to the bound root *gram* (i.e., something that is written or drawn).

Table 68: Participant responses to the ambi, rupt and vis bound word parts

Word part	Participant ID	Challenge 1 responses (score = 0 out of 2)	Challenge 2 response (score = 2 out of 2)
ambi	P10I	*dunno*	*It means both*
	P45I	*wanting things*	*being able to use both things or like two meanings like ambiguous*
	P102I	*feeling to do with hands*	*around or both of something like using both hands*
	P113I	*don't know what it means or what those words are but I watched the queens gambit and ambi is in gambit*	*both*
	P119I	*leading someone*	*both things using more than one like your hands or stuff*
	P128I	*never heard of the words*	*using both*
rupt	P10I	*cant see a connection because I cant think of words*	*the words with this all break things or are to do with something breaking*
	P45I	*not sure sorry*	*the words break or have borken something*
	P102I	*not sure of the link going in front of somnething maybe like interrupting*	*break something up*
	P113I	*don't know of connection*	*all about inserting yourself in something or breaking up something like a conversation*
	P119I	*no idea*	*the words all have a bit that means you break something*
	P128I	*not sure*	*the words have rupt in which means breaking like another one is erupt which is when a volcanoe explodes*

vis	P10I	*not sure*	*seeing some thing*
	P45I	*not sure sorry*	*the words aere all to do with looking at something or seeing it*
	P102I	*not sure they seem different but have the same part*	*seeing things*
	P113I	*idk*	*its to do with sight or being able to see something*
	P119I	*telling someone to do something*	*these words all mean to look at something*
	P128I	*not sure what it links with*	*they all relate to the idea of seeing something or someone*

Table 68 shows that in Challenge 1, some of the above participants were trying to think about word meanings in relation to other words that might contain the word part. For example, participant P113I's response about how *ambi* appears in *gambit* shows a lack of awareness about the word part's meaning and suggests that, prior to instruction, they were not aware that word parts do not hold the same meaning every time they appear. This finding is reflective of 102 participants' Challenge 1 responses (control group n = 71; intervention group n = 31). For example, in relation to the word part *voc,* one control group participant said:

> *I'm not sure but its in avocado so maybe its like foods or something as well as whatever the other stuff is.*

Similarly, 19 participants referred to the idea that the bound word part *port* appears in the word *sport.* For example, one participant commented:

> *Idk how the words like with the meanin but is in sport os maybe thas a clue*

It seems that in Challenge 1, some participants did not understand that when looking for bound word parts, one must also consider the meaning of the word part in relation to a whole word to determine whether the meaning is relevant or not.

Furthermore, in Challenge 1, 46 control and intervention group participants provided answers in which they used examples that contained the letters of the bound word parts, but not the

bound word part itself. For example, in Challenge 1, despite being given the example words *vocal, vocabulary, vocative, advocate* and *vocalise,* when trying to define the bound word part *voc,* participant P22I explained:

> *I don't get the link here but the letters are in cover and convert so maybe its like them?*

Likewise, in relation to the word part *sens,* participant P15C said:

> *I don't really know the words in the list but you can remake t hem to get ness and you can get like hardness and darkness so maybe that means it's like that*

Overall, in Challenge 1, none of the 46 participants who made errors like participant P15C (above) showed understanding about how clusters of letters need to be kept together for a bound word part to hold its meaning. However, in Challenge 2, it was only some control group participants (n = 27) who continued to provide these sorts of answer. The 22 intervention group participants who had given these letter-based responses in Challenge 1, did not repeat the errors in Challenge 2. In fact, at the end of task 4 in Challenge 2, participant P118I commented:

> *I think I done better this time because before I didn't know that the word root things have to be kept hole becos there parts of old words with origonations in like romans and greeks so you cant split them up because it might not mean the same thing so like I struggled becose this is really hard but I hpoe I done better than last time.*

Participant P118I had 'done better' in Challenge 2, as their task 4 score was 9 marks higher than it was for Challenge 1 (Challenge 1 n = 14; Challenge 2 n = 23). Overall, the etymological awareness scores of all 22 intervention group participants increased from Challenge 1 to Challenge 2. The Challenge 2 responses of the participants shown in Table 68 also demonstrates that many learners developed an awareness of how bound word parts function—no participants tried to divide up the letters in the word part or provide their own irrelevant/inaccurate examples—as well as an awareness of the meanings of the bound word parts. These findings indicate that explicit instruction in word origins and bound word part meanings could support learners' awareness of why and how certain words are structured the way they are, and how this structure can be decoded to find meaning.

Some of the tasks in the vocabulary skills development programme tutorials aimed to support learners with developing awareness of bound word part meanings and how to identify when and where the bound word parts hold meaning. For example, in tutorial 1, participants were given 12 Latin/Ancient Greek bound word parts and their meanings and asked to build vocabulary networks by producing as many modern-day English words as they could that related to the meaning of the bound word part (for example, see Figure 41 below). Overall, participants responded well to this task and produced an average of 3.4 modern-day English words per bound word root.

Figure 41: Tutorial 1 etymology networks task example

Additionally, in tutorial 3, participants played a Latin/Ancient Greek word root game, in which they had to progress through six levels by producing words that contained the bound word parts they were given. The final level of the game was a word part and word part meaning match challenge (see Figure 42 below).

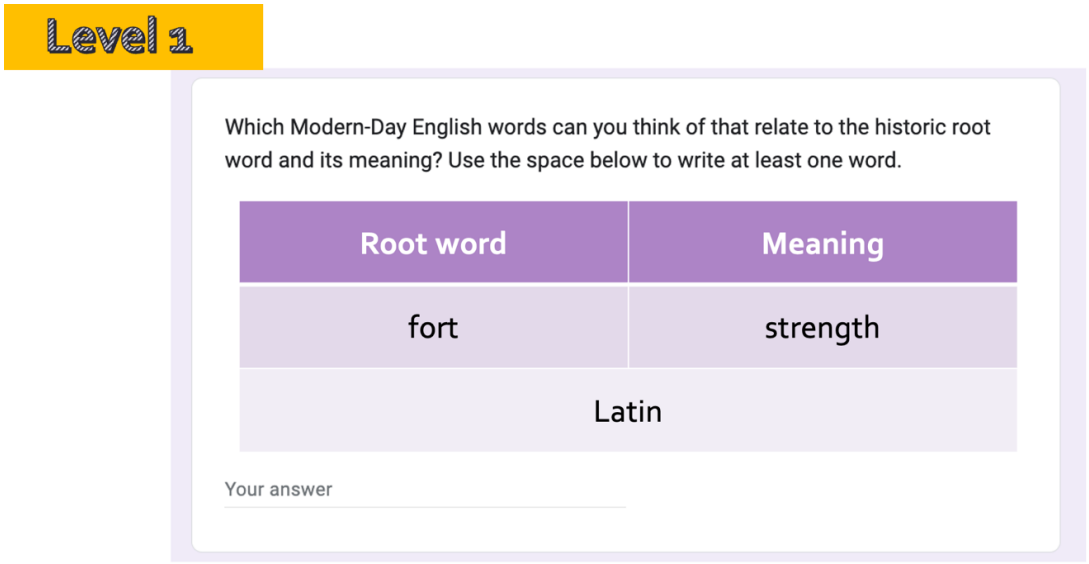


Figure 42: Examples from the tutorial 3 Latin and Ancient Greek bound word part game

In the above game, participants produced an average of 2 words per word part, and on the match game, they scored an average of 12 out of 15 points. When combined with the task 4 results, these findings suggest that the explicit instruction was effective with developing learners understanding of bound word parts and meanings. The intervention group's task 4 results also correlate with Schreuder and Baayen's (1995) word processing model and Perfetti and Hart's (2002) and Perfetti's (2007) Lexical Quality Hypothesis (discussed in detail in

Chapter 2, section 2.7). They both explain that, for the decomposition of complex words to occur, an individual must have access to representations of morphemes (i.e., base word and bound morphemes in their 'raw forms' without other affixes), as this provides a foundation to which new, additional syntactic and semantic information can be attached. In Challenge 1, participants in both groups seem to have had low levels of access to representations of the common Romance- and Ancient Greek-rooted bound word parts in the mental lexicon. However, I propose that the vocabulary skills development programme worked to expose and deepen the intervention group learners' awareness of common Romance- and Ancient Greek-rooted word parts in their 'raw forms'. Following this type of exposure and explicit instruction, the intervention group participants' access to representations of the relevant morphemes seems to have increased.

7.4 Task 5: Word definition results

In the second of the etymological awareness tasks, participants were provided with a list of multimorphemic words that contained bound Romance- or Ancient Greek-rooted word parts. Participants were asked to select a definition that described the meaning of the word most accurately. As explained in Chapter 4, this task was included because it reflects some of the word definition GCSE-style questions asked in WJEC English language papers (for examples, also refer back to Chapter 2, section 2.2). Like the questions in the GCSE past papers, the questions in this task were multiple choice—participants had three options to choose from—therefore, there was one mark available for each of the six questions. The words selected for this task all used prefixes and derivational suffixes which, for the intervention group, were explicitly taught in the vocabulary skills development programme.

Table 69 (below) shows the average task 5 scores of the two groups. In Challenge 1, the average score was 0.5 marks higher in the intervention group than in the control group. However, the average scores for both groups were over 50% (control group m = 3.8 out of 6; intervention group m = 4.3 out of 6). Table 69 also shows that in Challenge 2, the control group's average task 5 score increased by 1 mark, whereas the intervention group's average score increased by 0.4 marks.

Table 69: Task 5 results

Group	Challenge 1 task 5 average score (out of 6)	Challenge 2 task 5 average score (out of 6)	Difference between the Challenge 1 and Challenge 2 scores
Control group	3.8	4.8	1
Intervention group	4.3	4.7	0.4
Difference between the control and intervention group averages	0.5	0.1	0.6

Table 70 (below) illustrates that the reason for the above score differences could be that the scores of more control group participants increased from Challenge 1 to Challenge 2. Interestingly, the percentage of participants whose scores remained the same from Challenge 1 to Challenge 2 was exactly the same in both groups (23.8%). Finally, more intervention group participants' scores decreased from Challenge 1 to Challenge 2. Given that the majority of the intervention group participants' scores stayed the same or decreased from Challenge 1 to Challenge 2, it seems that the vocabulary skills development programme was not successful with extending learners' skills in decoding the meaning of unfamiliar words.

Table 70: Distribution of task 5 score changes

	Percentage of control group participants	Percentage of intervention group participants
Score increased	52.5	43.4
Stayed the same	23.8	23.8
Decreased	23.8	32.9

As explained above, all of the words used in these tasks comprised word parts that the intervention group were explicitly taught the meanings of as part of the vocabulary skills development programme. Table 71 provides a breakdown of the words and the average scores for each word. The results indicate that, in the control group, the average scores increased by an average of 0.1 to 0.3 marks for all but one of the target words used in the task. The average score for *nonsensical* remained the same. However, in the intervention group the average scores only increased by 0.1 or 0.2 marks and, for the word *nonsensical,* the average score decreased

by 0.2 marks. These figures help to explain why the control group's scores increased by more marks for this task.

Table 71: Average score per bound word part used in task 5

Word	Control group: Challenge 1 average score	Control group: Challenge 2 average score	Challenge 1 to Challenge 2 score difference	Intervention group: Challenge 1 average score	Intervention group: Challenge 2 average score	Challenge 1 to Challenge 2 score difference
Prospective	0.7	0.9	**0.2**	0.8	0.9	**0.1**
Unbeneficial	0.7	0.8	**0.1**	0.7	0.8	**0.1**
Inaudible	0.5	0.8	**0.3**	0.6	0.7	**0.1**
Rejection	0.6	0.8	**0.2**	0.7	0.8	**0.1**
Abduction	0.6	0.8	**0.2**	0.7	0.9	**0.2**
Nonsensical	0.7	0.7	**0**	0.8	0.6	**-0.2**
Average total (out of 6)	**3.8**	**4.8**	**1**	**4.3**	**4.7**	**0.4**

Analysis of the control and intervention groups' responses to the word *nonsensical* shows that many participants did not understand that the prefix *non-* turned the meaning of the bound root word *sens* into its opposite meaning. Most participants selected 'something that feels good' rather than 'something that does not have meaning'. For the control group, understanding of this word did not change; however, for the intervention group, understanding of this word seems to have decreased. Rather than a lack of awareness about the meaning of the bound root word *sens,* it seems that participants had particular difficulty with the prefix *non-.* The third of the multiple-choice options was 'something that does not lead anywhere'. In Challenge 2, only three intervention group participants selected this option. This suggests that most participants had developed an awareness of the meaning of the word part *sens* as both of the other multiple-choice options related to 'meaning' or 'feeling' in some way. This lack of prefix awareness maps on to some of the morphological awareness results discussed in Chapter 5 (section 5.4) which demonstrated that overall, participants started the study with fairly high levels of English prefix awareness, but that some learners did have difficulties with manipulating and decoding prefixes that negated the meaning of the root word. This adds gravitas to the argument made in Chapter 5 which explained that it is highly important to consider how instruction in prefix awareness could be sustained in classroom practice.

Broadly, the results of task 5 illustrate that participants in both groups have fairly high levels of awareness when decoding and comprehending the meaning of unfamiliar words that contain a bound root. There are, however, numerous limitations with this particular task. Firstly, the multiple-choice nature of this task does mean that participants had a one in three chance of randomly selecting the correct answer. It is not possible to investigate the extent to which random selection impacted the task results. Secondly, both test repetition and dynamic testing could have helped learners in the control group. For this task, the same words were used in Challenge 1 and Challenge 2 and participants were given the correct answers at the end of Challenge 1. Consequently, learners could have remembered the answers from one week to the next. Thirdly, this task only included six questions. This decision was made to try and ensure that participants had enough time to complete all elements of the challenges. But, in future, studies might look to include more words that use a wider variety of Latin and Ancient Greek-rooted bound word parts. Finally, although I selected words that comprised low frequency affixes and bound roots, some learners may have already known the meanings of the whole words and, therefore, been able to use prior knowledge to answer the challenge questions.

To reduce the impact of these limitations, future research could use a mixture of real words and pseudowords to offer a more accurate assessment of the extent to which learners could decode and comprehend the meanings of multimorphemic words that contain bound word parts. Past research has shown that pseudoword testing can be a highly effective way of measuring children's word decoding and comprehension skills (e.g., Mitchell and Brady 2014; Casalis et al. 2015). Several of the tutorial tasks in the vocabulary skills development programme did require learners to decode the meanings of pseudowords and it is, perhaps, learners' responses to these tutorial tasks which offer more accurate insight into their word decoding and comprehension abilities.

For example, in tutorial 4, participants in the intervention group played a game that I designed called *Logomachy!*. The words in *Logomachy!* comprised real word parts but the whole words themselves are not used in everyday English. Participants' written responses suggest that they really enjoyed this game and they felt it tested their awareness of specific word parts. For example, one participant explained:

> *I loved this game! I've not done anything like this before and it really made me focus on the meanings of the individual word parts because that's the only way you could get the answers. I divided the words in the parts like the tutor showed us and then tried to remember their meanings. Id like to play again! I think I got some but maybe not all of them.*

Although from just one participant, the above quotation exemplifies the feedback of many intervention group participants who implied that analysing pseudowords had increased their focus on the meanings of the individual word parts. In this study, *Logomachy!* was included in the programme in order to develop learners' awareness of free morphemes. However, in future, the game could be expanded to include pseudowords that contain bound word parts. This may allow learners to use and develop some aspects of their etymological awareness i.e., the identification and comprehension of Romance/Ancient Greek-rooted bound word parts.

In addition to *Logomachy!*, participants responses to the task used in tutorial 4, in which they had to make up their own words that comprised Romance/Ancient Greek bound word parts, further extends the argument for using pseudowords in this type of testing in the future. In these

tasks, participants were given a list of Romance/Ancient Greek bound word parts and asked to make up a new word and provide a definition for this new word (see Figure 43 below).

Video 10 content

1. Use the prefix and Romance root word tables to make up a new Latin-rooted English word.

2. Remember, a prefix comes at the beginning of a word and can change the word's meaning.

3. Once you have created your word, write down a definition.

For example:
auto + fort = autofort

Autofort could mean 'one's own strength'.

Prefix	Meaning
anti	against
auto	self (oneself)
co or com	with or together
dis	not or away from
ex	out of
il	not or the opposite of something
im	not or the opposite of something
in	not or the opposite of something
ir	not or the opposite of something
inter	between or among
mis	bad or wrong
pre	before
post	after
pro	forward or to be for something
re	again or back
sub	under or to take away
un	not or the opposite of something

Romance root	Meaning
acer, acri	bitter
ambi	both
aud	to hear
brev	short
cent	hundred
dict	to say
duc(t)	lead, make
fort	strength
fract	break
fund	bottom
ject	throw
lev	to lift
luc, lum	light
manu	hand
mis, mit	send
port	to carry
rupt	to break
scrib, script	to write
sect/sec	to cut
sens	to feel
voc	voice; to call

Figure 43: Example of a pseudoword task used in tutorial 4

Overall, most intervention group participants made up new words and wrote definitions that directly related to the meaning of those new words. At the end of this task, one intervention group participant explained:

> *Making up the words and defining them really helped me because it showed me about how to spot small word parts and how to think about their meaning in relation to the other bits of the words I wasn't doing that before. Its also just really fun to make up words and I learnt so much about latin and Greek word pieces. I think id find it easier to find them now that ive had to write them myself.*

The participant responses and results of this pseudoword task suggest that allowing learners to be creative with bound word parts could be an effective method of expanding understanding about the structures and meanings of real English words that contain bound word parts. Furthermore, tasks that require learners to explain the meaning of their own words and/or the processes involved with creating the meaning of their own new word requires them to

demonstrate a high level of metalinguistic awareness. As such, these methods may allow teachers and researchers to assess the extent to which learners have truly understood the structures and meanings of the bound word parts more accurately than the approach taken in task 5. Some participants' written responses to the etymology-based tasks suggest that external factors, such as age and English language status, may also have influenced the study results. Therefore, the next sections of this chapter continue by presenting findings from the etymological awareness external factor mixed-effects model.

7.5 Etymological awareness external factors mixed-effects model

Like the morphological awareness results, to explore whether any external factors influenced the etymological awareness results, I built a mixed-effects model that added one fixed effect factor to the model at a time. Table 72 (below) shows the order in which the factors were added into the model. There was no particular reason for this order and the order in which they were added did not affect the model results.

Table 72: Mixed-effects models and factors

Model number	Fixed effect factor added to the model
Model 1	Condition (i.e., control or intervention group) Challenge number (i.e., Challenge 1 or Challenge 2)
Model 2	School year group
Model 3	Enjoyment of school English lessons
Model 4	Difficulty rating of English lessons at school
Model 5	Out-of-school reading habits
Model 6	Morphology task difficulty ratings
Model 7	English language status

To test the effectiveness of each new model, I used the *anova* function in RStudio. This function shows whether the new model is more effective than the previous model or not. If the *p*-value (column Pr(>Chisq) in Table 73) was greater than 0.01, the model was deemed more effective than the model that had gone before. Table 73 shows the *anova* test results for each model.

Table 73: Mixed-effects model anova test results

	AIC	BIC	logLik	Pr(>Chisq)	Signif.
Model2	24352.67	24427.69	-12166.34	0.630181	
Model3	24353.03	24428.05	-12166.52	0.712534	
Model4	24355.62	24445.64	-12165.81	0.733101	
Model5	24133.30	24208.23	-12056.65	0.159277	
Model6	12551.73	12620.06	-6265.86	0.466743	
Model7	24352.28	24419.79	-12167.14	0.938552	

Signif. codes: . $p \leq 0.05$, * $p \leq 0.01$, ** $p \leq 0.001$, *** $p \leq 0$

Table 73 illustrates that none of the mixed-effects models were significantly more accurate when the external factors were included. The most effective model remained the one explored in section 7.2, which analysed condition (i.e., control or intervention group), challenge numbers (i.e., Challenge 1 and Challenge 2), and the effects of the intervention for participants in the intervention group (i.e., Challenge 1 scores compared to Challenge 2 scores). Table 74 below shows each of the external factors and explains why none of the models above were significant. Unlike for the morphological awareness results, in which some external factors were significant predictors of score outcome, *none* of the external factors were significant predictors of etymological awareness scores.

Table 74: External factors mixed-effects model results

	Estimate	Std. Error	z-Value	Pr(>|z|)	Signif.
(Intercept)	-0.134167	0.22119	-0.6066	0.00000000131	***
Condition (Baseline: Control)					
Intervention	0.003029	0.027530	0.110	0.912	
Challenge (Baseline: Challenge 1)					
Challenge 2	0.111038	0.019275	5.761	0.00000000837	***
School year group (Baseline: Year 5)					
Year 6	-0.09529	0.12063	-0.790	0.429590	
Year 7	-0.04995	0.09061	-0.551	0.581424	
Year 8	-0.08351	0.09278	-0.900	0.368069	
Enjoyment of school English lessons (Baseline: Yes)					
No	-0.12380	0.19204	-0.645	0.519142	
Sometimes	-0.11400	0.19204	-0.759	0.447750	
Not sure	0.01826	0.09375	0.195	0.845542	
Difficulty rating of English lessons at school (Baseline: Very hard)					
Somewhat hard	0.08278	0.19698	0.420	0.674309	
Sometimes easy, sometimes hard	0.21783	0.17277	1.261	0.207370	
Not sure	0.25915	0.22031	1.176	0.239481	
Somewhat easy	0.20949	0.17719	1.182	0.237082	
Very easy	0.24805	0.18355	1.351	0.176553	

Out-of-school reading habits (Baseline: I never read outside of school)					
I sometimes read outside of school	0.08616	0.05888	1.463	0.143381	
I read quite often outside of school	0.18232	0.05282	3.452	0.557001	
I read outside of school all the time	0.05240	0.04060	1.291	0.196781	
Etymology task difficulty (Baseline: Really hard)					
Fairly hard	0.03539	0.04605	0.768	0.442239	
Not sure	0.01398	0.05364	0.261	0.794321	
Fairly easy	-0.03806	0.06296	-0.605	0.545505	
English language status (Baseline: English as an additional language)					
English L1	0.03	0.10028	0.355	0.722926	
Bilingual (with English as a main language)	0.04746	0.05475	0.867	0.385990	
Intervention condition (Baseline: Challenge 1)					
Challenge 2	0.209460	0.032980	6.351	0.000000000214	***

(Signif.) codes: . $p \leq 0.05$, * $p \leq 0.01$, ** $p \leq 0.001$, *** $p \leq 0$

Given some of the qualitative results presented earlier in Chapter 7 (i.e., sections 7.1 and 7.2), particularly those that referred to English language status, it is surprising that no external factors are significant predictors of participants' etymological awareness results. The model does predict that participants who are bilingual (with English as one of their main languages) are more likely to get an etymological awareness score that is 0.867 marks higher than learners who have English as an additional language, and 0.512 marks higher than learners who are monolingual first language English speakers. However, the model suggests that the score differences are not enough for English language status to be a significant, reliable predictor of etymological awareness score. This insignificance of the English language status results is particularly surprising given that the thematic analysis identified that 26 bi/multilingual intervention group participants referred to how the programme had developed their understanding of how their other language(s) could be connected to English. For example, participant P117I, whose score increased by 12 marks from Challenge 1 to Challenge 2, is bilingual in English plus one other Romance language and, at the end of Challenge 2, they explained:

> *I didn't know how many languages English was related to and it helped me see how my language is connected. I speak another language at home and I haven't really used it to help me before but I tried to here because the teacher in the video explained how my language is connected and then I could spot some things that were the same.*

Additionally, at the end of tutorial 1, which primarily focussed on English etymology, participant P69I, whose etymological awareness score increased from 15 marks in Challenge 1 to 26 marks in Challenge 2, explained:

> *I enjoyed today's tutorial because I learnt something new, that I never knew before. It was interesting and informing about my language history. I enjoyed today's tutorial because I learnt some new fact's and went back in time to learn more about where English came from in the Middle Ages. it was fun to see how words has xhanged and wierd to think if the words now would change but I had no idea I could use my language to look at words before which is so cool*

It seems that for this participant, the etymological instruction and tutorial practice tasks may have been effective in developing an understanding of how languages are connected and how linguistic skills in another language could be used to support word comprehension elsewhere. Similarly, participant P86I, whose etymological awareness score increased from 15 in Challenge 1 to 28 in Challenge 2, commented:

> *I didn't know how many languages English was related to and it helped me see how my language is connected. I speak [Romance language] at home and I haven't really used it to help me before but I might now.*

While statistically, the results show insignificant correlations, the above qualitative findings correlate with Bell and Wing-Davey's (2018) research which, as discussed in Chapter 1 (section 1.4), showed that direct instruction in Latin particularly supported the growth of EAL and bi/multilingual children's word confidence and literacy skills. Similarly to the morphological awareness findings, the etymological awareness findings raise important questions about how bi/multilingual learners metalinguistic skills could be extended and capitalised upon to help their English word decoding and comprehension skills. Furthermore, the progression steps repeated at the beginning of this chapter show that as part of the new LLC curriculum for Wales, teachers need to support learners with developing their abilities to 'apply knowledge of connections, commonalities and differences between languages', and to 'use knowledge of language evolution and etymology to deepen understanding of language construction' (Welsh Government 2019a). The qualitative data collected as part of this study suggests that explicit instruction in Romance- and Ancient Greek-rooted bound word parts could offer learners the opportunity to develop and enhance the aforementioned metalinguistic skills.

Aside from English language status, the qualitative data does not provide insight into any of the other mixed-effects model results. However, the literature reviewed in chapters 1 and 2 of this thesis made clear that, in Wales, access to ancient language-based education and/or etymology teaching is varied and inconsistent. Furthermore, Chapter 2 indicated that very few research studies have been conducted in this area of vocabulary learning. As such, very little is known about the role of broader etymology instruction (i.e., teaching about the history of a language and the impact of learning about Ancient Greek bound word parts, as well as Latinate ones) on children's word decoding and comprehension skills. This lack of research makes it

difficult to determine whether the results shown in Table 74 are consistent with any previous research findings or not.

Consequently, I suggest that the results reemphasise the idea that currently etymology is both underexplored in academic research, and not explicitly nor consistently taught in classrooms in the UK/Wales. As such, the results indicate that decoding and comprehending the meanings of bound word parts using etymology-based knowledge and awareness is a new concept for all learners, regardless of age, enjoyment levels, out-of-school reading habits, etc. This claim is supported by the results of the thematic analysis I conducted in relation to the etymological awareness qualitative data. Across the six weeks of the programme, participants in the intervention group made a total of 768 comments in relation to the etymology-based tasks. Overall, 325 comments (from 113 out of 143 participants) referred to the idea that learning about etymology was a 'new' and 'interesting' experience. The idea of 'novelty' was the main, consistent finding from the thematic analysis of the etymological awareness data. Section 7.1 of this chapter presented some comments which referred to the idea that leaning about etymology was 'new'. However, a more in-depth analysis of participants' responses showed that out of the 113 participants who made 'new concept'-based responses, 74 participants also made comments about how the 'newness' of the learning had motivated them and had made them want to know more. Therefore, the final section of this chapter offers a critical analysis of the novelty and motivation-based qualitative data.

7.6 Novelty and motivation

> *I learnt that the English language had a lot of changes and a lot of different phases for example Old English, Middle English, Early Modern English and Modern English, the language we use today. I enjoyed today'r tutorial because I learnt something new about languages and etymology! I love learning and this was so new to me it made me just want to keep going. I had no idea! I love the idea that when we speak English, its got this history and we're combining and stealing words from different places ALL THE TIME! Thank you for teaching us such new things. I want to know more*

As explained above, the primary theme that emerged from an analysis of the intervention group's written responses to the etymology-based tasks was that learning about etymology was a new and motivating experience. The role of motivation in second/additional language learning is well-documented (for examples, see (MacIntyre et al. 2001; Wang and Guthrie 2004; Gilakjani et al. 2012; Zheng 2012; Tanaka 2017). Subsequently, in the literature, there are numerous definitions of the term motivation. For example, in their review of key vocabulary learning and motivation studies, MacIntyre et al. (2001) define motivation as the psychological qualities that drive an individual's behaviour towards or within a particular task. MacIntyre et al. (2001) also proposes that there must be something that the learner wishes to accomplish or gain, such as mastering a new/additional language, and this is what drives them to participate in the vocabulary learning task. Additionally, as a result of his seminal research into the psychology of second language learning, Gardner (1985) postulated that being motivated means an individual is persistent and attentive to the task at hand, and has goals, desires and aspirations within the activity. Therefore, I took these definitions as a starting point to establish whether there were any recurring reasons behind the 74 new- and motivation-based responses. Results of this analysis showed that there were four main motivating factors that participants referred to: 1) motivated by enjoyment of etymology; 2) motivated by enjoyment of history; 3) motivated by development of a specific literacy skills, and 4) motivated by doing well in the next task. There were also five responses that were unrelated to these themes, and one another, so I coded these comments as 'other'. Table 75 shows the number of times each of the sub-themes occurred and provides some examples of participants' written responses.

Table 75: Analysis of new topic- and motivation-based sub-themes

Sub-theme	Number of participants	Example written responses
Motivated by enjoyment of etymology	31	*I enjoyed it because i learned more about the english language because i learnt a lot about all the diffrenet launges I didn't know bfore I think it wd be good to do this miore in class*
		It was fascinating to learn the origins of our words/languages. I've never done something like this before the quiz was a fun way to try and remember things that could help me do better in English
		it was fun learning new words i enjoyed learning about our language and i liked learning about romans I would like to know more about this
		I had no idea about any of this and I just found it absolutely fascinating. Thank you for telling us! I want to know more now and I might try and look up some words when I get home.
Motivated by enjoyment of history	16	*i learnt a lot of stuff about the english language and its history and then when I was trying to fo the words question I really tried to remember the history because I really enjoy history and I wanted to use it to do well*
		It was relaxed, but I got to learn about history, to me history is one large story and I enjoy reading it, its interesting. It made me want to know more and to do well in the quiz
		it was interesting to learn about the history of English because I hadn't done that before. I don't like English at school but history is my favourite and I really like all stuff to do with romans and gladiators
Motivated by development of a specific literacy skill	14	*I injoyed learnin about the english languge history cos its somthing diffrent to do in class and its a fun way to learn more things. It made me want to now more becose I think it culd help my spellings which im bad at. The tutor said that knowin about french form the normuns could help*
		i learnt where english comes from It has taught me new ideas. The video was realy interesting and I hope we get to do more of this in the next lesson becose it might help my reading

		I think knowing more about etymology might help me make my vocabulary skills better and vary my vocabulary more which is good because I always have that as a target. i think it might help me with understanding the words at school as well because the books we read now are harder than before and it makes me worried if I have to explain something in class.
Motivated by doing well in the next task	8	*I really tried to do well in this because this is all new stuff that I didn't know before but I think it might help me in th next task becus the tutor said the next task is about trying to work out a missing word and I really want to get it*
		I had no idea that English works like this and it was really fun to learn new stuff. I qill try to use what I know now in the next task because I want to do better
Other	5	*it was just fun doing something new and that made me more intrested to do well*

Table 75 shows that there were a variety of reasons why learners felt motivated by learning about the 'new' topics included in the etymology instruction. However, most participants seemed motivated by how much they enjoyed learning about etymology. This finding supports the claims made in Chapter 6 which indicated that the role of enjoyment requires careful consideration in metalinguistic-based studies and instruction (see section 6.7). Furthermore, as explained in Chapter 4 (section 4.5), I used Graves et al.'s (2012) constructivist approach to inform the learning stages included in the vocabulary skills development programme. One of the latter stages of Graves et al.'s (2012) approach suggested 'Motivat[ing] students to use the strategy by explaining and discussing its value'. Therefore, throughout the instructional videos, I explained to learners why we were discussing/learning about a certain topic or skill and how it could help them with their broad vocabulary and literacy skills. I felt that this was a particularly important aspect of the instruction, because I was aware that I was introducing learners to concepts that could be considered abstract and irrelevant if the reasons for learning about the skills was not explained fully. The participants' responses in Table 75 indicate that these explanations did motivate learners and that understanding the 'why' of the etymology learning contributed to their engagement and enjoyment of the topic. As a result of this finding, I recommend that, when teaching abstract, metalinguistic skills, it is important to make the reasons for the learning clear to learners. Many teachers do display learning objectives at the

beginning of a lesson, but these findings show that providing learners with reasons 'why' throughout the learning episodes, may further develop engagement and enjoyment levels.

Participants' responses that relate to motivation and the development of specific literacy skills are particularly interesting. Table 75 shows that one participant explained that they have 'make my vocabulary better and vary my vocabulary more' as one of their English targets, and they believed that increasing their awareness of English etymology could help them achieve this. Interestingly, this participant is year 7 monolingual English speaker who, in the pre-intervention questionnaire, said that they find English at school 'very hard'. However, they had a high Challenge 1 etymological awareness score (29 out of 36), and their score increased by five marks in Challenge 2 (34 out of 36). As such, this participant's response implies that a lack of confidence with vocabulary-based skills may have affected the reflection of their own ability.

It is also interesting that this participant is in year 7, as their reference to the fact that 'the books we read now are harder than before', suggests that they may have found the linguistic demands of transition from primary to secondary school challenging. The studies reviewed in Chapters 1 and 2 made clear the vocabulary-based challenges facing the learner at the primary to secondary school transition, and highlighted the class-, race- and able-based issues with trying to get learners to 'better' their vocabulary. The reasons for the above participant's lack of confidence and 'worries' could be multifaceted; but, their response also illustrates that it can be problematic to impose vocabulary gap discourse—via learning targets—on learners. In some cases, it may impact word and reading confidence levels. The above participant's responses also emphasise the dangers of target-driven learning, and show that motivating factors are not always positive. As such, the role of motivation in children's vocabulary skills development needs careful consideration. However, overall, I argue that these findings strengthen the argument made in Chapter 1, that a focus on skills, not a specific set of words, is particularly important when introducing learners to new metalinguistic-based skills and concepts.

I also suggest the findings in Table 75 re-emphasise the importance of explicitly teaching etymology throughout the primary to secondary school transition, and making clear to learners why they are learning about a specific topic/skill etc. Many learners commented on how etymology itself, as well as the history aspects of etymology, and/or the development of a

specific literacy skill had motivated them and kept them engaged with the learning. As a result of the findings above, I propose that future research and teaching practice may also look to include these types of explicit explanations in order to assess the extent to which understanding why it may be beneficial to learn about something motivates and engages learners with the learning itself. Broadly, these findings imply that both novelty and motivation may have played an important role in participants' etymological awareness development and learning experiences.

7.7 Chapter summary

The first sections of this chapter have worked successfully to answer the remaining part of the research sub-question posed in Chapter 2: *To what extent do children in Wales already have an awareness of English morphology and etymology?* The results from this study have shown that the etymological awareness levels of learners in Wales is fairly low. Section 7.1 established that, on average, participants in both the control and intervention groups scored below 50% in the pre-intervention challenge. Only 4 out of 446 participants scored in the top score category. Some participants also achieved very low Challenge 1 scores, which has illustrated that there were also high levels of variation in learners' etymological awareness abilities. These findings correlate with the critical discussions offered in Chapters 1 and 2, which explained that in Wales approaches to the teaching of English word histories, word connections, word families and, therefore, Latin and Ancient Greek-rooted word parts are varied and inconsistent. These findings have reiterated the discussion in Chapter 1 which suggested that developing more consistent approaches to the explicit teaching of etymology is highly important if learners are to experience equal opportunities for learning, successfully meet all the progression steps in the new Curriculum for Wales, and develop the ability to decode and comprehend complex, unfamiliar school-based vocabulary.

Having explored the pre-intervention results, the chapter continued by successfully addressing the final part of another of the research sub-questions: *How does explicit instruction in English derivational morphology (word parts and structures) and etymology (bound word parts and word origins) affect children's abilities to comprehend complex school vocabulary?* Analysis of the post-intervention challenge results has demonstrated that the intervention group's average challenge score increased by 9 marks, whereas the control group's average score only increased by 3.5 marks. This 5.5-mark difference has suggested that the vocabulary skills

development programme was successful with progressing participants' levels of etymological awareness. However, the results of the mixed-effects statistical model have shown that, because the scores of both groups increased from Challenge 1 to Challenge 2, being in the intervention group was not significantly more likely to impact participants' etymological awareness scores. Nonetheless, the model has also shown that the etymological awareness scores of the intervention group participants were significantly more likely to be higher in Challenge 1 than Challenge 2. A breakdown of the individual etymological awareness tasks has demonstrated that the explicit instruction in etymology was successful with developing learners' awareness of the meanings of some Romance and Ancient Greek-rooted bound word parts. The instruction also seemed to have increased learners' awareness of how bound word parts function as, in Challenge 2, no intervention group participants provided inaccurate examples in their word part definitions, nor did they attempt to break up the letters in a word part as they did in Challenge 1. In section 7.4, I also acknowledged that there were a number of limitations to the second of the etymological awareness tasks (task 5) and I discussed the idea that future research may look to include pseudowords in tests of etymological awareness development in order to assess the extent to which participants' bound word part meaning knowledge has developed, if at all.

Analysis of individual participants' scores, and the two etymology tasks, has also illustrated that there are nuances to the dataset that are not captured in the statistics-based overviews. Some discussion points hinted at the idea that other factors, such as the novelty of learning about English etymology and participants' English language statuses, may have influenced the study results. Therefore, in line with research sub-question 3— *To what extent do external factors, such as age, mono/bi/multilingual status, languages spoken, enjoyment, perceptions of task/subject difficulty and out-of-school reading habits, affect the development of morphology- and etymology-based vocabulary decoding and comprehension skills?* (see Chapter 2)—I have presented results from an etymological awareness mixed-effects model that explored which, if any, external factors may have influenced participants' etymological awareness scores. The model results have shown that none of the examined external factors were significant predictors of etymological awareness. These results were surprising, particularly given some participants' written responses about how the explicit etymology instruction had improved their awareness of how English and their other spoken languages may be connected. However, a more in-depth thematic analysis of the etymological awareness qualitative data has indicated that the reasons for the mixed-effects model results might be that, regardless of school year group, languages

spoken etc., etymology was a new concept and learning topic. Effectively, the instruction in English etymology acted as a *tabula rasa.* It allowed many participants, regardless of external factors, the opportunity to explore the English language in a new, unfamiliar way.

Some participants' written responses have also illustrated that the vocabulary skills development programme had influenced learners' perceptions of English; it is a language to be studied and deconstructed, not just a medium through which to experience literature. Furthermore, results of the thematic analysis have indicated that learning about a new topic had increased some participants' motivation levels and engagement with word decoding and comprehension-based learning. Overall, the above evidence has suggested that explicit instruction in etymology could be effective in developing learners' awareness of bound word part forms, structures and meanings. This awareness could, in turn, support learners with decoding and comprehending the meaning of a variety of unfamiliar school-based academic words when they appear in different contexts. Consequently, I propose that it seems highly important to equip teachers with the resources required to embed the explicit teaching of English etymology into the everyday English/literacy classroom.

8 Conclusions

This thesis set out to offer an empirical exploration of whether explicit instruction in English morphology and etymology could influence the development of Welsh pupils' word decoding and comprehension abilities. In doing so, the primary aim of the research has been to investigate which aspects of explicit instruction in derivational morphology and English etymology could support teachers and learners with accessing the metalinguistic skills required to manage the complexities of school-based academic vocabulary. To achieve this aim, I set one primary research question that guided the investigation: *How does explicit teaching of English morphology and etymology impact the development of children's vocabulary decoding and comprehension skills at the transition from primary to secondary school?*

Subsequently, the research was directed by three research sub-questions (repeated below) that informed the study approach and design:

1. To what extent do children in Wales already have an awareness of English morphology and etymology?

2. How does explicit instruction in English derivational morphology (word parts and structures) and etymology (bound word parts and word origins) affect children's abilities to comprehend complex school vocabulary?

3. To what extent do external factors, such as age, mono/bi/multilingual status, languages spoken, enjoyment, and out-of-school reading habits, affect the development of morphology- and etymology-based vocabulary decoding and comprehension skills?

This final chapter summarises the main findings from each research sub-question and considers how the results expand current understandings of children's metalinguistic skills and word decoding and comprehension abilities in Wales. Section 8.1 discusses children's levels of morphological awareness and etymological awareness, prior to any intervention. Section 8.2 summarises the impact that explicit instruction in English derivational morphology and English etymology had on learners' morphological awareness and etymological awareness levels. Then, section 8.3 considers the external factors that may have influenced the overall study

results. Afterwards, section 8.4 offers my personal reflections on conducting education-based research during the COVID-19 pandemic and evaluates the approach taken to designing the vocabulary skills development programme. In that section, I also reflect on and address the limitations of the thesis. Finally, section 8.5 briefly outlines areas of consideration for future research, with a specific focus on the development of explicit metalinguistic teaching practices in the context of the new Curriculum for Wales.

8.1 Welsh pupils' pre-existing levels of morphological awareness and etymological awareness

Chapters 1 and 2 of this thesis have established that, currently, very little is known about the pre-existing levels of Welsh pupils' morphological awareness and etymological awareness. Much of the research that exists has been conducted in the United States and/or has focussed on the above metalinguistic skills in relation to additional/second language learning. Therefore, firstly, this thesis has investigated to what extent children in Wales already have an awareness of English morphology and etymology.

8.1.1 Pre-existing levels of morphological awareness

Results from the morphology-based Challenge 1 (pre-intervention) tasks have demonstrated that, overall, learners in Wales have fairly high pre-existing levels of morphological awareness. A small proportion of participants (36 out of 446) did achieve a morphological awareness score of 50% or lower (i.e., they achieved 21 marks or less in the morphology tasks in Challenge 1). However, prior to instruction, 47% of participants (210 out of 446) scored 36+ marks out of a possible 42 (i.e., 85%+). Many participants accurately decomposed multimorphemic words into parts to identify word roots (task 1), accurately produced the derived or root forms of target words using common productive English prefixes (task 2), and accurately removed or applied common derivational English suffixes to produce analogies of words based on common word patterns and pairings (task 3). In Chapter 5 (section 5.1) I explained that, overall, 67 out of the 210 participants who scored 36+ marks in Challenge 1 wrote comments that included the idea that the morphological awareness challenge tasks were 'easy'.

Based on previous research findings, and discussions with teachers, I hypothesised that many participants would start the programme with a relatively low ability to demonstrate explicit morphology-based skills. However, the above results indicate that this hypothesis was not

accurate. The high percentage of participants achieving 36+ marks in the Challenge 1 morphology tasks suggests that, in Wales, many children in Years 5 to 8 do have a foundation in morphological awareness. As shown in Chapter 4, past research evidence was used to design the challenges used in the study; but, a lack of research evidence that explores Welsh pupils' morphological awareness abilities meant that it was difficult to know at what level to pitch the morphology-based challenge tasks. Additionally, as discussed in detail in section 8.4, due to COVID-19 restrictions, I was unable to pilot the study materials. Therefore, in the Challenge 1 tasks, I aimed both to reflect the possibility that participants would find morphology-based questions very challenging, and to offer participants the opportunity to demonstrate more high-level morphology-based metalinguistic skills. In reflexive, education-based intervention studies (i.e., in-person explicit teaching studies), underestimating a benchmark hypothesis is not always necessarily an issue. As discussed in Chapter 1, learning is not a static experience and part of a teacher's role is to respond to live-time feedback from learners and adapt/differentiate tasks as necessary. However, the online, asynchronous nature of this particular study meant this was not possible. Subsequently, while it is possible to begin to answer the first research sub-question (see above) and state that, in Wales, prior to explicit instruction, many learners in Years 5 to 8 have a fairly high levels of morphological awareness, the extent to which this claim is reliable remains somewhat unclear.

In future, both teaching practice and morphology awareness-based studies may want to include a wider variety of high-level morphological skills-based tasks, as well as foundational morphology skills tasks, to assess the full extent of learners' pre-existing morphological awareness skills more accurately. Nevertheless, while a small percentage of participants achieved 41 or 42 out of 42 marks on Challenge 1, many participants did have space to improve upon or increase their morphological awareness score, even if by just one or two marks. In particular, participants seemed to find identifying the root of opaque derived words, and decoding and comprehending words that contained negating prefixes (i.e., *un-, il-, im* etc.), challenging. Some participants had a tendency to decode words according to phonemes (i.e., grapheme to phoneme patterns), rather than by morphemes. These findings re-emphasised the earlier argument made in Chapter 2 (section 2.3.1), in which I contended that a 'phonics-only' approach to vocabulary instruction may not be adequate in supporting learners with the development of the late, more complex aspects of vocabulary decoding and comprehension skills. The Challenge 1 findings indicated that, in numerous cases, there was a lack of awareness that individual, free word parts hold meanings. Overall, though, the pre-intervention

results showed that many learners in Wales have a strong foundation upon which additional, extended awareness of derivational morphology could be built.

8.1.2 Pre-existing levels of etymological awareness

The new Curriculum for Wales (Welsh Government 2019a) explicitly names etymology as a skill that learners should aim to develop. However, the studies reviewed in Chapters 1 and 2 demonstrated that, currently, approaches and access to explicit instruction are inconsistent and highly varied. Therefore, I designed two etymology-focussed tasks that aimed to explore Welsh pupils' pre-existing levels of awareness of Romance- and Ancient Greek-rooted bound word parts. The results of the Challenge 1 etymology tasks indicated that learners' pre-existing levels of etymological awareness are fairly low. Overall, 379 out of 446 learners (85%) achieved an etymological awareness score of 60% or less in Challenge 1. The lowest etymological awareness scores were between one and five marks (control group $n = 2$; intervention group $n = 2$). Conversely, two control group participants and two intervention group participants scored between 31 and 36 marks.

Overall, the figures above illustrate that, in Wales, there are high levels of variation in learners' pre-existing levels of etymological awareness. When compared to the morphological awareness results, the figures above suggest that levels of etymological awareness are lower than levels of derivational morphological awareness. The Challenge 1 findings map onto the discussion presented in Chapter 1 (section 1.3) which explained that in Wales, learners' exposure and access to etymology-based instruction is varied and inconsistent. This claim correlates with some participants' written feedback and survey responses. At the end of Challenge 1, 289 out of 446 participants said that they found the two etymology challenges 'fairly hard' or 'very hard'. Furthermore, 182 out of 446 participants wrote feedback which explained that analysing words in terms of etymological roots and shared meanings was a 'new' approach for them.

Analysis of the individual etymology tasks demonstrated that learners found decoding and comprehending the meanings of words that contained Ancient Greek-rooted bound word parts particularly challenging (task 4). On average, the control group participants scored 11.8 out of 30 marks, and the intervention group participants scored an average of 11.7 out of 30 marks. Overall, participants showed a lack of awareness about how to identify the bound word part

within a multimorphemic structure, and they had little awareness of the fact that the target words were connected because of the meaning of a bound word part. The results of the second etymology-based task (task 5) showed that participants did have higher pre-existing levels of awareness of how to decode the meanings of some low frequency, multimorphemic target words that contained bound Romance or Ancient Greek roots. However, section 7.4 explained that there were a number of limitations to task 5, as the multiple-choice nature and use only of six questions meant that participants could have been more likely to guess correct answers. Additionally, some participants could have used prior knowledge about the meanings of the target words to answer the questions. This may have resulted in a limited understanding of the extent to which learners were able to decode and comprehend the meanings of individual bound word parts. As such, I recommended that future research and teaching practice incorporate pseudowords into the task, as well as real words. The use of pseudowords may reduce the effects of prior word knowledge and could offer a more targeted approach to investigating learners' awareness of the structures and meanings of common bound word parts. Nonetheless, task 5 was included in the analysis because, despite these limitations, the results still broadened insight into learners' abilities to decode and comprehend complex academic words. Overall, though, I argued that the pre-intervention results indicate that many learners in Wales require support with developing an awareness of English etymology. In particular, I suggested that learners could benefit from instruction which targets the development of how to decode words that contain bound word parts, and how to identify the connections and meanings of the word parts.

The Challenge 1 findings were used as a baseline measurement from which to assess whether the explicit instruction provided in the vocabulary skills development programme influenced the intervention group participants' levels of morphological and etymological awareness. Therefore, to address the second of the research sub-questions (see the introduction to Chapter 8 above), this final chapter continues by presenting an overview of the Challenge 2 findings.

8.2 The impact of explicit instruction on Welsh pupils' morphological awareness and etymological awareness development

To explore whether explicit instruction in derivational morphology and English etymology could support the development of Welsh pupils' word decoding and comprehension skills, I built an online vocabulary skills development programme. The programme—which the

intervention group participants completed while COVID-19 restrictions were still in place—comprised a series of lessons, instructional videos and interactive tasks that centred on key aspects of English derivational morphology and English etymology. The programme tutorials were designed using evidence from past morphology- and etymology-based studies, as well as findings from online learning practices, and relevant progression steps from the new Curriculum for Wales. The intervention group began the programme one week after they had completed Challenge 1 and then completed Challenge 2 one week after the tutorial aspects of the programme had finished. Conversely, the control group completed Challenge 1, followed by Challenge 2 a week later.

8.2.1 Morphological awareness findings

Firstly, I conducted descriptive analysis of participants' Challenge 2 scores. Evaluations of the Challenge 2 results indicated that, on average, the intervention group participants' morphological awareness scores were 0.9 marks lower than the average scores of the control group participants. Additionally, on average, the scores of participants in the intervention group only increased by 0.2 marks from Challenge 1 to Challenge 2. Conversely, the scores of participants in the control group increased by an average of 1.5 marks from Challenge 1 to Challenge 2. As such, the descriptive analysis suggested that the vocabulary skills development programme was not successful with supporting learners' morphological awareness development. In fact, the intervention group learners appeared to have gone backwards.

To explore the significance of the above results, I used mixed-effects statistical models. The models accounted for the imbalances in the dataset and predicted whether taking part in the intervention was significantly more likely to increase the intervention group participants' scores or not. In line with the descriptive statistics findings, the results of the mixed-effects model showed that participating in the intervention was not significantly more likely to result in a higher morphological awareness score ($\beta = 0.02396$, $z = 0.832$, $p = 0.405$). Furthermore, the Challenge 2 morphological awareness scores of all participants were not likely to be significantly different from their Challenge 1 (pre-intervention) scores ($\beta = 0.08551$, $z = 1.187$, $p = 0.235$). These results mapped onto the descriptive statistics, which indicated that, regardless of condition (i.e., control or intervention), there was little difference in the average Challenge 1 and Challenge 2 morphological awareness scores. Most notably, the results indicated that there was no significant difference between the intervention group's Challenge 1 and Challenge

2 morphological awareness scores (β = -0.03227, z = -1.279, p = 0.201). This result confirmed that the vocabulary skills development programme did not support learners' morphological awareness development. Although not significant, the negative z-Value result (z = -1.279) also predicted that the intervention group participants were more likely to achieve a lower Challenge 2 score than they did in Challenge 1. However, the critical discussion offered in section 5.2.1 explained that there were several reasons why the control group participants' scores had increased more than the intervention group participants' scores.

Firstly, the discussion in Chapter 5 (section 5.2.1) explained that the control group completed Challenge 2 just one week after they completed Challenge 1. The discussion drew on key literatures which have shown that repeating tests near to each other can improve retention and memory recall (see Cepeda et al. 2006; Schell and Butler 2018). Different root words were used in the two challenges. However, the two challenges followed the same structure (i.e., all the questions were worded in exactly the same way), tested some of the same word parts (i.e., participants were repeatedly tested on the prefixes *un-, dis-, re-*, etc.), and tested the same word awareness skills (i.e., decomposition, derivation and word analogy). Consequently, the high level of repetition in the two challenges, and completing the challenges in a short timeframe, may have allowed some participants to remember and recall the expectations of the test. The discussion also presented some control group participants' written comments which explained that completing the challenges one week after the other helped them answer some of the Challenge 2 questions (see Table 28). In contrast, the intervention group experienced a longer gap between challenges 1 and 2 (five weeks in total). As such, I questioned whether the intervention group were less able to recall aspects of the tasks and use memories of the tasks to help them. Additionally, unlike the control group participants, no intervention group participants made comments about test repetition or the tests being the same. Subsequently, the discussion concluded that one key limitation of the study is that there was not enough time between the control group participants completing Challenge 1 and Challenge 2.

In addition to the impact of test repetition, the discussion in Chapter 5 also acknowledged that 'dynamic testing' may have impacted the control group participants' results. Participants were given the answers to morphology-based questions at the end of each task. This meant that the challenges were 'dynamic tests' rather than 'static tests' (Metsämuuronen and Mattsson 2013). Consequently, the findings from this research correlate with numerous past language testing studies which have found that final test results often increase more with dynamic testing

compared to static testing (i.e., Butler et al. 2007; Metcalfe et al. 2009; Vojdanoska et al. 2010). Again, the short timeframe in which the control group participants completed the two challenges may have remembered some of the correct answers from Challenge 1 and these memories could have helped them in Challenge 2. Chapter 3 explained that, in this study, I used a dynamic approach to testing to motivate participants to complete each of the challenges. I was aware that at this point in the COVID-19 pandemic, learners had spent a lot of time learning online. Therefore, I hypothesised that some learners may need incentives (i.e., revelations of clue answers and information about the criminal in the word detective storylines) to keep them engaged with the tests. However, as a result of the above findings, I recommend that future morphological awareness development studies may consider using 'static tests' (i.e., providing task/test answers at the end of the whole test, rather than after each task) and/or using other methods, such as the development of a storyline, but not real answers, to maintain participant motivation and engagement.

Although the overall statistical results were not significant, investigation into individual participants' score changes illustrated that the morphological awareness scores of 55.2% of participants in the intervention group did increase from Challenge 1 to Challenge 2 (n = 79). This percentage is 0.6% lower than the percentage of control group participants whose scores increased (55.8%; n = 169) which is why the result is insignificant. Evaluations of each of the three morphology-based tasks showed that, despite the explicit instruction, learners consistently struggled to decode and comprehend derived words that contained opaque roots (i.e., identifying *comprehend* from words like *incomprehension; decide* from *indecision,* and *compete* from *uncompetitive*). Additionally, some participants continued to decompose words by the sounds that are blended together to produce the word, rather than by morphemes.

Nonetheless, further analysis of individual results showed that, in Challenge 2, 12.6% of intervention group participants (n = 18) scored 41 or 42 out of 42 marks. This is a 10.6% increase in the percentage of intervention group participants achieving 41+ marks in Challenge 1 (n = 3). In total, 10 of the 18 participants who scored 41+ marks in Challenge 2 achieved between 31 and 35 marks in Challenge 1. Consequently, I suggested that these results indicated that, for some individual intervention group participants, particularly those who started the study with fairly high levels of morphological awareness, the explicit instruction did help to extend some word decoding and comprehension skills. Developing strategies that could extend the metalinguistic skills of high-achieving learners seems particularly important given that

Wales's Inspectorate, Estyn, found that Wales's highest achievers often do not reach their full potential, particularly when it comes to literacy (see Estyn 2021). Further analysis of individual results also demonstrated that the scores of all the intervention group participants who achieved 21 marks or below (i.e., 50% or less) on Challenge 1 increased in Challenge 2. Therefore, although the mixed-effects model results indicate that the vocabulary skills development programme made no significant difference to learners' morphological awareness scores, the programme does seem to have supported some participants who started the programme with lower levels of morphological awareness.

Overall, both groups did score highly in Challenge 1, which could explain why the Challenge 2 results were not significantly different. For some participants, Challenge 1 was not hard enough; thus, it is difficult to assess the extent to which some participants' awareness did/did not change. However, taking all the above evidence into account, I contend that prolonged and sustained instruction in how to recognise, decode, and comprehend the roots and affixes of opaque derived words could support learners' broader word recognition and comprehension skills. The new Curriculum for Wales makes clear that learners need to be able to manage a wide variety of vocabulary registers (see Welsh Government 2019a). Additionally, Chapter 1 showed that learners often encounter complex academic words out of context and, therefore, require an ability to decode and comprehend their meaning (see Figure 5, Figure 6 and Figure 7). As such, I argue that explicit instruction in derivational morphology does have a place in Wales's literacy classrooms. The limitations of this study are addressed in full in section 8.4, but it is important to note here that the asynchronous nature of the programme meant that I was not aware if/when participants found particular aspects of the morphology instruction challenging. Subsequently, the opportunity to engage with learners in meaningful conversations about their learning was lost because of COVID-19 restrictions. Some participants' written feedback indicated that this caused frustration in some aspects of the learning. However, in-person, reflexive practice would be able to respond to the questions and needs of the learners.

It is also possible that, due to the short nature of the current study, for the intervention group participants, I captured data at a half-way point in the intervention group participants' morphological awareness development process. Schreuder and Baayen's (1995) model for morphological processing illustrates that the acquisition of derivational morphology is a multifaceted and multi-layered aspect of the language development process. Some participants'

written responses showed that they needed more time to process and practice the content covered in the vocabulary skills development programme, particularly in relation to their opaque word derivation skills (for examples, see Table 48). As such, it would be interesting to see if and how the Challenge 2 results changed/developed if the explicit instruction was provided over a longer, more sustained period of time. Broadly, though, the Challenge 2 morphology-based findings indicate that it is important to build depth in word decoding and comprehension skills (i.e., the ability to recognise and identify root words, even when the root word is opaque within a derived word). Consequently, I recommend that pupils in Wales could particularly benefit from instruction in low frequency, multimorphemic words that contain opaque word derivations and further instruction on how to decode words via morphemes, not just phonemes.

8.2.2 Etymological awareness findings

To answer the final part of the second research sub-question, I analysed the results of the Challenge 2 etymology tasks. Descriptive analysis of the Challenge 2 results illustrated that, on average, the intervention group participants' Challenge 2 scores were 6.1 marks higher than the control group scores. Further analysis showed that, on average, the scores of participants in the control group increased by an average of 3.5 marks from Challenge 1 to Challenge 2. Conversely, the scores of participants in the intervention group increased by 9 marks from Challenge 1 to Challenge 2. These initial results indicated that the vocabulary skills development programme was successful with developing the etymological awareness skills of participants in the intervention group.

However, overall, the mixed-effects model results showed that participating in the intervention was not significantly more likely to result in a higher etymological awareness score (β = 0.00329, z = 0110, p = 0.912). This could be because the model showed that, in Challenge 2, regardless of condition (i.e., control or intervention group), all participants' etymological awareness scores were significantly more likely to be 5.761 marks higher than their Challenge 1 score (β = 0.111038, z = 5.761, p = 0. 00000000837). This result mapped onto the descriptive statistics discussed above which illustrated that there was a notable difference between the Challenge 1 and Challenge 2 scores of all participants. Although the overall results were statistically insignificant, the results suggested that there was a significant difference between the intervention group's Challenge 1 and Challenge 2 etymological awareness scores (β =

0.209460, z = 6.351, p = 0. 000000000214). In fact, the model predicted that the intervention group participants were significantly more likely to get a Challenge 2 score that was 6.351 marks higher than their Challenge 1 score. Thus, this finding implied that the vocabulary skills development programme did support some aspects of learners' etymological awareness development.

Analysis of participants' score changes from Challenge 1 to Challenge 2 showed that, overall, the etymological awareness scores of 82.5% of the intervention group participants increased from Challenge 1 to Challenge 2 (n = 118). This percentage was 12.2% higher than the proportion of control group participants whose scores increased (70.3% n = 213). Additionally, the percentage of participants whose etymological awareness scores decreased from Challenge 1 to Challenge was 13.4% lower in the intervention group than it was in the control group (14% and 27.4% respectively). Therefore, while many control group participants' scores increased, a notable percentage of participants scores decreased, too. Given that the control group received no explicit instruction in etymology, I explained that the 70.3% control group figure was still surprising. However, the high percentages helped to identify why the difference between the two groups was not enough to have been statistically significant in the mixed effects model.

As explained in relation to the morphological awareness results, there was only one week between the control group participants completing Challenge 1 and Challenge 2. The short timeframe could have affected the control group's retention and recall of the word/word parts used in the etymology challenge tasks. However, evaluations of the Challenge 2 etymology task results demonstrated that, the intervention group participants whose scores increased, did so by five marks or more. Conversely, in the control group, the majority of participants scores only increased by one to six marks. These findings indicated that taking part in the intervention resulted in a more notable score increase. Additionally, 16.8% of participants in the intervention group scores increased by 10 marks or more (n = 24). Interestingly, most of these participants achieved between 20-40% in the etymological awareness tasks in Challenge 1. These results suggested that the vocabulary skills development programme particularly supported the development of intervention group learners who started the study with fairly low levels of etymological awareness.

The findings above correlate with past research studies which have shown that direct instruction in Latin can have the most significant impact on the literacy skills of learners who have lower reading and word comprehension abilities (for full reviews see Bracke and

Bradshaw 2020; Holmes-Henderson and Kelly 2022; Holmes-Henderson 2023). Thus, I contend that the findings from this study have important implications for future vocabulary instruction practice. Explicit instruction in etymology, as part of the vocabulary skills development classroom, could particularly support the word decoding and comprehension skills of lower-ability learners.

Analysis of the individual Challenge 2 task results demonstrated that the explicit instruction was particularly effective with developing some learners' awareness of bound word parts and meanings. In Challenge 1, participants in both groups seem to have had low levels of access to representations of the common Romance- and Ancient Greek-rooted bound word parts in the mental lexicon. Prior to explicit instruction, some learners tried to explain the meanings of the bound roots by providing their own examples of words that contained the word part (i.e. that *tele* appears in *telebtubbies*); but, they did not show an awareness of how the meanings of the words containing were connected. Likewise, prior to instruction, some participants were not aware that word parts do not hold the same meaning every time they appear (i.e., that *ambi* holds no meaning in *gambit,* and the *voc* holds no meaning in *avocado;* see section 7.3). However, in Challenge 2, it was only some control group participants who continued to provide these sorts of answers. The 22 intervention group participants who had given these letter-based responses in Challenge 1 did not repeat the errors in Challenge 2. Consequently, I argue that, despite the lack of statistical significance of the results, explicit instruction in word origins and bound word part meanings does have the potential to support learners' awareness of the origins of word parts and their meanings, as well as how word structures containing bound word parts can be decoded to find this meaning.

Overall, the Challenge 2 morphological and etymological awareness results paint a varied picture in relation to the impact of explicit instruction in English derivational morphology and English etymology on children's word decoding and comprehension skills. Some aspects of the explicit instruction, such as instruction in Romance- and Ancient Greek-rooted bound word parts, do seem to have been successful in supporting learners' word awareness development. Other aspects, such as the instruction in common English prefixes and derivational suffixes, seem to have been less influential. However, overall, the findings presented in this thesis offer insight into areas of children's metalinguistic skills that, previously, we had no knowledge of in the Welsh education context. The COVID-19 restrictions did place limitations on this study and, in sections 8.4, I reflect upon the challenges posed by the pandemic in full. Nonetheless,

I propose that the above findings show that explicit instruction in morphology and etymology has a place in the literacy classroom. Key to successful integration, however, is sustained, prolonged instruction that is reflexive and responsive to the diverse needs of Wales's learners.

8.3 The influence of external factors on learners' morphological awareness and etymological awareness development

In the final summary section of this chapter, I reflect upon the external factor findings presented in Chapters 6 and 7 of the thesis. Based on past research, I hypothesised that a number of external factors, such as participants' school year groups, enjoyment of school English lessons, out-of-school-reading habits, and English language status, may all impact learners' morphological and etymological awareness development outcomes. However, the results of the mixed-effects models presented in Chapter 6 (section 6.2) and Chapter 7 (section 7.5) indicate that very few of these factors were significant predictors of learners' morphological or etymological awareness results. Only out-of-school reading habits, school English lesson enjoyment levels, and task difficulty ratings were significant predictors of morphological awareness scores. Although the model indicated that these factors were significant, I questioned the reliability of these findings due to the subjective nature of some of the questions asked, and the wide variations in participants' scores who gave certain responses (for full discussion, refer back to section 6.2.5). Additionally, no external factors were deemed significant predictors of learners' etymological awareness task outcomes.

Based on previous research, which had shown that both age and English language status could impact an individual's metalinguistic skills (e.g., Morrison and Ellis 1995; Dressler et al. 2011; Goodwin and Ahn 2013; Kuo et al. 2017), it was particularly surprising that school year group and English language status were not significant predictors of the challenge results. Chapter 2 exemplified that, for many learners, part of the challenge of the primary to secondary school transition is linguistic. However, the mixed-effects models indicated that school year group was not a significant predictor of morphological or etymological awareness outcomes. I propose, though, that this finding further emphasises the need to support learners' vocabulary skills development through the school transition. One might predict that, based on increased learning experiences and the number of words encountered, Year 8 learners would have outperformed Year 5 learners in the pre- and post-intervention challenges. However, analysis of the study results showed that this was not the case. Year 8 learners were not significantly more likely to have higher morphological awareness or etymological awareness scores than

Year 5 learners. This suggests that some learners' literacy skills may not be progressing in line with their relevant ages. The discussions presented in Chapter 1 highlighted that limited skills development could have negative impacts on learners' GCSE and post-school outcomes. As such, I contend that in this study, I targeted the correct age groups for explicit instruction in metalinguistic skills. However, more research and teaching is required to understand fully how best to sustain learners' vocabulary skills development through the primary to secondary school transition.

Additionally, a thematic analysis of participants' responses to the morphological awareness aspects of the challenges and tutorials indicated that explicit instruction in derivational morphology could offer monolingual English speakers, and secondary school pupils, the opportunity to broaden their perceptions of English as a language. Many older, and/or monolingual participants, explained that, rather than viewing English as a language which requires deconstruction and comprehension, they saw English as a subject through which to explore novels, plays and poetry, etc. As such, I questioned whether broadening perspectives about English as a language (i.e., that it comprises a diverse history of varied origins), could help learners understand why developing metalinguistic skills is an important aspect of their school English learning. In turn, these metalinguistic skills could be used to support comprehension in a variety of different contexts.

Furthermore, although English language status was not deemed a significant factor in the statistical analysis, the qualitative data indicated that explicit instruction in morphology could offer teachers and learners alike the opportunity to celebrate and capitalise upon the linguistic skills of bi/multilingual individuals. Many bi/multilingual learners, and learners who have English as an additional language, made comments that referred to a previous lack of awareness about how their language(s) and English could be connected. Furthermore, many had not thought to use the metalinguistic skills that their other language(s) provide(s) to support their abilities with decoding and comprehending unfamiliar English words. Due to the insignificance of the English language status results, I propose that further research into the relationship between language typologies, language morphologies and English morphology/etymology is required. However, the new Curriculum for Wales (Welsh Government 2019a) advocates a more holistic approach to the teaching and learning of Languages, Literacy and Communication by encouraging both teachers and learners to celebrate and explore how languages are connected. The results of this study begin to suggest that morphology and

etymology could be means through which to achieve this and thus, I contend that the English language status results further exemplify that explicit instruction in morphology and etymology hold an important place in Wales's literacy classrooms.

I postulate that the lack of significance regarding the external factors analysed in the mixed-effects models (discussed above) indicates that, regardless of age, enjoyment levels, out-of-school reading habits etc., decoding and comprehending words using morphology- and etymology-based metalinguistic skills is a new concept for all learners. Consequently, I argue that these findings re-emphasise the idea that, currently, the roles of morphology and etymology in the UK literacy classroom are both underexplored in academic research, and not explicitly nor consistently taught in classrooms in the UK/Wales. This claim is particularly supported by the results of the thematic analysis I conducted in relation to the etymological awareness qualitative data. Across the six weeks of the programme, participants in the intervention group made a total of 768 comments in relation to the etymology-based tasks. Overall, 325 comments (from 113 out of 143 participants) referred to the idea that learning about etymology was a 'new' and 'interesting' experience. Additionally, the thematic analysis showed that, currently, the roles of enjoyment, motivation and confidence are undervalued in Wales's literacy classrooms. Overall, 83 out of 143 participants made at least one comment about how much they had enjoyed an aspect of the morphology-based challenge or tutorial tasks. In particular, learners whose scores increased from Challenge 1 to Challenge 2 wrote comments about how much they had enjoyed both the tasks and challenges. Only 10 intervention group participants made at least one comment about how they had not enjoyed the morphology aspects of the vocabulary skills development. Interestingly, the scores of 7 of the 10 participants who made negative enjoyment comments decreased from Challenge 1 to Challenge 2. The scores of the other three participants stayed the same. These findings correlate with past second/foreign language acquisition research which has shown that enjoyment can be a significant factor in children's word learning and vocabulary development (see (Dewaele and MacIntyre 2014; McGeown et al. 2015; Dewaele et al. 2018; Dewaele 2022). Furthermore, participants' written responses also showed that it is important to consider the impact of confidence on individual's abilities to demonstrate and develop metalinguistic skills.

Analysis of individual results showed that most of the participants whose comments referred to the idea that they lacked confidence, scored 40% or lower in Challenge 1. As such, these results suggest that there could be a correlation between low morphological awareness

skills/test performance and confidence/self-esteem. The discussion in Chapter 6 acknowledges that it is difficult to determine the relationship between confidence and morphological awareness ability. Does a lack of morphological awareness skill contribute to low self-esteem in the task reflection? Or does a lack of self-esteem contribute to a low morphological awareness score? Nonetheless, previous research has shown that, in the English/literacy classroom, confidence levels can be a barrier to learning for school-aged EAL students (see Arnot et al. 2014; Zhang 2022). Thus, regardless of the direction of the literacy skills and self-esteem relationship, building confidence in word awareness is highly important. Interestingly, an examination into the profiles of the participants who lacked confidence showed that they were all monolingual English speakers. These findings do not diminish the need to ensure that EAL learners are supported with developing confidence in their English literacy skills. But it does raise important questions about how teaching practice can support the development of confidence in monolingual English speaking-students, too. Overall, I argue that these findings have important implications for future teaching practice, particularly when the results are considered in conjunction with statements included in the new Curriculum for Wales.

In the explanations of the 'four purposes' of the new curriculum (for full discussion of the purposes, refer to Chapter 1, section 1.1.3), the Welsh Government (2022a) suggest all learners should:

- […] have appropriate pathways for learning Welsh and English to enable them to develop the confidence to use both languages in everyday life.
- […] have the confidence to participate in performance.
- […] be supported and challenged so that they are prepared to confidently meet the demands of working in uncertain situations.

As explained in Chapter 6, the words 'confident' or 'confidence' are used 11 times in the 'developing a vision for curriculum design' document for schools (see Welsh Government 2022a) Furthermore, the 'designing your curriculum' guidance that is specific to the Languages, Literacy and Communication (LLC) Area of Learning and Experience (AoLE) states that, learning in this area should inspire and enable learners to: 'enjoy learning languages and develop a positive perception of themselves as users of those languages' (Welsh Government 2019a).

The above statement, and the findings from this study, suggest that considering learners' enjoyment levels and confidence levels matters in the LLC classroom. As such, I recommend that future morphological awareness research and teaching practice should consider how opportunities for enjoyment and confidence development could be built into learning episodes and activities. One of the primary aims of the new curriculum is to provide teachers with the autonomy to design a Languages, Literacy and Communication curriculum that suits the diverse needs of the learners in their contexts. As such, teachers have an exciting opportunity to take new, innovative approaches to vocabulary and literacy skills instruction. The results of this study indicate that teachers may want to consider whether integrating games that target the development of learners' metalinguistic skills could increase learners' word decoding and comprehension abilities, as well as their language learning enjoyment and confidence levels.

Additionally, it seems that for some participants, the COVID-19 restrictions in place at the time of data collection, as well as experiences of and attitudes towards online learning, had a notable impact on the study results. As such, it would be interesting to see whether the study results may change now that the pandemic restrictions have lifted, and school classrooms have returned to fulltime in-person classes. Nevertheless, this study does provide insight into learners' experiences of learning during the pandemic which, currently in Wales, largely remains unknown. Overall, I suggest that the study results contribute new insights to the field of children's language development and vocabulary teaching and learning studies. The findings discussed above begin to illustrate that developing learners' awareness of English word histories, word families and word connections could increase metalinguistic skills and enjoyment levels in the literacy classroom.

8.4 A pandemic PhD: Some personal reflections and limitations

It would be hard to conclude this thesis without reflecting on the experience of conducting an education-based PhD through a global pandemic. Chapter 3 of this thesis explained the impact that COVID-19 restrictions had on the original plans for this research and, subsequently, how I worked to design a programme that was still viable for use at the time I needed to collect data for the project. However, it is hard to express just quite how 'unknown' the 'unknown' was when I was trying to design the vocabulary skills development programme. This thesis does contribute important insights into the roles that explicit instruction in morphology and etymology could play in children's word decoding and comprehension skills development in

the Welsh education context. However, the conclusions drawn are somewhat limited in scope primarily because of the impact that COVID-19 restrictions had on the data I was able to collect. Therefore, this section of the chapter combines my personal reflections on designing and conducting a 'pandemic PhD' with critical discussions of the limitations of this thesis.

Firstly, it is important to reflect upon the fact that, due to lockdown restrictions and schools' reduced capacities to engage with external research, I was not able to conduct a pilot study. As explained in Chapter 3, I did get one Year 5 learner to test the programme, and their feedback about the interactive nature of the challenges and tasks was very useful. Based on their feedback, I integrated more interactive activities, added more visual aids to some of the instruction episodes and shortened the lengths of some longer instructional videos. However, this was the only feedback I received from a school-aged child. Had I been able to conduct a pilot study, I would have used participants' feedback to further adapt and amend the approach taken to the vocabulary skills development programme. Additionally, it may have become apparent that the morphology-based tasks in Challenge 1 did not contain a wide enough variety of questions and that the second of the etymology tasks (task 5) would have benefitted from the inclusion of pseudowords, as well as real words. As explained above, many participants achieved high morphological awareness scores in Challenge 1, and this left very little space for development and/or improvement. However, if I had piloted the study, I may have become aware of this and been able to make adaptations accordingly.

Secondly, it is important to acknowledge that, due to the lack of face-to-face interaction I had with the study participants, my analysis of their learning experiences relies entirely on what they chose to write down using a computer. Some participants may have had low levels of digital literacy (i.e., found it difficult to write down their thoughts using a computer), and this may have impacted the amount of information they shared in the free textboxes, as well as their overall experience of the programme. As such, key information about some learners' experiences could be absent from the dataset. Additionally, no participants directly commented on their thoughts of me as an instructor, and very few comments reflected upon the actual design and delivery of the vocabulary skills development programme. The comments that related to the videos etc. were more aligned with attitudes towards online learning and COVID-19 restrictions than to the design of the videos and tutorials themselves. This makes it very difficult for me to understand how my role as the instructor may have impacted study results. Similarly, due to limited capacity schools had to engage with the research, I was not able to get

any feedback from teachers that would have allowed me to critically evaluate and reflect upon the instruction itself. Had I been able to deliver the tutorials in person, I would have asked teachers to complete observation sheets (as is regular staff evaluation practice) and interviewed teachers about their reflections and experiences of watching learners engage with the programme. This limits understanding of if and how the instruction I provided was clear to learners, and how they responded to learning about metalinguistic skills. Therefore, if possible, future investigations into explicit instruction in metalinguistic skills may look to build an observation/critical evaluation of the instruction/teaching practice into the study, as this would allow for more critical evaluations of the instruction itself.

Additionally, I was very aware that at this point in the pandemic (i.e., one year and two national lockdowns in), learners had experienced a lot of online learning. Conversations with teachers showed that, for staff and pupils alike, perceptions of online learning were largely negative (for evidence, see the Family Kids & Youth 2022 report). Thus, I tried to make the online learning programme as interactive as I could, but this proved highly challenging. I had no interaction with participants at all. This meant that every single aspect of the programme had to be planned and accounted for through an online learning activity. Even spaces for learners to make notes and write things down had to be included as a 'question boxes' in the GoogleForm. There were, therefore, restrictions on how varied I could make the programme and still collect the data required to answer the overarching research question. The findings presented in sections 6.6 suggest that for some learners, the stress of COVID-19 restrictions, and more online learning, did impact their learning experiences and, potentially, study results. There was very little I could do about this, but these reflections do act as a reminder that variety, creativity and interactivity are hugely important aspects of any education-based intervention and/or study.

Had I been able to work with the study participants in-person, I would also have video- and audio-recorded some of the tutorial sessions, held focus groups with the participants, and kept my own detailed field notes, all of which would have allowed for a more nuanced and critical analysis of the study outcomes. There are, of course, limitations and drawbacks to some of these methods. In focus groups, some children may feel too nervous to speak and/or not be honest to the researcher etc. However, the data captured would have been more realistic of children's typical school learning experiences. As discussed throughout the thesis, had fewer COVID-19 restrictions been in place, and/or online learning for young learners been safer, I would have been able to deliver the programme synchronously, and react and respond to the

needs of individual learners. I could have also made notes relating to how I adapted, refined and/or re-evaluated the approach taken to instruction. Again, this would have allowed for a more nuanced investigation into how different types of instruction may influence different types of learners.

Perhaps the biggest limitation to this study, though, was the short amount of time that was available to collect data. As explained in Chapter 3, I collected data from April to June 2021. At this point in the pandemic, we were experiencing the 'phased exit from lockdown restrictions' (see UK Parliament; Brown et al. 2021). However, COVID-19 infections were still widespread, school year group bubbles kept 'popping', meaning that children kept returning to periods of home learning, and the COVID-19 isolation time period was still 10 days long. Additionally, the threat of returning to a full national lockdown still loomed. Consequently, teachers advised that we did all we could to collect data in the shortest feasible, timeframe possible: one half-term. The studies reviewed in Chapters 1 and 2 made clear that the length of the derivational morphology acquisition process is long, complex, multifaceted, and abstract. But there was very little I could do to reflect the complexity of the learning process in the timeframe in which I had to collect data. When introducing learners to such abstract concepts, one hour of instruction for four weeks is very little. I also only had time to test the intervention group participants twice: once at the beginning of the programme, and once at the end. However, future studies may look to collect 'test' data at more frequent and regular intervals, as this would allow for more nuanced analysis of learners' metalinguistic skills progress at different points in the learning process.

As a result of the above discussion, I propose that the most important take-away from this thesis is that embedding metalinguistic teaching and learning needs to be a prolonged, sustained aspect of literacy classroom practice. Although somewhat limited in scope, I argue that these findings do pave the way for future research into Welsh children's metalinguistic skills development, particularly in relation to morphology and etymology. Despite the influence of the COVID-19 pandemic, the study results still begin to demonstrate that explicit instruction in English derivational and English etymology have the potential to support the development of learners' word decoding and comprehension skills.

8.5 Future research

Throughout this thesis, I have highlighted several avenues for future research. Most notably, these include: an investigation into the role of frustration in the literacy skills development process (section 5.2); an exploration of the typological connections between the language(s) learners speak and English metalinguistic skills development, particularly in relation to morphological and etymological awareness (sections 6.1.2 and 7.3); an examination of the roles of enjoyment and confidence in Wales's literacy classrooms (sections 6.4, 6.5 and 7.6) ; and, further investigations into the role of etymology in developing children's awareness of how English is connected to other languages (section 7.2).

Overall, I suggest that investigations into each of the above aspects of children's metalinguistic skills development is particularly important in the Welsh context. Currently, there is a lack of UK-focussed research in the fields of morphological awareness and, as highlighted in Chapter 1, access to the skills that learning an ancient language can offer remains the preserve of the privately educated and/or already highest-achievers. Therefore, developing understanding about how teachers may support learners from all backgrounds and learning abilities with developing the word decoding and comprehension skills required to access the complexities of school-based academic vocabulary as part of the everyday literacy classroom is crucial. This thesis has worked to fill this gap. However, there is more work to do to ensure that, as researchers, we work with education practitioners and policymakers to provide all children and young people with access to the skills they require for success in education, and beyond. In this thesis, I did not set out to tell teachers 'what works' in relation to vocabulary skills development. Nor did I aim to contribute to the dangerous, class-based and colonial-rooted 'word gap' ideologies upon which many vocabulary policies and teaching aids are centred. Instead, I aimed to explore whether explicit instruction in metalinguistic skills could be of benefit to Welsh pupils and, by extension, which types of metalinguistic skills might be important to consider when designing explicit instruction. Overall, this thesis has highlighted that collaborative, reflexive approaches to skills-based research are key to offering important insight into how, collectively, we can best support learners' word skills and literacy development as they progress through the school years. The new Curriculum for Wales offers new, exciting opportunities to be innovative and creative with literacy and language learning. But to do this, further research is needed that takes into account, and celebrates, the linguistic diversity and context-specific needs of Wales's learners.

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Appendix I: Building the GCSE word corpus

To explore the morphological and etymological knowledge and awareness school students require for GCSE exams in Wales, I built a corpus of past English language and literature exam papers (henceforth referred to as the GCSE word corpus). In Wales, the Welsh Joint Education Committee (WJEC) is the most frequently used examination board and GCSE syllabus provider. All GCSE papers, from 2017 onwards, are freely available for download from the WJEC website. As the focus of this project is literacy ability in the English language classroom, I downloaded the available English language and English literature past papers (48 in total), which comprised question papers, excerpts of core texts, and answer booklets. Papers in other subjects are available and literacy skills are required across the curriculum. However, English language and literature exams test literacy skills most directly and explicitly. Therefore, I uploaded the past paper files to Sketch Engine and compiled a corpus. Overall, the corpus contained 9706 items, but this included unnecessary items such as punctuation marks, question numbers/codes and exam paper barcodes. I removed these entries resulting in a corpus of 9251 words and a total word frequency of 95,942.

To understand the types of words children need to be able to decode and comprehend in GCSE English exams, I built two sub-corpora from the GCSE words corpus. The first is a sub-corpus of the 500 most frequently occurring words. The 500 highest frequency words occurred between 4803 (the) and 21 (e.g., caged, history) times. The second sub-corpora comprises 500 of the least frequently occurring words. Overall, there were 7484 words that occurred fewer than 5 times in the corpus and, of that figure, 4481 words that occurred just once. Therefore, to select 500 low frequency words for analysis, I created a list of all words with a frequency of 5 or lower. I then used the randomise function in Excel and selected the first 500 words that appeared on the list. Analysing the low frequency words was particularly important because these are the words that usually hold the meaning of the question and/or excerpt students must answer or respond to (i.e., they are function rather than content words).

To test the accuracy of the GCSE word corpus frequencies—i.e., whether they were frequent/infrequent in just the GCSE word corpus or whether the frequency patterns may also occur in word usage more generally—I selected a random sample of 10 high frequency and 10 low frequency words and explored how frequently they occurred in the British National Corpus (BNC). The BNC comprises 100 million words collected from samples of written (90% of the

corpus) and spoken (10% of the corpus) language from a range of sources, such as extracts from regional/national newspapers, periodicals, journals for all ages, academic books, popular fiction, school and university essays, informal conversations etc (University of Oxford 2022). I selected this corpus as it is designed to represent a wide cross-section of current British English and, therefore, the frequency of a word in the corpus is highly likely to reflect how commonly it is or is not used in everyday English reading/writing and speaking/listening interactions. Table 1 shows results from 10 high frequency and 10 low frequency GCSE word corpus words.

Table 1: GCSE word corpus and BNC comparisons

Word	**Absolute frequency in the GCSE word corpus**	**Frequency in the GCSE word corpus (per million)**	**Absolute frequency in the BNC**	**Frequency in the BNC (per million words)**
the	4803	50061.5	6041234	61448.72
and	2751	28673.57	2616708	26615.98
to	2744	28600.61	2593729	268382.25
a	2150	22409.37	2164238	22013.66
of	1951	20335.2	3042376	30945.68
answer	476	4961.33	14293	145.38
time	205	2136.71	152502	1551.18
comment	106	1104.83	5235	53.25
mood	54	562.84	3137	31.91
reading	21	218.88	10689	108.72
awareness	5	52.15	3531	35.92
impression	5	52.15	4108	41.78
encouragement	4	41.69	1460	14.85
detrimental	3	31.27	361	3.67
obliterated	3	31.27	150	1.53
consortium	2	20.85	893	9.08
incredulously	2	20.85	149	1.52
commissionaire	1	10.42	16	0.16
inconsequential	1	10.42	93	0.95

unemotionally	1	10.42	16	0.16

Table 1 shows that the GCSE word corpus frequencies broadly compare to how frequently a word occurs in the BNC. For example, *and*, *to*, *a*, and *of* have fairly similar frequency per million averages in both corpora and, therefore, can be deemed highly frequent words in everyday use. There are some discrepancies, though. For example, *answer, time, comment* and *reading* are high frequency words in the GCSE word corpus but have lower frequency per million words in the BNC. However, this is not surprising when we consider that the GCSE word corpus comprises past exam papers in which instructions and questions often include these types of command words. Additionally, all 10 low frequency words from the GCSE word corpus have a higher frequency per million than the same words in the BNC. In part, this is to be expected because of the difference in size of the two corpora. The BNC contains more entries and, thus, more variation than the GCSE word corpus. However, some words, such as unemotionally, have a very low frequency in the BNC (0.16 instances per million words). As the BNC represents a varied cross-section of current British English, this frequency finding implies that unemotionally is rarely used in everyday written or spoken language. Furthermore, this finding suggests it is likely that some of the key words given to students in GCSE exam papers are words they have not encountered before. Consequently, a student is likely to need to be able to break down the word to understand and interpret its meaning and answer the GCSE question.

While it appears that there is a correlation between word frequencies in the GCSE word corpus and the BNC, I ran a correlation coefficient test to establish the significance and generalisability of the relationship between high/low frequency words in the GCSE word corpus and the BNC. To prevent large frequency values skewing the regression model and drawing coefficient estimates 'away from the bulk of the data' (Winter 2019: 91), I used logarithm frequencies. The logarithm takes large numbers and reduces them (Winter 2019: 91) so that high frequency does not outweigh low frequency. Figure 1 illustrates that there is more variation in the correlation between the low frequency GCSE word corpus words and the BNC. As is suggested in discussion of Table 1 above, this is to be expected because of the difference in size and, therefore, word variation, of the two corpora. However, the graph clearly shows that there is a correlation between the high frequency GCSE word corpus words and the same words in the BNC.

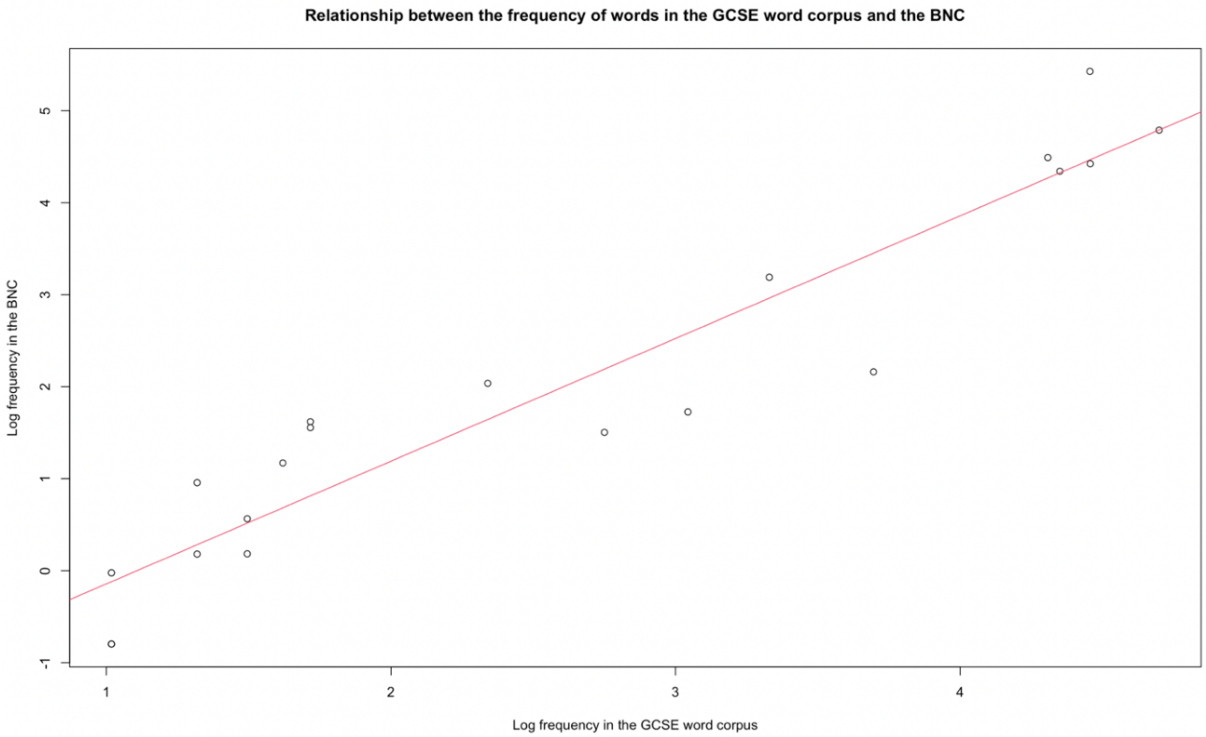
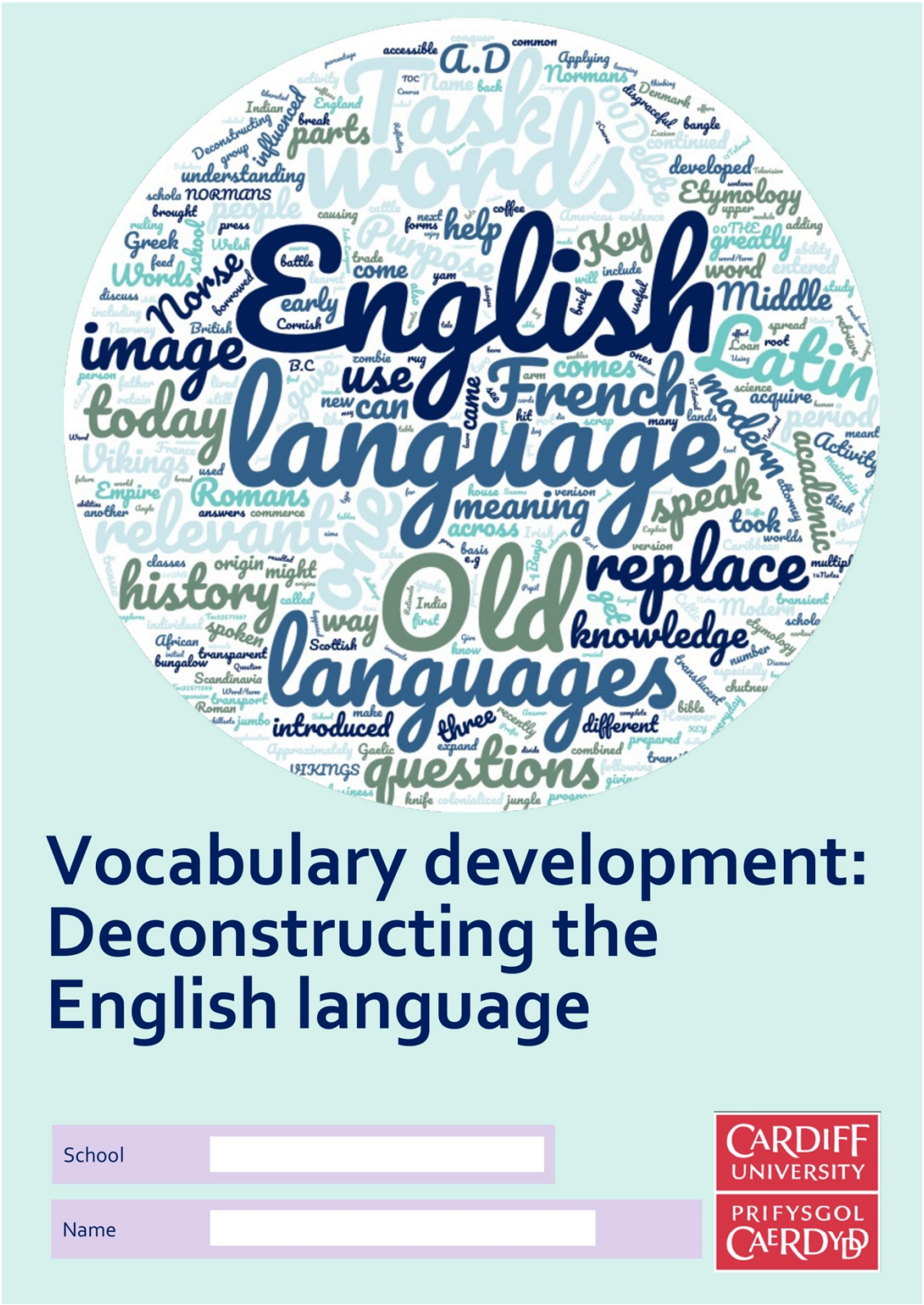


Figure 1: Correlation between the GCSE word corpus frequencies and BNC word frequencies

To test the strength of the relationship between GCSE word corpus and BNC word frequencies, I conducted a correlation coefficient test. Results showed a very high positive correlation ($r = 0.95$, $p = <0.05$). The strength of the correlation suggests that the frequency findings from the GCSE word corpus can be generalised. The low frequency words are likely to be low frequency words in everyday language use and vice versa for the high frequency words. As such, I hypothesised that students were less likely to have encountered the low frequency words and, therefore, would require a higher level of morphological and/or etymological awareness to deconstruct and decode their meaning.

Appendix II: The original vocabulary skills development programme



Contents

Course Rationale

Language, viewed from any perspective, remains the human 'miracle tool'. It liberated us from our earliest ape ancestors, gave rise to our history, enables us to learn, innovate, develop and interpret the world we see around us. But where did our language come from? What historic languages have influenced the English language and how can understanding these languages help us break-down and understand our modern day vocabulary? Why might being able to divide the word 'antidisestablishmentarianism' (one of the longest words in the English language!) into different parts help us understand its meaning? These are just some of the questions to be asked, investigated and answered in this vocabulary development module.

This course offers students of all abilities a different way of thinking about and interacting with the English language. It explores the history of our language and aims to develop key vocabulary deconstruction and knowledge skillsets that may help reading, writing, spelling and speaking skills in the classroom and beyond. The initial tutorials will introduce the broad history of the English language. We will explore the effect of crucial historic events, such as the expansion of the Roman Empire, the Anglo-Saxon invasion and the Norman conquest, on the development of the English language. We will then examine the construction and history of individual word parts—prefixes, suffixes and root words—before considering *why* understanding these word parts is important and *how* this knowledge can help to develop vocabulary and literacy comprehension skills. Finally, we will apply the strategies and knowledge we have acquired to school-specific vocabulary and look to understand how these techniques may help continued development of complex academic vocabulary.

Glossary of Keywords

Word	Definition	Used in a sentence
Affix		
Decoding		
Deconstruction		
Derivational morphology		
Etymology		
Lexicon		
Morpheme		
Morphology		
Prefix		
Root word		
Suffix		
Word knowledge		
Word-part meaning		

Tutorial 1 – So, what is the English language and where does it come from?

What is the purpose of tutorial 1?

- To gain some understanding of how the English language developed
- To identify some of the changes that have happened in the English language over time
- To understand that our modern English vocabulary is made up of lots of different languages

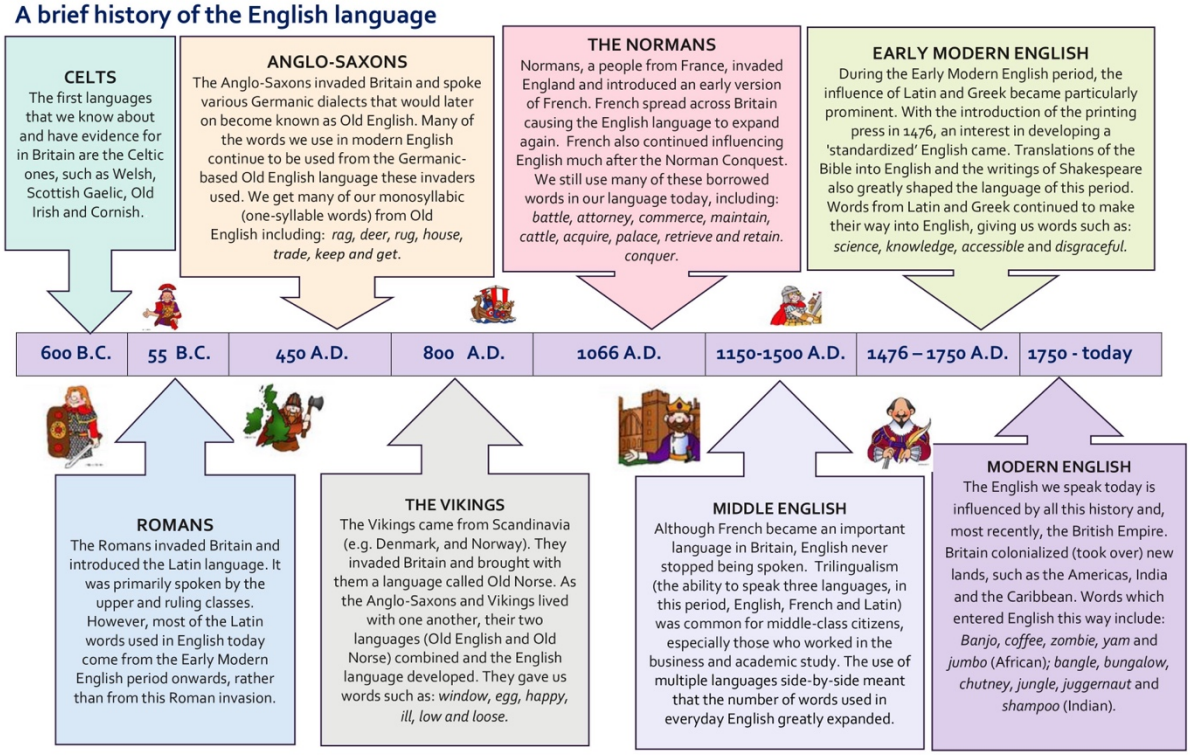
Key questions:

- What languages is Modern English related to?
- How can we look at the origins of words?
- Why is understanding the history of English important today?

KEY WORDS:

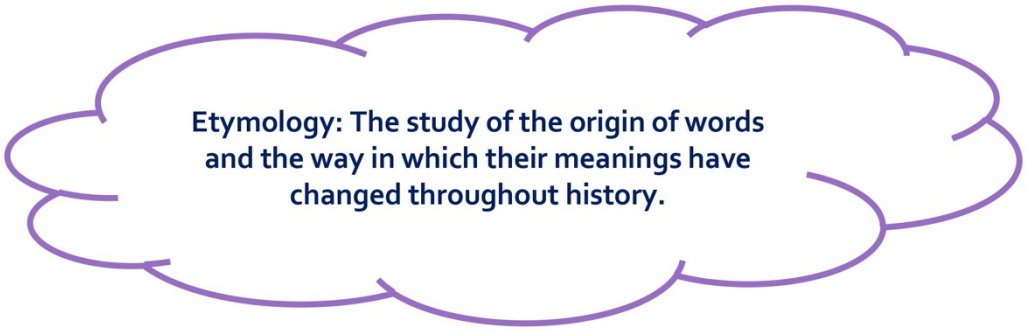
- **Etymology**
- **Loan words**
- **Trilingualism**
- **Latin**
- **Old English**
- **Old Norse**
- **French**
- **Middle English**
- **Early Modern English**
- **Modern English**

A brief history of the English language



Activity 1: History of English challenge

Question	Your Answer
What language was spoken by the Romans?	
When did the Anglo-Saxons invade Britain?	
What is the period of the English language when the Anglo-Saxons lived?	
Name three words that came from Old English times.	
Which language did the Vikings introduce to Britain?	
Where did the Normans come from and what language did they speak?	
Which three languages did people from the Middle English period speak?	
Explain why you think the English language has continued to grow and acquire (add) new vocabulary.	



Word/term	Language of origin	Past meaning
scientia	Latin	What is known, knowledge (of something) acquired by studying the world
bi + kyklos	Latin + Greek	Latin, bi = two, having two, twice, double Greek, kyklos = circle or wheel
psykhē + logia	Greek	The study of the spirit or soul
peculiaire	French	Unusual, uncommon, odd
nawhit	Old English	Evil, an evil act
circulus	Latin	Circular, figure, small ring, hoop
difficile	French	Not easy, requiring or dependent on effort, troublesome, arduous
wimman	Old English	Adult female human
drit	Old Norse	Mud, earth
buzz	Early Modern English	A busy rumour or a humming sound

Activity 3: Knowledge discussion

With the person next to you, discuss the following questions. Be prepared to feed your answers back to the group.

- What have you learnt about where the English language comes from?
- Did activity 2 help you understand how we can break words down to understand their meaning?
- Why might it be useful to understand the individual parts of words?

In your own words, what is etymology?

Do you think learning about etymology is important? Give at least one reason for your answer.

Tutorial 2 –Breaking words into parts: Prefixes and suffixes

What is the purpose of tutorial 2?

- To understand what is meant by the terms 'prefix' and 'suffix'
- To discuss why prefixes and suffixes are important to understand the meaning of a word
- To investigate the etymology and multilingual connections of key prefixes and suffixes
- To explore how prefixes and suffixes can be identified within a word

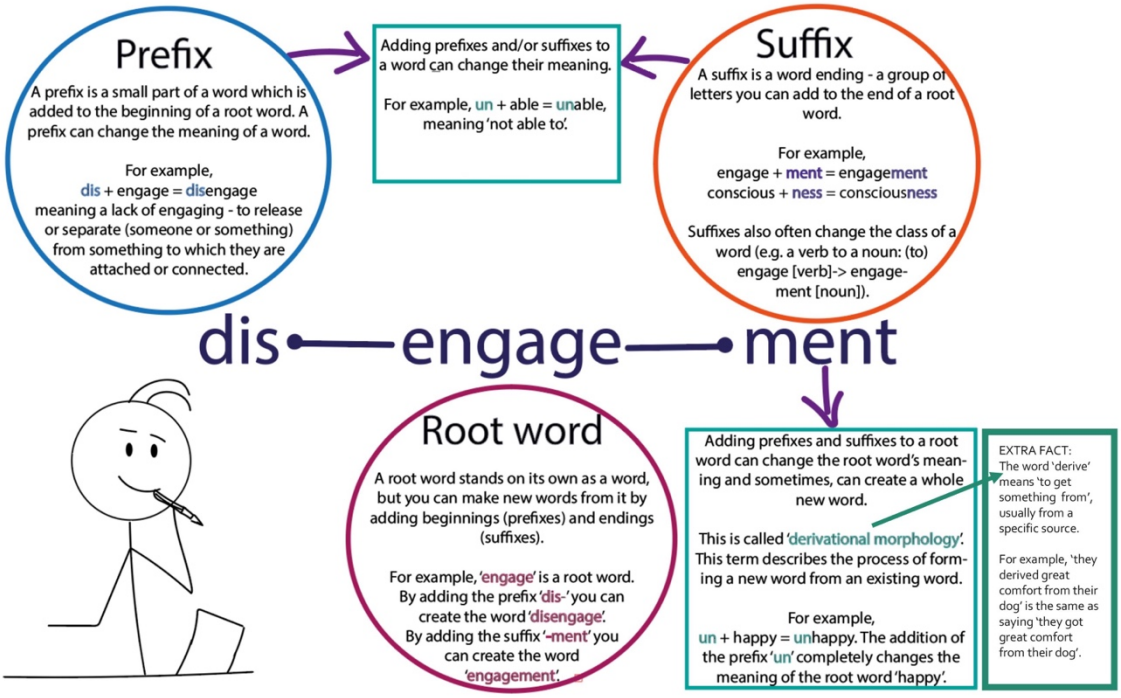
Key questions:

- What is a prefix and what is a suffix?
- Why are prefixes and suffixes important?
- What is the word-history and meanings of key prefixes and suffixes?
- How can we identify a prefix or suffix?

KEY WORDS:

- **Prefix**
- **Suffix**
- **Root word**
- **Derivational morphology**

Activity 1: Understanding root words, prefixes and suffix



Prefix	Meaning	Etymology origin
Anti-	Against	Greek
Auto-	Self or own	Greek
Co-	Together or with	Latin
Dis-	Not or opposite of	Latin
Ex-	Going out of	Greek
Il-	Not or opposite of	Latin
Im-	Not or opposite of	Latin
In-	Not or opposite of	Latin
Inter-	Between or among	Latin
Ir-	Not or opposite of	Latin
Mis-	Not or opposite of	Latin
Pre-	Before	French
Re-	Again or back	Latin
Sub-	Under	Latin
Un-	Not or opposite of	Old English

Suffix	Meaning	Etymology origin
-ness	The action of the root word	Old English
-less	Lacking, cannot be, does not	Old English
-tion, -sion, -ssion	Turns the root word into an action or condition	Latin
-ment	The result of something	Latin
-ous	Full of	French
-ian	Relating to something	French
-ance, -ant, -ancy	The state or quality of something	Latin
-ence, -ent, -ency	The state or quality of something	Latin
-able or -ible	Capable of, allowed or worthy of	Latin
-ary	Connected with or belonging to	Latin

Activity 2: Combining small parts

Prefixes and suffixes all have their own meanings and by attaching these small word parts to root words, we can create different words with new meanings. Your next challenge is to find out the history and meaning of some of the most common prefixes and suffixes in the English language and add them to some root words. Use the tables above and the alien vocabulary cards to complete the table below. (TIP: Not every word has to have a prefix AND a suffix…some words just have one!).

Prefix	Root word	Suffix

Using the tables you have just completed, write a list of words that contain a prefix and/or suffix. In your own words, explain how the meaning of the root word changes when the prefix/suffix is ended.

For example:
un + happy = unhappy. Adding the prefix *un-* to the word 'happy' changes to meaning of the root word 'happy'. It shows that someone is the opposite of happy; not happy. This is an example of **derivational morphology**.

1.

2.

3.

4.

5.

Activity 3: Spotting the prefix or suffix

We have now thought about the meaning and history of some of the most common prefixes and suffixes in the English language. Understanding the meaning of prefixes and suffixes can help us to understand the meaning of the whole word. But in order to break down the meaning of a word, we need to know how to spot the prefixes and suffixes!

To start with, see if you can spot the prefixes and suffixes in this list of words. Use your pen to underline them or use a highlighter. (TOP TIP: some words may contain a prefix AND a suffix! Watch out too, for as we discussed, sometimes the spellings change!)

beautiful	undecided
unfortunate	intolerant
reassure	inedible
disrespectful	consciousness
thoughtless	describable
careful	irreplaceable

Remember, it's always important to think about how a prefix and/or suffix changes the meaning of a word. So, how do prefixes and suffixes change the meanings of these words?

DISRESPECTFUL: Prefix = **Root word=** **Suffix =**

Meaning =

THOUGHTLESS: Root word = **Suffix =**

Meaning =

Tutorial 3 – Getting to the root

What is the Purpose of Tutorial 3?

- To understand what the term 'root word' means
- To examine how to break words apart to find the meaning of the word
- To recap the process of derivational morphology

Key questions:

- What is a root wood?
- How can we break words apart to find the root word and its meaning?
- How do affixes (prefixes and suffixes) change the meanings of root words?

KEY WORDS:

- **Root word**
- **Multimorphemic**
- **Affixes**

Activity 1: It's all in the root

With the person next to you, discuss the following questions. Be prepared to feed your answers back to the group.

- What is your understanding of what a root word is?
- Can you write a list of 6 root words that commonly occur in the books you read? E.g. 'thought' is the root word of: thoughtless, thoughtlessness, thoughtful

1. 2. 3.
4. 5. 6.

- Why is being able to identify the root of a word really important?
- What do you think the word '**multimorphemic**' might mean? Can you break it into different parts and guess its meaning? (It doesn't matter if you're not sure. Just give it a go!)

In your own words, write down what multimorphemic means?

Read the following passage taken from a GCSE English language paper. It is an extract from Charles Dicken's *David Copperfield*. Using your highlighter or pen, highlight/underline all the root words you can see within **multimorphemic** words.

For example:

The door opened, and I looked, half laughing and half crying in my pleasant agitation, for my mother. It was not she, but a strange servant.

The root of the word 'agitation' is 'agitate', therefore I need to highlight it

↓

root word 'agitat(e)' + suffix *-ion* = multimorphemic word 'agitation'

Passage

'Why, Peggotty!' I said, ruefully, 'isn't she come home?'

'Yes, yes, Master Davy,' said Peggotty. 'She's come home. Wait a bit, Master Davy, and I'll—I'll tell you something.'

Between her agitation, and her natural awkwardness in getting out of the cart, Peggotty was making a most extraordinary festoon of herself, but I felt too blank and strange to tell her so. When she had got down, she took me by the hand; led me, wondering, into the kitchen; and shut the door.

'Peggotty!' said I, quite frightened. 'What's the matter?'

'Nothing's the matter, bless you, Master Davy dear!' she answered, assuming an air of sprightliness.

'Something's the matter, I'm sure. Where's mama?'

'Where's mama, Master Davy?' repeated Peggotty.

'Yes. Why hasn't she come out to the gate, and what have we come in here for? Oh, Peggotty!'

My eyes were full, and I felt as if I were going to tumble down.

'Bless the precious boy!' cried Peggotty, taking hold of me. 'What is it? Speak, my pet!'

'Not dead, too! Oh, she's not dead, Peggotty?'

Peggotty cried out No! with an astonishing volume of voice; and then sat down, and began to pant, and said I had given her a turn. I gave her a hug to take away the turn or to give her another turn in the right direction, and then stood before her, looking at her in anxious inquiry.

'You see, dear, I should have told you before now,' said Peggotty,

'but I hadn't an opportunity. I ought to have made it, perhaps, but I couldn't azackly'—that was always the substitute for exactly, in Peggotty's militia of words—'bring my mind to it.'

'Go on, Peggotty,' said I, more frightened than before.

'Master Davy,' said Peggotty, untying her bonnet with a shaking hand, and speaking in a breathless sort of way.

'What do you think? You have got a Pa!'

Dickens, C. (XXXX). *David Copperfield.*

Activity 2: Playing Logomachy

The aim of this game is to use your knowledge of words and derivational morphology to write definitions for some bizarre but real words. You will also have to make up words that match the definitions given. The more word knowledge you can use, the more likely you are to win! Here's how you play:

1) Each player requires a whiteboard pen and a 'definitions card'. Each player writes their name at the bottom of their card and adds their name to the score card.

2) Select a player to read out a Logomachy word card first. This player takes the card on the top of the deck and reads out everything that is written in black but NOT the sentence written in purple.

3) All the other players then write down the word or definition given to them by the reader. Players then create either their own definition for the word given or create their own word to match the definition given by the reader. The person who has read the card writes down the REAL definition on their own definition card.

4) All players hand their definitions cards in to the person who read the card. The reader then shuffles all the cards (face down so no one can see!) and reads them out in a random order, but does not reveal anyone's names!

5) Players then try to guess which definition is the REAL definition of the word or which is the REAL word. If you correctly guess the real word or definition, you score 2 points. Record them as a tally on the score board. If someone else thinks the definition you wrote was the real answer, you get 1 point. You get 1 point per person who selects your answer.

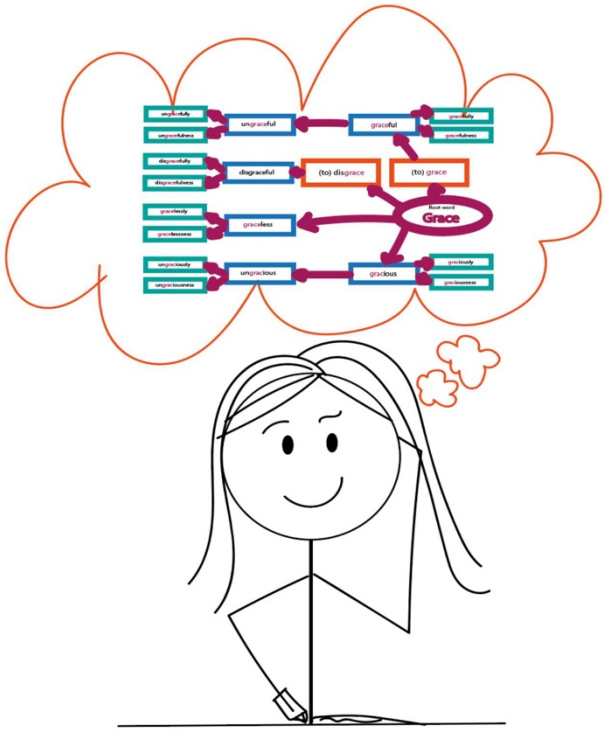
6) Once you have finished with this Logomachy word card, put it to the side. The person to the left of the first reader then picks up the next card and the game continues. The first person to get 15 points is the winner!

What was your favourite word from the game?

What definition did you give for this word?

Why did you give this definition?

Tutorial 4 – Expanding vocabulary networks



What is the Purpose of Tutorial 4?

- To further understand how we can expand our vocabulary networks (lexicons) by adding affixes to root words
- To practice deconstructing words and decoding their meaning

Key questions:

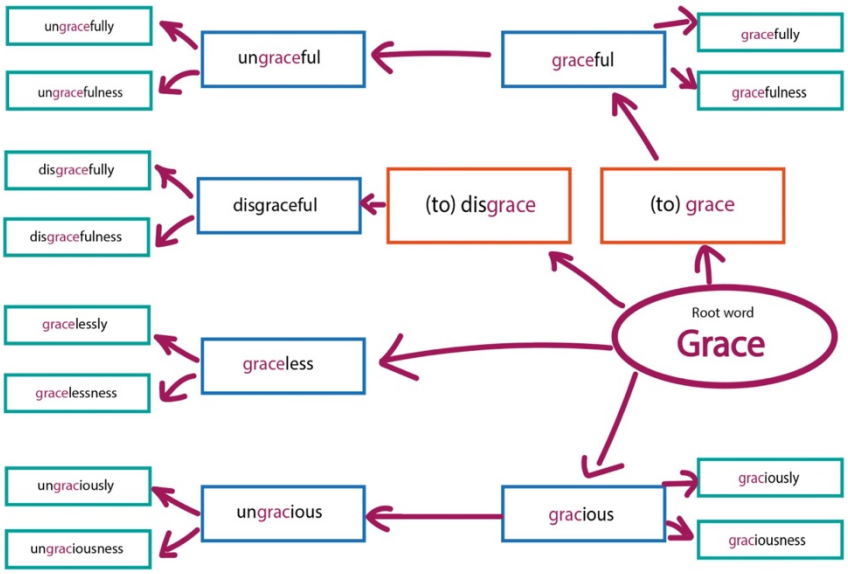
- How do affixes affect word meaning(s)?
- What strategies can we use to decode the meaning(s) of complex words?

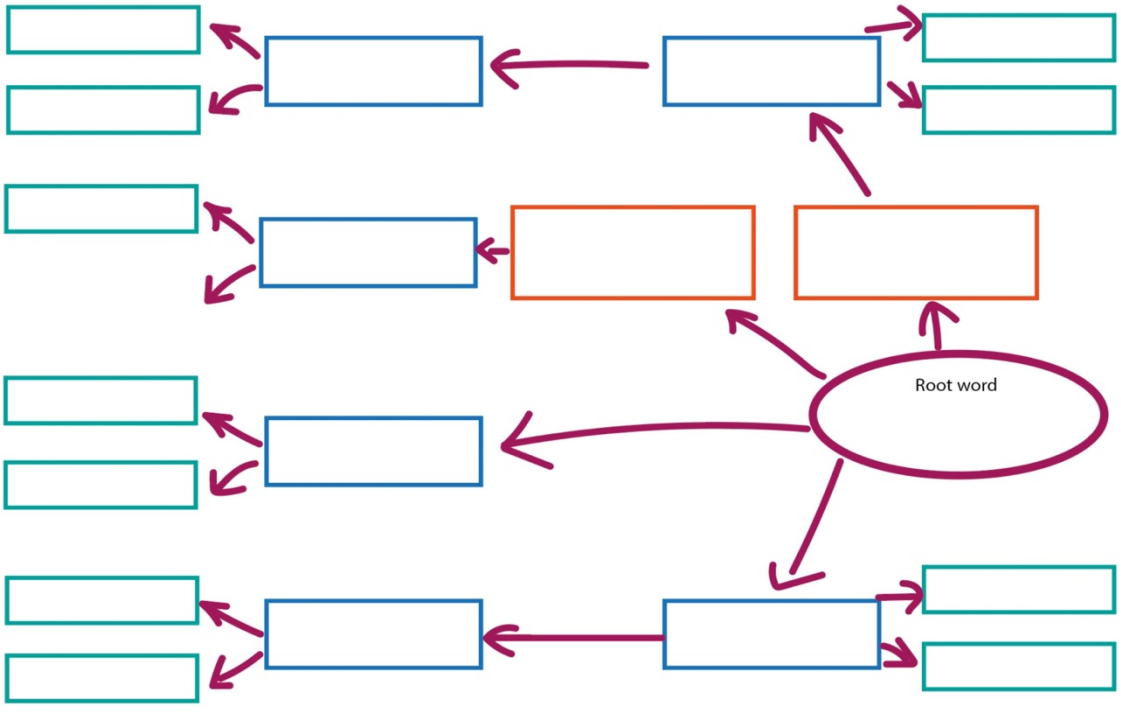
KEY WORDS:

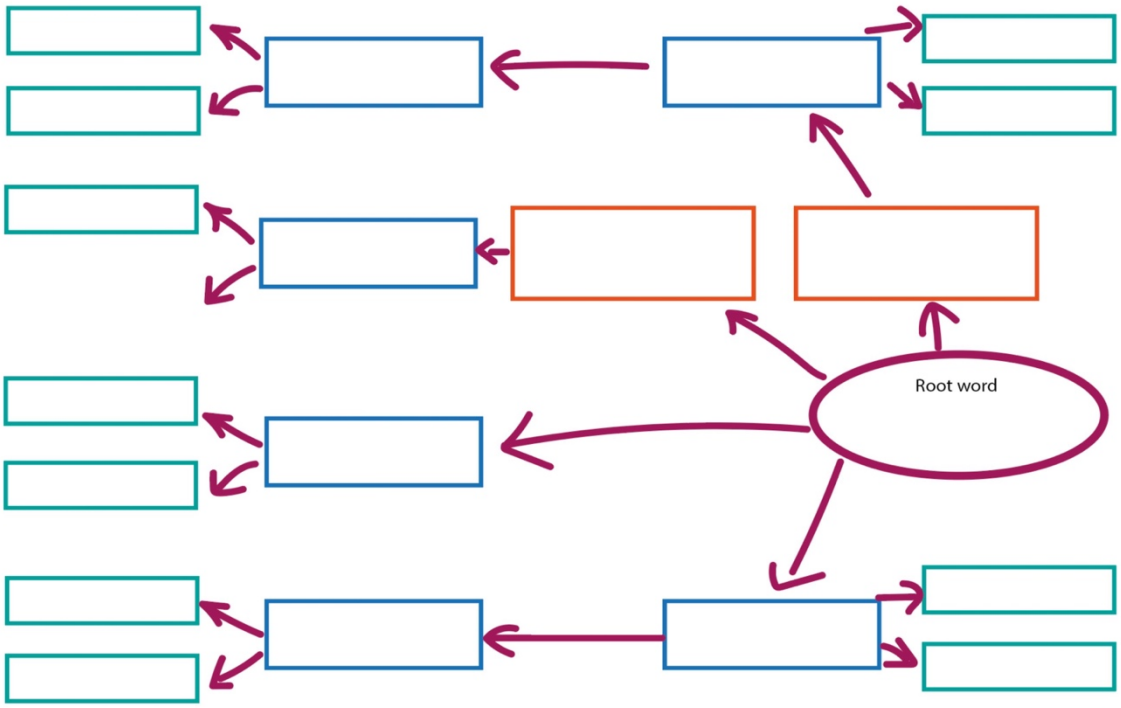
- **Word parts**
- **Decoding**
- **Affixes**
- **Vocabulary network**
- **Lexicon**

Activity 1: Challenge: Time to break it down

Using the root word 'grace', I have been able to find 19 other multimorphemic words that contain the word 'grace'. Each word has a slightly different meaning based on the affixes (prefixes and suffixes) that have been added. Using the templates below, can you complete your own 'Time to break it down' word map? Really think about the root word you choose! Try to fill as many boxes as you can.







Activity 2: Becoming a word master

Your next challenge is to become a 'word master'. To do this, you need to complete the table below with words that YOU have made up. Using your knowledge of prefixes, suffixes and root words, you will create new words that could be used in our everyday vocabulary. Shakespeare was a master of this and now we use many of the words that he created in our everyday language – he expanded the everyday lexicon. If you get stuck, you can use the word cards on the table to help you.

TOP TIP: Think about how we have deconstructed words, analysed the meaning of each part and put them back together to understand the meaning of a whole, long, complex word.

Word	Definition	Where could it come from?
EXAMPLE: **inlunaness**	Not having moon like qualities	in + luna+ ness not or opposite of + Latin for moon + the quality or state of

Activity 3: Varied vocabulary stories

Now you have created your word maps and become masters of words, it's time to see if you can use this vocabulary in your writing! You are going to select one of the word maps you have created and at least three of the words you have made up to write your own story. Use as many words from the word map as you can and your own new vocabulary. Your story can be on any topic you like. Look at the example below to see how you could use you word map and new vocabulary in your story. This is the opening to a story that uses the 'grace' word map and the 'inlunaness' word.

The clock was ticking. It was really beginning to look as if Zoe's experiment was not going to work.

'What a **disgrace**!', thought Zoe as she **gracefully** moved across the lab to see if she could get the computer she was working on to spring back into action. She had spent months and months working on a computer programme that could be used to calculate the speed at which a new eco-ship could to travel across water. The new eco-ship was beautiful. It was bright yellow and orange and looked just like the sun.

'Completely **inlunaness**', thought Zoe as she daydreamed about the **gracefulness** of the ship. It moved so **graciously** as it sailed across the water; it was as **graceful** as a swan.

'But oh, how **ungracious** I'll look for all the help my team have given me if I can't get this bit of the experiment back on track!', worried Zoe. She simply had to get the computer to work.

'It may be a **graceless** process', she thought, 'but I know my team are relying on me and I'll have to prove I can do this somehow.'

Now it's your turn!

I am going to use my _____ word map and the following three words from my 'word master' table:

1.
2.
3.

REMEMBER: In this activity we are practicing creative writing by inventing words and playing around with them. In assessed work at school, you should check with your teacher if you want to use a new word that you have invented.

Use this space to plan and write your story.

Tutorial 5 – Deconstructing academic language

What is the Purpose of Tutorial 5?

- To understand why deconstructing words into parts and decoding their meaning is an important skill
- To examine how the complexity and register of vocabulary changes in different texts
- To practice building academic language into sentences

Key questions:

- Why is deconstructing words into relevant parts an important skill?
- How does the complexity and register of vocabulary vary and change in different texts?
- How can we build academic language into our writing?

KEY WORDS:

- **Deconstructing**
- **Academic language**
- **Complexity**
- **Registers**
- **Decoding**

Activity 1: Decoding questions

In this activity, you will look at some questions taken from past English language and literature GCSE papers. GCSE questions usually contain at least one complex word that is crucial to understanding the answer the examiners are looking for. Use this activity to practice deconstructing and decoding the meaning of difficult words in these questions.

1. Highlight or underline the word that you think is most difficult in the question
2. Use the deconstruction strategies we have practised to pull this word apart
3. Work out the meanings of the different word parts
4. Put the word back together and write a definition for what you think it means

Question 1:

Compare how the writers convey their different perspectives on surfing.

In your answer, you could:

- compare their different perspectives on surfing
- compare the methods the writers use to convey their perspectives
- support your response with references to both texts.

[16 marks]

Which word have you highlighted?

Deconstruct this word into parts:

What do the different word parts mean?

What could the whole word mean?

Question 2:

A9. The text refers to the possibility that robots will 'revolutionise surgery'. Which of the following definitions best fits the word 'revolutionise' in this context? **Tick (✓) the correct box.** [1]

- something which will inspire medical staff ☐
- something which will protect significant laws ☐
- something which will cause rebellion ☐
- something which will bring about fundamental change ☐

Which word have you highlighted?

Deconstruct this word into parts:

What do the different word parts mean?

What could the whole word mean?

Question 3:

A13. How does the writer show that Professor Goodfellow is uncomfortable about the robot? [10]

Which word have you highlighted?

Deconstruct this word into parts:

What do the different word parts mean?

What could the whole word mean?

Question 4:

(b) Write an account of a time you were unwilling to do something.

Which word have you highlighted?

Deconstruct this word into parts:

What do the different word parts mean?

What could the whole word mean?

Question 5:

(a) In this extract, how does Austen show Elizabeth Bennett finds Mr Darcey incomprehensible? [25]

Which word have you highlighted?

Deconstruct this word into parts:

What do the different word parts mean?

What could the whole word mean?

Question 6:

(f) In this extract, how does the author reveal Michael's subconscious thoughts? [40]

Which word have you highlighted?

Deconstruct this word into parts:

What do the different word parts mean?

What could the whole word mean?

Activity 2: Vocabulary register: Comparative task

We have looked at how to break difficult words apart, but you may be thinking, 'why is this important?' and 'how can what I've learnt help me in class and in assessments?'. This next task may help you figure out the answers to those questions.

Below are three different types of text. Each one is around 50 words long. The first text is an extract of *Anna Karenina* from a GCSE English language paper. The second is part of an online game review of a new Pokemon game and the third are a series of tweets taken from a random selection of famous social media accounts. Using your highlighter or pen, go through these texts and highlight every word you see that attaches a derivational prefix and/or suffix to a root word. Once you have done this, go through each text again and count how many words you have highlighted or underlined. Write the number at the bottom of each text.

Text 1: *Anna Karenina* by Leo Tolstoy

After dinner, and till the commencement of the evening, Kitty was feeling a sensation akin to the anticipation of a young man before a battle. Her heart throbbed violently, and her thoughts would not rest on anything. When she reimagined the past, she dwelt with pleasure, with tenderness, on the memories of her relations with Levin.

Total number of words highlighted =

Text 2: Game review

Pokemon Mystery Dungeon: Rescue Team DX for Switch is wondrous to play. You wake up one morning and everything seems pretty ordinary, at least until you realize that you're not a human anymore. Instead, you've magically and mysteriously metamorphosed into a Pokemon—which exact species is determined by a fun little personality quiz you take at the beginning of the game.

Total number of words highlighted =

Text 3: Series of Tweets

Total number of words highlighted =

World Wildlife Fund @World_Wildlife · Feb 19

The health of our planet is dependent on a vibrant ocean rich with natural resources. Standing in the way, however, are unsustainable fishing operations supported by harmful government subsidies. Learn more: wwf.to/37Kk5Bg

Total number of words highlighted =

Greg James @gregjames · Mar 7

There are some incredible books out for @WorldBookDayUK this year. We we lucky enough to be asked to write one too. And they're FREE which is undoubtedly amazing and gives millions of kids the chance to fall in love with reading. We've loved this week #ShareAStory

Total number of words highlighted =

Register: a variety of language used for a particular purpose or in a particular communicative situation. For example, when writing an essay you would use a more formal register of English than writing a message to your friends.

Which text did you highlight the HIGHEST number of words in? Give at least one reason *why* you think it was this text.

Which text did you highlight the LOWEST number of words in? Give at least one reason *why* you think it was this text.

How do you think having knowledge and understanding of how to break words apart and work out their meanings may help you when reading in class and in assessments?

Give one example of a word you had not seen before from these texts. Using your word deconstruction knowledge, can you work out its meaning? Write out your definition below.

Tutorial 6 – Applying my knowledge

What is the Purpose of Tutorial 6?

- To explore how to apply the skills and knowledge gained through this module to real examples
- To reflect on what we have learnt throughout this module

Key questions:

- How can I use vocabulary deconstruction and decoding skills to decipher the meanings of complex, new words?
- What have I learnt, enjoyed and not enjoyed on this module?

KEY WORDS:

- **Deconstructing**
- **Decoding**
- **Application**
- **Reflection**

Activity 1: Deconstructing complex words

It's now time to put together everything you've learnt throughout this module! Using the knowledge you have gained and the skills we have practiced, see if you can work out the meaning of these words. Some of these words are very difficult (they are A* words at GCSE level!) so do not worry if you find them very hard. The first one is done for you as an example of how to lay out your answers.

EXAMPLE:

Word:	**INDESCRIBABLE**		
Word parts	**Prefix:** In-	**Root word:** describ(e)	**Suffix:** -able
Meaning:	Not, opposite of or without	To interpret or explain something, usually by writing or speaking	Turns the verb into an adjective – a descriptive word. Means having the quality of or able to be.
Definition of whole word	Indescribable means something that is not able to be explained or interpreted.		

Word:	**UNTHOUGHTFUL**		
Word parts	**Prefix:**	**Root word:**	**Suffix:**
Meaning:			
Definition of whole word			

Word:	**INCONSEQUENTIAL**		
Word parts	**Prefix:**	**Root word:**	**Suffix:**
Meaning:			
Definition of whole word			

Word:	IRREVERSIBLE		
Word parts	Prefix:	Root word:	Suffix:
Meaning:			
Definition of whole word			

Word:	RECONSTRUCTION		
Word parts	Prefix:	Root word:	Suffix:
Meaning:			
Definition of whole word			

Word:	MISINFORMATION		
Word parts	Prefix:	Root word:	Suffix:
Meaning:			
Definition of whole word			

Word:	UNTRUSTWORTHY		
Word parts	Prefix:	Root word:	Suffix:
Meaning:			
Definition of whole word			

Word:	DISASSOCIATION		
Word parts	Prefix:	Root word:	Suffix:
Meaning:			
Definition of whole word			

Word:	UNCREATIVE		
Word parts	Prefix:	Root word:	Suffix:
Meaning:			
Definition of whole word			

Activity 2: Reflecting on the vocabulary development module

What did you most enjoy about the vocabulary development module?

Will you use any of the strategies we learnt and discussed in this module? Give reasons for your answers.
•   •   •

How did learning about vocabulary on this module effect your confidence when looking at long, difficult words?
•   •   •

What did you find challenging about the programme?	How did you overcome these challenges?
• • •	• • •

Extra Notes

Appendix III: Ethics approval letter

School of English, Communication and Philosophy
Ysgol Saesneg, Cyfathrebu ac Athroniaeth

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10th February 2021

Dear Ms Ellen Bristow,

Research project title: English language vocabulary pedagogy: Investigating the impact of explicit etymology and morphology teaching on children's vocabulary development at the transition from primary to secondary school

SREC reference: ENCAP/Bristow/10-02-2021

The ENCAP Research Ethics Committee reviewed the above application via its proportionate review process.

Ethical Opinion
The Committee gave a favourable ethical opinion of the above application on the basis described in the application form, protocol and supporting documentation

Additional approvals
This letter provides an ethical opinion only. You must not start your research project until all appropriate approvals are in place.

Amendments
Any substantial amendments to documents previously reviewed by the Committee must be submitted to the Committee via Dr Sara M. Pons-Sanz for consideration and cannot be implemented until the Committee has confirmed it is satisfied with the proposed amendments.

You are permitted to implement non-substantial amendments to the documents previously reviewed by the Committee but you must provide a copy of any updated documents to the Committee via Dr Sara M. Pons-Sanz for its records.

Monitoring requirements
The Committee must be informed of any unexpected ethical issues or unexpected adverse events that arise during the research project. Researchers are responsible for ensuring that they adhere to the procedures set out in approved applications. The Committee must be informed when your research project has ended. This notification should be made to ENCAP's Research Office (encap-res@cardiff.ac.uk) within two months of research project completion. You should confirm that data collection has ended and submit a final report of any amendments to the research procedure.

Documents reviewed by Committee
The documents reviewed by the Committee were:

Document	Date
Research Ethics Approval Application Form	09/02/2021
Participant and Gatekeeper Information Sheets	09/02/2021
Consent Forms	09/02/2021
Recruitment advertisements	09/02/2021
Data gathering tools	09/02/2021
Project outline	09/02/2021
Document outlining SOP compliance	09/02/2021
Data Protection Impact Assessment Template	09/02/2021
Debrief document	09/02/2021
Certificates of course completion	09/02/2021

Complaints/Appeals

If you are dissatisfied with the decision made by the Committee, please contact Dr Sara M. Pons-Sanz in the first instance to discuss your complaint. If this discussion does not resolve the issue, you are entitled to refer the matter to the Head of School for further consideration. The Head of School may refer the matter to the to the Open Research Integrity and Ethics Committee (ORIEC), where this is appropriate. Please be advised that ORIEC will not normally interfere with a decision of the Committee and is concerned only with the general principles of natural justice, reasonableness and fairness of the decision.

Please use the Committee reference number on all future correspondence.

The Committee reminds you that it is your responsibility to conduct your research project to the highest ethical standards and to keep all ethical issues arising from your research project under regular review.

You are expected to comply with Cardiff University's policies, procedures and guidance at all times, including, but not limited to, its Policy on the Ethical Conduct of Research involving Human Participants, Human Material or Human Data and our Research Integrity and Governance Code of Practice.

Yours sincerely,

Dr Sara M. Pons-Sanz, Chair of ENCAP's Research Ethics Committee

Cc ENCAP's Research Office

Appendix IV: Gatekeeper information sheet and consent form

Gatekeeper consent form

This is the gatekeeper consent form for taking part in the project, 'English language vocabulary pedagogy: Investigating the impact of explicit etymology and morphology teaching on children's vocabulary development at the transition from primary to secondary school'.

SREC reference and committee: ENCAP/Bristow/10-02-2021

Name of Chief Investigator: Ellen Bristow, Cardiff University

Please write your name and role within the school under each of the statements to confirm you agree to allow your pupils at your school to participate in this project.

* Required

1. Which school do you work for? *

2. What is your name and role within the school? *

3. I confirm that I have read the information sheet dated 10.02.21 version 1 for the above research project. *

4. I confirm that I have understood the information sheet dated 10.02.21 version 1 for the above research project and that I have had the opportunity to ask questions and that these have been answered satisfactorily. *

5. I understand that my school's participation is voluntary and myself, staff, parents/guardians and children are free to refuse to participate without giving a reason and without any adverse consequences. As data will be anonymised two weeks after the research at the school being completed, participants will not be able to withdraw their data after this timeframe. *

6. I understand that data collected during the research project may be looked at by individuals from Cardiff University or from regulatory authorities, where it is relevant to my taking part in the research project. I give permission for these individuals to have access to my data and that of students at my school. *

7. I consent to the processing of this personal information about students at our school:

   - Name of school (to be anonymised)
   - Student name (to be anonymised)
   - Age (in years and months)
   - Gender
   - School year group
   - English language group/set
   - English language academic-level
   - First language spoken
   - Bilingual/multilingual
   - Additional language(s) spoken
   - Reading habits (enjoyment, frequency)

   for the purposes explained to me. I understand that such information will be held in accordance with all applicable data protection legislation and in strict confidence, unless disclosure is required by law or professional obligation. *

8. I understand who will have access to personal information provided, how the data will be stored and what will happen to the data at the end of the research project. *

9. I understand how the findings and results of the research project will be written up and published. *

10. I agree to take part in this research project. *

GATEKEEPER INFORMATION SHEET

Project title: English language vocabulary pedagogy: Investigating the impact of explicit etymology and morphology teaching on children's vocabulary development at the transition from primary to secondary school.

You are being invited to take part in a research project. Before you decide whether or not to take part, it is important for you to understand why the research is being undertaken and what it will involve. Please take time to read the following information carefully and discuss it with others, if you wish.

Thank you for reading this.

1. What is the purpose of this research project?

I am a PhD student in Cardiff University's Centre for Language and Communication Research. Using the Language, Literacy and Communication progression steps from the forthcoming Curriculum for Wales (2022), this research aims to understand how we can better support primary and secondary school students to access the high-level vocabulary required for classroom and exam success. Specifically, it aims to investigate children's ability to understand and analyse the meaning of unfamiliar and/or complex academic words. To do this, I will be trialling and testing an online vocabulary development programme, which investigates creative word-learning strategies which could aid both children's vocabulary development and teaching practices in the English language classroom. I will be working with numerous primary and secondary schools across Wales to understand the strategies and materials that could be used to support children's English vocabulary learning.

2. Why have my school been invited to take part?

Your school has been invited to take part in this study because the students in your school are studying at a Key Stage 2 or 3 level in a mainstream school in Wales. This research aims to investigate teaching strategies which will support the development of these learners' vocabulary.

3. Does my school have to take part?

No, participation in this research project is entirely voluntary and it is up to you, your staff, parents/guardians and students to decide whether or not to take part. If you decide to allow your school to take part, I will ask you to sign a consent form and then will discuss the logistics of the research project with you in more detail. I will gain your written consent, parent/guardian written consent and student consent before the research begins. If you decide you do not wish for your school to take part, you do not have to explain your reasons. Likewise, if parents and students selected for this study choose not to take part, it will not affect theirs or their child's legal rights. If a parent/guardian or student no longer wishes to take part in the research whilst it is happening, they do not have to explain their reasons. They are free to withdraw their consent without giving a reason, even after signing the consent form. However, two weeks

after the research at the school is complete, all data will be anonymised , therefore it will not be possible to withdraw after this timeframe.

4. What will taking part involve?

The vocabulary development programme is a pre-recorded online learning module. As a whole, the programme lasts for six weeks (one tutorial or challenge per week). All students in the selected classes will take part in the research and complete exactly the same Vocabulary Development Programme. However, students will begin the programme at slightly different times depending on whether they are allocated to group 1 or group 2. It can be completed in school as part of a regular lesson or at home as part of homework/home learning. We will arrange when you would like to begin the programme and the classes/students that will take part. I will email you the link to each tutorial at the beginning of the week so that you can forward this on to participating students. They can complete the tutorial on any day or time that you agree with them during this week. As a participating school, this is the process that would be followed:

1) The pre-experiment questionnaire and word detective challenge. The questionnaire collects information about each participant, such as:
    - Name of school (to be anonymised)
    - Age (in years and months)
    - Gender
    - School year group
    - English language group/set
    - English language academic-level
    - First language spoken
    - Bilingual/multilingual
    - Additional language(s) spoken
    - Reading habits (enjoyment, frequency)

These factors have been selected as previous research suggests that these factors influence an individual's vocabulary and reading comprehension ability. Therefore, collecting this data allows for investigation into if and how these factors may influence participant vocabulary test scores. The word detective challenge tests different aspects of morphological problem-solving ability and vocabulary decoding skill prior to the intervention. Each task has been created by adapting different elements of previous morphology and vocabulary studies. The pre-experiment tasks should take no more than 30 minutes to complete. National Curriculum England (2014) and Curriculum for Wales (2016) word lists have been used to create the challenges in the pre-experiment tasks, ensuring that age-appropriate language is used throughout.

2) Group 1 completes online vocabulary development module.

There are five tutorials in the programme. Students will complete one tutorial a week. I shall email you the link for the tutorial on the Monday morning of each week. This can then be sent on to the students taking part. Each tutorial in this programme is based on adaptations of

previous morphology and/or etymology-based studies, English language pedagogy research and at least one 'progression' target from the Literacy, Languages and Communication stream of the forthcoming Curriculum for Wales (2022). Each pre-recorded lesson lasts for approximately thirty minutes and the additional activities will take no more than twenty minutes each week. In total, this is approximately equal to one lesson of a typical school timetable (50 – 60 minutes).

3) All participants complete the post-experiment word detective challenge. This is exactly the same type of task as the pre-experiment vocabulary sheet, but uses different vocabulary.

4) Group 2 participants complete the online vocabulary development module.

Upon completion of the study, I will make all these materials available to you and they can be shared with all your teachers and students. You can also send these resources home to parents/guardians, should you wish to. Once the initial research period is complete, all year 5 and 6 or year 7 and 8 students at your school will have opportunities to access the learning.

5. Will I be paid for taking part?

No. You should understand that any data collected will be given as a gift and the school will not benefit financially in the future should this research project lead to the development of new teaching methods.

6. What are the possible benefits of taking part?

The possible benefits for your school taking part in this research are as follows:

- An increased understanding of the types of vocabulary teaching strategies that may support your students
- Access to evidence-based English teaching and learning materials

Possible benefits for your students:

- An increased understanding of how the English language works
- Deeper knowledge about how to take apart complex academic vocabulary and work out the meaning(s) of high-level words
- Practice of how to approach difficult language in long pieces of reading/writing and how to use these strategies in an exam/assessment setting
- Potential to build vocabulary understanding and knowledge through exposure to advanced words, word games and English language classroom tasks
- An understanding of how to use a variety of vocabulary decoding strategies, why these strategies are important and how to apply them in future school work

7. What are the possible risks of taking part?

All participant data will be protected, held confidentially and anonymised two weeks after the research at the school is complete. All tasks involved in this study support the activities students would complete in normal school lessons. I have experience of primary and secondary school teaching and have previously completed child protection and safeguarding training.

8. Will my taking part in this research project be kept confidential?

All information collected from (or about) the school and students during the research project will be kept confidential and any personal information provided will be managed in accordance with data protection legislation. Please see 'What will happen to my Personal Data?' (below) for further information.

I will follow all standard child protection and safeguarding practice and, as such, if a disclosure was made through anything written on the online learning tasks which raised concerns about the welfare, safety or wellbeing of a student, I would report any concerns to your designated safeguard lead. Although this situation is highly unlikely, in this instance, I would be legally and professionally required to over-ride confidentiality and disclose information obtained from a student to relevant personnel.

9. What will happen to my Personal Data?

Cardiff University is the Data Controller and is committed to respecting and protecting your personal data in accordance with your expectations and Data Protection legislation. Further information about Data Protection, including:

- your rights
- the legal basis under which Cardiff University processes your personal data for research
- Cardiff University's Data Protection Policy
- how to contact the Cardiff University Data Protection Officer
- how to contact the Information Commissioner's Office

may be found at https://www.cardiff.ac.uk/public-information/policies-and-procedures/data-protection

In this research, I will be collecting the following data about students:

- Name of school (to be anonymised)
- Student name (to be anonymised)
- Age (in years and months)
- Gender
- School year group
- English language group/set
- English language academic-level - students will be asked to self-report this information as part of the questionnaire. The questionnaire makes clear that this refers to the level they are working at in the English lessons/the grade/level they received on

their last test. Students will also be given a 'not sure' option' and if this option is selected, I will work with yourself/class teachers to understand the level the child is working at in class.

- First language spoken - Data is being collected about this factor from an etymological perspective i.e. how closely related is the first/additional language(s) spoken to English etymologically (in terms of language families) and does the appear to have any influence in the participant's answers? In reporting, I will anonymise the languages by classifying them in terms of etymological family i.e. Romance language, Germanic language etc. This will prevent the singling out a specific language that may identify a child.
- Bilingual/multilingual
- Additional language(s) spoken
- Reading habits (enjoyment, frequency)
- Pre-experiment activities sheet
- Post-experiment activities sheet
- Intervention study activities (if the student takes part in the initial intervention)

Anonymisation

To ensure this personal information and the data collected is anonymised, two weeks after completing the research at the school, I will translate each student's name into a participant number (i.e. participant 1, participant 2 etc.) and this is how their data will be recorded on an encrypted Excel spreadsheet. Their real name will be removed from all online documents and the participant number added so that these too are fully anonymised. This will ensure that students are not identifiable from the earliest opportunity and will only be referred to using their participant number.

As data will be anonymised two weeks after the research at the school being completed, participants will not be able to withdraw their data after this timeframe. Should participants wish to withdraw their information from the study ***before*** the data anonymisation occurs, they should contact Ellen Bristow on BristowEL@cardiff.ac.uk.

The paragraphs below outline how long I will keep the different types of data for:

- **Consent form**: Yours and parental/guardian signed consent forms will be retained for the duration of the PhD (three years) in accordance with the University Records Retention Schedules and GDPR. It may be accessed by the researcher and, where necessary, by members of the University's governance and audit teams or by regulatory authorities, who will maintain the confidentiality of the data provided. This is to ensure that I did gain consent from all gatekeepers and participants. Upon confirmation of completion of the PhD, I shall delete the non-anonymised personal data.

- **Data collected:** All anonymised data will be retained for a minimum of five years after the completion of the PhD project. Results from this research project are likely to be

published in academic journals and presented at conferences and retaining the data allows the researcher to do this.

10. What happens to the data at the end of the research project?

The data collected during this research project may be used after the end of the research project. It may be shared within and outside of the University and may be used in research publications and presentations. As above, all data will be anonymised and any personal data will be removed before any form of sharing takes place.

11. What will happen to the results of the research project?

Results from this research project will be used for University assessment and are likely to be published in academic journals and presented at conferences. These results will also be shared with participating schools to inform future teaching practices. A sharable link with an explanation of results will be made available to you and you can share this with parents/guardians and students. However, due to anonymity and the randomised nature of this study, it will not be possible to identify exactly which results may apply to your school and students. Verbatim quotes from participants may be used. However no participants will be identified in any report, publication or presentation. All participants will appear as 'participant 1, participant 2' etc.

12. What if there is a problem?

If you wish to complain, or have grounds for concerns about any aspect of the manner in which you, your school, parents/guardians or students have been approached or treated during the course of this research, please contact the Chief Investigator, Ellen Bristow on BristowEL@cardiff.ac.uk. If your complaint is not managed to your satisfaction, please contact the ENCAP Research Ethics Officer, Dr Sara Pons-Sanz (pons-sanzs@cardiff.ac.uk).

If you are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, you may have grounds for legal action, but you may have to pay for it.

13. Who is organising and funding this research project?

The research is organised by Ellen Bristow who is under the supervision of Dr. Lise Fontaine and Dr. Sara Pons-Sanz at the School of English, Communication and Philosophy at Cardiff University. The research is currently funded by the Economic and Social Research Council, Wales Doctoral Training Partnership.

14. Who has reviewed this research project?

This research project has been reviewed and given a favourable opinion by the School of English, Communication and Philosophy Research Ethics Committee, Cardiff University.

15. Further information and contact details

Should you have any questions relating to this research project, you may contact me during normal working hours:

Ellen Bristow, BristowEL@cardiff.ac.uk, School of English, Communication and Philosophy Cardiff University, Colum Drive, Cardiff, CF10 3EU.

Thank you for considering taking part in this research project. If you decide to participate, you will be given a copy of the Participant Information Sheet and a signed consent form to keep for your records.

Appendix V: Parent/guardian information sheet and consent forms

PARENT/GUARDIAN INFORMATION SHEET

Project title: English language vocabulary pedagogy: Investigating the impact of explicit etymology and morphology teaching on children's vocabulary development at the transition from primary to secondary school.

Your child is being invited to take part in a research project. Before you decide whether or not to allow your child to take part, it is important for you to understand why the research is being undertaken and what it will involve. Please take time to read the following information carefully and discuss it with others, if you wish.

Thank you for reading this.

1. What is the purpose of this research project?

I am a PhD student in Cardiff University's Centre for Language and Communication Research. Using the new Language, Literacy and Communication progression steps from the forthcoming Curriculum for Wales (2022), this research aims to understand how we can better support primary and secondary school students to access the high-level vocabulary required for classroom and exam success. Specifically, it aims to investigate children's ability to understand and analyse the meaning of unfamiliar and/or complex academic words. To do this, I will be trialling and testing an online vocabulary development programme. The Vocabulary Development Programme is a six-week pre-recorded online programme which explores the history of our language and aims to develop key vocabulary deconstruction and knowledge skillsets that may help reading, writing, spelling, and speaking skills in the classroom and beyond. The tutorials comprise a series of videos, quizzes, games, story writing exercises, and detective-based 'word solving' challenges. I will be working with numerous primary and secondary schools across Wales to understand the strategies and materials that could be used to support children's English vocabulary learning.

2. Why has my child been invited to take part?

Your child has been invited to take part in this study because they are studying at Key Stage 2 or 3 level in a mainstream school in the UK. This research aims to investigate teaching strategies which will support the development of these learners' vocabulary.

3. Does my child have to take part?

No, participation in this research project is entirely voluntary and it is up to you and your child to decide whether or not to take part. If you decide to allow your child to take part, I will ask you to sign a consent form. They will then be provided with information about how to access the learning module from their school. Using an online form, I will gain their consent before they begin the learning activities. If you decide not to allow your child to take part, you do not have to explain your reasons and it will not affect yours or your child's legal rights. Likewise, if a child has begun the programme, but no longer wishes to take part in the research, they do

not have to explain their reasons. You are free to withdraw your consent for your child's participation whilst the research is taking place, without giving a reason, even after signing the consent form. Withdrawal will not be possible from two weeks after data collection is complete (Friday 4th June 2021), as all data will be anonymised at this point.

4. What will taking part involve?

The vocabulary development programme is a pre-recorded online learning module. As a whole, the programme lasts for six weeks (one tutorial or challenge per week). All students in your child's class will take part in the research and complete exactly the same Vocabulary Development Programme. However, students will begin the programme at slightly different times. It can be completed in school as part of a regular lesson or at home as part of homework/home learning. I will arrange with your child's school when the programme will begin. As a participant school, your child will take part in the following activities:

1) The pre-experiment questionnaire and word detective challenge. The questionnaire collects information about each participant, such as:
    - Name of school (to be anonymised)
    - Age (in years and months)
    - Gender
    - School year group
    - English language group/set
    - English language academic-level
    - First language spoken
    - Bilingual/multilingual
    - Additional language(s) spoken
    - Reading habits (enjoyment, frequency)

Collecting this data allows for investigation into if and how these factors may influence participant vocabulary test scores. The word detective challenge tests different aspects of morphological problem solving ability and vocabulary decoding skill prior to the intervention. Each task has been created by adapting different elements of previous morphology and vocabulary studies. The pre-experiment tasks should take no more than 30 minutes to complete. National Curriculum England (2014) and Curriculum for Wales (2016) word lists have been used to create the challenges in the pre-experiment tasks, ensuring that age-appropriate language is used throughout.

2) Group 1 completes online vocabulary development module.

There are six tutorials in the programme. Students will complete one tutorial a week. Each tutorial in this programme is based on adaptations of previous morphology and/or etymology-based studies, English language pedagogy research and at least one 'progression' target from the Literacy, Languages and Communication stream of the forthcoming Curriculum for Wales (2022). Each pre-recorded lesson lasts for approximately 30 minutes and the additional activities will take no more than twenty minutes each week. In total, this is approximately equal to one lesson of a typical school timetable (50 – 60 minutes).

3) All participants complete the post-experiment word detective challenge. This is exactly the same as pre-experiment vocabulary challenge, but uses different vocabulary.

4) Group 2 participants complete online vocabulary development module.

Upon completion of the study, I will make all these materials available to the school. These resources can be sent home to you should you wish.

5. Will I be paid for taking part?

No. You should understand that any data collected will be given as a gift and you will not benefit financially in the future should this research project lead to the development of new learning and teaching methods.

6. What are the possible benefits of taking part?

The possible benefits for your child taking part in this research are as follows:

- An increased understanding of how the English language works
- Deeper knowledge about how to take apart complex academic vocabulary and work out the meaning(s) of high-level words
- Practice of how to approach difficult language in long pieces of reading/writing and how to use these strategies in an exam/assessment setting
- Potential to build vocabulary understanding and knowledge through exposure to advanced words, word games and English language classroom tasks
- An understanding of how to use a variety of vocabulary decoding strategies, why these strategies are important and how to apply them in future school work

7. What are the possible risks of taking part?

All participant data will be protected, held confidentially and anonymised two weeks after the research at the school is complete. All tasks involved in this study support the activities students would complete in normal school lessons. I have experience of primary and secondary school teaching and have previously completed child protection and safeguarding training.

8. Will my child taking part in this research project be kept confidential?

All information collected from (or about) your child during the research project will be kept confidential and any personal information provided will be managed in accordance with data protection legislation. Please see 'What will happen to my Personal Data?' (below) for further information.

I will follow all standard child protection and safeguarding practice and, as such, if a disclosure is made through anything written on the online learning tasks which raises concerns about the welfare, safety or wellbeing of a student, I would report any concerns to the school's designated

safeguard lead. Although this situation is highly unlikely, in this instance, I would be legally and professionally required to over-ride confidentiality and disclose information obtained from a student to relevant personnel.

9. What will happen to my Personal Data?

Cardiff University is the Data Controller and is committed to respecting and protecting your personal data in accordance with your expectations and Data Protection legislation. Further information about Data Protection, including:

- your rights
- the legal basis under which Cardiff University processes your personal data for research
- Cardiff University's Data Protection Policy
- how to contact the Cardiff University Data Protection Officer
- how to contact the Information Commissioner's Office

may be found at https://www.cardiff.ac.uk/public-information/policies-and-procedures/data-protection

In this research, I will be collecting the following data about students:

- Name of school (to be anonymised)
- Student name (to be anonymised)
- Age (in years and months)
- Gender
- School year group
- English language group/set
- English language academic-level
- First language spoken
- Bilingual/multilingual
- Additional language(s) spoken
- Reading habits (enjoyment, frequency)
- Pre-experiment activities sheet
- Post-experiment activities sheet
- Vocabulary development programme

Anonymisation

To ensure this personal information and the data collected is anonymised, two weeks after completing the research at the school, I will translate your child's name into a participant number (i.e. participant 1, participant 2 etc.) and this is how their data will be recorded on an encrypted Excel spreadsheet. Their real name will be removed from all online documents and the participant number added so that these too are fully anonymised. This will ensure that students are not identifiable from the earliest opportunity and will only be referred to using their participant number.

As data will be anonymised two weeks after the research at the school being completed, participants will not be able to withdraw their data after this timeframe. Should participants wish to withdraw their information from the study ***before*** the data anonymisation occurs, they should contact Ellen Bristow on BristowEL@cardiff.ac.uk.

The paragraphs below outline how long I will keep the different types of data for:

- **Consent form**: Your signed consent form will be retained for the duration of the PhD (three years) in accordance with the University Records Retention Schedules and GDPR. It may be accessed by the researcher and, where necessary, by members of the University's governance and audit teams or by regulatory authorities, who will maintain the confidentiality of the data provided. This is to ensure that I did gain consent from all gatekeepers and participants. Upon confirmation of completion of the PhD, I shall delete the non-anonymised personal data.

- **Data collected:** All anonymised data will be retained for a minimum of five years after the completion of the PhD project. Results from this research project are likely to be published in academic journals and presented at conferences and retaining the data allows the researcher to do this.

10. What happens to the data at the end of the research project?

The data collected during this research project may be used after the end of the research project. It may be shared within and outside of the University and may be used in research publications and presentations. As above, all data will be anonymised and any personal data will be removed before any form of sharing takes place.

11. What will happen to the results of the research project?

Results from this research project will be used for University assessment and are likely to be published in academic journals and presented at conferences. These results will also be shared with participating schools to inform future teaching practices. A sharable link with an explanation of results will be made available to you. However, due to anonymity and the randomised nature of this study, it will not be possible to identify exactly which results may apply to your school and students. Verbatim quotes from participants may be used. However no participants will be identified in any report, publication or presentation. All participants will appear as 'participant 1, participant 2' etc.

12. What if there is a problem?

If you wish to complain, or have grounds for concerns about any aspect of the manner in which you or your child has been approached or treated during the course of this research, please contact the Chief Investigator, Ellen Bristow on BristowEL@cardiff.ac.uk. If your complaint

is not managed to your satisfaction, please contact the ENCAP Research Ethics Officer, Dr Sara Pons-Sanz (pons-sanzs@cardiff.ac.uk).

If you are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, you may have grounds for legal action, but you may have to pay for it.

13. Who is organising and funding this research project?

The research is organised by Ellen Bristow who is under the supervision of Dr. Lise Fontaine and Dr. Sara Pons-Sanz at the School of English, Communication and Philosophy at Cardiff University. The research is funded by the Economic and Social Research Council, Wales Doctoral Training Partnership.

14. Who has reviewed this research project?

This research project has been reviewed and given a favourable opinion by the School of English, Communication and Philosophy Research Ethics Committee, Cardiff University.

15. Further information and contact details

Should you have any questions relating to this research project, you may contact me during normal working hours:

Ellen Bristow, BristowEL@cardiff.ac.uk, School of English, Communication and Philosophy Cardiff University, Colum Drive, Cardiff, CF10 3EU.

Thank you for considering allowing your child to take part in this research project. If you decide to participate, you will be given a copy of the Participant Information Sheet and a signed consent form to keep for your records.

30 minutes

Parent/guardian consent form

This is the parent/guardian consent form for your child taking part in the project, 'English language vocabulary pedagogy: Investigating the impact of explicit etymology and morphology teaching on children's vocabulary development at the transition from primary to secondary school'.

SREC reference and committee: ENCAP/Bristow/10-02-2021

Name of Chief Investigator: Ellen Bristow, Cardiff University

Please write your name, your child's name and your relationship to the child under each of the statements to confirm you agree to allow your child to participate in this project.

* Required

1. What is your child's name? *

2. What is your name and relationship to the child? *

3. Which school does your child attend? *

4. I confirm that I have read the information sheet dated 10.02.21 version 1 for the above research project. *

5. I confirm that I have understood the information sheet dated 10.02.21 version 1 for the above research project and that I have had the opportunity to ask questions and that these have been answered satisfactorily. *

6. I understand that my child's participation is voluntary and myself and child are free to refuse to participate without giving a reason and without any adverse consequences. As data will be anonymised two weeks after the research at the school being completed, participants will not be able to withdraw their data after this timeframe. *

7. I understand that data collected during the research project may be looked at by individuals from Cardiff University or from regulatory authorities, where it is relevant to my taking part in the research project. I give permission for these individuals to have access to my child's data. *

8. I consent to the processing of this personal information about my child:

   - Name of school (to be anonymised)
   - Student name (to be anonymised)
   - Age (in years and months)
   - Gender
   - School year group
   - English language group/set
   - English language academic-level
   - First language spoken
   - Bilingual/multilingual
   - Additional language(s) spoken
   - Reading habits (enjoyment, frequency)

   for the purposes explained to me. I understand that such information will be held in accordance with all applicable data protection legislation and in strict confidence, unless disclosure is required by law or professional obligation. *

9. I understand that anonymised excerpts from my child's vocabulary learning activities may be used as part of the research publication. *

10. I understand who will have access to personal information provided, how the data will be stored and what will happen to the data at the end of the research project. *

11. I understand how the findings and results of the research project will be written up and published. *

12. I agree to allow my child to take part in this research project. *

Ffurflen gydsynio rhiant/gwarcheidwad (2)

Dyma'r ffurflen gydsyniad rhiant/gwarcheidwad i'ch plentyn sy'n cymryd rhan yn y prosiect 'Addysgeg geirfa Saesneg: Ymchwilio i effaith addysgu etymoleg a morffoleg benodol ar ddatblygiad geirfa plant wrth iddynt drosglwyddo o'r ysgol gynradd i'r ysgol uwchradd'.

Cyfeirnod SREC a phwyllgor: ENCAP/Bristow/10-02-2021

Enw'r Prif Ymchwilydd: Ellen Bristow, Prifysgol Caerdydd

Ysgrifennwch eich enw, enw'ch plentyn a'ch perthynas â'r plentyn o dan bob un o'r datganiadau i gadarnhau eich bod yn cytuno i ganiatáu i'ch plentyn gymryd rhan yn y prosiect hwn.

* Required

1. Beth yw enw'ch plentyn? *

2. Beth yw eich enw chi a'ch perthynas â'r plentyn? *

3. Pa ysgol y mae eich plentyn yn ei mynychu? *

4. Nodwch ym mha dosbarth cofrestru mae eich plentyn. *

- ◯ 7 Hafren 1
- ◯ 7 Hafren 2
- ◯ 7 Rhymni 1
- ◯ 7 Rhymni 2
- ◯ 7 Taf 1
- ◯ 7 Taf 2
- ◯ Ddim yn siŵr

5. Rwy'n cadarnhau fy mod wedi darllen taflen wybodaeth fersiwn 1 dyddiedig 10.02.21 ar gyfer y prosiect ymchwil uchod. *

- ◯ Ydw
- ◯ Nac Ydw

6. Rwy'n cadarnhau fy mod wedi deall taflen wybodaeth fersiwn 1 dyddiedig 10.02.21 ar gyfer y prosiect ymchwil uchod, a fy mod wedi cael cyfle i ofyn cwestiynau a'u bod wedi cael eu hateb yn foddhaol. *

- ◯ Ydw
- ◯ Nac Ydw

7. Rwy'n deall bod cyfranogiad fy mhlentyn yn wirfoddol ac rydw i a'm plentyn yn rhydd i wrthod cymryd rhan heb roi rheswm a heb unrhyw ganlyniadau niweidiol. Gan y bydd data'n ddienw bythefnos ar ôl i'r ymchwil yn yr ysgol gael ei chwblhau, ni fydd cyfranogwyr yn gallu tynnu eu data yn ôl ar ôl yr amserlen hon. *

- ◯ Ydw
- ◯ Nac Ydw

8. Rwy'n deall bod cyfranogiad fy mhlentyn yn wirfoddol ac rydw i a'm plentyn yn rhydd i wrthod cymryd rhan heb roi rheswm a heb unrhyw ganlyniadau niweidiol. Gan y bydd data'n ddienw bythefnos ar ôl i'r ymchwil yn yr ysgol gael ei chwblhau, ni fydd cyfranogwyr yn gallu tynnu eu data yn ôl ar ôl yr amserlen hon. *

- ◯ Ydw
- ◯ Nac Ydw

9. Rwy'n cydsynio i brosesu'r wybodaeth bersonol hon am fy mhlentyn:

   - Enw'r ysgol (a fydd yn cael ei wneud yn ddienw)
   - Enw'r myfyriwr (i fod yn ddienw)
   - Oedran (mewn blynyddoedd a misoedd)
   - Rhyw
   - Grŵp blwyddyn ysgol
   - Grŵp/set Saesneg
   - Lefel academaidd yn y Saesneg
   - Iaith gyntaf a siaredir
   - Dwyieithog/amlieithog
   - Iaith (ieithoedd) ychwanegol a siaredir
   - Arferion darllen (mwynhad, amlder)

   at y dibenion a eglurwyd imi. Deallaf y bydd gwybodaeth o'r fath yn cael ei chadw'n unol â'r holl ddeddfwriaeth berthnasol ynghylch diogelu data ac yn gwbl gyfrinachol, oni bai fod angen ei datgelu yn ôl y gyfraith neu rwymedigaeth broffesiynol. *

   ◯ Ydw

   ◯ Nac Ydw

10. Rwy'n deall y gellir defnyddio dyfyniadau anhysbys o weithgareddau dysgu geirfa fy mhlentyn fel rhan o'r cyhoeddiad ymchwil. *

    ◯ Ydw

    ◯ Nac Ydw

11. Rwy'n deall pwy fydd yn cael mynediad at wybodaeth bersonol a ddarperir, sut y storir y data, a beth fydd yn digwydd i'r data ar ddiwedd y prosiect ymchwil. *

- ◯ Ydw
- ◯ Nac Ydw

12. Rwy'n deall sut bydd canfyddiadau a chanlyniadau'r prosiect ymchwil yn cael eu cyflwyno a'u cyhoeddi. *

- ◯ Ydw
- ◯ Nac Ydw

13. Rwy'n cytuno i ganiatáu i'm plentyn gymryd rhan yn y prosiect ymchwil hwn. *

- ◯ Ydw
- ◯ Nac Ydw

Appendix VI: Child consent forms and pre-intervention questionnaire

What is the vocabulary development programme?

Where does our language come from? What historic languages have influenced the English language and how can understanding these languages help us break-down and understand our modern-day vocabulary?

Why might being able to divide the word 'antidisestablishmentarianism' (one of the longest words in the English language!) into different parts help us understand its meaning? These are just some of the questions to be asked, investigated and answered in this vocabulary development programme.

How does language work?

What is the vocabulary development programme?

This course offers you a different way of thinking about and interacting with the English language. It explores:

- What languages Modern English is related to
- How we can look at the origins of words
- Why understanding the history of English is important today
- How to identify different word parts (prefixes, root words and suffixes)
- The history of these word parts
- Why identifying different word parts is important
- What strategies we can use to decode the meaning(s) of complex words
- How we can build academic language into our writing
- How we can use vocabulary deconstruction and decoding skills to work out the meanings of complex, new words

Types of activities

- Word detective challenges – Use the word clues to figure out who committed a crime
- History of English challenges and games
- Deconstructing (pulling apart) English words
- Playing 'Logomachy' – a game where you have to create your own words
- Expanding vocabulary networks: Becoming a word master
- Creative story writing using your own language
- Putting your skills into practice

What will you do?

- You will complete six online tutorials
- You will watch videos and complete weekly word challenges and tasks based on the videos you have watched

Would you like to take part?

- Your teachers and parents/guardians have said you are allowed to take part in this programme, but would you like to?
- Please fill in the form at the end of this video to say whether you would like to take part or not.

What is your name? (Please put your first and last name) *

Your answer

Do you want to take part in this research study? *

- ◯ I understand the video and would like to take part in the study
- ◯ I do not understand the video but would like to take part in the study
- ◯ I understand the video and do not want to take part in the study
- ◯ I do not understand the video and do not want to take part in the study

Which school do you go to? *

Your answer

Which class or English set are you in at school? (e.g. Dosbarth Acorn or set 7Y1) *

Your answer

How old are you? (In years and months) *

Your answer

What is your gender? *

- ◯ Female
- ◯ Male
- ◯ Prefer not to say
- ◯ Other:

Is English your first and only language or are you bilingual (speak, write and read two languages fluently) or are you multilingual (speak, write and read two or more languages fluently)? *

- ◯ I only speak English
- ◯ I am bilingual (two languages)
- ◯ I am multilingual (more than two languages)

What is your English language status? *

- ◯ English is my first and only language
- ◯ I am bilingual or multilingual with English as one of my main languages
- ◯ English is not my first language/one of my main languages. I am learning it.
- ◯ Not sure

If English is not your first language, what is your first language?

Your answer

If you are bi/multilingual, what languages do you speak?

Your answer

Do you enjoy English at school? *

- ◯ Yes
- ◯ No
- ◯ Sometimes
- ◯ Not sure

How difficult or easy do you find English at school? *

- ◯ Very easy
- ◯ Somewhat easy
- ◯ Sometimes easy, sometimes hard
- ◯ Somewhat hard
- ◯ Very hard
- ◯ Not sure

How often do you do you read outside of school? This could be books, magazines, articles online etc. *

- ☐ I never read outside of school
- ☐ I sometimes read outside of school
- ☐ I read quite often outside of school
- ☐ I read outside of school all the time

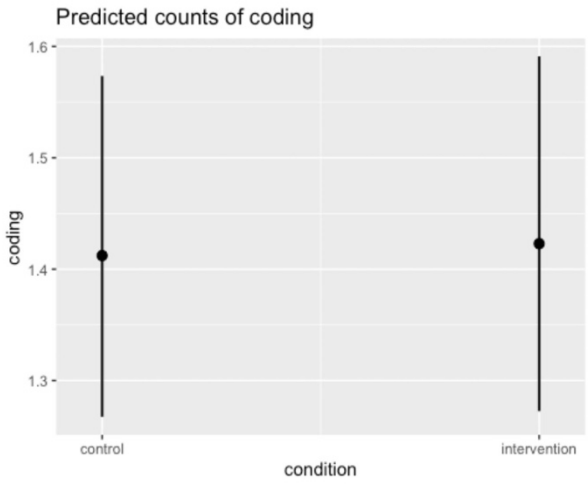
Appendix VII: Morphological awareness RStudio code and script

Morphological-awareness-R-Script.R

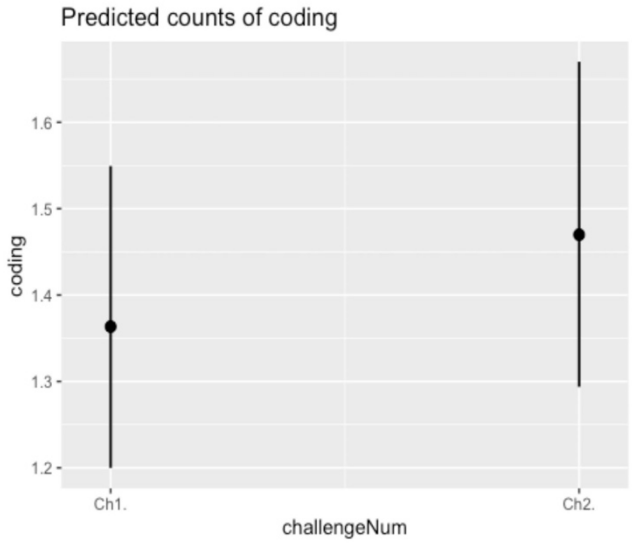
```
#Final RScript

library(lme4)

## Loading required package: Matrix

# The location of the folder on computer
try(setwd("~/Desktop/Project 1/processing"))

# Load the data
d = read.csv("../data/processed/ChallengeData.csv")


# fit the model
Model1 = glmer(coding ~ condition*challengeNum +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d)


# Summary of the model
summary(Model1)

## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + (1 | participantID) + (1 |
##     School) + (1 | questionNum)
##    Data: d
##
##      AIC      BIC   logLik deviance df.resid
##  49274.4  49329.2 -24630.2  49260.4    18703
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4319 -0.2252  0.1189  0.3057  2.1629
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.04528  0.2128
##  questionNum   (Intercept) 0.03724  0.1930
##  School        (Intercept) 0.01514  0.1231
## Number of obs: 18710, groups:  participantID, 446; questionNum, 30; School
```

```
, 10
##
## Fixed effects:
##                                         Estimate Std. Error z value Pr(>|z|
)
## (Intercept)                              0.30243    0.06596   4.585 4.53e-0
6 ***
## conditionintervention                    0.02369    0.02846   0.832    0.40
5
## challengeNumCh2.                         0.08551    0.07206   1.187    0.23
5
## conditionintervention:challengeNumCh2. -0.03227    0.02523  -1.279    0.20
1
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2.
## cndtnntrvnt -0.147
## chllngNmC2. -0.548  0.050
## cndtnn:NC2.  0.062 -0.448 -0.111
```

```
# Plot model inference
library(sjPlot)

## #refugeeswelcome

plot_model(Model1,"eff")

## $condition
```



```
##
## $challengeNum
```




```
pdf('../results/InteractionPlot2.pdf',
    width=4,height=3)
plot_model(Model1,"int")
dev.off()
```

```
## quartz_off_screen
##                 2
```

```
#Year group model
d$Year.group = factor(d$Year.group)

Model2 = glmer(coding ~ condition*challengeNum + Year.group +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d,
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model2)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
```

```
## Formula:
## coding ~ condition * challengeNum + Year.group + (1 | participantID) +
##     (1 | School) + (1 | questionNum)
##    Data: d
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  49275.1  49353.4 -24627.5  49255.1    18700
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4297 -0.2221  0.1178  0.3056  2.1160
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.04471  0.2115
##  questionNum   (Intercept) 0.03712  0.1927
##  School        (Intercept) 0.01034  0.1017
## Number of obs: 18710, groups:  participantID, 446; questionNum, 30; School
, 10
##
## Fixed effects:
##                                        Estimate Std. Error z value Pr(>|z|
)
## (Intercept)                             0.21333    0.08167   2.612   0.009
0 **
## conditionintervention                   0.03842    0.02913   1.319   0.187
3
## challengeNumCh2.                        0.08549    0.07196   1.188   0.234
8
## Year.group6                             0.06514    0.06947   0.938   0.348
4
## Year.group7                             0.08679    0.06269   1.384   0.166
2
## Year.group8                             0.13516    0.06319   2.139   0.032
4 *
## conditionintervention:challengeNumCh2. -0.03226    0.02523  -1.279   0.200
9
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. Yr.gr6 Yr.gr7 Yr.gr8
## cndtnntrvnt -0.227
## chllngNmC2. -0.442  0.049
## Year.group6 -0.303  0.036  0.000
## Year.group7 -0.639  0.148  0.000  0.424
## Year.group8 -0.609  0.212  0.000  0.439  0.866
## cndtnn:NC2.  0.050 -0.438 -0.112  0.000  0.000  0.000
```

```
m1v2 = anova(Model1, Model2)
m1v2
```

```
## Data: d
## Models:
## Model1: coding ~ condition * challengeNum + (1 | participantID) + (1 | Sch
ool) + (1 | questionNum)
## Model2: coding ~ condition * challengeNum + Year.group + (1 | participantI
D) + (1 | School) + (1 | questionNum)
##        npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model1    7 49274 49329 -24630    49260
## Model2   10 49275 49353 -24628    49255 5.3247  3     0.1495
```

```
#School English enjoyment model

d$Do.you.enjoy.English.at.school. = factor(d$Do.you.enjoy.English.at.school.,
ordered = T,
                                           levels = c("Yes","Sometimes", "No"
, "Not sure"))

Model3 = glmer(coding ~ condition*challengeNum +
                 Do.you.enjoy.English.at.school. +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d,
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model3)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  49266.6  49345.0 -24623.3  49246.6    18700
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4328 -0.2269  0.1195  0.3065  2.1450
##
## Random effects:
```

```
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.04363  0.2089
##  questionNum   (Intercept) 0.03721  0.1929
##  School        (Intercept) 0.01389  0.1179
## Number of obs: 18710, groups:  participantID, 446; questionNum, 30; School
, 10
##
## Fixed effects:
##                                         Estimate Std. Error z value Pr(>|z|
)
## (Intercept)                              0.24525    0.07119   3.445 0.00057
1 ***
## conditionintervention                    0.01909    0.02830   0.675 0.49992
5
## challengeNumCh2.                         0.08552    0.07204   1.187 0.23516
4
## Do.you.enjoy.English.at.school..L       -0.10389    0.07816  -1.329 0.18377
0
## Do.you.enjoy.English.at.school..Q        0.08002    0.06500   1.231 0.21829
5
## Do.you.enjoy.English.at.school..C        0.11599    0.04811   2.411 0.01591
9 *
## conditionintervention:challengeNumCh2. -0.03232    0.02523  -1.281 0.20008
6
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. D...E....L D...E....Q D...E....C
## cndtnntrvnt -0.121
## chllngNmC2. -0.507  0.051
## D.y..E....L  0.399  0.037  0.000
## D.y..E....Q  0.255  0.000  0.000  0.758
## D.y..E....C  0.055  0.025  0.000  0.365      0.774
## cndtnn:NC2.  0.058 -0.451 -0.112  0.000      0.000     -0.001
```

```
m1v3 = anova(Model1, Model3)
m1v3
```

```
## Data: d
## Models:
## Model1: coding ~ condition * challengeNum + (1 | participantID) + (1 | Sch
ool) + (1 | questionNum)
## Model3: coding ~ condition * challengeNum + Do.you.enjoy.English.at.school
. + (1 | participantID) + (1 | School) + (1 | questionNum)
##        npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model1    7 49274 49329 -24630    49260
## Model3   10 49267 49345 -24623    49247 13.741  3    0.00328 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
allAnovaTests = rbind(m1v2[2,], m1v3[2,])
write.csv(allAnovaTests, "../results/allAnovaTests.csv")


#School English difficulty

d$How.difficult.or.easy.do.you.find.English.at.school. = factor(d$How.difficu
lt.or.easy.do.you.find.English.at.school., ordered = T,
                                                                levels = c("V
ery hard", "Somewhat hard", "Sometimes easy, sometimes hard", "Not sure", "So
mewhat easy", "Very easy"))
Model4 = glmer(coding ~ condition*challengeNum +
                 Do.you.enjoy.English.at.school. +
                 How.difficult.or.easy.do.you.find.English.at.school. +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d[!is.na(d$How.difficult.or.easy.do.you.find.English.at
.school.), ],
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model4)

## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + (1 |
##     participantID) + (1 | School) + (1 | questionNum)
##    Data: d[!is.na(d$How.difficult.or.easy.do.you.find.English.at.school.),
##     ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  49144.2  49261.7 -24557.1  49114.2    18653
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4403 -0.2184  0.1198  0.3038  2.0819
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.04036  0.2009
##  questionNum   (Intercept) 0.03698  0.1923
##  School        (Intercept) 0.01122  0.1059
## Number of obs: 18668, groups:  participantID, 445; questionNum, 30; School
```

```
, 10
##
## Fixed effects:
##                                                    Estimate Std. Error
## (Intercept)                                         0.16296    0.07160
## conditionintervention                               0.01882    0.02783
## challengeNumCh2.                                    0.08597    0.07183
## Do.you.enjoy.English.at.school..L                  -0.09117    0.07681
## Do.you.enjoy.English.at.school..Q                   0.02629    0.06445
## Do.you.enjoy.English.at.school..C                   0.05338    0.04885
## How.difficult.or.easy.do.you.find.English.at.school..L  0.20234    0.07314
## How.difficult.or.easy.do.you.find.English.at.school..Q -0.19185    0.07345
## How.difficult.or.easy.do.you.find.English.at.school..C  0.06810    0.05744
## How.difficult.or.easy.do.you.find.English.at.school.^4 -0.11190    0.05299
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.12165    0.06360
## conditionintervention:challengeNumCh2.             -0.03318    0.02524
##                                                    z value Pr(>|z|)
## (Intercept)                                          2.276  0.02284 *
## conditionintervention                                0.676  0.49893
## challengeNumCh2.                                     1.197  0.23139
## Do.you.enjoy.English.at.school..L                   -1.187  0.23525
## Do.you.enjoy.English.at.school..Q                    0.408  0.68330
## Do.you.enjoy.English.at.school..C                    1.093  0.27453
## How.difficult.or.easy.do.you.find.English.at.school..L   2.766  0.00567 **
## How.difficult.or.easy.do.you.find.English.at.school..Q  -2.612  0.00900 **
## How.difficult.or.easy.do.you.find.English.at.school..C   1.185  0.23584
## How.difficult.or.easy.do.you.find.English.at.school.^4  -2.112  0.03470 *
## How.difficult.or.easy.do.you.find.English.at.school.^5  -1.913  0.05580 .
## conditionintervention:challengeNumCh2.              -1.315  0.18857
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##               (Intr) cndtnn chNC2. D...E....L D...E....Q D...E....C
## cndtnntrvnt    -0.116
## chllngNmC2.    -0.503  0.052
## D.y..E....L     0.379  0.029  0.000
## D.y..E....Q     0.282  0.001  0.000  0.724
## D.y..E....C     0.107  0.028  0.000  0.324      0.779
## H.......E....L -0.105 -0.006  0.000  0.092     -0.157     -0.244
## H.......E....Q  0.048 -0.040  0.000 -0.015      0.077      0.164
## H.......E....C -0.181  0.026  0.000 -0.013     -0.104     -0.123
## H.......E...^4  0.191 -0.049  0.000  0.068      0.081      0.051
## H.......E...^5  0.191  0.043  0.000 -0.014      0.067      0.062
## cndtnn:NC2.     0.058 -0.459 -0.112  0.000      0.000      0.000
##               H.......E....L H.......E....Q H.......E....C H.......E...^4
## cndtnntrvnt
## chllngNmC2.
## D.y..E....L
## D.y..E....Q
```

```
## D.y..E....C
## H.......E....L
## H.......E....Q -0.640
## H.......E....C  0.432         -0.195
## H.......E...^4 -0.019         -0.037         -0.742
## H.......E...^5  0.132         -0.580         -0.269          0.475
## cndtnn:NC2.     0.000          0.000          0.000          0.000
##                H.......E...^5
## cndtnntrvnt
## chllngNmC2.
## D.y..E....L
## D.y..E....Q
## D.y..E....C
## H.......E....L
## H.......E....Q
## H.......E....C
## H.......E...^4
## H.......E...^5
## cndtnn:NC2.     0.000
```

```
Model3.1 = glmer(coding ~ condition*challengeNum +
                   Do.you.enjoy.English.at.school. +
                   (1 | participantID) +
                   (1 | School) +
                   (1 | questionNum),
                 family = "poisson",
                 data = d[!is.na(d$How.difficult.or.easy.do.you.find.English.
at.school.), ],
                 control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun
=1e4)))

m1v4 = anova(Model3.1, Model4)
m1v4
```

```
## Data: d[!is.na(d$How.difficult.or.easy.do.you.find.English.at.school.),  .
..
## Models:
## Model3.1: coding ~ condition * challengeNum + Do.you.enjoy.English.at.scho
ol. + (1 | participantID) + (1 | School) + (1 | questionNum)
## Model4: coding ~ condition * challengeNum + Do.you.enjoy.English.at.school
. + How.difficult.or.easy.do.you.find.English.at.school. + (1 | participantID
) + (1 | School) + (1 | questionNum)
##          npar   AIC   BIC logLik deviance Chisq Df Pr(>Chisq)
## Model3.1   10 49163 49241 -24572    49143
## Model4     15 49144 49262 -24557    49114 28.97  5  2.351e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
allAnovaTests = rbind(m1v2[2,], m1v3[2,], m1v4[2,])
write.csv(allAnovaTests, "../results/allAnovaTests.csv")
```

```r
#Reading habits

d$How.often.do.you.do.you.read.outside.of.school. = factor(d$How.often.do.you
.do.you.read.outside.of.school., ordered = T,
                                                          levels = c("I neve
r read outside of school", "I sometimes read outside of school", "I read quit
e often outside of school", "I read outside of school all the time"))

Model5 = glmer(coding ~ condition*challengeNum +
                 Do.you.enjoy.English.at.school. +
                 How.difficult.or.easy.do.you.find.English.at.school. +
                 How.often.do.you.do.you.read.outside.of.school. +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d[!is.na(d$How.often.do.you.do.you.read.outside.of.scho
ol.), ],
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model5)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.yo
u.do.you.read.outside.of.school. +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d[!is.na(d$How.often.do.you.do.you.read.outside.of.school.),
]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  48692.0  48832.9 -24328.0  48656.0    18482
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4370 -0.2132  0.1193  0.3049  2.0621
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.03761  0.1939
##  questionNum   (Intercept) 0.03694  0.1922
##  School        (Intercept) 0.01057  0.1028
## Number of obs: 18500, groups:  participantID, 441; questionNum, 30; School
```

```
, 10
##
## Fixed effects:
##                                                    Estimate Std. Erro
r
## (Intercept)                                        0.187591   0.07110
7
## conditionintervention                              0.020943   0.02745
5
## challengeNumCh2.                                   0.086660   0.07179
9
## Do.you.enjoy.English.at.school..L                 -0.065348   0.07547
7
## Do.you.enjoy.English.at.school..Q                  0.029525   0.06298
3
## Do.you.enjoy.English.at.school..C                  0.048078   0.04774
3
## How.difficult.or.easy.do.you.find.English.at.school..L  0.178153   0.07233
4
## How.difficult.or.easy.do.you.find.English.at.school..Q -0.207253   0.07208
6
## How.difficult.or.easy.do.you.find.English.at.school..C  0.066269   0.05625
5
## How.difficult.or.easy.do.you.find.English.at.school.^4 -0.117557   0.05196
2
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.094295   0.06290
5
## How.often.do.you.do.you.read.outside.of.school..L       0.147349   0.03292
8
## How.often.do.you.do.you.read.outside.of.school..Q      -0.004792   0.02813
2
## How.often.do.you.do.you.read.outside.of.school..C       0.048879   0.02157
5
## conditionintervention:challengeNumCh2.                 -0.038307   0.02531
2
##                                                    z value Pr(>|z|)
## (Intercept)                                          2.638  0.00834 **
## conditionintervention                                0.763  0.44557
## challengeNumCh2.                                     1.207  0.22744
## Do.you.enjoy.English.at.school..L                   -0.866  0.38660
## Do.you.enjoy.English.at.school..Q                    0.469  0.63922
## Do.you.enjoy.English.at.school..C                    1.007  0.31393
## How.difficult.or.easy.do.you.find.English.at.school..L   2.463  0.01378 *
## How.difficult.or.easy.do.you.find.English.at.school..Q  -2.875  0.00404 **
## How.difficult.or.easy.do.you.find.English.at.school..C   1.178  0.23879
## How.difficult.or.easy.do.you.find.English.at.school.^4  -2.262  0.02367 *
## How.difficult.or.easy.do.you.find.English.at.school.^5  -1.499  0.13387
## How.often.do.you.do.you.read.outside.of.school..L        4.475 7.64e-06 **
*
## How.often.do.you.do.you.read.outside.of.school..Q       -0.170  0.86474
```

```
## How.often.do.you.do.you.read.outside.of.school..C        2.266  0.02348 *
## conditionintervention:challengeNumCh2.                  -1.513  0.13018
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 15 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

```
Model4.1 = glmer(coding ~ condition*challengeNum +
                   Do.you.enjoy.English.at.school. +
                   How.difficult.or.easy.do.you.find.English.at.school. +
                   (1 | participantID) +
                   (1 | School) +
                   (1 | questionNum),
                 family = "poisson",
                 data = d[!is.na(d$How.often.do.you.do.you.read.outside.of.sc
hool.), ],
                 control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun
=1e4)))

summary(Model4.1)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + (1 |
##     participantID) + (1 | School) + (1 | questionNum)
##    Data: d[!is.na(d$How.often.do.you.do.you.read.outside.of.school.),
]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  48707.1  48824.4 -24338.5  48677.1    18485
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4400 -0.2174  0.1202  0.3040  2.0858
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.04017  0.2004
##  questionNum   (Intercept) 0.03696  0.1922
##  School        (Intercept) 0.01081  0.1040
## Number of obs: 18500, groups:  participantID, 441; questionNum, 30; School
, 10
```

```
##
## Fixed effects:
##                                                    Estimate Std. Error
## (Intercept)                                         0.16272    0.07128
## conditionintervention                               0.02353    0.02786
## challengeNumCh2.                                    0.08667    0.07181
## Do.you.enjoy.English.at.school..L                  -0.09318    0.07669
## Do.you.enjoy.English.at.school..Q                   0.02664    0.06438
## Do.you.enjoy.English.at.school..C                   0.05337    0.04879
## How.difficult.or.easy.do.you.find.English.at.school..L  0.20543    0.07313
## How.difficult.or.easy.do.you.find.English.at.school..Q -0.18621    0.07341
## How.difficult.or.easy.do.you.find.English.at.school..C  0.07211    0.05739
## How.difficult.or.easy.do.you.find.English.at.school.^4 -0.11298    0.05295
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.12371    0.06355
## conditionintervention:challengeNumCh2.             -0.03831    0.02531
##                                                    z value Pr(>|z|)
## (Intercept)                                          2.283  0.02243 *
## conditionintervention                                0.844  0.39841
## challengeNumCh2.                                     1.207  0.22746
## Do.you.enjoy.English.at.school..L                   -1.215  0.22434
## Do.you.enjoy.English.at.school..Q                    0.414  0.67900
## Do.you.enjoy.English.at.school..C                    1.094  0.27403
## How.difficult.or.easy.do.you.find.English.at.school..L   2.809  0.00497 **
## How.difficult.or.easy.do.you.find.English.at.school..Q  -2.537  0.01119 *
## How.difficult.or.easy.do.you.find.English.at.school..C   1.257  0.20892
## How.difficult.or.easy.do.you.find.English.at.school.^4  -2.134  0.03286 *
## How.difficult.or.easy.do.you.find.English.at.school.^5  -1.947  0.05158 .
## conditionintervention:challengeNumCh2.              -1.513  0.13017
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##               (Intr) cndtnn chNC2. D...E....L D...E....Q D...E....C
## cndtnntrvnt    -0.118
## chllngNmC2.    -0.505  0.052
## D.y..E....L     0.380  0.028  0.000
## D.y..E....Q     0.283  0.000  0.000  0.724
## D.y..E....C     0.107  0.028  0.000  0.323      0.778
## H.......E....L -0.104 -0.008  0.000  0.092     -0.157     -0.244
## H.......E....Q  0.049 -0.040  0.000 -0.015      0.077      0.164
## H.......E....C -0.181  0.026  0.000 -0.013     -0.104     -0.123
## H.......E...^4  0.193 -0.052  0.000  0.068      0.081      0.051
## H.......E...^5  0.192  0.041  0.000 -0.013      0.068      0.061
## cndtnn:NC2.     0.058 -0.459 -0.113  0.000      0.000     -0.001
##               H.......E....L H.......E....Q H.......E....C H.......E...^4
## cndtnntrvnt
## chllngNmC2.
## D.y..E....L
## D.y..E....Q
## D.y..E....C
```

```
## H.......E....L
## H.......E....Q -0.636
## H.......E....C  0.433         -0.193
## H.......E...^4 -0.016         -0.035         -0.740
## H.......E...^5  0.133         -0.578         -0.269          0.475
## cndtnn:NC2.     0.000          0.000          0.000          0.000
##                H.......E...^5
## cndtnntrvnt
## chllngNmC2.
## D.y..E....L
## D.y..E....Q
## D.y..E....C
## H.......E....L
## H.......E....Q
## H.......E....C
## H.......E...^4
## H.......E...^5
## cndtnn:NC2.     0.000
```

```
m1v5 = anova(Model4.1, Model5)
m1v5
```

```
## Data: d[!is.na(d$How.often.do.you.do.you.read.outside.of.school.),  ...
## Models:
## Model4.1: coding ~ condition * challengeNum + Do.you.enjoy.English.at.scho
ol. + How.difficult.or.easy.do.you.find.English.at.school. + (1 | participant
ID) + (1 | School) + (1 | questionNum)
## Model5: coding ~ condition * challengeNum + Do.you.enjoy.English.at.school
. + How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.you.d
o.you.read.outside.of.school. + (1 | participantID) + (1 | School) + (1 | que
stionNum)
##          npar   AIC   BIC logLik deviance Chisq Df Pr(>Chisq)
## Model4.1   15 48707 48824 -24338    48677
## Model5     18 48692 48833 -24328    48656 21.06  3  0.0001023 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
allAnovaTests = rbind(m1v2[2,], m1v3[2,], m1v4[2,], m1v5[2,])
write.csv(allAnovaTests, "../results/allAnovaTests.csv")


#Task difficulty

d$How.did.you.find.this.task..1 = factor(d$How.did.you.find.this.task..1, ord
ered = T,
                                         levels = c("Really hard", "Fairly ha
rd", "Not sure", "Just right (a micture of easy and hard", "Fairly easy", "Ve
ry easy"))

Model6 = glmer(coding ~ condition*challengeNum +
```

```
                Do.you.enjoy.English.at.school. +
                How.difficult.or.easy.do.you.find.English.at.school. +
                How.often.do.you.do.you.read.outside.of.school. +
                How.did.you.find.this.task..1 +
                (1 | participantID) +
                (1 | School) +
                (1 | questionNum),
              family = "poisson",
              data = d[!is.na(d$How.did.you.find.this.task..1), ],
              control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model6)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.yo
u.do.you.read.outside.of.school. +
##     How.did.you.find.this.task..1 + (1 | participantID) + (1 |
##     School) + (1 | questionNum)
##    Data: d[!is.na(d$How.did.you.find.this.task..1), ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  23837.7  23987.0 -11897.9  23795.7     9024
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.3947 -0.2661  0.1366  0.3283  1.9145
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.022487 0.14996
##  questionNum   (Intercept) 0.037468 0.19357
##  School        (Intercept) 0.005114 0.07151
## Number of obs: 9045, groups:  participantID, 319; questionNum, 30; School,
10
##
## Fixed effects:
##                                                      Estimate Std. Erro
r
## (Intercept)                                         -0.044983   0.08564
1
## conditionintervention                                0.019736   0.03403
4
## challengeNumCh2.                                     0.079869   0.07481
```

```
## Do.you.enjoy.English.at.school..L                       -0.469514   0.14322
6
## Do.you.enjoy.English.at.school..Q                       -0.271036   0.11124
8
## Do.you.enjoy.English.at.school..C                       -0.063276   0.06759
2
## How.difficult.or.easy.do.you.find.English.at.school..L  0.027130   0.08059
0
## How.difficult.or.easy.do.you.find.English.at.school..Q -0.152796   0.07778
2
## How.difficult.or.easy.do.you.find.English.at.school..C  0.048312   0.06082
4
## How.difficult.or.easy.do.you.find.English.at.school.^4 -0.125521   0.05567
1
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.053922   0.06387
0
## How.often.do.you.do.you.read.outside.of.school..L       0.117308   0.03930
1
## How.often.do.you.do.you.read.outside.of.school..Q      -0.006235   0.03213
9
## How.often.do.you.do.you.read.outside.of.school..C       0.032070   0.02348
7
## How.did.you.find.this.task..1.L                         0.183749   0.04116
4
## How.did.you.find.this.task..1.Q                         0.065218   0.05356
6
## How.did.you.find.this.task..1.C                         0.188724   0.06405
0
## conditionintervention:challengeNumCh2.                 -0.039026   0.04187
8
##                                                       z value Pr(>|z|)
## (Intercept)                                            -0.525  0.59941
## conditionintervention                                   0.580  0.56199
## challengeNumCh2.                                        1.068  0.28569
## Do.you.enjoy.English.at.school..L                      -3.278  0.00104 **
## Do.you.enjoy.English.at.school..Q                      -2.436  0.01484 *
## Do.you.enjoy.English.at.school..C                      -0.936  0.34919
## How.difficult.or.easy.do.you.find.English.at.school..L  0.337  0.73639
## How.difficult.or.easy.do.you.find.English.at.school..Q -1.964  0.04948 *
## How.difficult.or.easy.do.you.find.English.at.school..C  0.794  0.42702
## How.difficult.or.easy.do.you.find.English.at.school.^4 -2.255  0.02415 *
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.844  0.39853
## How.often.do.you.do.you.read.outside.of.school..L       2.985  0.00284 **
## How.often.do.you.do.you.read.outside.of.school..Q      -0.194  0.84618
## How.often.do.you.do.you.read.outside.of.school..C       1.365  0.17211
## How.did.you.find.this.task..1.L                         4.464 8.05e-06 **
*
## How.did.you.find.this.task..1.Q                         1.218  0.22340
## How.did.you.find.this.task..1.C                         2.947  0.00321 **
```

```
## conditionintervention:challengeNumCh2.                  -0.932  0.35138
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 18 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

```
Model5.1 = glmer(coding ~ condition*challengeNum +
                   Do.you.enjoy.English.at.school. +
                   How.difficult.or.easy.do.you.find.English.at.school. +
                   How.often.do.you.do.you.read.outside.of.school. +
                   (1 | participantID) +
                   (1 | School) +
                   (1 | questionNum),
                 family = "poisson",
                 data = d[!is.na(d$How.did.you.find.this.task..1 ), ],
                 control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun
=1e4)))

summary(Model5.1)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.yo
u.do.you.read.outside.of.school. +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d[!is.na(d$How.did.you.find.this.task..1), ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  23887.8  24015.8 -11925.9  23851.8     9027
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4374 -0.2704  0.1442  0.3289  1.9562
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.028742 0.1695
##  questionNum   (Intercept) 0.037642 0.1940
##  School        (Intercept) 0.008557 0.0925
## Number of obs: 9045, groups:  participantID, 319; questionNum, 30; School,
10
##
```

```
## Fixed effects:
##                                                    Estimate Std. Err
or
## (Intercept)                                       0.0574666  0.08665
47
## conditionintervention                             0.0353091  0.03557
91
## challengeNumCh2.                                  0.0950465  0.07505
43
## Do.you.enjoy.English.at.school..L                -0.3988321  0.14866
91
## Do.you.enjoy.English.at.school..Q                -0.1843337  0.11536
39
## Do.you.enjoy.English.at.school..C                -0.0143327  0.07067
59
## How.difficult.or.easy.do.you.find.English.at.school..L  0.1747983  0.08147
87
## How.difficult.or.easy.do.you.find.English.at.school..Q -0.2187767  0.08007
80
## How.difficult.or.easy.do.you.find.English.at.school..C  0.1260286  0.06373
45
## How.difficult.or.easy.do.you.find.English.at.school.^4 -0.1810658  0.05897
33
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.0983400  0.06687
86
## How.often.do.you.do.you.read.outside.of.school..L       0.1289725  0.04189
50
## How.often.do.you.do.you.read.outside.of.school..Q      -0.0002532  0.03427
37
## How.often.do.you.do.you.read.outside.of.school..C       0.0322204  0.02498
68
## conditionintervention:challengeNumCh2.                -0.0425796  0.04257
89
##                                                    z value Pr(>|z|)
## (Intercept)                                          0.663  0.50722
## conditionintervention                                0.992  0.32100
## challengeNumCh2.                                     1.266  0.20538
## Do.you.enjoy.English.at.school..L                   -2.683  0.00730 **
## Do.you.enjoy.English.at.school..Q                   -1.598  0.11008
## Do.you.enjoy.English.at.school..C                   -0.203  0.83930
## How.difficult.or.easy.do.you.find.English.at.school..L   2.145  0.03193 *
## How.difficult.or.easy.do.you.find.English.at.school..Q  -2.732  0.00629 **
## How.difficult.or.easy.do.you.find.English.at.school..C   1.977  0.04800 *
## How.difficult.or.easy.do.you.find.English.at.school.^4  -3.070  0.00214 **
## How.difficult.or.easy.do.you.find.English.at.school.^5  -1.470  0.14145
## How.often.do.you.do.you.read.outside.of.school..L        3.078  0.00208 **
## How.often.do.you.do.you.read.outside.of.school..Q       -0.007  0.99411
## How.often.do.you.do.you.read.outside.of.school..C        1.289  0.19722
## conditionintervention:challengeNumCh2.                  -1.000  0.31730
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 15 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

m1v6 = anova(Model5.1, Model6)
m1v6

## Data: d[!is.na(d$How.did.you.find.this.task..1), ]
## Models:
## Model5.1: coding ~ condition * challengeNum + Do.you.enjoy.English.at.scho
ol. + How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.you
.do.you.read.outside.of.school. + (1 | participantID) + (1 | School) + (1 | q
uestionNum)
## Model6: coding ~ condition * challengeNum + Do.you.enjoy.English.at.school
. + How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.you.d
o.you.read.outside.of.school. + How.did.you.find.this.task..1 + (1 | particip
antID) + (1 | School) + (1 | questionNum)
##          npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model5.1   18 23888 24016 -11926    23852
## Model6     21 23838 23987 -11898    23796 56.091  3  4.016e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

allAnovaTests = rbind(m1v2[2,], m1v3[2,], m1v4[2,], m1v5[2,], m1v6[2,])
write.csv(allAnovaTests, "../results/allAnovaTests.csv")


#EnglishL1 Model

d$English.L1. = factor(d$English.L1.)


Model7 = glmer(coding ~ condition*challengeNum +
                 Do.you.enjoy.English.at.school. +
                 How.difficult.or.easy.do.you.find.English.at.school. +
                 How.often.do.you.do.you.read.outside.of.school. +
                 How.did.you.find.this.task..1 +
                 English.L1. +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d[!is.na(d$English.L1.), ],
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))
summary(Model7)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.yo
u.do.you.read.outside.of.school. +
##     How.did.you.find.this.task..1 + English.L1. + (1 | participantID) +
##     (1 | School) + (1 | questionNum)
##    Data: d[!is.na(d$English.L1.), ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  23839.9  24003.4 -11897.0  23793.9     9022
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.3999 -0.2662  0.1361  0.3280  1.8929
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.022231 0.14910
##  questionNum   (Intercept) 0.037459 0.19354
##  School        (Intercept) 0.004965 0.07046
## Number of obs: 9045, groups:  participantID, 319; questionNum, 30; School,
10
##
## Fixed effects:
##                                                          Estimate Std. Err
or
## (Intercept)                                           -5.285e-02  8.905e-
02
## conditionintervention                                  2.218e-02  3.403e-
02
## challengeNumCh2.                                       8.011e-02  7.480e-
02
## Do.you.enjoy.English.at.school..L                     -4.803e-01  1.432e-
01
## Do.you.enjoy.English.at.school..Q                     -2.722e-01  1.112e-
01
## Do.you.enjoy.English.at.school..C                     -6.015e-02  6.752e-
02
## How.difficult.or.easy.do.you.find.English.at.school..L  1.275e-02  8.120e-
02
## How.difficult.or.easy.do.you.find.English.at.school..Q -1.463e-01  7.782e-
02
## How.difficult.or.easy.do.you.find.English.at.school..C  4.772e-02  6.131e-
02
## How.difficult.or.easy.do.you.find.English.at.school.^4 -1.327e-01  5.619e-
```

```
02
## How.difficult.or.easy.do.you.find.English.at.school.^5 -5.750e-02  6.380e-
02
## How.often.do.you.do.you.read.outside.of.school..L       1.187e-01  3.935e-
02
## How.often.do.you.do.you.read.outside.of.school..Q       4.064e-05  3.247e-
02
## How.often.do.you.do.you.read.outside.of.school..C       3.255e-02  2.345e-
02
## How.did.you.find.this.task..1.L                         1.852e-01  4.112e-
02
## How.did.you.find.this.task..1.Q                         6.261e-02  5.357e-
02
## How.did.you.find.this.task..1.C                         1.882e-01  6.404e-
02
## English.L1.N                                           -7.144e-02  6.481e-
02
## English.L1.Y                                            1.344e-02  3.204e-
02
## conditionintervention:challengeNumCh2.                 -4.067e-02  4.187e-
02
##                                                       z value Pr(>|z|)
## (Intercept)                                            -0.594 0.552840
## conditionintervention                                   0.652 0.514527
## challengeNumCh2.                                        1.071 0.284228
## Do.you.enjoy.English.at.school..L                      -3.353 0.000799 **
*
## Do.you.enjoy.English.at.school..Q                      -2.448 0.014360 *
## Do.you.enjoy.English.at.school..C                      -0.891 0.373024
## How.difficult.or.easy.do.you.find.English.at.school..L  0.157 0.875259
## How.difficult.or.easy.do.you.find.English.at.school..Q -1.879 0.060194 .
## How.difficult.or.easy.do.you.find.English.at.school..C  0.778 0.436375
## How.difficult.or.easy.do.you.find.English.at.school.^4 -2.362 0.018166 *
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.901 0.367408
## How.often.do.you.do.you.read.outside.of.school..L       3.017 0.002549 **
## How.often.do.you.do.you.read.outside.of.school..Q       0.001 0.999001
## How.often.do.you.do.you.read.outside.of.school..C       1.388 0.165217
## How.did.you.find.this.task..1.L                         4.503  6.7e-06 **
*
## How.did.you.find.this.task..1.Q                         1.169 0.242530
## How.did.you.find.this.task..1.C                         2.939 0.003294 **
## EnglishAL.L1.N                                         -1.102 0.270344
## BiEnglish.L1.bi                                         -.103 0.452314
## English.L1.Y                                            0.420 0.674793
## conditionintervention:challengeNumCh2.                 -0.971 0.331421
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 20 > 12.
```

```
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

Model6.1 = glmer(coding ~ condition*challengeNum +
                   Do.you.enjoy.English.at.school. +
                   How.difficult.or.easy.do.you.find.English.at.school. +
                   How.often.do.you.do.you.read.outside.of.school. +
                   How.did.you.find.this.task..1 +
                   (1 | participantID) +
                   (1 | School) +
                   (1 | questionNum),
                 family = "poisson",
                 data = d[!is.na(d$English.L1.), ],
                 control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun
=1e4)))

summary(Model6.1)

## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.yo
u.do.you.read.outside.of.school. +
##     How.did.you.find.this.task..1 + (1 | participantID) + (1 |
##     School) + (1 | questionNum)
##    Data: d[!is.na(d$English.L1.), ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  23837.7  23987.0 -11897.9  23795.7     9024
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.3947 -0.2661  0.1366  0.3283  1.9145
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.022487 0.14996
##  questionNum   (Intercept) 0.037468 0.19357
##  School        (Intercept) 0.005114 0.07151
## Number of obs: 9045, groups:  participantID, 319; questionNum, 30; School,
10
##
## Fixed effects:
##                                                          Estimate Std. Erro
r
## (Intercept)                                             -0.044983   0.08564
```

```
1
## conditionintervention                                      0.019736   0.03403
4
## challengeNumCh2.                                           0.079869   0.07481
0
## Do.you.enjoy.English.at.school..L                         -0.469514   0.14322
6
## Do.you.enjoy.English.at.school..Q                         -0.271036   0.11124
8
## Do.you.enjoy.English.at.school..C                         -0.063276   0.06759
2
## How.difficult.or.easy.do.you.find.English.at.school..L  0.027130   0.08059
0
## How.difficult.or.easy.do.you.find.English.at.school..Q -0.152796   0.07778
2
## How.difficult.or.easy.do.you.find.English.at.school..C  0.048312   0.06082
4
## How.difficult.or.easy.do.you.find.English.at.school.^4 -0.125521   0.05567
1
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.053922   0.06387
0
## How.often.do.you.do.you.read.outside.of.school..L       0.117308   0.03930
1
## How.often.do.you.do.you.read.outside.of.school..Q      -0.006235   0.03213
9
## How.often.do.you.do.you.read.outside.of.school..C       0.032070   0.02348
7
## How.did.you.find.this.task..1.L                         0.183749   0.04116
4
## How.did.you.find.this.task..1.Q                         0.065218   0.05356
6
## How.did.you.find.this.task..1.C                         0.188724   0.06405
0
## conditionintervention:challengeNumCh2.                 -0.039026   0.04187
8
##                                                       z value Pr(>|z|)
## (Intercept)                                            -0.525  0.59941
## conditionintervention                                   0.580  0.56199
## challengeNumCh2.                                        1.068  0.28569
## Do.you.enjoy.English.at.school..L                      -3.278  0.00104 **
## Do.you.enjoy.English.at.school..Q                      -2.436  0.01484 *
## Do.you.enjoy.English.at.school..C                      -0.936  0.34919
## How.difficult.or.easy.do.you.find.English.at.school..L   0.337  0.73639
## How.difficult.or.easy.do.you.find.English.at.school..Q  -1.964  0.04948 *
## How.difficult.or.easy.do.you.find.English.at.school..C   0.794  0.42702
## How.difficult.or.easy.do.you.find.English.at.school.^4  -2.255  0.02415 *
## How.difficult.or.easy.do.you.find.English.at.school.^5  -0.844  0.39853
## How.often.do.you.do.you.read.outside.of.school..L        2.985  0.00284 **
## How.often.do.you.do.you.read.outside.of.school..Q       -0.194  0.84618
## How.often.do.you.do.you.read.outside.of.school..C        1.365  0.17211
```

```
## How.did.you.find.this.task..1.L                          4.464 8.05e-06 **
*
## How.did.you.find.this.task..1.Q                          1.218  0.22340
## How.did.you.find.this.task..1.C                          2.947  0.00321 **
## conditionintervention:challengeNumCh2.                  -0.932  0.35138
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 18 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

```
m1v7 = anova(Model6.1, Model7)
m1v7
```

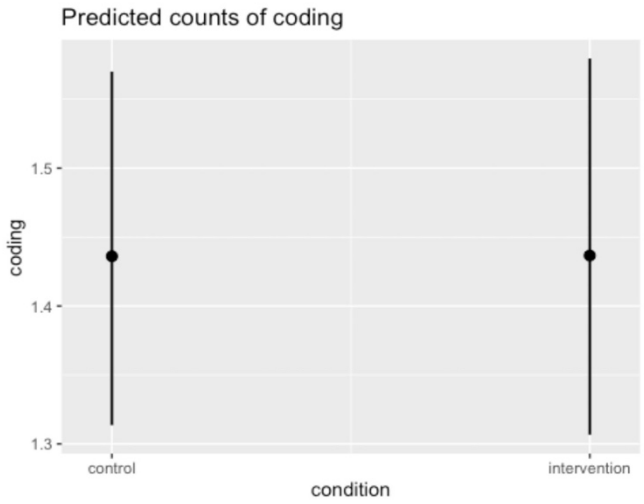
```
## Data: d[!is.na(d$English.L1.), ]
## Models:
## Model6.1: coding ~ condition * challengeNum + Do.you.enjoy.English.at.scho
ol. + How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.you
.do.you.read.outside.of.school. + How.did.you.find.this.task..1 + (1 | partic
ipantID) + (1 | School) + (1 | questionNum)
## Model7: coding ~ condition * challengeNum + Do.you.enjoy.English.at.school
. + How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.you.d
o.you.read.outside.of.school. + How.did.you.find.this.task..1 + English.L1. +
(1 | participantID) + (1 | School) + (1 | questionNum)
##          npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model6.1   21 23838 23987 -11898    23796
## Model7     23 23840 24003 -11897    23794 1.8114  2     0.4043
```

```
allAnovaTests = rbind(m1v2[2,], m1v3[2,], m1v4[2,], m1v5[2,], m1v6[2,], m1v7[
2,])
write.csv(allAnovaTests, "../results/allAnovaTests.csv")
```

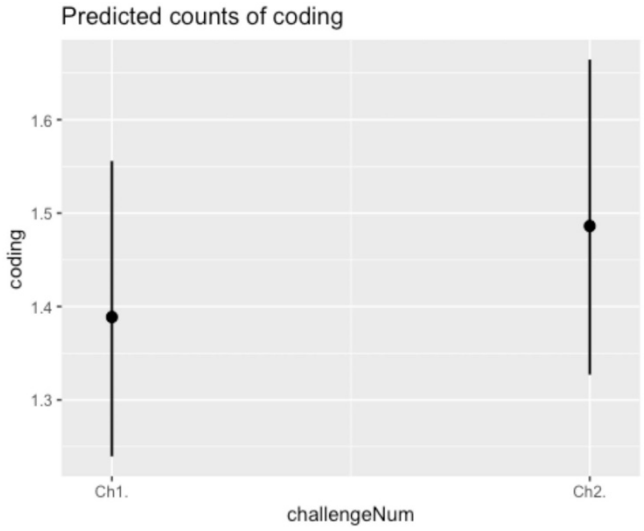
```
MorphologicalAwarenessModel1 = glmer(coding ~ condition*challengeNum +
                                       Do.you.enjoy.English.at.school. +
                                       How.difficult.or.easy.do.you.find.Engl
ish.at.school. +
                                       How.often.do.you.do.you.read.outside.o
f.school. +
                                       How.did.you.find.this.task..1 +
                                       (1 | participantID) +
                                       (1 | School) +
                                       (1 | questionNum),
                                     family = "poisson",
                                     data = d,
                                     control=glmerControl(optimizer="bobyqa",
optCtrl=list(maxfun=1e4)))

summary(MorphologicalAwarenessModel1)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: coding ~ condition * challengeNum + Do.you.enjoy.English.at.schoo
l. +
##     How.difficult.or.easy.do.you.find.English.at.school. + How.often.do.yo
u.do.you.read.outside.of.school. +
##     How.did.you.find.this.task..1 + (1 | participantID) + (1 |
##     School) + (1 | questionNum)
##    Data: d
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  23837.7  23987.0 -11897.9  23795.7     9024
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.3947 -0.2661  0.1366  0.3283  1.9145
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.022487 0.14996
##  questionNum   (Intercept) 0.037468 0.19357
##  School        (Intercept) 0.005114 0.07151
## Number of obs: 9045, groups:  participantID, 319; questionNum, 30; School,
10
##
## Fixed effects:
##                                                      Estimate Std. Erro
r
## (Intercept)                                         -0.044983   0.08564
1
## conditionintervention                                0.019736   0.03403
4
## challengeNumCh2.                                     0.079869   0.07481
0
## Do.you.enjoy.English.at.school..L                   -0.469514   0.14322
6
## Do.you.enjoy.English.at.school..Q                   -0.271036   0.11124
8
## Do.you.enjoy.English.at.school..C                   -0.063276   0.06759
2
## How.difficult.or.easy.do.you.find.English.at.school..L  0.027130   0.08059
0
## How.difficult.or.easy.do.you.find.English.at.school..Q -0.152796   0.07778
2
## How.difficult.or.easy.do.you.find.English.at.school..C  0.048312   0.06082
4
## How.difficult.or.easy.do.you.find.English.at.school.^4 -0.125521   0.05567
```

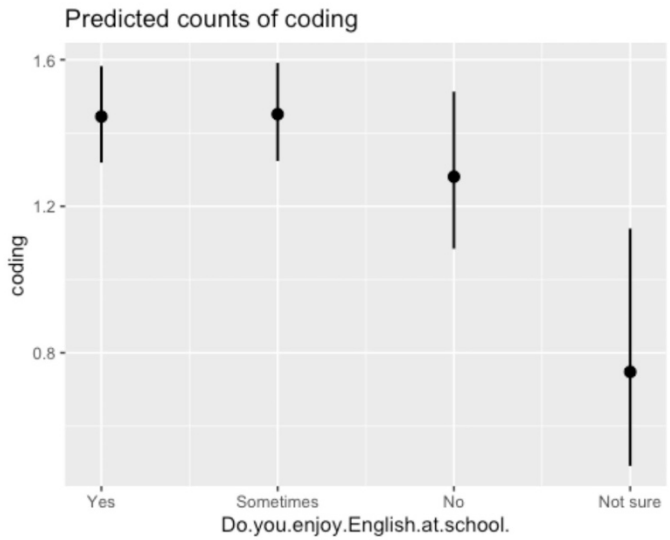
```
1
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.053922   0.06387
0
## How.often.do.you.do.you.read.outside.of.school..L       0.117308   0.03930
1
## How.often.do.you.do.you.read.outside.of.school..Q      -0.006235   0.03213
9
## How.often.do.you.do.you.read.outside.of.school..C       0.032070   0.02348
7
## How.did.you.find.this.task..1.L                         0.183749   0.04116
4
## How.did.you.find.this.task..1.Q                         0.065218   0.05356
6
## How.did.you.find.this.task..1.C                         0.188724   0.06405
0
## conditionintervention:challengeNumCh2.                 -0.039026   0.04187
8
##                                                       z value Pr(>|z|)
## (Intercept)                                            -0.525  0.59941
## conditionintervention                                   0.580  0.56199
## challengeNumCh2.                                        1.068  0.28569
## Do.you.enjoy.English.at.school..L                      -3.278  0.00104 **
## Do.you.enjoy.English.at.school..Q                      -2.436  0.01484 *
## Do.you.enjoy.English.at.school..C                      -0.936  0.34919
## How.difficult.or.easy.do.you.find.English.at.school..L  0.337  0.73639
## How.difficult.or.easy.do.you.find.English.at.school..Q -1.964  0.04948 *
## How.difficult.or.easy.do.you.find.English.at.school..C  0.794  0.42702
## How.difficult.or.easy.do.you.find.English.at.school.^4 -2.255  0.02415 *
## How.difficult.or.easy.do.you.find.English.at.school.^5 -0.844  0.39853
## How.often.do.you.do.you.read.outside.of.school..L       2.985  0.00284 **
## How.often.do.you.do.you.read.outside.of.school..Q      -0.194  0.84618
## How.often.do.you.do.you.read.outside.of.school..C       1.365  0.17211
## How.did.you.find.this.task..1.L                         4.464 8.05e-06 **
*
## How.did.you.find.this.task..1.Q                         1.218  0.22340
## How.did.you.find.this.task..1.C                         2.947  0.00321 **
## conditionintervention:challengeNumCh2.                 -0.932  0.35138
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 18 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

library(sjPlot)
plot_model(MorphologicalAwarenessModel1,"eff")

## $condition
```



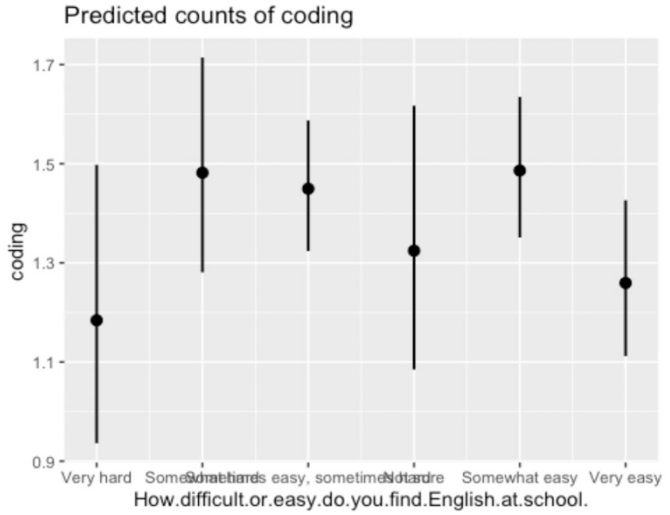

```
##
## $challengeNum
```



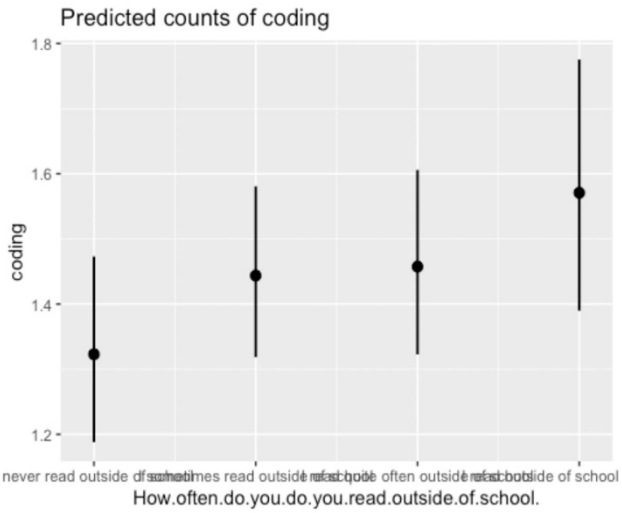

```
##
## $Do.you.enjoy.English.at.school.
```



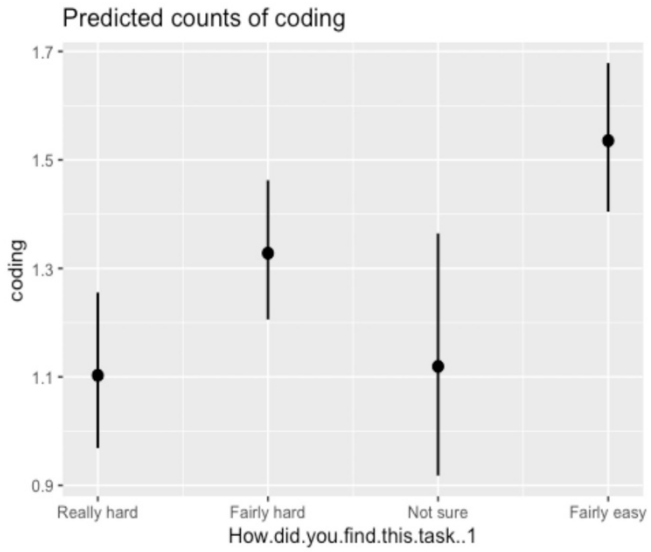

```
##
## $How.difficult.or.easy.do.you.find.English.at.school.
```



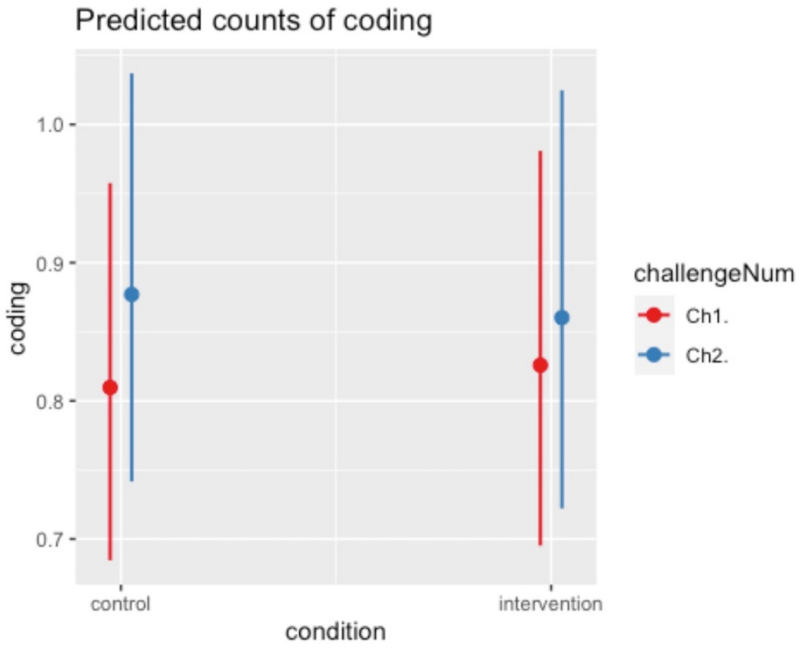

```
##
## $How.often.do.you.do.you.read.outside.of.school.
```




```
##
## $How.did.you.find.this.task..1
```




```
plot_model(MorphologicalAwarenessModel1,"int")
```


Predicted counts of coding
1.0
0.9
0.8
0.7
coding
control
intervention
condition
challengeNum
Ch1.
Ch2.

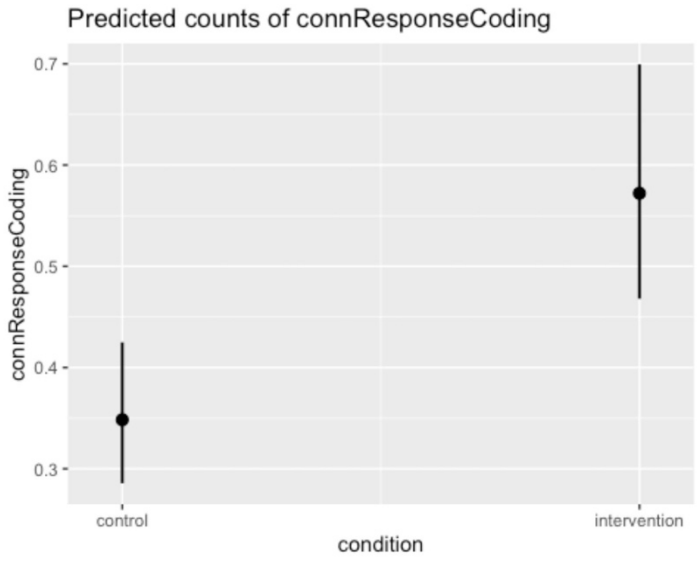
Appendix VIII: Etymological awareness RStudio code and script

Stage2Etym.R

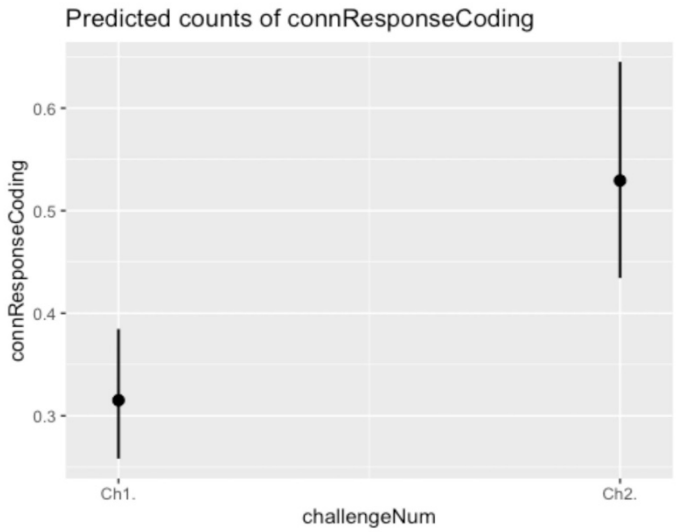
```
library(lme4)

## Loading required package: Matrix

# The location of the folder on computer
try(setwd("~/Desktop/Desktop /project/processing"))

# Load the data
d2 = read.csv("../data/processed/Stage2_ChallengeData.csv")
d2$connResponseCoding=as.numeric(d2$connResponseCoding)
d2$condition=factor(d2$condition)
d2$challengeNum=factor(d2$challengeNum)
Model1 = glmer(connResponseCoding ~ condition*challengeNum +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2)
summary(Model1)

## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: connResponseCoding ~ condition * challengeNum + (1 | participantI
D) +
##     (1 | School) + (1 | questionNum)
##    Data: d2
##
##      AIC      BIC   logLik deviance df.resid
##  24348.4  24400.9 -12167.2  24334.4    13373
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.5193 -0.6525 -0.5319  0.3019  5.6799
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.042610 0.20642
##  questionNum   (Intercept) 0.133328 0.36514
##  School        (Intercept) 0.007977 0.08931
## Number of obs: 13380, groups:  participantID, 446; questionNum, 15; School
, 10
##
## Fixed effects:
##                                       Estimate Std. Error z value Pr(>|z|
)
```

```
## (Intercept)                              0.053444    0.077245 0.692  0.489
## conditionintervention                    0.003029    0.027530 0.110  0.912
## challengeNumCh2.                         0.111038    0.019275 5.761 8.37e-9
***
## conditionintervention:challengeNumCh2.  0.209460    0.0032980 6.351 < 2.14
e-102 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2.
## cndtnntrvnt -0.159
## chllngNmC2. -0.180  0.379
## cndtnn:NC2.  0.113 -0.737 -0.630
```

```
#Plot model inference

library(sjPlot)
plot_model(Model1,"eff")

## $condition
```




```
##
## $challengeNum
```




```
pdf('../results/InteractionPlot1.pdf',
    width=4,height=3)
plot_model(Model1,"int")
dev.off()
```

```
## quartz_off_screen
##                 2
```

```
#Year group model
d2$Year.group = factor(d2$Year.group)

Model2 = glmer(connResponseCoding ~ condition*challengeNum + Year.group +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2,
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))
summary(Model2)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: connResponseCoding ~ condition * challengeNum + Year.group +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d2
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
```

```
)
##
##      AIC      BIC   logLik deviance df.resid
##  24352.7  24427.7 -12166.3  24332.7    13370
##
## Scaled residuals:
##    Min     1Q Median     3Q    Max
## -1.508 -0.652 -0.532  0.299  5.729
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.042546 0.20627
##  questionNum   (Intercept) 0.133198 0.36496
##  School        (Intercept) 0.006557 0.08097
## Number of obs: 13380, groups:  participantID, 446; questionNum, 15; School
, 10
##
## Fixed effects:
##                                          Estimate Std. Error z value Pr(>|z|
)
## (Intercept)                              -1.22611    0.11915 -10.291  < 2e-1
6 ***
## conditionintervention                     0.03023    0.04955   0.610    0.54
2
## challengeNumCh2.                          0.21849    0.03341   6.540 6.16e-1
1 ***
## Year.group6                               0.02262    0.08880   0.255    0.79
9
## Year.group7                               0.08613    0.07184   1.199    0.23
1
## Year.group8                               0.04718    0.07326   0.644    0.52
0
## conditionintervention:challengeNumCh2.  0.93605    0.05304  17.648  < 2e-1
6 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. Yr.gr6 Yr.gr7 Yr.gr8
## cndtnntrvnt -0.202
## chllngNmC2. -0.155  0.374
## Year.group6 -0.224  0.016  0.000
## Year.group7 -0.501  0.104  0.000  0.390
## Year.group8 -0.476  0.162  0.000  0.392  0.820
## cndtnn:NC2.  0.098 -0.726 -0.630  0.000  0.000  0.000

m1v2 = anova(Model1, Model2)
m1v2
```

```
## Data: d2
## Models:
## Model1: connResponseCoding ~ condition * challengeNum + (1 | participantID
) + (1 | School) + (1 | questionNum)
## Model2: connResponseCoding ~ condition * challengeNum + Year.group + (1 |
participantID) + (1 | School) + (1 | questionNum)
##        npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model1    7 24348 24401 -12167    24334
## Model2   10 24353 24428 -12166    24333 1.7305  3     0.6302
```

```
#School English enjoyment model

d2$EnjoyEnglish = factor(d2$EnjoyEnglish, ordered = T,
                                          levels = c("Yes","Sometimes", "No"
, "Not sure"))

Model3 = glmer(connResponseCoding ~ condition*challengeNum + EnjoyEnglish +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2,
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model3)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: connResponseCoding ~ condition * challengeNum + EnjoyEnglish +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d2
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  24353.0  24428.0 -12166.5  24333.0    13370
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.5161 -0.6520 -0.5313  0.3036  5.6357
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.042170 0.20535
##  questionNum   (Intercept) 0.133320 0.36513
##  School        (Intercept) 0.007912 0.08895
## Number of obs: 13380, groups:  participantID, 446; questionNum, 15; School
, 10
```

```
##
## Fixed effects:
##                                      Estimate Std. Error z value Pr(>|z
|)
## (Intercept)                         -1.173272   0.110321 -10.635  < 2e-
16
## conditionintervention                0.031592   0.048928   0.646    0.5
18
## challengeNumCh2.                     0.218488   0.033411   6.539 6.18e-
11
## EnjoyEnglish.L                      -0.007480   0.106725  -0.070    0.9
44
## EnjoyEnglish.Q                      -0.008282   0.088490  -0.094    0.9
25
## EnjoyEnglish.C                       0.036309   0.064894   0.560    0.5
76
## conditionintervention:challengeNumCh2.  0.936048   0.053042  17.647  < 2e-
16
##
## (Intercept)                         ***
## conditionintervention
## challengeNumCh2.                    ***
## EnjoyEnglish.L
## EnjoyEnglish.Q
## EnjoyEnglish.C
## conditionintervention:challengeNumCh2. ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. EnjE.L EnjE.Q EnjE.C
## cndtnntrvnt -0.138
## chllngNmC2. -0.168  0.379
## EnjyEngls.L  0.350  0.034  0.000
## EnjyEngls.Q  0.229  0.006  0.000  0.767
## EnjyEngls.C  0.055  0.025  0.000  0.381  0.774
## cndtnn:NC2.  0.106 -0.736 -0.630  0.000  0.000  0.000
```

```
m1v3 = anova(Model1, Model3)
m1v3
```

```
## Data: d2
## Models:
## Model1: connResponseCoding ~ condition * challengeNum + (1 | participantID
) + (1 | School) + (1 | questionNum)
## Model3: connResponseCoding ~ condition * challengeNum + EnjoyEnglish + (1
| participantID) + (1 | School) + (1 | questionNum)
##        npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model1    7 24348 24401 -12167    24334
## Model3   10 24353 24428 -12166    24333 1.3702  3     0.7125
```

```r
#School English difficulty
d2$HowDifficultIsEnglish = factor(d2$HowDifficultIsEnglish, ordered = T,
                                                                levels = c("V
ery hard", "Somewhat hard", "Sometimes easy, sometimes hard", "Not sure", "So
mewhat easy", "Very easy"))

Model4 = glmer(connResponseCoding ~ condition*challengeNum + HowDifficultIsEn
glish +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2,
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model4)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## connResponseCoding ~ condition * challengeNum + HowDifficultIsEnglish +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d2
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  24355.6  24445.6 -12165.8  24331.6    13368
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.5151 -0.6521 -0.5317  0.3027  5.7195
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.042246 0.20554
##  questionNum   (Intercept) 0.133384 0.36522
##  School        (Intercept) 0.008629 0.09289
## Number of obs: 13380, groups:  participantID, 446; questionNum, 15; School
, 10
##
## Fixed effects:
##                                      Estimate Std. Error z value Pr(>|z|
)
## (Intercept)                          -1.12638    0.10689 -10.538  < 2e-1
6 ***
## conditionintervention                 0.02857    0.04898   0.583    0.56
0
```

```
## challengeNumCh2.                          0.21849    0.03341   6.539 6.18e-1
1 ***
## HowDifficultIsEnglish.L                  -0.03075    0.08729  -0.352    0.72
5
## HowDifficultIsEnglish.Q                   0.03858    0.09314   0.414    0.67
9
## HowDifficultIsEnglish.C                  -0.01116    0.07537  -0.148    0.88
2
## HowDifficultIsEnglish^4                   0.04928    0.07249   0.680    0.49
7
## HowDifficultIsEnglish^5                   0.07600    0.08657   0.878    0.38
0
## conditionintervention:challengeNumCh2.  0.93605    0.05304  17.647  < 2e-1
6 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. HDIE.L HDIE.Q HDIE.C HDIE^4 HDIE^5
## cndtnntrvnt -0.146
## chllngNmC2. -0.173  0.378
## HwDffclIE.L -0.113 -0.017  0.000
## HwDffclIE.Q  0.028 -0.035  0.000 -0.591
## HwDffclIE.C -0.141  0.030  0.000  0.329 -0.100
## HwDffclIE^4  0.132 -0.046  0.000  0.061 -0.094 -0.740
## HwDffclIE^5  0.178  0.043  0.000  0.169 -0.624 -0.267  0.469
## cndtnn:NC2.  0.109 -0.735 -0.630  0.000  0.000  0.000  0.000  0.000
```

```
m1v4 = anova(Model1, Model4)
m1v4
```

```
## Data: d2
## Models:
## Model1: connResponseCoding ~ condition * challengeNum + (1 | participantID
) + (1 | School) + (1 | questionNum)
## Model4: connResponseCoding ~ condition * challengeNum + HowDifficultIsEngl
ish + (1 | participantID) + (1 | School) + (1 | questionNum)
##        npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model1    7 24348 24401 -12167    24334
## Model4   12 24356 24446 -12166    24332 2.7849  5     0.7331
```

```
#Reading habits
d2$HowOftenDoYouReadOutsideSchool = factor(d2$HowOftenDoYouReadOutsideSchool,
ordered = T,
                                                          levels = c("I neve
r read outside of school", "I sometimes read outside of school", "I read quit
e often outside of school", "I read outside of school all the time"))

Model5 = glmer(connResponseCoding ~ condition*challengeNum + HowOftenDoYouRea
dOutsideSchool +
```

```
                (1 | participantID) +
                (1 | School) +
                (1 | questionNum),
              family = "poisson",
              data = d2[!is.na(d2$HowOftenDoYouReadOutsideSchool), ],
              control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model5)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## connResponseCoding ~ condition * challengeNum + HowOftenDoYouReadOutsideSc
hool +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d2[!is.na(d2$HowOftenDoYouReadOutsideSchool), ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  24133.3  24208.2 -12056.7  24113.3    13250
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.5103 -0.6520 -0.5316  0.3067  5.6580
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.040741 0.20184
##  questionNum   (Intercept) 0.132853 0.36449
##  School        (Intercept) 0.007252 0.08516
## Number of obs: 13260, groups:  participantID, 442; questionNum, 15; School
, 10
##
## Fixed effects:
##                                          Estimate Std. Error z value Pr(>|z
|)
## (Intercept)                             -1.137203   0.102968 -11.044  < 2e-
16
## conditionintervention                    0.031739   0.048835   0.650   0.51
57
## challengeNumCh2.                         0.214866   0.033614   6.392 1.63e-
10
## HowOftenDoYouReadOutsideSchool.L         0.037213   0.044357   0.839   0.40
15
## HowOftenDoYouReadOutsideSchool.Q         0.079974   0.038213   2.093   0.03
64
## HowOftenDoYouReadOutsideSchool.C         0.003782   0.030660   0.123   0.90
```

```
18
## conditionintervention:challengeNumCh2.  0.938985   0.053221  17.643  < 2e-
16
##
## (Intercept)                             ***
## conditionintervention
## challengeNumCh2.                        ***
## HowOftenDoYouReadOutsideSchool.L
## HowOftenDoYouReadOutsideSchool.Q        *
## HowOftenDoYouReadOutsideSchool.C
## conditionintervention:challengeNumCh2. ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. HODYROS.L HODYROS.Q HODYROS.C
## cndtnntrvnt -0.156
## chllngNmC2. -0.181  0.381
## HwOfDYROS.L  0.033 -0.023  0.000
## HwOfDYROS.Q  0.081  0.000  0.000  0.050
## HwOfDYROS.C -0.021 -0.063  0.000  0.287     0.233
## cndtnn:NC2.  0.114 -0.739 -0.632  0.000     0.000     0.000
```

```
Model1.1 = glmer(connResponseCoding ~ condition*challengeNum +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2[!is.na(d2$HowOftenDoYouReadOutsideSchool), ],
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

m1v5 = anova(Model1.1, Model5)
m1v5
```

```
## Data: d2[!is.na(d2$HowOftenDoYouReadOutsideSchool), ]
## Models:
## Model1.1: connResponseCoding ~ condition * challengeNum + (1 | participant
ID) + (1 | School) + (1 | questionNum)
## Model5: connResponseCoding ~ condition * challengeNum + HowOftenDoYouReadO
utsideSchool + (1 | participantID) + (1 | School) + (1 | questionNum)
##          npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model1.1    7 24132 24185 -12059    24118
## Model5     10 24133 24208 -12057    24113 5.1771  3     0.1593
```

```
#Task difficulty
d2$HowDidYouFindTask4 = factor(d2$HowDidYouFindTask4, ordered = T,
                                        levels = c("Really hard", "Fairly ha
rd", "Not sure", "Just right (a micture of easy and hard", "Fairly easy", "Ve
ry easy"))
```

```r
Model6 = glmer(connResponseCoding ~ condition*challengeNum + HowDidYouFindTas
k4 +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2[!is.na(d2$HowDidYouFindTask4), ],
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))

summary(Model6)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: connResponseCoding ~ condition * challengeNum + HowDidYouFindTask
4 +
##     (1 | participantID) + (1 | School) + (1 | questionNum)
##    Data: d2[!is.na(d2$HowDidYouFindTask4), ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  12551.7  12620.1  -6265.9  12531.7     6845
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4523 -0.6533 -0.5294  0.3084  5.1709
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.049457 0.2224
##  questionNum   (Intercept) 0.142162 0.3770
##  School        (Intercept) 0.005446 0.0738
## Number of obs: 6855, groups:  participantID, 347; questionNum, 15; School,
10
##
## Fixed effects:
##                                          Estimate Std. Error z value Pr(>|z
|)
## (Intercept)                             -1.161258   0.108435 -10.709  < 2e-
16
## conditionintervention                    0.005554   0.065840   0.084    0.9
33
## challengeNumCh2.                         0.238197   0.053028   4.492 7.06e-
06
## HowDidYouFindTask4.L                     0.039021   0.046689   0.836    0.4
03
```

```
## HowDidYouFindTask4.Q                    0.025401   0.054319   0.468    0.6
40
## HowDidYouFindTask4.C                   -0.061701   0.063218  -0.976    0.3
29
## conditionintervention:challengeNumCh2.  0.910088   0.078605  11.578  < 2e-
16
##
## (Intercept)                            ***
## conditionintervention
## challengeNumCh2.                       ***
## HowDidYouFindTask4.L
## HowDidYouFindTask4.Q
## HowDidYouFindTask4.C
## conditionintervention:challengeNumCh2. ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. HDYFT4.L HDYFT4.Q HDYFT4.C
## cndtnntrvnt -0.201
## chllngNmC2. -0.185  0.349
## HwDdYFnT4.L -0.022  0.011 -0.179
## HwDdYFnT4.Q -0.080  0.001 -0.064 -0.430
## HwDdYFnT4.C -0.039  0.001 -0.218 -0.174    0.218
## cndtnn:NC2.  0.136 -0.736 -0.615  0.049    0.028   -0.012
```

```
Model1.2 = glmer(connResponseCoding ~ condition*challengeNum +
                   (1 | participantID) +
                   (1 | School) +
                   (1 | questionNum),
                 family = "poisson",
                 data = d2[!is.na(d2$HowDidYouFindTask4), ],
                 control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun
=1e4)))

summary(Model1.2)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: connResponseCoding ~ condition * challengeNum + (1 | participantI
D) +
##     (1 | School) + (1 | questionNum)
##    Data: d2[!is.na(d2$HowDidYouFindTask4), ]
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  12548.3  12596.1  -6267.1  12534.3     6848
##
```

```
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4518 -0.6535 -0.5299  0.3061  5.2052
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.048798 0.22090
##  questionNum   (Intercept) 0.142208 0.37710
##  School        (Intercept) 0.005895 0.07678
## Number of obs: 6855, groups:  participantID, 347; questionNum, 15; School,
10
##
## Fixed effects:
##                                         Estimate Std. Error z value Pr(>|z
|)
## (Intercept)                            -1.153180   0.108068 -10.671  < 2e-
16
## conditionintervention                   0.004748   0.065763   0.072    0.9
42
## challengeNumCh2.                        0.241398   0.049989   4.829 1.37e-
06
## conditionintervention:challengeNumCh2.  0.902150   0.078343  11.515  < 2e-
16
##
## (Intercept)                            ***
## conditionintervention
## challengeNumCh2.                       ***
## conditionintervention:challengeNumCh2. ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2.
## cndtnntrvnt -0.201
## chllngNmC2. -0.224  0.374
## cndtnn:NC2.  0.143 -0.740 -0.638
```

```
m1v6 = anova(Model1.2, Model6)
m1v6
```

```
## Data: d2[!is.na(d2$HowDidYouFindTask4), ]
## Models:
## Model1.2: connResponseCoding ~ condition * challengeNum + (1 | participant
ID) + (1 | School) + (1 | questionNum)
## Model6: connResponseCoding ~ condition * challengeNum + HowDidYouFindTask4
+ (1 | participantID) + (1 | School) + (1 | questionNum)
##          npar   AIC   BIC  logLik deviance  Chisq Df Pr(>Chisq)
## Model1.2    7 12548 12596 -6267.1    12534
## Model6     10 12552 12620 -6265.9    12532 2.5476  3     0.4667
```

```r
#EnglishL1 Model
d2$EnglishL1 = factor(d2$EnglishL1)

Model7 = glmer(connResponseCoding ~ condition*challengeNum + EnglishL1 +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2)

summary(Model7)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: connResponseCoding ~ condition * challengeNum + EnglishL1 + (1 |
##     participantID) + (1 | School) + (1 | questionNum)
##    Data: d2
##
##      AIC      BIC   logLik deviance df.resid
##  24352.3  24419.8 -12167.1  24334.3    13371
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.5194 -0.6526 -0.5318  0.3023  5.6802
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.042616 0.20644
##  questionNum   (Intercept) 0.133331 0.36514
##  School        (Intercept) 0.008019 0.08955
## Number of obs: 13380, groups:  participantID, 446; questionNum, 15; School
, 10
##
## Fixed effects:
##                                      Estimate Std. Error z value Pr(>|z|
)
## (Intercept)                          -1.16686    0.10745 -10.860  < 2e-1
6 ***
## conditionintervention                 0.02749    0.04883   0.563    0.57
3
## challengeNumCh2.                      0.21849    0.03341   6.539 6.18e-1
1 ***
## EnglishL1N                            0.02821    0.07959   0.354    0.72
3
## EnglishL1Y                            0.00259    0.04146   0.062    0.95
0
## conditionintervention:challengeNumCh2.  0.93604    0.05305  17.646  < 2e-1
6 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cndtnn chNC2. EngL1N EngL1Y
## cndtnntrvnt -0.148
## chllngNmC2. -0.172  0.379
## EnglishL1N  -0.122 -0.025  0.000
## EnglishL1Y  -0.282 -0.015  0.000  0.312
## cndtnn:NC2.  0.109 -0.737 -0.630  0.000  0.000
```

```
m1v7 = anova(Model1, Model7)
m1v7
```

```
## Data: d2
## Models:
## Model1: connResponseCoding ~ condition * challengeNum + (1 | participantID
) + (1 | School) + (1 | questionNum)
## Model7: connResponseCoding ~ condition * challengeNum + EnglishL1 + (1 | p
articipantID) + (1 | School) + (1 | questionNum)
##        npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## Model1    7 24348 24401 -12167    24334
## Model7    9 24352 24420 -12167    24334 0.1268  2     0.9386
```

```
allAnovaTests = rbind(m1v2[2,], m1v3[2,], m1v4[2,], m1v5[2,], m1v6[2,], m1v7[
2,])
write.csv(allAnovaTests, "../results/allAnovaTests.csv")
```

```
#Etymology Model
```

```
EtymologyModel = glmer(connResponseCoding ~ condition*challengeNum + Year.gro
up + EnjoyEnglish + HowDifficultIsEnglish + HowOftenDoYouReadOutsideSchool +
HowDidYouFindTask4 + EnglishL1 +
                 (1 | participantID) +
                 (1 | School) +
                 (1 | questionNum),
               family = "poisson",
               data = d2,
               control=glmerControl(optimizer="bobyqa", optCtrl=list(maxfun=1
e4)))
summary(EtymologyModel)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: connResponseCoding ~ condition * challengeNum + Year.group +
##     EnjoyEnglish + HowDifficultIsEnglish + HowOftenDoYouReadOutsideSchool
+
##     HowDidYouFindTask4 + EnglishL1 + (1 | participantID) + (1 |
##     School) + (1 | questionNum)
```

```
##    Data: d2
## Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)
)
##
##      AIC      BIC   logLik deviance df.resid
##  12469.4  12646.8  -6208.7  12417.4     6769
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4481 -0.6543 -0.5304  0.3168  5.2062
##
## Random effects:
##  Groups        Name        Variance Std.Dev.
##  participantID (Intercept) 0.038245 0.19556
##  questionNum   (Intercept) 0.140086 0.37428
##  School        (Intercept) 0.006385 0.07991
## Number of obs: 6795, groups:  participantID, 344; questionNum, 15; School,
10
##
## Fixed effects:
##                                       Estimate Std. Error z value Pr(>|z
|)
## (Intercept)                          -0.134167   0.22119  -0.6066 1.31e-9
## conditionintervention                 0.0111038   0.027530  -0.110 0.921
## challengeNumCh2.                      0.209460   0.032980  6.351 2.14e-10


## Year.group6                           -0.095293   0.120632  -0.790 0.4295
61
## Year.group7                           -0.049954   0.090608  -0.551 0.5814
17
## Year.group8                           -0.083508   0.092776  -0.900 0.3680
65
## EnjoyEnglish.L                        -0.123800   0.192027  -0.645 0.5191
20
## EnjoyEnglish.Q                        -0.113997   0.150157  -0.759 0.4477
41
## EnjoyEnglish.C                         0.018265   0.093743   0.195 0.8455
16
## HowDifficultIsEnglish.L                0.012769   0.113833   0.112 0.9106
89
## HowDifficultIsEnglish.Q                0.149739   0.112459   1.331 0.1830
26
## HowDifficultIsEnglish.C               -0.005304   0.095781  -0.055 0.9558
36
## HowDifficultIsEnglish^4                0.012484   0.095659   0.131 0.8961
67
## HowDifficultIsEnglish^5               -0.177823   0.115561  -1.539 0.1765
## HowOftenDoYouReadOutsideSchool.L       0.086164   0.058883   1.463 0.1433
80
```

```
## HowOftenDoYouReadOutsideSchool.Q        0.182319   0.052819   3.452 0.5570
## HowOftenDoYouReadOutsideSchool.C        0.052401   0.040596   1.291 0.1967
81
## HowDidYouFindTask4.L                    0.035388   0.046054   0.768 0.4422
40
## HowDidYouFindTask4.Q                    0.013984   0.053641   0.261 0.7943
20
## HowDidYouFindTask4.C                   -0.038063   0.062964  -0.605 0.5454
99
## EnglishL1N                              0.035554   0.100277   0.355 0.7229
22
## EnglishL1Y                              0.047462   0.054749   0.867 0.3859
96
## conditionintervention:challengeNumCh2.  0.903102   0.078205  11.548  < 2e-
16
##
## (Intercept)                            ***
## conditionintervention
## challengeNumCh2.                       ***
## Year.group6
## Year.group7
## Year.group8
## EnjoyEnglish.L
## EnjoyEnglish.Q
## EnjoyEnglish.C
## HowDifficultIsEnglish.L
## HowDifficultIsEnglish.Q
## HowDifficultIsEnglish.C
## HowDifficultIsEnglish^4
## HowDifficultIsEnglish^5
## HowOftenDoYouReadOutsideSchool.L
## HowOftenDoYouReadOutsideSchool.Q
## HowOftenDoYouReadOutsideSchool.C
## HowDidYouFindTask4.L
## HowDidYouFindTask4.Q
## HowDidYouFindTask4.C
## EnglishL1N
## EnglishL1Y
## conditionintervention:challengeNumCh2. ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 23 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

Appendix VIIII: Challenge 1 (pre-intervention)

Vocabulary development programme

Challenge 1

Will you be a word detective?

PhD Tutor: Ellen Bristow, Cardiff University

Who committed the crime?

- Once again, the police need your help as a word detective to figure out another crime!
- This time, someone has broken into a house and stolen all the laptops, phones and TVs the family own! There are instructions before each task that tell you what you need to do to work out who committed the crime.
- There are a few different challenges and clues to solve. Complete each section and move on to the next.
- Don't worry if you're not sure of some of the answers. Just try your best!
- The answer is revealed at the end of the challenge.
- Take your time, think carefully and enjoy.
  Good luck, detective!

Word detectives: Task 1

→ Your first detective challenge is to help the Chief Inspector complete a statement about what is already known about the suspect. This statement will be read to a local news team who are reporting on what happened in the bank robbery.

→ You are going to help the Chief Inspector write their news report statement. You need to find the root word of each of these word families to complete the missing words in the statement.

→ Here's an example to show you what to do…

Task 1 example

The detectives are looking for the person who committed this crime. The team is going to have to _____ all of the clues they find very carefully!

What is the root of these words?

Reassessment **nonassessable**

Write your answer below

Task 1 example

The detectives are looking for the person who committed this crime. The team is going to have to assess all of the clues they find very carefully!

What is the root of these words?

Re**assess**ment non**assess**able

Write your answer below

Task 1, question 1

Find the missing word in each sentence by working out the root (base) word for each of these word families.

We are looking for the _____ who committed this robbery.

What is the root of these words?

Decriminalise re-criminalise non-criminality

Write your answer below

Task 1, question 2

This person tried to _____ when no one would be around so that they could steal a large amount of money without being noticed.

What is the root of these words?

unpredictive unpredictable unpredictably

Write your answer below

Task 1, question 3

We believe the person who robbed the bank was aiming to _____ with their friends to see who could take the most money.

What is the root of these words?

uncompetitive **noncompetition** **anticompetitive**

Write your answer below

Task 1, question 4

We believe the person who took the money might be younger than twenty-five years old and have dark brown hair. The victim cannot _____ why someone would want to upset them.

What is the root of these words?

incomprehension **miscomprehension** **incomprehensible**

Write your answer below

Task 1, question 5

We believe the criminal to be cold-hearted as they have shown no _____ for others in their actions.

What is the root of these words?

thoughtlessly **unthoughtful** **thoughtlessness**

Write your answer below

Task 1, question 6

We appeal to witnesses to step forward and _____ the police about anything they have seen.

What is the root of these words?

misinformative **noninformative** **uninformitive**

Write your answer below

Task 1, question 7

We need the public to be on the alert to help us catch this bank robber and encourage anyone who knows something to _____ to come forward with their evidence!

What is the root of these words?

indecisive **undecisive** **indecision**

Write your answer below

When you're ready, get started! Good luck detective!

Task 1 clue answers

We are looking for the __criminal__ who committed this robbery.

This person tried to __predict__ when no one would be around so that they could steal a large amount of money without being noticed.

We believe the person who robbed the bank was aiming to __compete__ with their friends to see who could take the most money.

We believe the person who took the money might be younger than twenty-five years old and have dark brown hair. The victim cannot __comprehend__ why someone would want to upset them.

We believe the criminal to be cold-hearted as they have shown no __thought__ for others in their actions

We appeal to witnesses to step forward and __inform__ the police about anything they have seen.

We need the public to be on the alert to help us catch this bank robber and encourage anyone who knows something to __decide__ to come forward with their evidence!

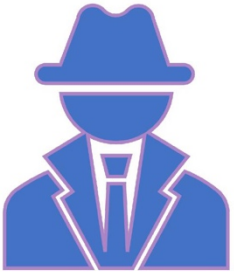
Word detectives: Task 2

Since the Chief Inspector's news report went live, members of the public have been phoning the police hotline with descriptions of the suspect.

The police have had so many calls and had to write descriptions of the suspect's actions down so quickly, they have mixed up the information they have been given! Here's what you need to do to help the police...

→ Look at the list of words the police have written and turn them into their opposite meanings by **changing the word's prefix.**

→ You will need to identify the root word and change the prefixes by adding them or taking them away. This will tell you what the suspect is really like.

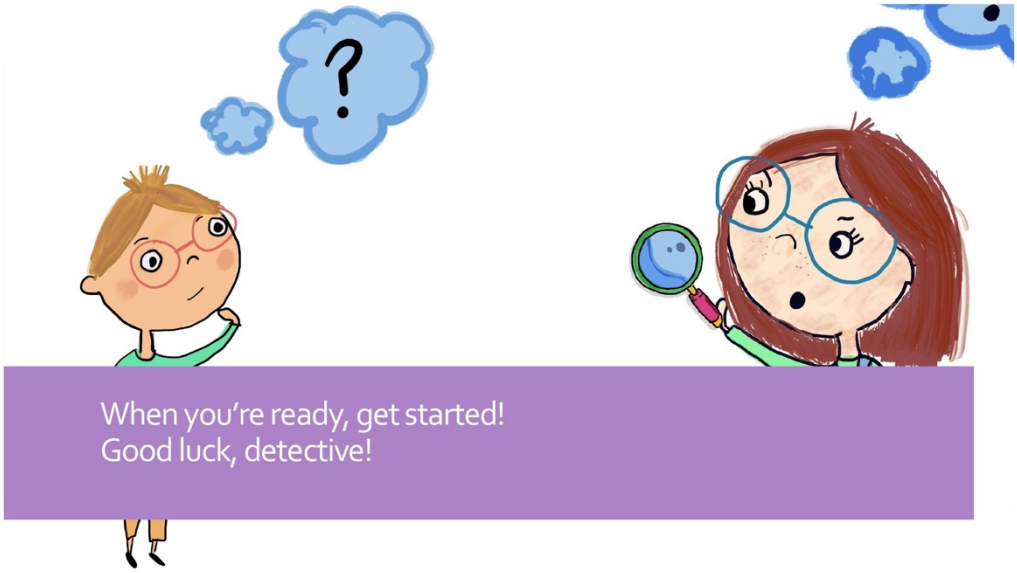


Task 2 example

Change the prefix to show the opposite of the word you have been given.

Thoughtful → **Un**thoughtful

Write your answer below



When you're ready, get started!
Good luck, detective!

Task 2, question 1

What is the opposite of the word below? Remember, you need to think about the prefix!

Disorganised	→	

Write your answer below

Task 2, question 2

What is the opposite of the word below? Remember, you need to think about the prefix!

Uncommitted → ____

Write your answer below

Task 2, question 3

What is the opposite of the word below? Remember, you need to think about the prefix!

Respectful → ____

Write your answer below

Task 2, question 4

What is the opposite of the word below? Remember, you need to think about the prefix!

Dependent →

Write your answer below

Task 2, question 5

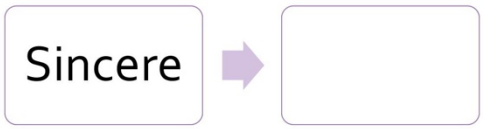
What is the opposite of the word below? Remember, you need to think about the prefix!

Unenvious →

Write your answer below

Task 2, question 6

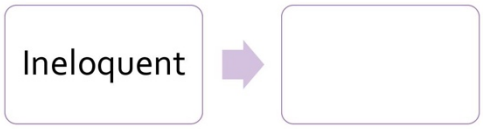
What is the opposite of the word below? Remember, you need to think about the prefix!



Write your answer below

Task 2, question 7

What is the opposite of the word below? Remember, you need to think about the prefix!



Write your answer below

Task 2, question 8

What is the opposite of the word below? Remember, you need to think about the prefix!

Practical	➡	

Write your answer below

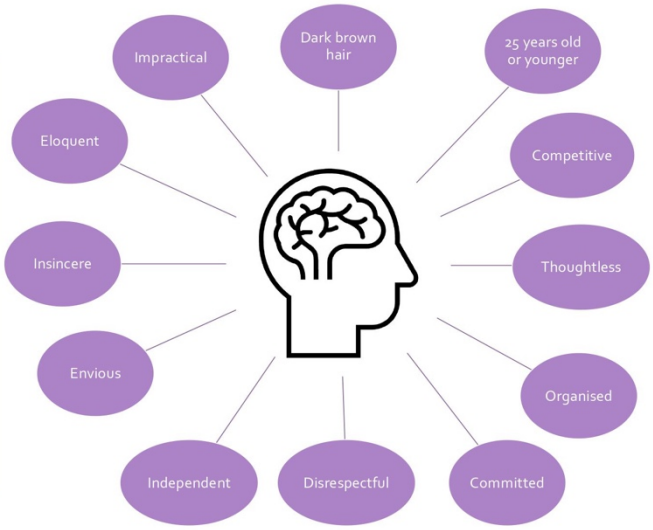
Task 2 clue answers (1)

Disorganised	➡	**Organised**
Uncommitted	➡	**Committed**
Respectful	➡	**Disrespectful**
Dependent	➡	**Independent**

Task 2 clue answers (2)

Unenvious	**Envious**
Sincere	**Insincere**
Ineloquent	**Eloquent**
Practical	**Impractical**

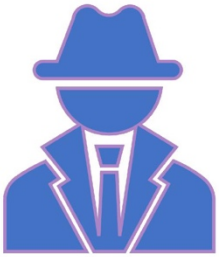
What is the suspect looking like now?



Word detectives: Task 3

→ We have now thought about the type of person who may have committed the crime. However, the Chief Inspector has uncovered some more clues! He's left the list of clues for you to figure out. They will help you to create a profile of what this person is like.

→ Your job is to figure out what the missing word is in each sequence. Think carefully about the suffixes you may need to use to uncover the next set of clues.



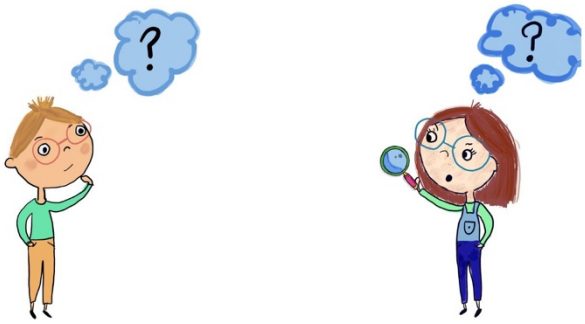
Task 3 example

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

select	select**able**
detest	**detestable**

Write the missing word below

Detestable



When you're ready, get started!
Good luck detective!

Task 3, question 1

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

punish	→	punishment	
astonish	→		

Write the missing word below

Task 3, question 2

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

decide	→	decisive	
elude	→		

Write the missing word below

Task 3, question 3

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

comfort	comfortable
predict	

Write the missing word below

Task 3, question 4

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

connect	connective
destruct	

Write the missing word below

Task 3, question 5

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

geology	geologist
science	

Write the missing word below

Task 3, question 6

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

magic	magician
music	

Write the missing word below

Task 3, question 7

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

sensible	sensibly
horrible	

Write the missing word below

Task 3, question 8

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

decide	decision
explode	

Write the missing word below

Task 3, question 9

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

possible	possibility
flexible	

Write the missing word below

Task 3, question 10

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

dull	dullness
hard	

Write the missing word below

Task 3, question 11

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

care	→	careless	
heart	→		

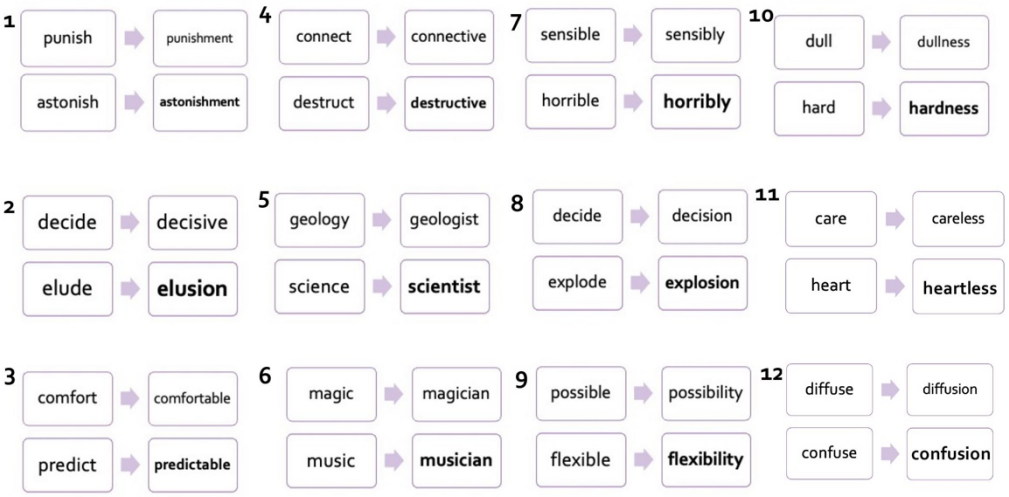
Write the missing word below

Task 3, question 12

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

diffuse	→	diffusion	
confuse	→		

Write the missing word below



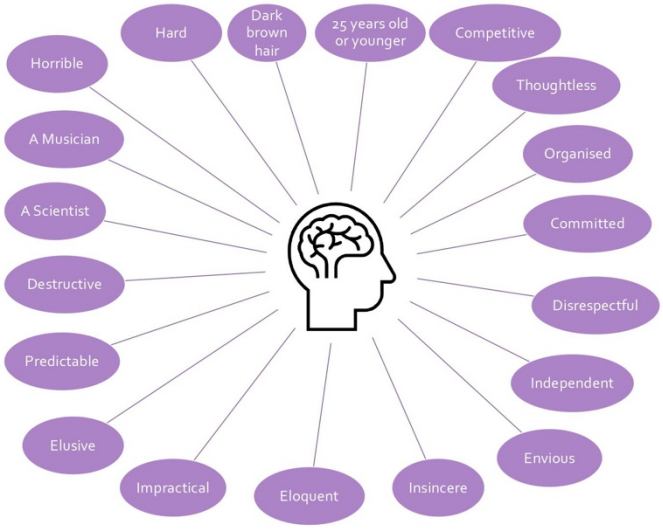
Well done for completing the tasks so far!

Your work in these tasks has helped the police uncover a note left by the bank robber. Have a read to find out more...

I am writing this note to explain why I have committed this crime. I have a big music concert coming up soon which I need money for. I have kept it a secret from my friends and family because they don't think I'll ever become a famous guitarist. They don't think the music I like is any good, but I want to show them they are WRONG! I will be the best, most famous musician in the world. I will use the money to prove myself. Just you watch.

You will never catch me, and you will never know who I am.

Let's recap what we already know about the suspect…



Word detectives: Task 4

Your next task is to work with the forensic linguistics team to try and work out the meaning of some word lists that the criminal left behind.

For each question, you will be given a Latin or Ancient Greek word part. You will also be given a list of words that contain the word part. Your job is to try and figure out how the meanings of the words in the list are all connected.

Task 4 example

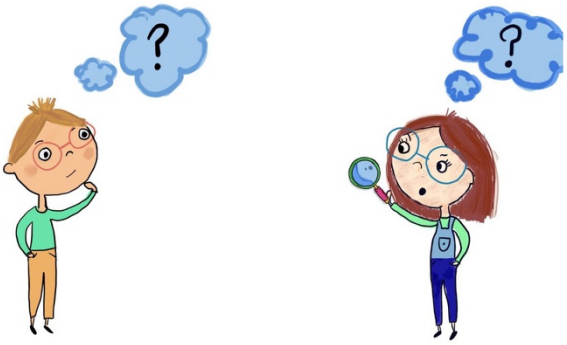
The words below all contain the word part ***bio.***

Biology
Autobiography
Bioscience
Biodiversity
Antibiotics

The word part bio means 'life' so I think all of these words are to do with life or living things.

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *bio.*

Write your answer below.



When you're ready, get started!
Good luck detective!

Task 4, question 1

The words below all contain the word part ***ambi.***

Ambiguous
Ambivalent
Ambidextrous

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *ambi.*

Write your answer below.

Task 4, question 2

The words below all contain the word part ***dict.***

Dictator
Contradict
Prediction
Verdict
Dictionary

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *dict.*

Write your answer below.

Task 4, question 3

The words below all contain the word part ***spect.***

Inspection
Retrospect
Spectacles
Spectator
Respect

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *spect.*

Write your answer below.

Task 4, question 4

The words below all contain the word part ***port.***

Transport
Exportation
Import
Portability
Deportation

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *port.*

Write your answer below.

Task 4, question 5

The words below all contain the word part ***struct.***

Construction
Destruct
Structure
Reconstruct
Infrastructure

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *struct.*

Write your answer below.

Task 4, question 6

The words below all contain the word part ***rupt.***

Erupt
Disruption
Corrupt
Interrupt
Bankrupt

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *rupt.*

Write your answer below.

Task 4, question 7

The words below all contain the word part ***scrib.***

Describe
Inscribe
Scribble
Subscribe
Prescribe

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *scrib.*

Write your answer below.

Task 4, question 8

The words below all contain the word part ***sens.***

Sensible
Sensitive
Sensual
Sensation
Sensory

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *sens.*

Write your answer below.

Task 4, question 9

The words below all contain the word part ***vis.***

Visual
Invisible
Revise
Advisable
Visibility

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *vis.*

Write your answer below.

Task 4, question 10

The words below all contain the word part ***voc.***

Vocal
Vocabulary
Vocative
Advocate
Vocalise

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *voc.*

Write your answer below.

Task 4, question 11

The words below all contain the word part ***chron.***

Chronology
Chronological
Synchronisation
Chronicle
Asynchronous

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *chron.*

Write your answer below.

Task 4, question 12

The words below all contain the word part ***dyna.***

Dynamics
Dynamite
Dynasty
Aerodynamics

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *dyna.*

Write your answer below.

Task 4, question 13

The words below all contain the word part ***gram.***

Telegram
Grammar
Diagram
Programme
Gramophone

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *gram.*

Write your answer below.

Task 4, question 14

The words below all contain the word part ***scope.***

Microscope
Telescope
Stethoscope
Periscope
Kaleidoscope

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *scope.*

Write your answer below.

Task 4, question 15

The words below all contain the word part ***tele.***

Television
Telecommunication
Telegraph
Telephone
Telepathic

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *tele..*

Write your answer below.

Well done for completing this task! The team of forensic linguists have received your definitions and will use them to match up some clues.

Word detectives: Task 5

Your final task is to work out the meaning of a final list of words that contain the final clues about who the criminal is.

This task is multiple choice, so your job is to select the definition you think matches the word you have been given.

Task 5, question 1

What is the meaning of the word **prospective?**

- ◯ Looking backwards at the past
- ◯ Leading someone somewhere
- ◯ Looking forward to the future
- ◯ Not sure

Task 5, question 2

What is the meaning of the word **unbeneficial?**

- ◯ Something that is not good for someone or something
- ◯ Something not important
- ◯ Something that is good for someone or something
- ◯ Not sure

Task 5, question 3

What is the meaning of the word **inaudible?**

- ◯ Something that does not smell nice
- ◯ Something that cannot be heard
- ◯ Something that can be heard
- ◯ Not sure

Task 5, question 4

What is the meaning of the word **rejection?**

- ◯ To throw away or give something back to someone
- ◯ To throw something forward to someone
- ◯ To break something apart
- ◯ Not sure

Task 5, question 5

What is the meaning of the word **abduction?**

- ◯ To take or lead something or someone away from somewhere
- ◯ To call for someone
- ◯ To look at something or someone far away
- ◯ Not sure

Task 5, question 6

What is the meaning of the word **nonsensical?**

- ◯ Something that looks far away
- ◯ Something that does have meaning
- ◯ Something that does not mean anything
- ◯ Not sure

Watch the final video to see who the police caught as the criminal. Well done for all your hard work, detective!

CRIMINAL PROFILE

- 25 year-old male
- Dark brown hair
- Ex-Scientist
- Musician

MOTIVES FOR COMMITTING THE CRIME

1)Competing with friends to see who could steal the most money from the bank.

2) Wanted money to achieve his ambition of become a famous guitarist.

BIGGEST FLAW IN THE CRIME

The criminal left a note to explain his motives to the Police. The word detectives decoded the note which ensured the Police could catch the right person.

CHARACTERISTICS

- Competitive
- Thoughtless
- Organised
- Committed
- Disrespectful
- Independent
- Envious
- Insincere
- Eloquent
- Impractical
- Elusive
- Predictable
- Destructive
- Horrible
- Hard

Appendix X: Challenge 2 (post-intervention)

Vocabulary development programme

Challenge 2

Will you be a word detective?

PhD Tutor: Ellen Bristow, Cardiff University

Who committed the crime?

- Once again, the police need your help as a word detective to figure out another crime!
- This time, someone has broken into a house and stolen all the laptops, phones and TVs the family own! There are instructions before each task that tell you what you need to do to work out who committed the crime.
- There are a few different challenges and clues to solve. Complete each section and move on to the next.
- Don't worry if you're not sure of some of the answers. Just try your best!
- The answer is revealed at the end of the challenge.
- Take your time, think carefully and enjoy.
  Good luck, detective!

Word detectives: Task 1

→ Your first detective challenge is to help the Chief Inspector complete a statement about what is already known about the suspect. This statement will be read to a local news team who are reporting on what happened in the bank robbery.

→ You are going to help the Chief Inspector write their news report statement. You need to find the root word of each of these word families to complete the missing words in the statement.

→ Here's an example to show you what to do…

Task 1 example

The detectives are looking for the person who committed this crime. The team is going to have to _____ all of the clues they find very carefully!

What is the root of these words?

Reassessment **nonassessable**

Write your answer below

Task 1 example

The detectives are looking for the person who committed this crime. The team is going to have to assess all of the clues they find very carefully!

What is the root of these words?

Re**assess**ment non**assess**able

Write your answer below

Task 1, question 1

Find the missing word in each sentence by working out the root (base) word for each of these word families.

The person who has committed this crime has worked to _____ against the law.

What is the root of these words?

reactive **interactive** **inactive**

Write your answer below

Task 1, question 2

The items they have taken are not theirs to _____.

What is the root of these words?

repossession **dispossession** **prepossession**

Write your answer below

Task 1, question 3

We believe the criminal can _____very carefully on planning detailed crimes. They may strike again.

What is the root of these words?

overconcentration **reconcentration** **preconcentration**

Write your answer below

Task 1, question 4

Their actions suggest that they may be looking to _____ their criminal operation. They were clever in their planning. We believe the person who took the items might be about forty-five to fifty years old and have light, blonde hair.

What is the root of these words?

inconclusive **unconclusive** **non-conclusion**

Write your answer below

Task 1, question 5

The criminal has made the family very _____ about what might happen to their important items.

What is the root of these words?

intensely intensity intenseness

Write your answer below

Task 1, question 6

We urge anyone with information to _____ about what has happened and listen to this message so that we can catch the person behind these awful acts!

What is the root of these words?

uncareful uncareless carefully

Write your answer below

Task 1, question 7

We want to prevent future crimes and _____ those that have already been committed!

What is the root of these words?

undetectable **indetectable** **non-detective**

Write your answer below

When you're ready, get started!
Good luck detective!

Task 1 clue answers

The person who has committed this crime has worked to __act__ against the law.

The items they have taken are not theirs to ____possess____.

We believe the criminal can _concentrate_very carefully on planning detailed crimes. They may strike again.

Their actions suggest that they may be looking to _conclude their criminal operation. They were clever in their planning. We believe the person who took the items might be about forty-five to fifty years old and have light, blonde hair.

The criminal has made the family very _tense_ about what might happen to their important items.

We urge anyone with information to ___care_ about what has happened and listen to this message so that we can catch the person behind these awful acts!

We want to prevent future crimes and _detect___ those that have already been committed!

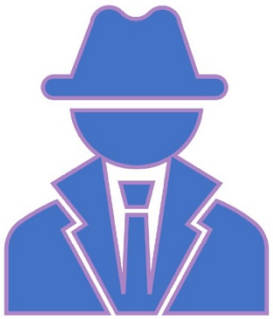
Word detectives: Task 2

Since the Chief Inspector's news report went live, members of the public have been phoning the police hotline with descriptions of the suspect.

The police have had so many calls and had to write descriptions of the suspect's actions down so quickly, they have mixed up the information they have been given! Here's what you need to do to help the police...

→ Look at the list of words the police have written and turn them into their opposite meanings by **changing the word's prefix.**

→ You will need to identify the root word and change the prefixes by adding them or taking them away. This will tell you what the suspect is really like.

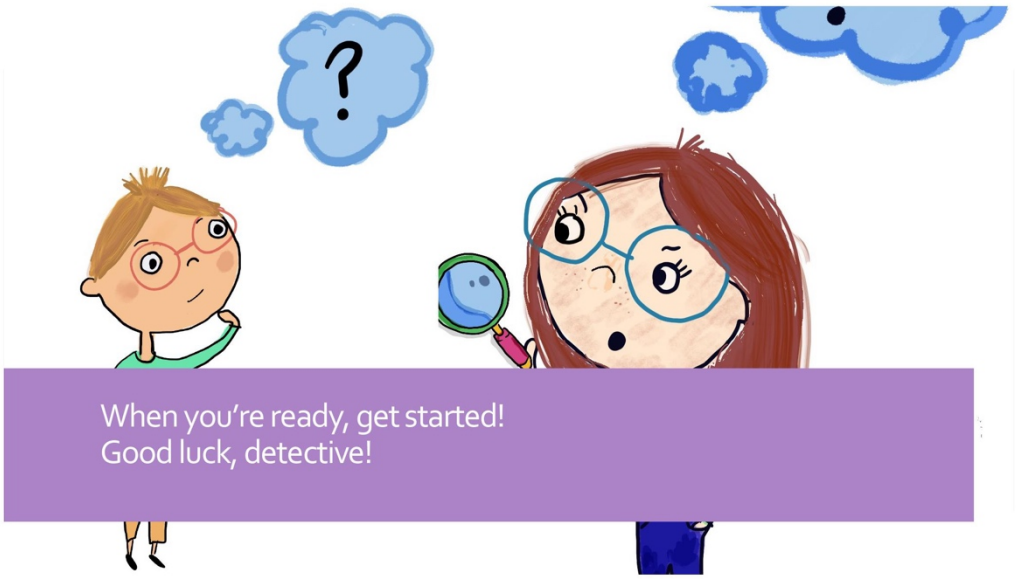


Task 2 example

Change the prefix to show the opposite of the word you have been given.

Thoughtful → **Un**thoughtful

Write your answer below



Task 2, question 1

What is the opposite of the word below? Remember, you need to think about the prefix!

Graceful →

Write your answer below

Task 2, question 2

What is the opposite of the word below? Remember, you need to think about the prefix!

Incompetent →

Write your answer below

Task 2, question 3

What is the opposite of the word below? Remember, you need to think about the prefix!

Helpful →

Write your answer below

Task 2, question 4

What is the opposite of the word below? Remember, you need to think about the prefix!

Unpersuasive →

Write your answer below

Task 2, question 5

What is the opposite of the word below? Remember, you need to think about the prefix!

Tolerant →

Write your answer below

Task 2, question 6

What is the opposite of the word below? Remember, you need to think about the prefix!

Undaring →

Write your answer below

Task 2, question 7

What is the opposite of the word below? Remember, you need to think about the prefix!

Indecisive →

Write your answer below

Task 2, question 8

What is the opposite of the word below? Remember, you need to think about the prefix!

Polite	➡	

Write your answer below

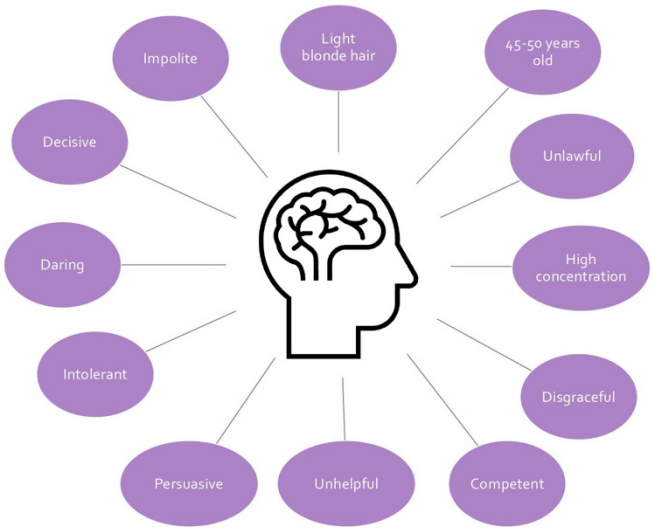
Task 2 clue answers (1)

Graceful	➡	**Disgraceful**
Incompetent	➡	**Competent**
Helpful	➡	**Unhelpful**
Unpersuasive	➡	**Persuasive**

Task 2 clue answers (2)

Tolerant	**Intolerant**
Undaring	**Daring**
Indecisive	**Decisive**
Polite	**Impolite**

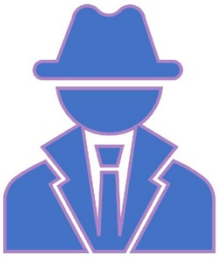
What is the suspect looking like now?



Word detectives: Task 3

→ We have now thought about the type of person who may have committed the crime. However, the Chief Inspector has uncovered some more clues! He's left the list of clues for you to figure out. They will help you to create a profile of what this person is like.

→ Your job is to figure out what the missing word is in each sequence. Think carefully about the suffixes you may need to use to uncover the next set of clues.



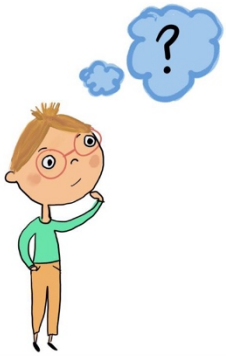
Task 3 example

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

select	select**able**
detest	**detestable**

Write the missing word below

Detestable



When you're ready, get started!
Good luck detective!

Task 3, question 1

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

insist	insistent
consist	

Write the missing word below

Task 3, question 2

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

supervise	supervision
revise	

Write the missing word below

Task 3, question 3

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

accept	acceptable
adapt	

Write the missing word below

Task 3, question 4

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

protect	protective
product	

Write the missing word below

Task 3, question 5

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

psychology	psychologist
biology	biologist

Write the missing word below

Task 3, question 6

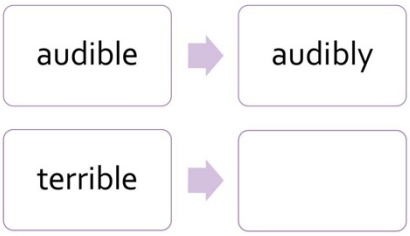
Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

magic	magician
statistic	

Write the missing word below

Task 3, question 7

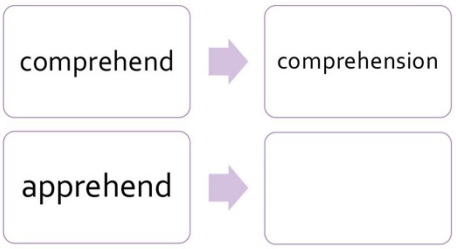
Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.



Write the missing word below

Task 3, question 8

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.



Write the missing word below

Task 3, question 9

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

possible	possibility
responsible	

Write the missing word below

Task 3, question 10

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

slow	slowness
dark	

Write the missing word below

Task 3, question 11

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

doubt	doubtless
fear	

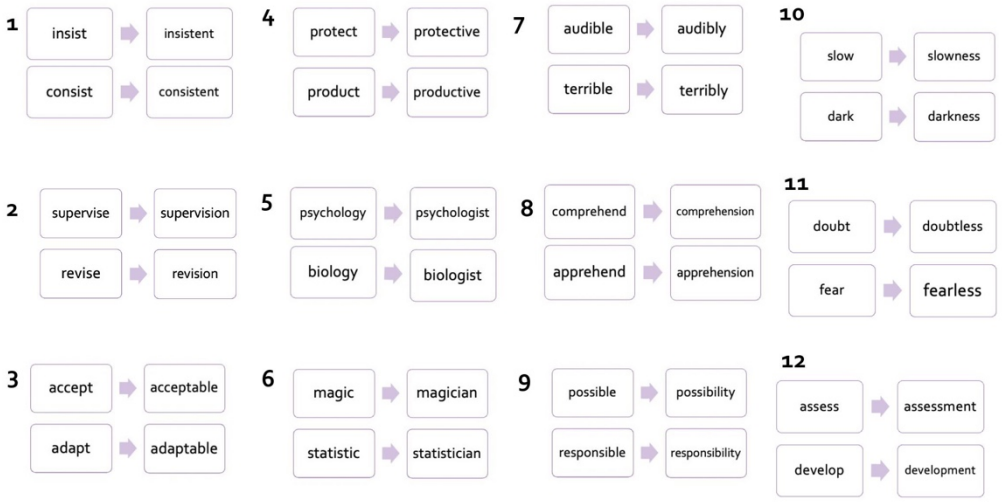
Write the missing word below

Task 3, question 12

Use the example to help you figure out the word pattern and the missing word. Think carefully about the suffix.

assess	assessment
develop	

Write the missing word below



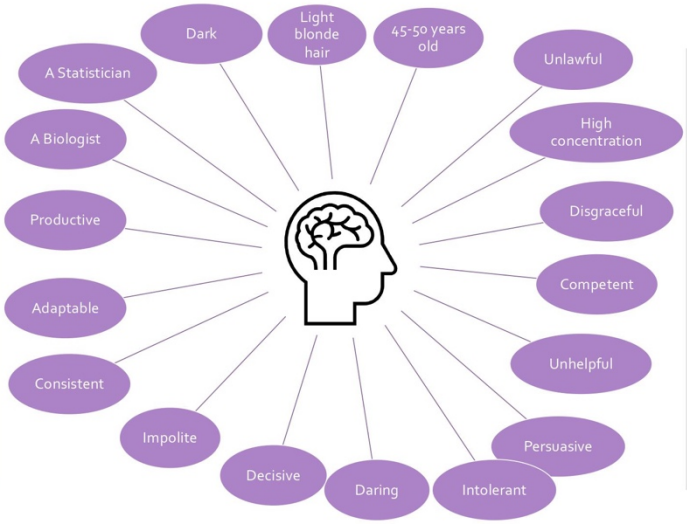
Well done for completing the tasks so far!

Your work in these tasks has helped the police uncover a note left by the bank robber. Have a read to find out more...

I am writing you this letter to explain why I have committed this crime. You see, recently, my own house was broken into, and all my beautiful belongings were stolen! So, I decided to steal back what was taken from me as ***revenge***. The police did not help recover my items. Therefore, I took matters into my own hands. Those items were important to my family. As a Biologist and Statistician, I have learnt how to use experiments to hide away clues. I can conceal my fingerprints which means you will never catch me! I acted to make the terrible situation fair again.

You will **never** find out who I am.

Let's recap what we already know about the suspect…



Word detectives: Task 4

Your next task is to work with the forensic linguistics team to try and work out the meaning of some word lists that the criminal left behind.

For each question, you will be given a Latin or Ancient Greek word part. You will also be given a list of words that contain the word part. Your job is to try and figure out how the meanings of the words in the list are all connected.

Task 4 example

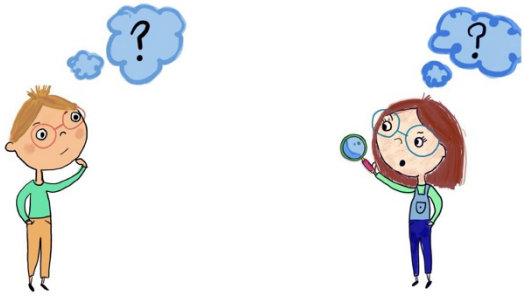
The words below all contain the word part ***bio.***

Biology
Autobiography
Bioscience
Biodiversity
Antibiotics

The word part bio means 'life' so I think all of these words are to do with life or living things.

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *bio.*

Write your answer below.



When you're ready, get started!
Good luck detective!

Task 4, question 1

The words below all contain the word part ***ambi.***

Ambiguous
Ambivalent
Ambidextrous

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *ambi.*

Write your answer below.

Task 4, question 2

The words below all contain the word part ***dict.***

Dictator
Contradict
Prediction
Verdict
Dictionary

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *dict.*

Write your answer below.

Task 4, question 3

The words below all contain the word part ***spect.***

Inspection
Retrospect
Spectacles
Spectator
Respect

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *spect.*

Write your answer below.

Task 4, question 4

The words below all contain the word part ***port.***

Transport
Exportation
Import
Portability
Deportation

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *port.*

Write your answer below.

Task 4, question 5

The words below all contain the word part ***struct.***

Construction
Destruct
Structure
Reconstruct
Infrastructure

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *struct.*

Write your answer below.

Task 4, question 6

The words below all contain the word part ***rupt.***

Erupt
Disruption
Corrupt
Interrupt
Bankrupt

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *rupt.*

Write your answer below.

Task 4, question 7

The words below all contain the word part ***scrib.***

Describe
Inscribe
Scribble
Subscribe
Prescribe

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *scrib.*

Write your answer below.

Task 4, question 8

The words below all contain the word part ***sens.***

Sensible
Sensitive
Sensual
Sensation
Sensory

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *sens.*

Write your answer below.

Task 4, question 9

The words below all contain the word part ***vis.***

Visual
Invisible
Revise
Advisable
Visibility

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *vis.*

Write your answer below.

Task 4, question 10

The words below all contain the word part ***voc.***

Vocal
Vocabulary
Vocative
Advocate
Vocalise

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *voc.*

Write your answer below.

Task 4, question 11

The words below all contain the word part ***chron.***

Chronology
Chronological
Synchronisation
Chronicle
Asynchronous

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *chron.*

Write your answer below.

Task 4, question 12

The words below all contain the word part ***dyna.***

Dynamics
Dynamite
Dynasty
Aerodynamics

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *dyna.*

Write your answer below.

Task 4, question 13

The words below all contain the word part ***gram.***

Telegram
Grammar
Diagram
Programme
Gramophone

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *gram.*

Write your answer below.

Task 4, question 14

The words below all contain the word part ***scope.***

Microscope
Telescope
Stethoscope
Periscope
Kaleidoscope

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *scope.*

Write your answer below.

Task 4, question 15

The words below all contain the word part ***tele.***

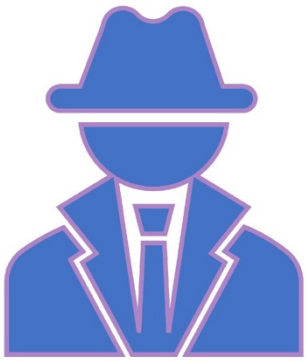
Television
Telecommunication
Telegraph
Telephone
Telepathic

What is the connection between the meanings of these words? Think carefully about the meaning of the word part *tele..*

Write your answer below.

Well done for completing this task! The team of forensic linguists have received your definitions and will use them to match up some clues.

Word detectives: Task 5



Your final task is to work out the meaning of a final list of words that contain the final clues about who the criminal is.

This task is multiple choice, so your job is to select the definition you think matches the word you have been given.

Task 5, question 1

What is the meaning of the word **prospective?**

- ◯ Looking backwards at the past
- ◯ Leading someone somewhere
- ◯ Looking forward to the future
- ◯ Not sure

Task 5, question 2

What is the meaning of the word **unbeneficial?**

- ◯ Something that is not good for someone or something
- ◯ Something not important
- ◯ Something that is good for someone or something
- ◯ Not sure

Task 5, question 3

What is the meaning of the word **inaudible?**

- ◯ Something that does not smell nice
- ◯ Something that cannot be heard
- ◯ Something that can be heard
- ◯ Not sure

Task 5, question 4

What is the meaning of the word **rejection?**

- ◯ To throw away or give something back to someone
- ◯ To throw something forward to someone
- ◯ To break something apart
- ◯ Not sure

Task 5, question 5

What is the meaning of the word **abduction?**

- ◯ To take or lead something or someone away from somewhere
- ◯ To call for someone
- ◯ To look at something or someone far away
- ◯ Not sure

Task 5, question 6

What is the meaning of the word **nonsensical?**

- ◯ Something that looks far away
- ◯ Something that does have meaning
- ◯ Something that does not mean anything
- ◯ Not sure

Watch the final video to see who the police caught as the criminal. Well done for all your hard work, detective!

CRIMINAL PROFILE

- 45 – 50-year-old female
- Light, blonde hair
- Biologist
- Statistician

MOTIVES FOR COMMITTING THE CRIME

1)This criminal was trying to get revenge for having her family's own items stolen. She believed the Police were not acting quickly enough in solving the crime. Therefore, she took matters into her own hands.

2) She used her training as a biologist to hide the clues

BIGGEST FLAW IN THE CRIME

The criminal left a note to explain her motives to the Police. As you detected, this made her actions predictable and ensured the Police could catch her!

CHARACTERISTICS

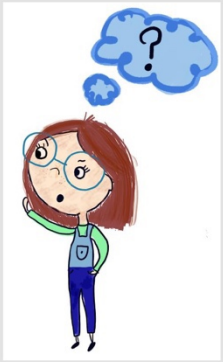
- Unlawful
- High concentration levels
- Disgraceful
- Competent
- Unhelpful
- Persuasive
- Intolerant
- Daring
- Decisive
- Impolite
- Consistent
- Adaptable
- Productive
- Apprehensive
- Dark

Appendix XI: Tutorial 1

Vocabulary skills development programme

Tutorial 1:
So, what is the English language and where does it come from?

PhD Tutor: Ellen Bristow, Cardiff University



What is your name? (Please provide your first and last name) *

Your answer

This is a required question

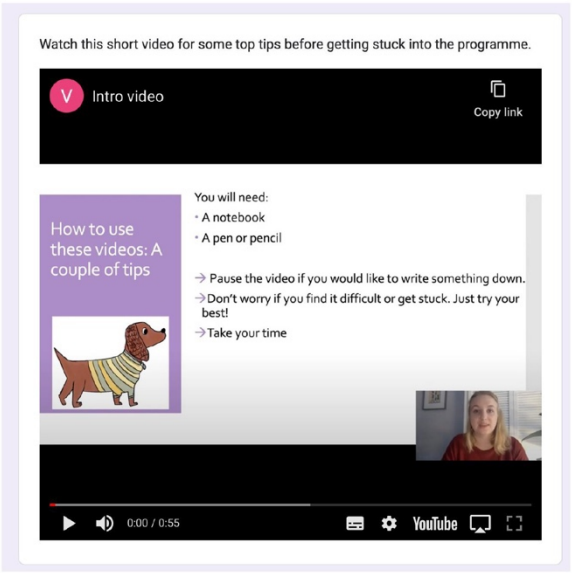
Which school do you go to? *

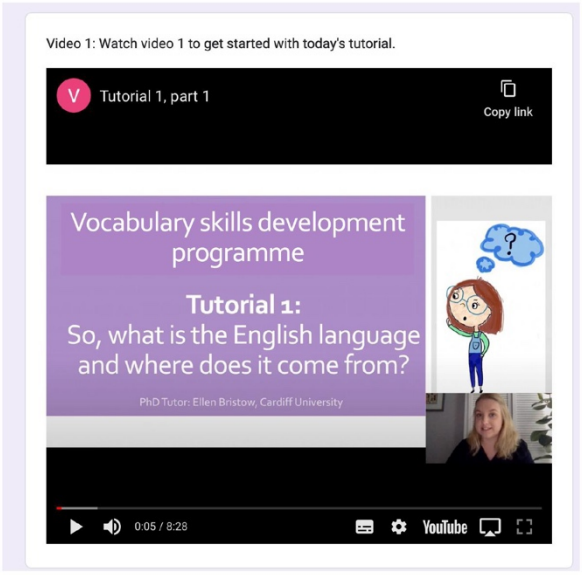
Your answer

This is a required question

Which year group are you in? *

- Year 5
- Year 6
- Year 7
- Year 8
- Other


Watch this short video for some top tips before getting stuck into the programme.
Intro video
Copy link
How to use these videos: A couple of tips
You will need:
• A notebook
• A pen or pencil
→ Pause the video if you would like to write something down.
→ Don't worry if you find it difficult or get stuck. Just try your best!
→ Take your time
0:00 / 0:55
YouTube


Video 1: Watch video 1 to get started with today's tutorial.
Tutorial 1, part 1
Copy link
Vocabulary skills development programme
Tutorial 1:
So, what is the English language and where does it come from?
PhD Tutor: Ellen Bristow, Cardiff University
0:05 / 8:28
YouTube

Video 1 content

What is the purpose of tutorial 1?

→To gain some understanding of how the English language developed

→To identify some of the changes that have happened in the English language over time

→To understand that our modern English vocabulary is made up of lots of different languages

- **Key questions:**
- What languages is Modern English related to?
- How can we look at the origins of words?
- Why is understanding the history of English important today?

A brief history of the English language

600 B.C. CELTS
The first languages that we know about and have evidence for in Britain are the Celtic ones, such as Welsh, Scottish Gaelic, Old Irish and Cornish.

450 A.D. ANGLO-SAXONS
The Anglo-Saxons invaded Britain and spoke various Germanic dialects that would later on become known as Old English. Many of the words we use in modern English continue to be used from the Germanic-based Old English language these invaders used. We get many of our monosyllabic (one-syllable words) from Old English, including: *rag, deer, rug, house, keep, ship* and *scrap.*

1066 A.D. THE NORMANS
Normans, a people from France, invaded England and introduced an early version of French. French spread across Britain causing the English language to expand again. French also continued influencing English much after the Norman Conquest. We still use many of these borrowed words in our language today, including: *battle, attorney, commerce, maintain, cattle, acquire, palace, retrieve* and *conquer.*

1476 – 1750 A.D. EARLY MODERN ENGLISH
During the Early Modern English period, the influence of Latin and Greek became particularly prominent. With the introduction of the printing press in 1476, an interest in developing a 'standardized' English came. Translations of the bible into English and the writings of Shakespeare also greatly shaped the language of this period. Words from Latin and Greek continued to make their way into English, giving us words such as: *science, knowledge, accessible* and *disgraceful.*

600 B.C. | 55 B.C. | 450 A.D. | 800 A.D. | 1066 A.D. | 1150-1500 A.D. | 1476 – 1750 A.D. | 1750 - today

55 B.C. ROMANS
The Romans invaded Britain and introduced the Latin language. It was primarily spoken by the upper and ruling classes. However, most of the Latin words used in English today come from the Early Modern English period onwards, rather than from this Roman invasion.

800 A.D. THE VIKINGS
The Vikings came from Scandinavia (e.g. Denmark, and Norway). They invaded Britain and brought with them a language called Old Norse. As the Anglo-Saxons and Vikings lived with one another, their two languages (Old English and Old Norse) combined and the English language developed. They gave us words such as: *window, egg, happy, ill, low* and *loose.*

1150-1500 A.D. MIDDLE ENGLISH
Although French became an important language in Britain, English never stopped being spoken. Trilingualism (the ability to speak three languages, in this period, English, French and Latin) was common, especially in the worlds of business and academic study. The use of multiple languages side-by-side meant that the number of words used in everyday English greatly expanded.

1750 – today MODERN ENGLISH
The English we speak today is influenced by all this history and, most recently, the British Empire. Britain colonialized (took over) new lands, such as the Americas, India and the Caribbean. Words which entered English this way include: *Banjo, coffee, zombie, yam* and *jumbo* (African); *bangle, bungalow, chutney, jungle, juggernaut* and *shampoo* (Indian).

Activity 1: History of English challenge

- It's time for a quiz!
- Using information from the timeline, answer the questions below
- Just try your best!

Task 1

Question 1

What language was used by the Romans?

Your answer

Question 2

When did the Anglo-Saxons invade Britain?

Your answer

Question 3

What type of English did the Anglo-Saxons speak?

Your answer

Question 4

List three words of Old English origin.

Your answer

Question 5

Which language did the Vikings introduce to Britain?

Your answer

Question 6

Where did the Normans come from and what language did they speak?

Your answer

Question 7

Which three languages did people from the Middle English period speak?

Your answer

Question 8

Explain why you think the English language has continued to grow and acquire (add) new vocabulary.

Your answer

Video 2 content

Quiz answers (1)

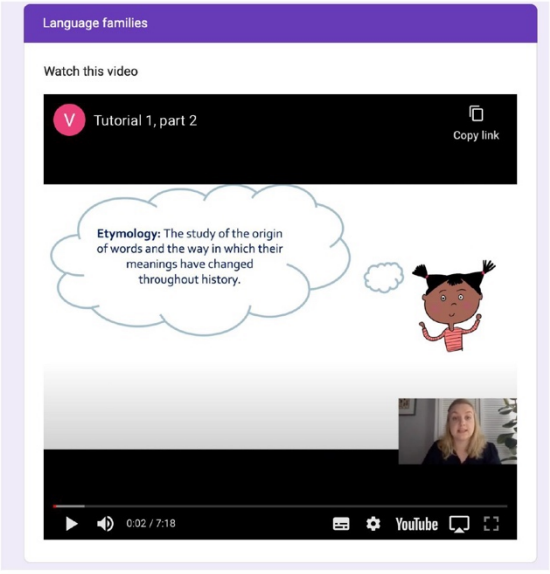
- What language was used by the Romans? **The Romans used the Latin language to communicate.**
- When did the Anglo-Saxons invade Britain? **The Anglo-Saxons invaded Britain around 450AD.**
- What type of English did the Anglo-Saxons speak? **The Anglo-Saxons spoke Germanic dialects which developed into Old English.**
- List three words of Old English origin. **Old English words you could have listed include: take, rag, deer, rug, house, hit , trade, keep, get and scrap (plus many more!).**
- Which language did the Vikings introduce to Britain? **The Vikings introduced Old Norse to Britain.**
- Where did the Normans come from and what language did they speak? **The Normans came from France and spoke an early version of French.**
- Which three languages did people from the Middle English period speak? **English, Latin and French.**

Quiz answers (2)

Explain why you think the English language has continued to grow and acquire (add) new vocabulary. Answers you could have given include:

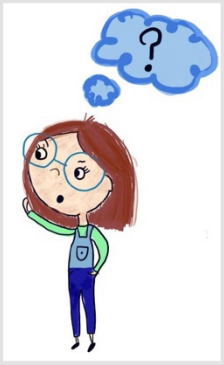
- **The English language has continued to grow because we constantly borrow new words from different countries and cultures.**
- **We create new words all the time to explain new things and new ideas.**
- **Advancements and improvements in technology continue to influence the vocabulary that we use.**
- **We live in an increasingly globalized and connected word (i.e. we are all more connected through social media than we used to be) and this can influence the vocabulary we add to our language and use every day.**

Learning episode 2



Video 3 content

What is etymology?



Etymology: The study of the origin of words and the way in which their meanings have changed throughout history.

Word meanings have changed throughout history

Etymologies of words

- We can use the history of words to understand what they mean today
- This can be very helpful when we come across a word we have not seen before

Task 2 content

What do you think the word etymology means? Write your answer below.

Your answer

Video 4 content

'School'

Latin - Schola

Old English - Scol

Middle English - Scole

Modern English - School

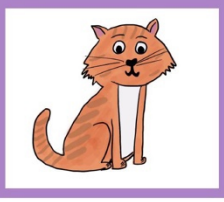
'Heat'

Proto-Germanic **haita-* "heat"
(source also of Old Saxon *hittia*, Old Norse *hiti*, Old Frisian *hete*, German *hitze* "heat").

Old English *hætu, hæto*
"heat, warmth, quality of being hot"

Modern English - Heat

'Cat'



Late Latin – *cattus* - is the source of Old Irish and Gaelic *cat*, Welsh *kath*,

Old English - Catt

Modern English - Cat

Task 3 content

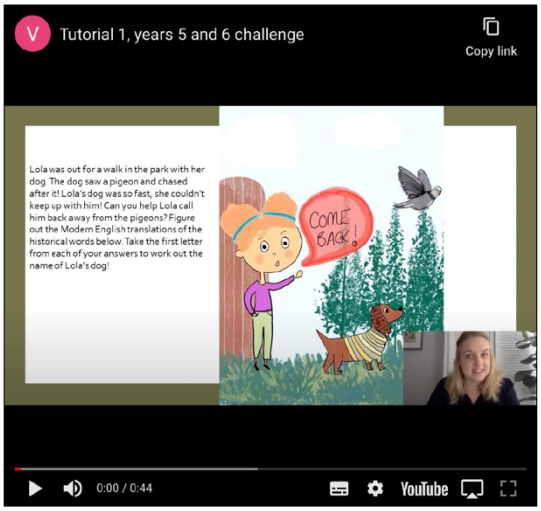
The next challenge…

Watch the video above and then select which year group you are in.

Which year group are you in? *

- (•) Year 5 or 6
- ( ) Year 7 or 8

Watch the video to understand the challenge



Clue 1

The word **'raquette'** is an Old French word. What Modern English word do you think this relates to?

(CLUE: read it out loud to hear if it sounds similar to something!)

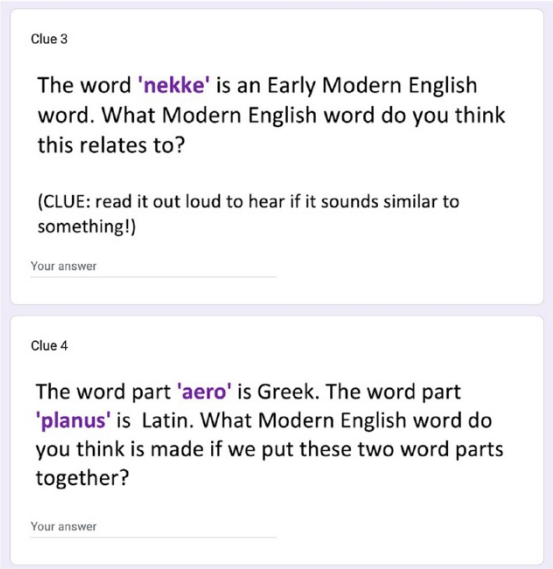
Your answer

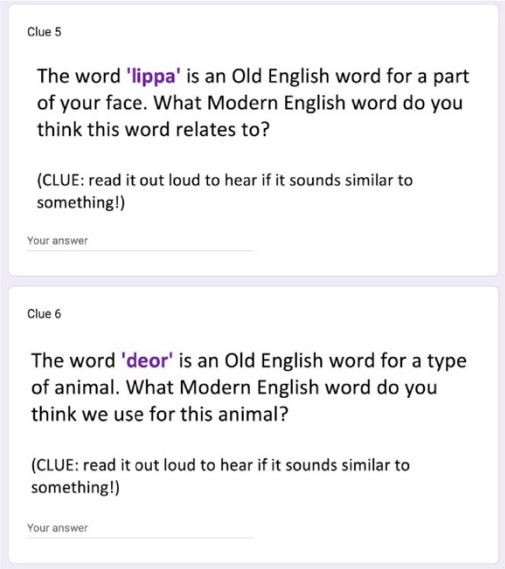
Clue 2

The word **'oceanus'** is a Latin word. What Modern English word do you think this relates to?

(CLUE: read it out loud to hear if it sounds similar to something!)

Your answer


Clue 3
The word 'nekke' is an Early Modern English word. What Modern English word do you think this relates to?
(CLUE: read it out loud to hear if it sounds similar to something!)
Your answer
Clue 4
The word part 'aero' is Greek. The word part 'planus' is Latin. What Modern English word do you think is made if we put these two word parts together?
Your answer


Clue 5
The word 'lippa' is an Old English word for a part of your face. What Modern English word do you think this word relates to?
(CLUE: read it out loud to hear if it sounds similar to something!)
Your answer
Clue 6
The word 'deor' is an Old English word for a type of animal. What Modern English word do you think we use for this animal?
(CLUE: read it out loud to hear if it sounds similar to something!)
Your answer

Answer...

Take the first letter from each of your answers. Write them out in order. This will reveal to you the name of Lola's dog! Write out the dog's name below. Lola's dog is called...

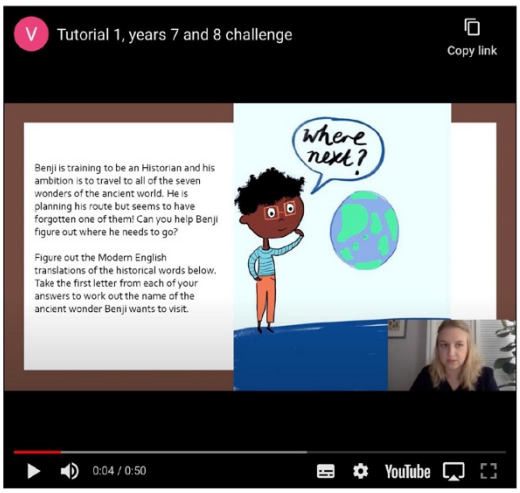
Your answer

Years 5 and 6 video 5 content

Year 5 and 6 challenge answers

1. Raquette = **R**acket
2. Oceanus = **O**cean
3. Nekke = **N**eck
4. Aero + planus = **A**eroplane
5. Lippa = **L**ip
6. Deor = **D**ear

Watch the video to understand the challenge



Clue 1

The word **'palacium'** is a Latin word for a type of building. What Modern English word do you think we use for this building?

(CLUE: read it out loud to hear if it sounds similar to something!)

Your answer

Clue 2

The word **'geong'** is an Old English word. What Modern English word do you think this word relates to?

(CLUE: over time, the letter 'g' has become a 'y' sound in English. Read it out loud to hear if it sounds similar to something!)

Your answer

Clue 3

The word **'regalis'** is a Latin word. What Modern English word do you think this word relates to?

(CLUE: read it out loud to hear if it sounds similar to something!)

Your answer

Clue 4

The word **'audire'** is a Latin word. What Modern English word do you think this word relates to?

(CLUE: read it out loud to hear if it sounds similar to something!)

Your answer

Clue 5

The word part **'mikros'** is a Greek. The word part **'phōnē'** is also Greek. What Modern English word do you think is made if we put these two word parts together?

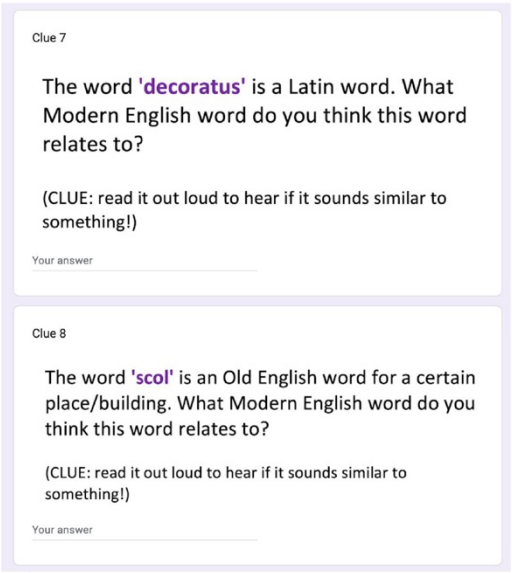
Your answer

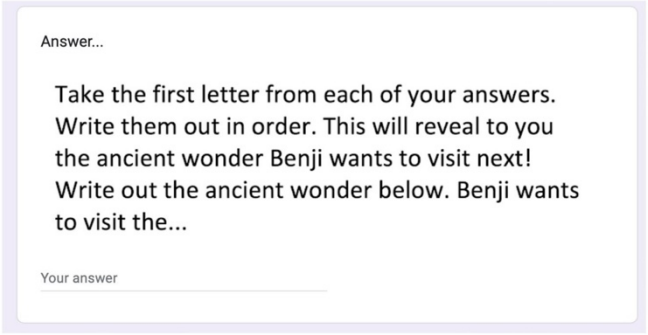
Clue 6

The word **'ikon'** is a Greek word. What Modern English word do you think this word relates to?

(CLUE: read it out loud to hear if it sounds similar to something!)

Your answer


Clue 7
The word 'decoratus' is a Latin word. What Modern English word do you think this word relates to?
(CLUE: read it out loud to hear if it sounds similar to something!)
Your answer
Clue 8
The word 'scol' is an Old English word for a certain place/building. What Modern English word do you think this word relates to?
(CLUE: read it out loud to hear if it sounds similar to something!)
Your answer


Answer...
Take the first letter from each of your answers. Write them out in order. This will reveal to you the ancient wonder Benji wants to visit next! Write out the ancient wonder below. Benji wants to visit the...
Your answer

Learning episode 3

Video 6 content

Making word networks

- Some words have 'roots'
- A root is a part of a word that contains meaning
- A root is often found at the beginning or middle of a word
- A root word part can appear in lots of different words that share similar meanings

A network example

- 'Voc' is a Latin root word part that means 'word or name'. It is similar to the word 'voice'.
- The word part 'voc' appears in lots of our Modern-Day English words, like ***voc**abulary, **voc**al, ad**voc**ate, **voc**alist,* and *pro**voc**ative.*
- The root word 'voc' appears in all of the words listed above and this also shows us that the meaning of these words may be connected in some way.
- For example, the meaning of the Modern-Day English words *vocal* and *advocate* are similar. If someone is ***vocal*** they might be loud and use lots of words to explain something. Likewise, if someone is an ***advocate*** it means a person who uses their words to publicly support a particular cause.

You might say:

> Greta Thunberg is very ***voc**al* about saving the environment. She is an *ad**voc**ate* for climate change.

Here, we can see that the meanings of the words ***vocal*** and ***advocate*** are connected because they are about using words and naming things to explain or stand up for something.

Similarly, the '**vocabulary**' means the words we use to name things.

The word '**vocalist**' means a some who uses words in music (i.e., a singer).

The word '**provocative**' means using words to make people think about something or to make people angry or annoyed about something.

All of these words are share similar meanings because they are connected by the same root word part.

Word connections

- In Modern-Day English, a lot of words are connected by root word parts that come from Latin or Ancient Greek.
- Sometimes, we don't stop to think about how many words might come from one word part.
- For example, pause the video and take 30 seconds to see how many words you can think of that contain the root word part 'port', which means 'to carry'.
- Did you come up with any of these words? Trans**port**, im**port**, ex**port**, re**port**, **port**able or tele**port**?
- They all contain the root part '**port**', and all of the words are to do with carrying something (i.e., export means to carry something out of somewhere. Transport means to carry something using a vehicle).
- The words all **share meaning** and belong to the same **word family.**

WARNING!!!! We do sometimes have to be careful with which words are connected or not. For example, the word part 'port' does appear in the word 'sport'. BUT in Modern-Day English, the word 'sport' does not relate to the idea of something being carried. Therefore, it is not part of the same word family.

Task 4 content

On the history of English timeline, we saw that a lot of our modern-day English vocabulary comes from Latin.

You have been given a list of Latin words and their original meanings.

Can you think of some Modern-Day English words that may come from these Latin roots? Keep this video playing and come up with as many words as you can. The video will stop after 3 minutes! Go!!

Familia → Household

Corōna → Garland

Scaena → Stage

Timeō → Fear

Multus → many/much

Fortūna → fortune/luck

Sōlus → only

Ingenium → talent/ability

Question 1

What modern day word(s) are similar to the Latin word 'familia', meaning household?

Your answer

Question 2

What modern day word(s) are similar to the Latin word 'corona', meaning garland?

Your answer

Question 3

What modern day word(s) are similar to the Latin word 'scaena', meaning stage?

Your answer

Question 4

What modern day word(s) are similar to the Latin word 'timeo', meaning fear?

Your answer

Question 5

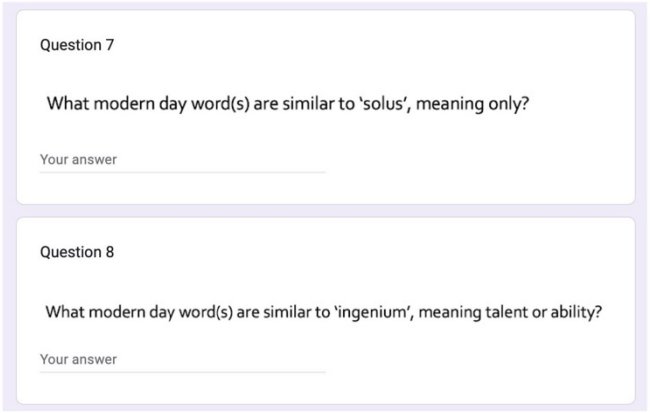
What modern day word(s) are similar to 'multus', meaning many or much?

Your answer

Question 6

What modern day word(s) are similar to 'fortuna', meaning luck?

Your answer



Video 7 content

Latin task answers

What modern day word(s) are similar to the Latin word 'familia', meaning household? **Family**

What modern day word(s) are similar to the Latin word 'corona', meaning garland? **Coronation, crown, coronavirus (the virus has three prongs and is shaped like a crown)**

What modern day word(s) are similar to the Latin word 'scaena', meaning stage? **Scene**

What modern day word(s) are similar to the Latin word 'timeo', meaning fear? **Timid**

What modern day word(s) are similar to 'multus', meaning many or much? **Multiple, multiply, multitude**

What modern day word(s) are similar to 'fortuna', meaning luck? **Fortune, fortunate**

What modern day word(s) are similar to 'solus', meaning only? **Solo, solitude**

What modern day word(s) are similar to 'ingenium', meaning talent or ability? **Ingenious**

Task 5 content

Time for a challenge!

We still use these historic word parts in many of our modern-day English words.

How many Modern-Day English words can you think of that contain these word parts? Keep this video playing and come up with as many words as you can. The video will stop after 15 minutes! Go!!

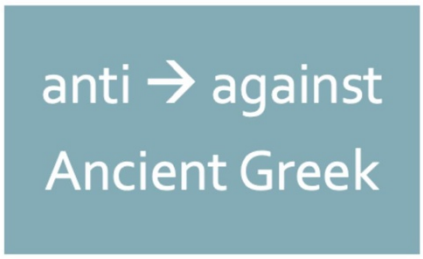
tele → far Ancient Greek	anti → against Ancient Greek	sens→ to feel Latin
bio → life Ancient Greek	graph→ write Ancient Greek	auto →self Ancient Greek
scrib or scrip → write Latin	vid or vis → to see Latin	voc → voice or to call Latin
fac → to do; to make Latin	spect → to look Latin	rupt → to break Latin

Write as many Modern-Day English words as you can that contain the word part below.

tele → far
Ancient Greek

Your answer

Write as many Modern-Day English words as you can that contain the word part below.



Your answer

Write as many Modern-Day English words as you can that contain the word part below.

Your answer

Write as many Modern-Day English words as you can that contain the word part below.

Your answer

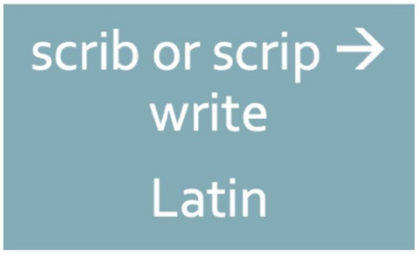
Write as many Modern-Day English words as you can that contain the word part below.

Your answer

Write as many Modern-Day English words as you can that contain the word part below.

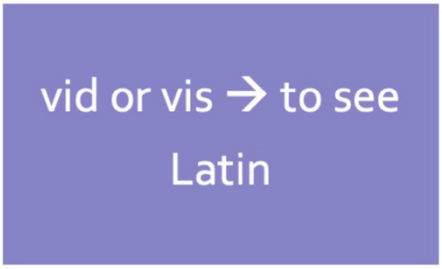
Your answer

Write as many Modern-Day English words as you can that contain the word part below.



Your answer

Write as many Modern-Day English words as you can that contain the word part below.

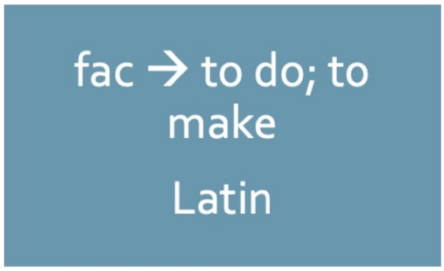


Your answer

Write as many Modern-Day English words as you can that contain the word part below.

Your answer

Write as many Modern-Day English words as you can that contain the word part below.



Your answer

Write as many Modern-Day English words as you can that contain the word part below.

Your answer

Video 8 content

Possible task answers (there are lots more! Don't worry if yours aren't on this list!).

tele: **tele**port, **tele**vision, **tele**pathic, **tele**scope

anti: **anti**thesis, **anti**pathy, **anti**biotic, **anti**climax, **anti**dote, **anti**social, **anti**septic

sens: **sens**ual, **sens**ible, **sens**itive, **sens**ation, **sens**eless, **sens**or

bio: **bio**logy, **bio**graphy, **bio**chemical, **bio**fuel

graph: **graph**ics, mono**graph**, para**graph**, tele**graph**, epi**graph**, geo**graph**y

auto: **auto**mobile, **auto**biography, **auto**graph, **auto**matic, **auto**nomy

scrib or scrip: **scrib**ble, **scrib**e, de**scrib**e, in**scrib**e, **scrip**t, manu**scrip**t, tran**scrip**t, de**scrip**tion

vid or vis: **vid**eo, e**vid**ence, **vis**ual, **vis**ible, re**vise**, super**vise**

form: trans**form**, in**form**, con**form**, **form**ulate, re**form**, in**form**ation

fac: **fac**tory, manu**fac**ture, **fac**ilitate, **fac**tual

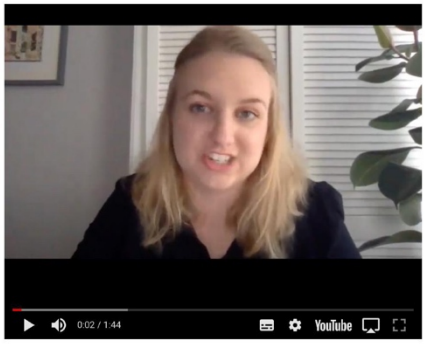
spect: in**spect**, res**pect**, retro**spect**, **spect**acles, **spect**acular, per**spect**ive, **spect**ate

rupt: e**rupt**, dis**rupt**, cor**rupt**, inter**rupt**, ab**rupt**

Although each individual word has its own definition, these words all share similar meanings because they contain the same root word parts.

Learning episode 4: Reflection/recap

Video 9 content (tutorial summary)

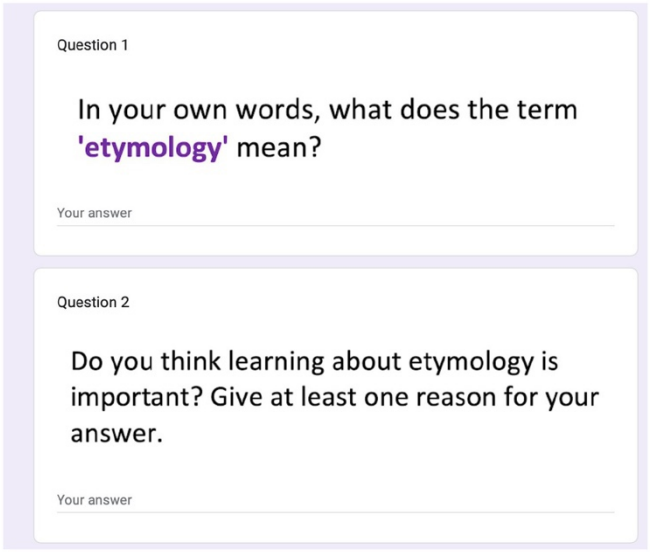


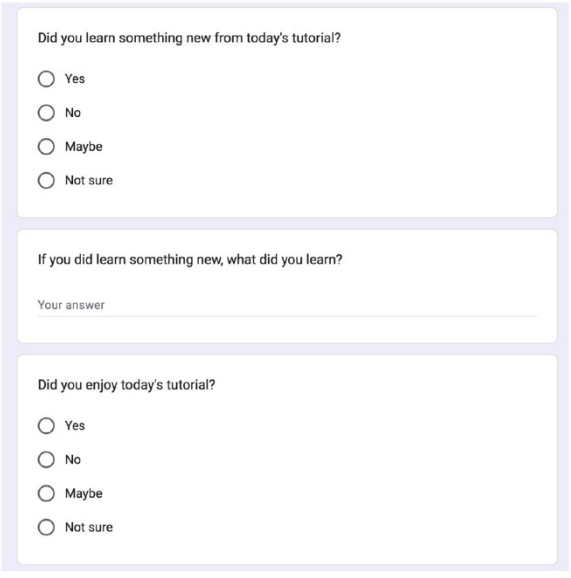
Question 1

In your own words, what does the term **'etymology'** mean?

Your answer

Task 5 reflection questions





Why did/ didn't you enjoy today's tutorial?

Your answer

Question answers

In your own words, what does the term 'etymology' mean? Answers you could have written include:

→**Etymology refers to the history of the English language**

→**Etymology refers to the history of the modern day English vocabulary (or words) that we use**

→**Etymology refers to the study of the origin of words and how their meanings have changed throughout history**

Do you think learning about etymology is important? Give at least one reason for your answer. Answers you could have given include:

→**Etymology is important because it can help us to understand where our modern day vocabulary comes from and, therefore, what it might mean.**

→**Etymology is important because it can help us to understand how the language we use is connected to other languages around the world.**

→**Etymology is important because it can help us figure out the main meaning of complicated words.**

Appendix XII: Tutorial 2

Vocabulary skills development programme

Tutorial 2:
Breaking words into parts:
Prefixes, root words and suffixes

PhD Tutor: Ellen Bristow, Cardiff University

What is your name? (Please provide your first and last name) *

Your answer

This is a required question

Which school do you go to? *

Your answer

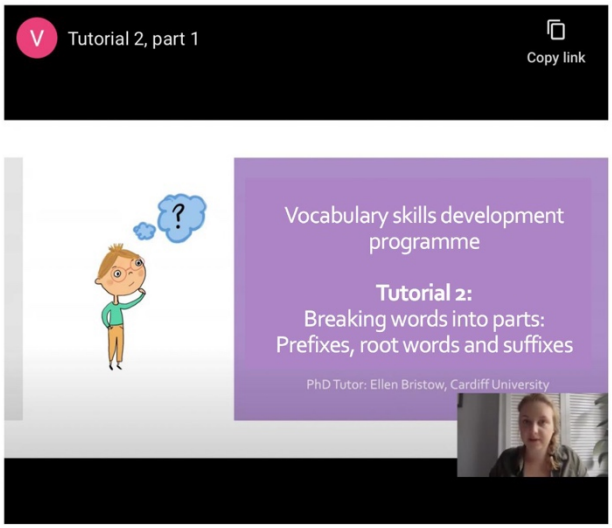
This is a required question

Which year group are you in? *

- (●) Year 5
- ( ) Year 6
- ( ) Year 7
- ( ) Year 8
- ( ) Other

Learning episode 1

Watch video 1 to get started with today's tutorial.



Video 1 content

What is the purpose of tutorial 2?

- To begin to understand what the term 'morphology' means
- To understand how to identify and recognise prefixes, root words and suffixes
- To identify and comprehend root words
- To explore what compound words are

What is morphology?

The study of the structure of words and forms

Let's use our etymology knowledge on the word 'morphology'

- The term 'morphology' comes from Ancient Greek word parts

Morph + ology

Means 'shape' or 'form'

Means 'study' or 'knowledge of'

Why can morphology be helpful?

Being able to recognise morphemes can help us to decode (break down) the meaning of words we haven't seen before.

- Morphology helps us to break words into parts
- We call word parts **'morphemes'**
- **Morphemes are parts of words that contain meaning**

In the word **'unhappy'** both **'un'** (the prefix) and **'happy'** (the root word) are morphemes. They both contain meaning.

→**Un-** means not or the opposite of

→**Happy** means a feeling of joy

If we put these two morphemes together, we create the word **'unhappy'** which means **'not or the opposite of feeling joy'.**

Task 1 content

What do you think the word **morphology** means? Write your answer below.

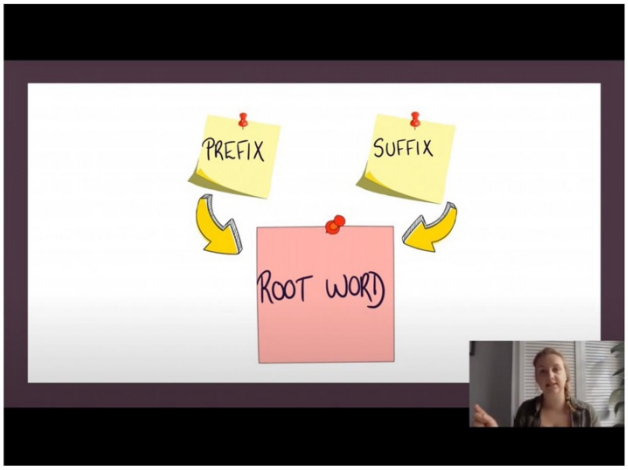
Your answer

Video 2 content

Morphology is…

- The study of the structure of words (i.e., how words are put together)
- In morphology, we look at morphemes which are the small word parts that make up a word
- Morphemes are word parts that contain meaning (i.e., **un-** in **unhappy**).

Learning episode 2



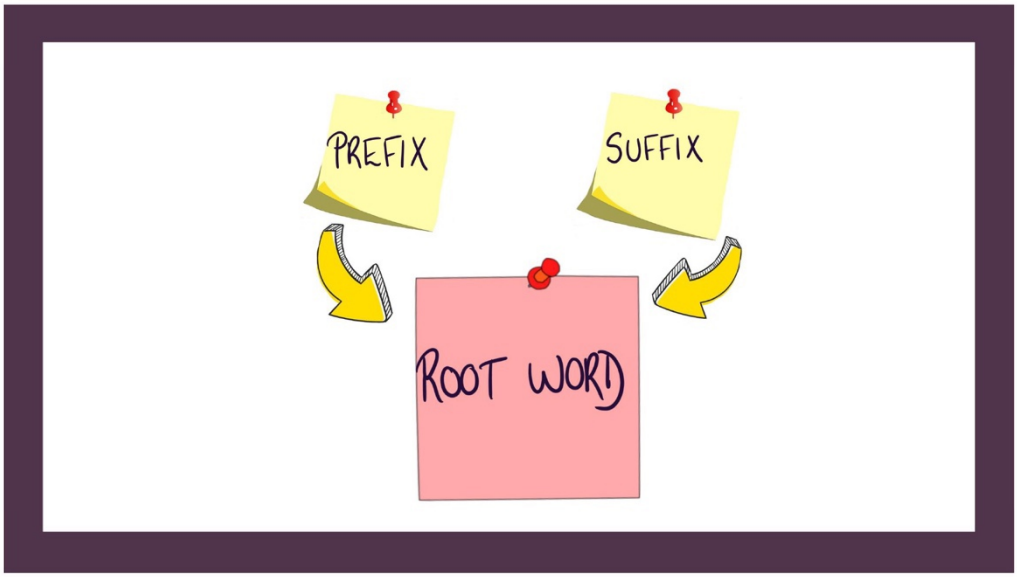
Video 3 content

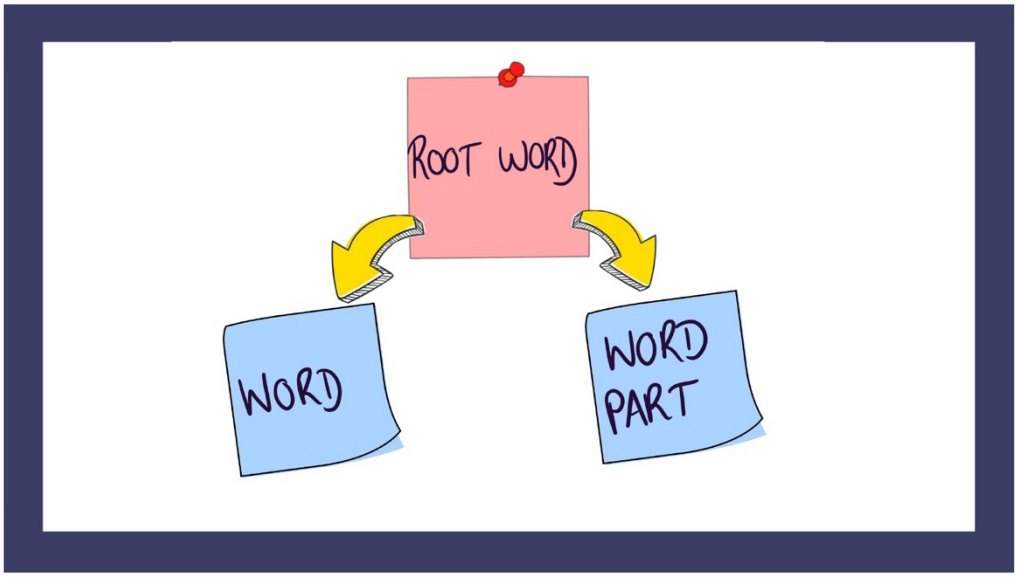
Word parts

- Now that we know words contain morphemes, we need to know what the morphemes are called.

In English, we have three main types of morphemes:

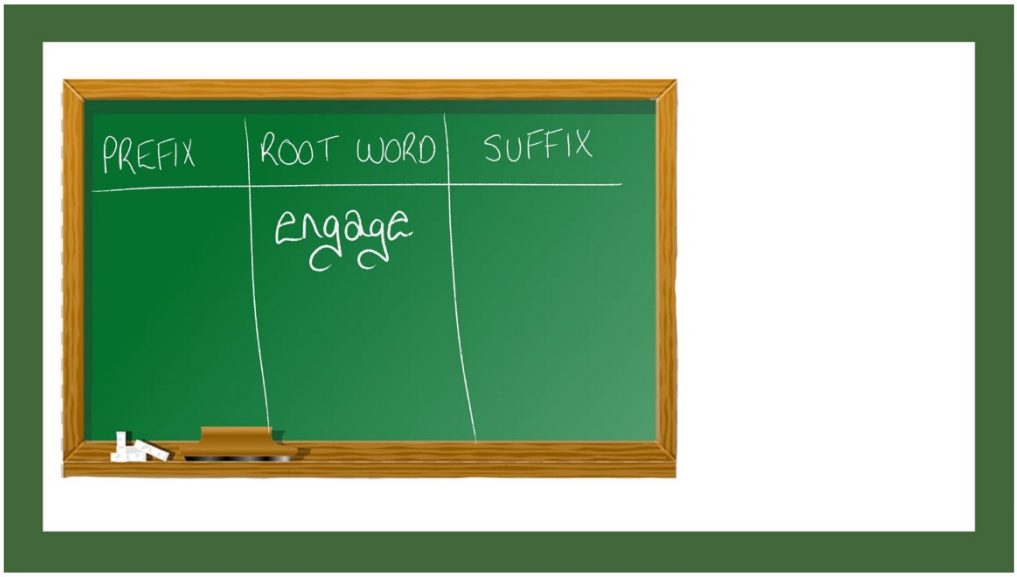
- **Prefixes**
- **Root words**
- **Suffixes**

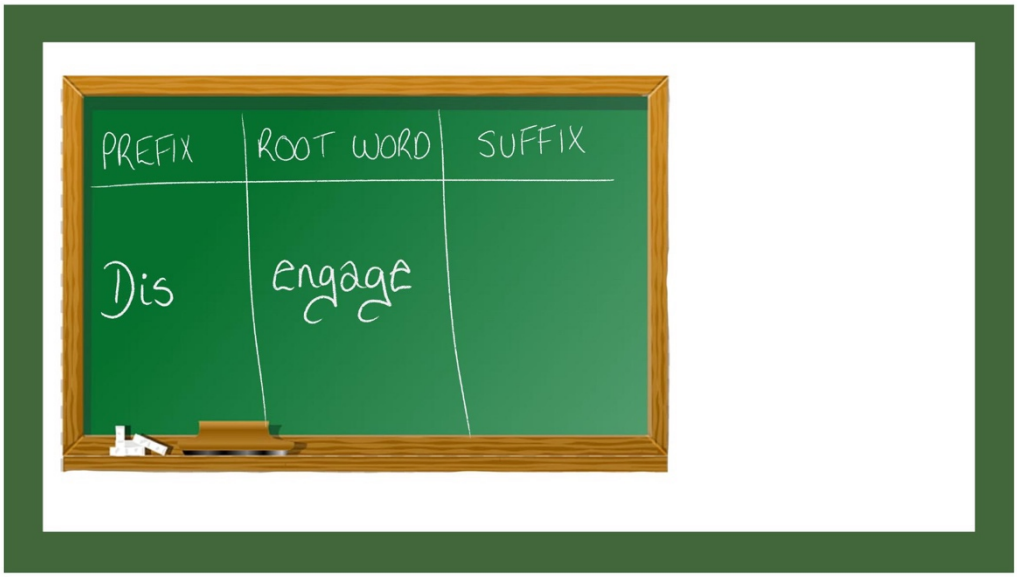




So, what is a root word?

- Root words can form the basis of new words
- A root word stands by itself as a word
- It is the main part of a word which has meaning
- It can stand by itself – it is FREE


PREFIX
ROOT WORD
SUFFIX
Engage


PREFIX
ROOT WORD
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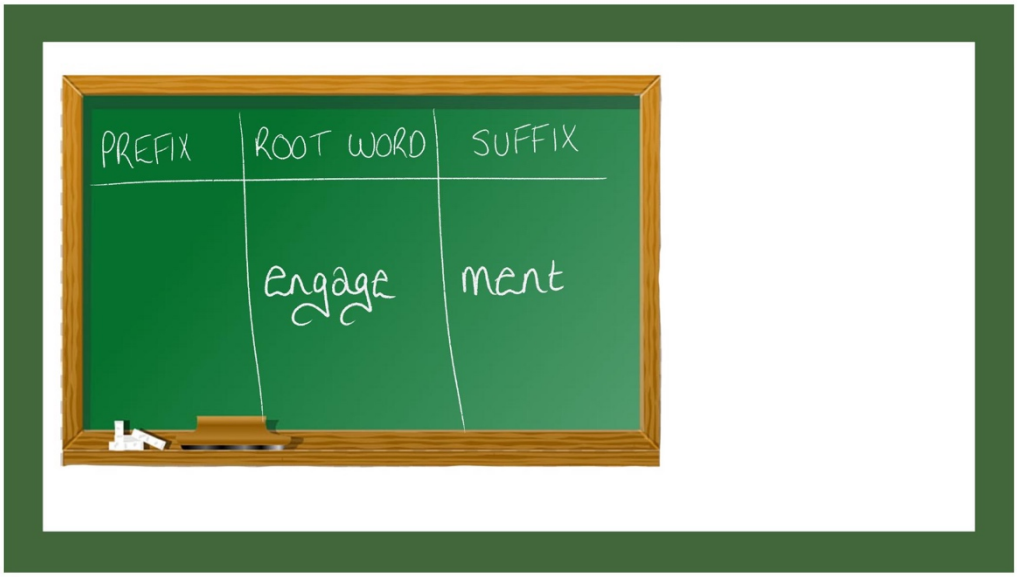
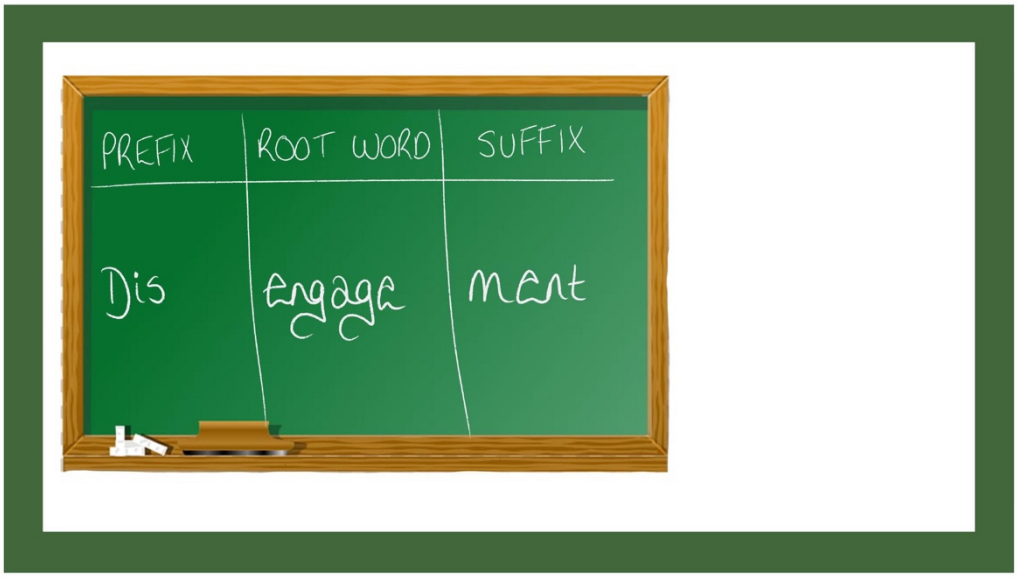
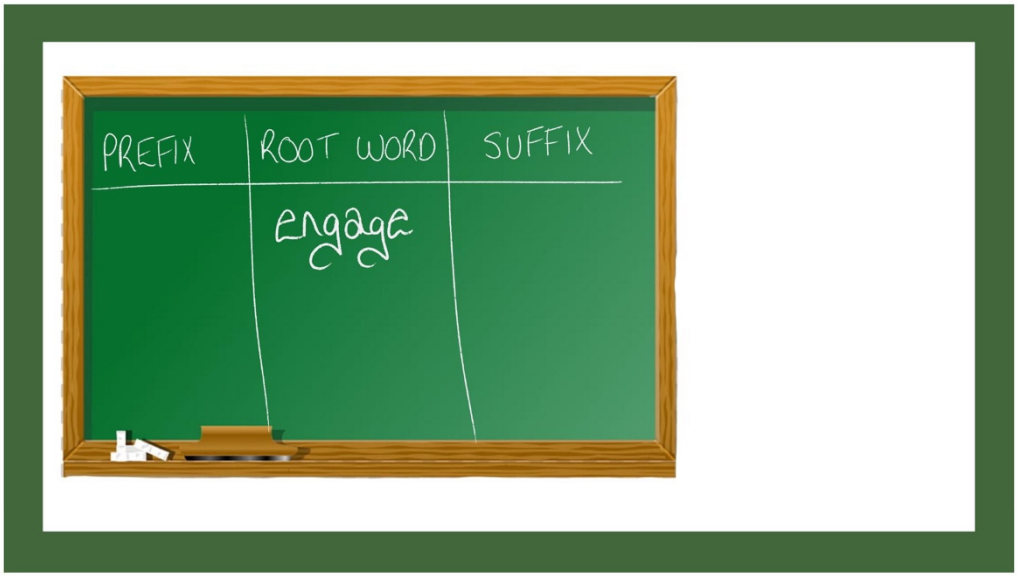
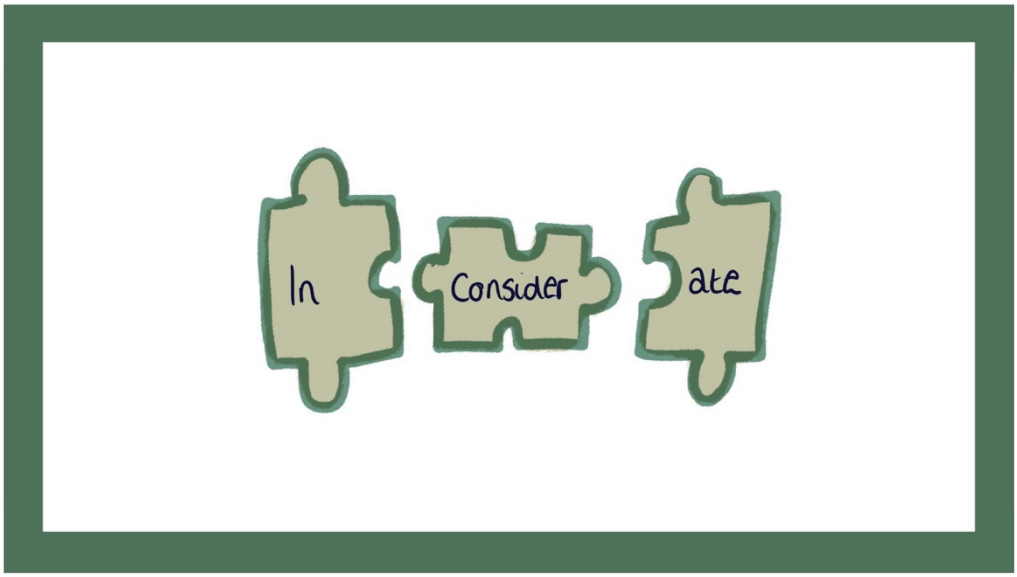
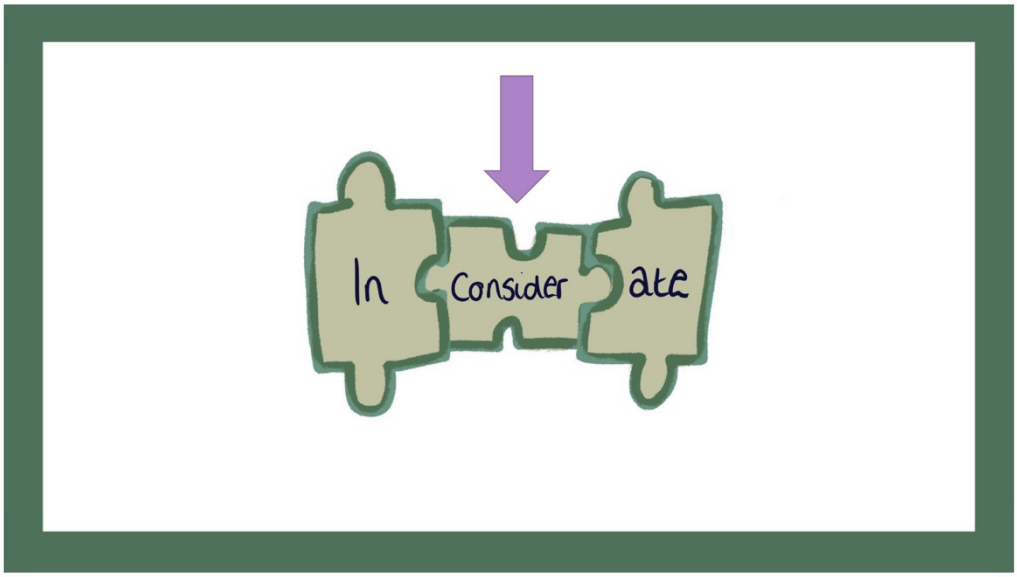
Dis
Engage


PREFIX
ROOT WORD
SUFFIX
engage
ment

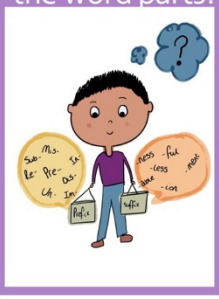

PREFIX
ROOT WORD
SUFFIX
Dis
engage
ment


PREFIX
ROOT WORD
SUFFIX
engage


In
Consider
ate

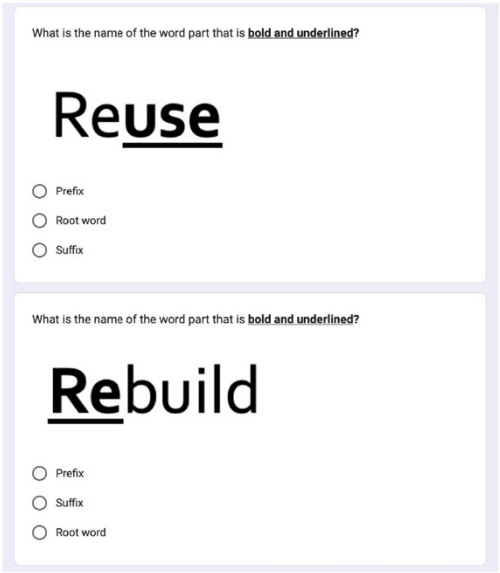


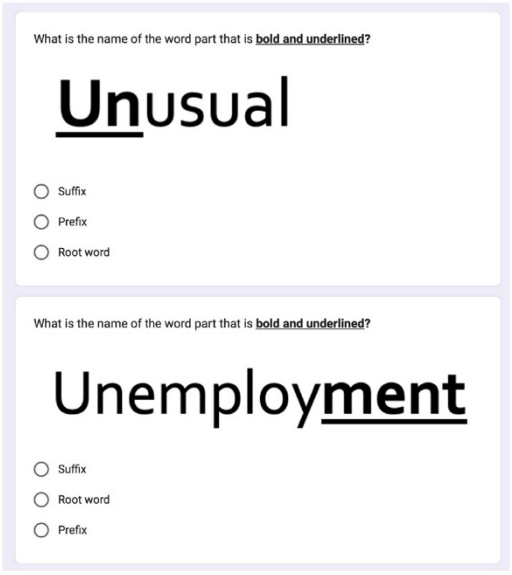
Your challenge… Can you name the word parts?



- You we will see a list of words and one part of each word will be in **bold** and **underlined.**
- Your task is to name whether the word part is a prefix, root word or suffix.
- The challenge gets progressively harder so just try your best!
- You have 5 minutes to complete the task.
- Keep this video playing so that you know when your time on challenge is up.

Task 2 content





What is the name of the word part that is **bold and underlined**?

Dis**regard**

- ◯ Prefix
- ◯ Suffix
- ◯ Root word

What is the name of the word part that is **bold and underlined**?

Disorientat**ion**

- ◯ Prefix
- ◯ Root word
- ◯ Suffix

What is the name of the word part that is **bold and underlined**?

Cooperate

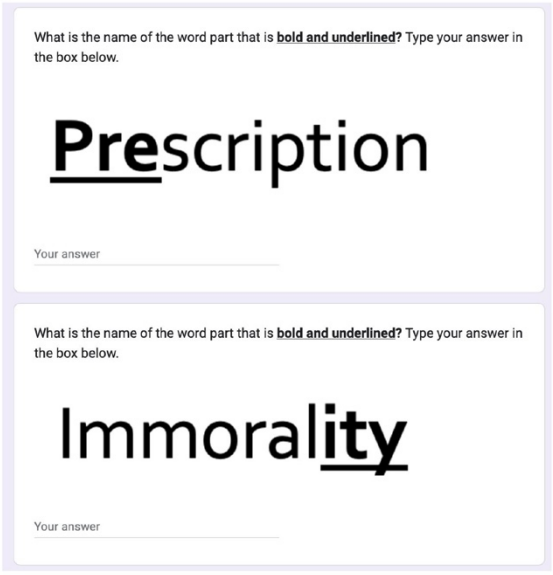
- ◯ Suffix
- ◯ Root word
- ◯ Prefix

What is the name of the word part that is **bold and underlined**?

Intolerant

- ◯ Root word
- ◯ Prefix
- ◯ Suffix


What is the name of the word part that is bold and underlined?
Descriptive
Prefix
Root word
Suffix
What is the name of the word part that is bold and underlined?
Encouragement
Prefix
Suffix
Root word


What is the name of the word part that is bold and underlined? Type your answer in the box below.
Prescription
Your answer
What is the name of the word part that is bold and underlined? Type your answer in the box below.
Immorality
Your answer

What is the name of the word part that is **bold and underlined**? Type your answer in the box below.

Projection

Your answer

What is the name of the word part that is **bold and underlined**? Type your answer in the box below.

Mis**manage**

Your answer

What is the name of the word part that is **bold and underlined**? Type your answer in the box below.

Transformation

Your answer

What is the name of the word part that is **bold and underlined**? Type your answer in the box below.

Irre**place**able

Your answer

What is the name of the word part that is **bold and underlined?** Type your answer in the box below.

Your answer

What is the name of the word part that is **bold and underlined?** Type your answer in the box below.

Your answer

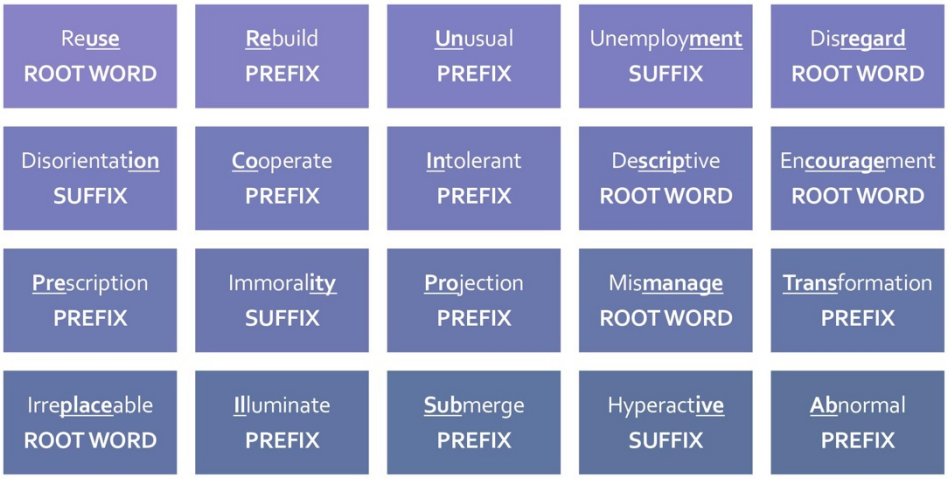
What is the name of the word part that is **bold and underlined?** Type your answer in the box below.

Your answer

What is the name of the word part that is **bold and underlined?** Type your answer in the box below.

Your answer

Video 4 content



Learning episode 3

Video 5 content

Root word recap

- Remember, root words can form the basis of new words
- A root word stands by itself as a word
- It is the main part of a word which has meaning
- Some root words are easier to spot than others!

Transparent root words

Some root words are easy to spot because they do not change, even when they have a prefix and suffix added to them.

For example:

uncomfortable (root word = comfort)

inactive (root word = act)

undetectable (root word = detect)

Nothing has happened to the spelling or sound of the root words so we call these examples **transparent root words**.

Transparent means see through!

Opaque root words

HOWEVER, some root words are more difficult to spot because their sound and spelling changes, particularly when we add a suffix.

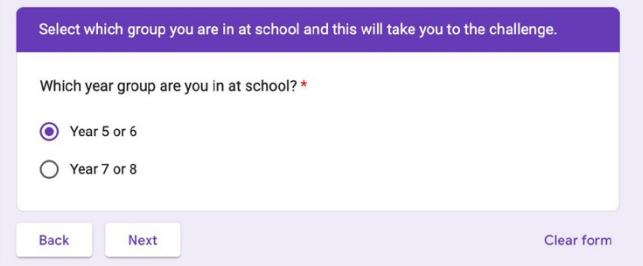
For example:

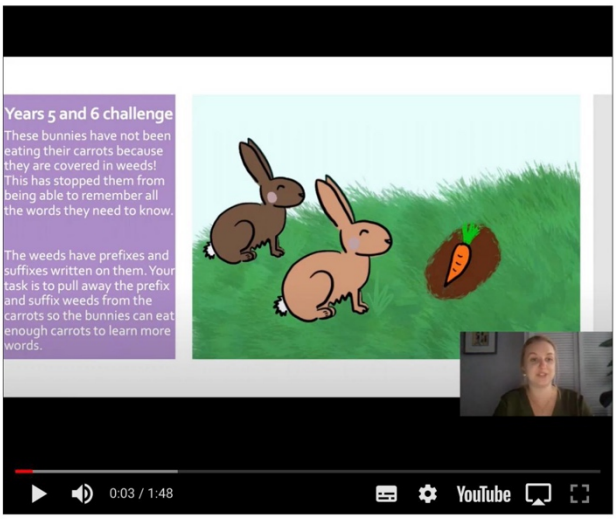
indecisive (root word = decide. The 'de' ending becomes an 's')

concentration (root word = concentrate. The 'te' ending becomes a 'sh' sound but is spely with a t!)

The spelling and/or sound of the root word has changed, so we call these examples **opaque root words**.

Opaque means not see through!



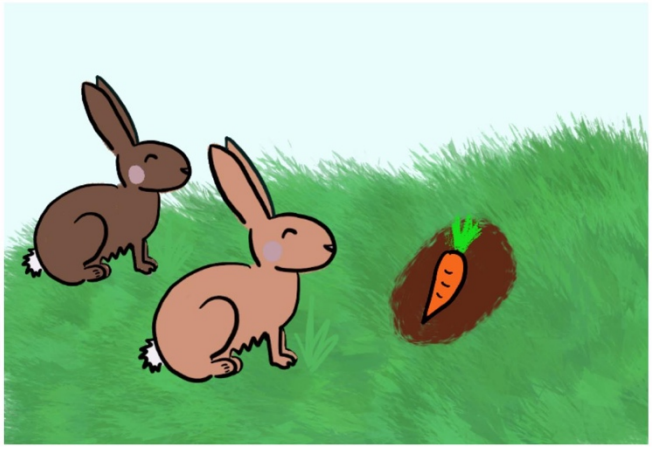


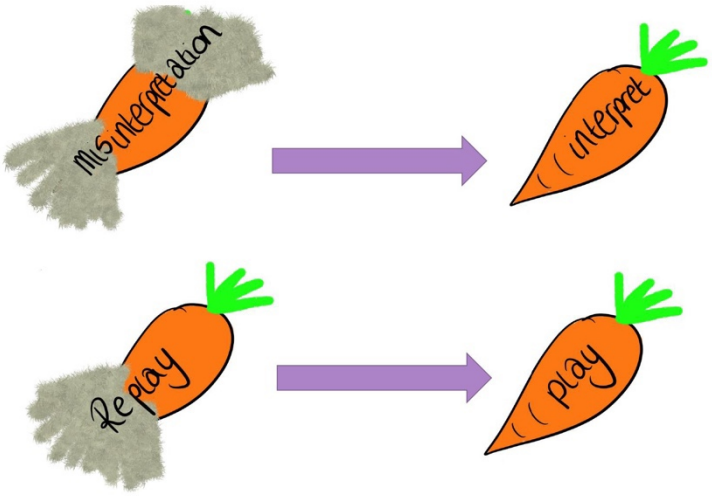
Video 6 Year 5/6content

Years 5 and 6 challenge

These bunnies have not been eating their carrots because they are covered in weeds! This has stopped them from being able to remember all the words they need to know.

The weeds have prefixes and suffixes written on them. Your task is to pull away the prefix and suffix weeds from the carrots so the bunnies can eat enough carrots to learn more words.

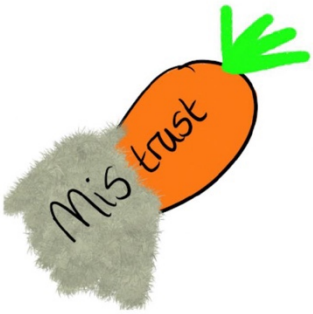




Task 3 years 5 and 6 content

Question 1

What is the root word of this carrot? Pull away the weeds to find it!



Your answer

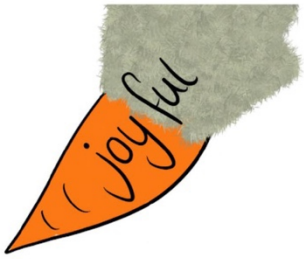
Question 2

What is the root word of this carrot? Pull away the weeds to find it!

Your answer

Question 3

What is the root word of this carrot? Pull away the weeds to find it!



Your answer

Question 4

What is the root word of this carrot? Pull away the weeds to find it!

Your answer

Question 5

What is the root word of this carrot? Pull away the weeds to find it!

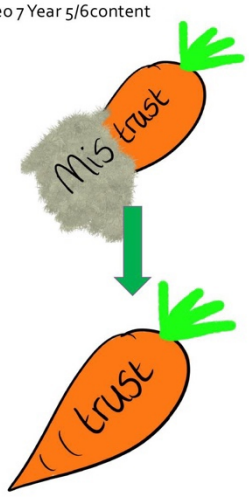
Your answer

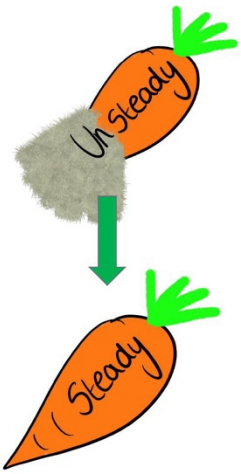
Question 6

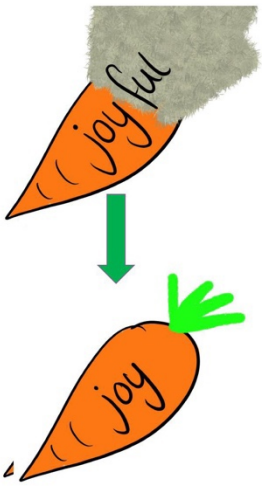
What is the root word of this carrot? Pull away the weeds to find it!

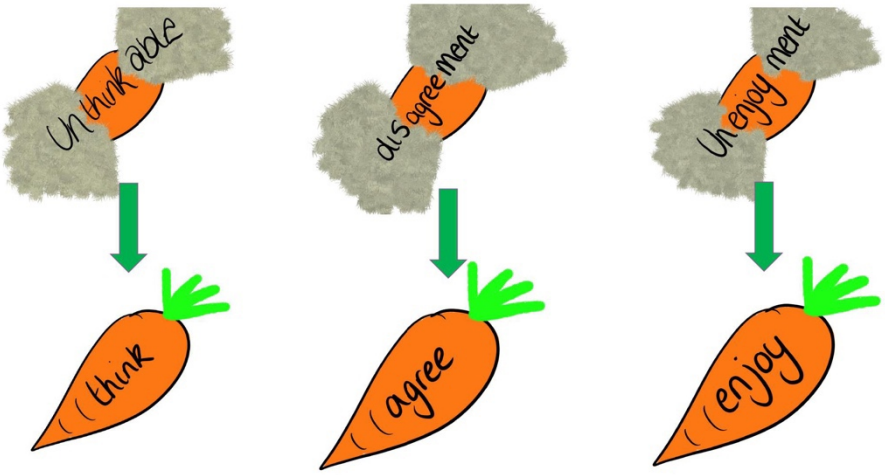
Your answer

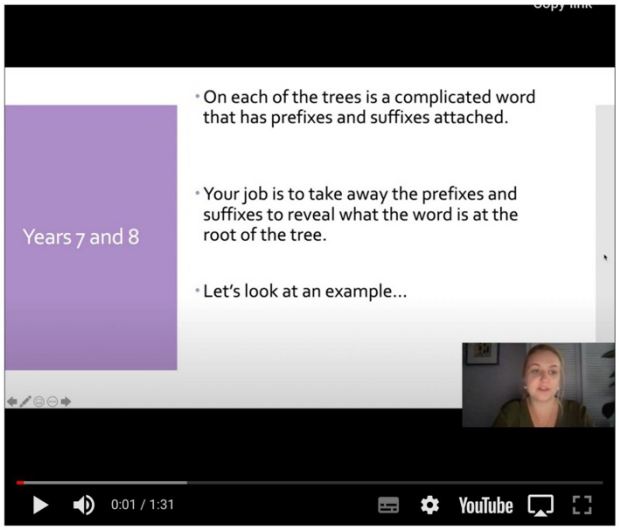
Video 7 Year 5/6content







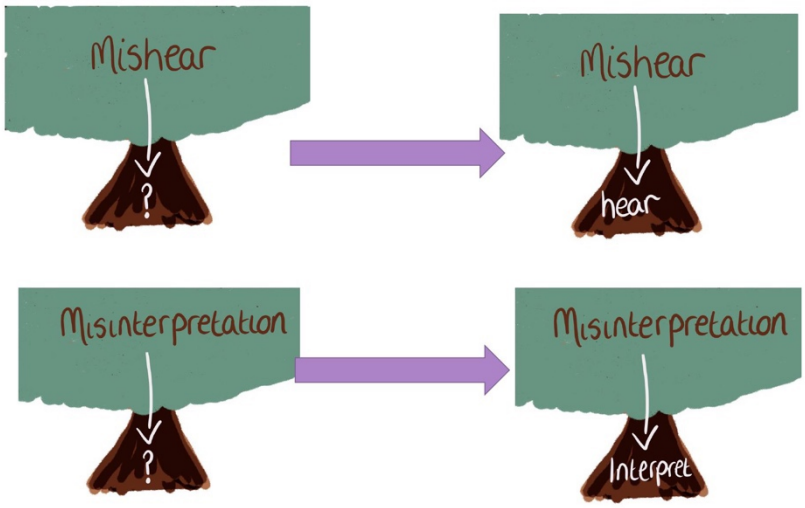

Un think able
think
dis agree ment
agree
Un enjoy ment
enjoy


Years 7 and 8
On each of the trees is a complicated word that has prefixes and suffixes attached.
Your job is to take away the prefixes and suffixes to reveal what the word is at the root of the tree.
Let's look at an example...
0:01 / 1:31
YouTube

Video 6 Year 7/8 content

Years 7 and 8

- On each of the trees is a complicated word that has prefixes and suffixes attached.
- Your job is to take away the prefixes and suffixes to reveal what the word is at the root of the tree.
- Let's look at an example…



Task 3 years 7 and 8 content

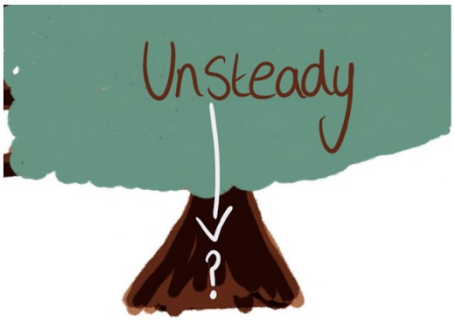
Question 1

What is the root of this word? Take away the prefixes and/or suffixes to find it.

Your answer

Question 2

What is the root of this word? Take away the prefixes and/or suffixes to find it.



Your answer

Question 3

What is the root of this word? Take away the prefixes and/or suffixes to find it.

Your answer

Question 4

What is the root of this word? Take away the prefixes and/or suffixes to find it.

Your answer

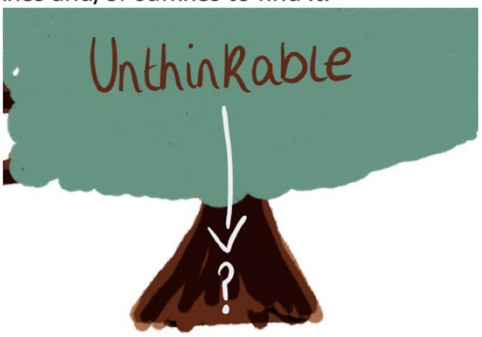
Question 5

What is the root of this word? Take away the prefixes and/or suffixes to find it.

Your answer

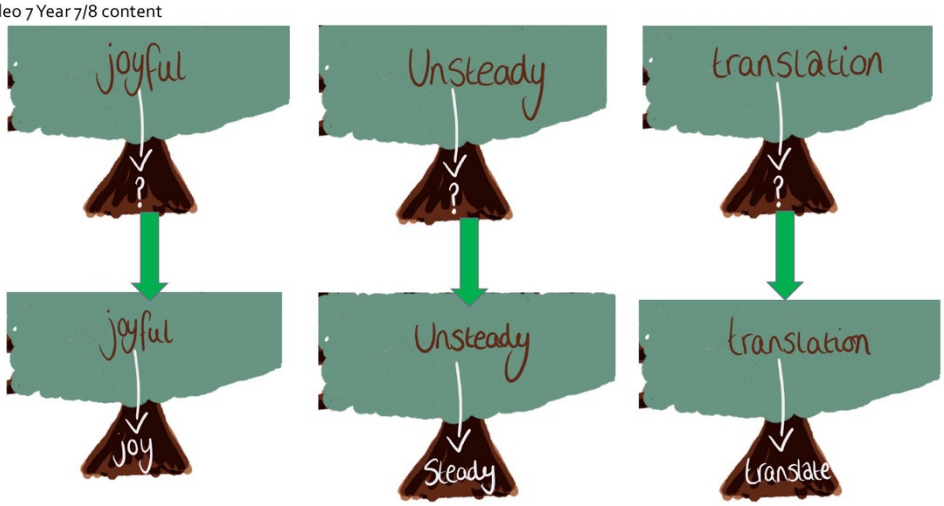
Question 6

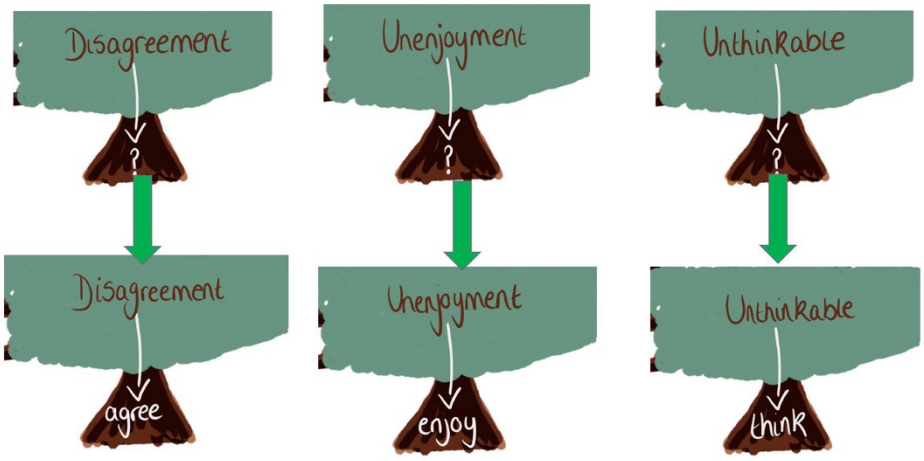
What is the root of this word? Take away the prefixes and/or suffixes to find it.



Your answer

Video 7 Year 7/8 content

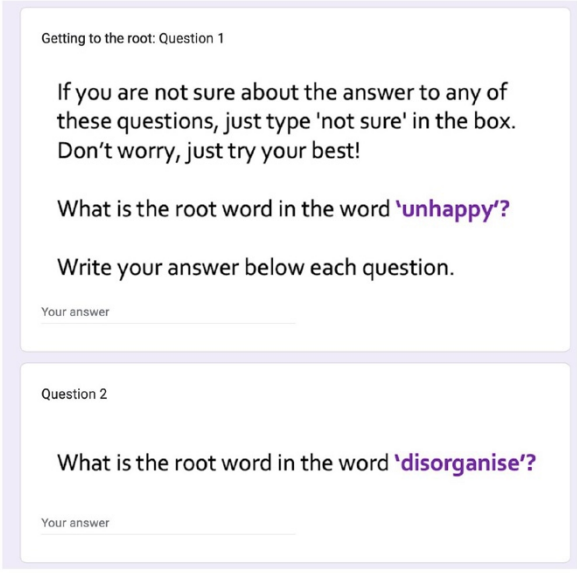




Video 8 content

- Can you identify the roots in the words below?
- Remember, you're looking for the part of the word that has meaning by itself
- It is the main part of the word that has meaning
- Each question gets a little harder than the one before. Will you take on the challenge?
- Just try your best, good luck!

Task 4 content



Question 3

What is the root word in the word **'reappear'?**

Your answer

Question 4

What is the root word in the word **'uncreative'?**

Your answer

Question 5

What is the root word in the word **'antisocial'?**

Your answer

Question 6

What is the root word in the word **'immeasurable'?**

Your answer

Question 7

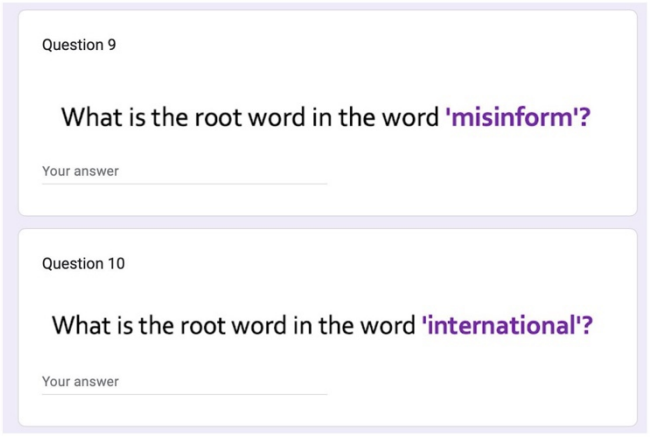
What is the root word in the word **'indecision'?**

Your answer

Question 8

What is the root word in the word **'submarine'?**

Your answer



Video 9 content

Task answers

1. The root of unhappy is happy
2. The root of disorganise is organise
3. The root of reappear is appear
4. The root of uncreative is create
5. The root of antisocial is social
6. The root of immeasurable is measure
7. The root of indecision is decide
8. The root of submarine is marine
9. The root of misinform is inform (you may have also put 'form'. That is okay, too!)
10. The root of international is nation

Learning episode 4

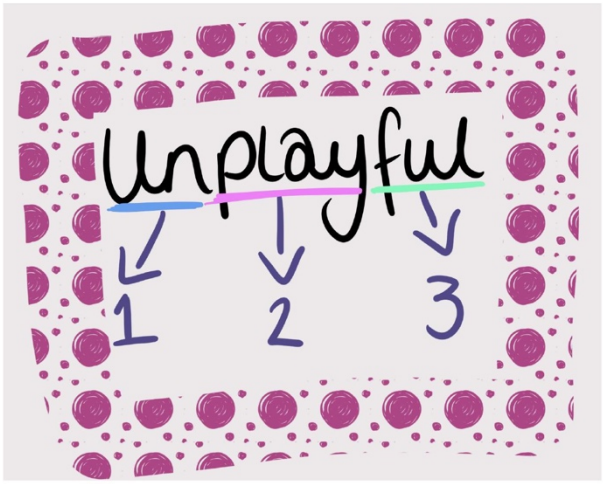
Video 10 content

How do we count morphemes?

1

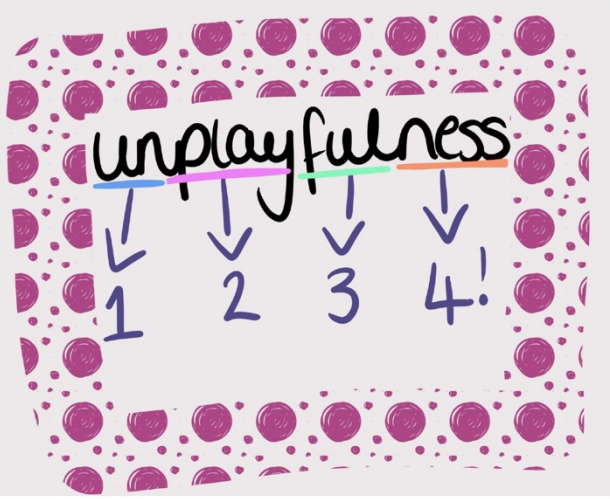
How do we count morphemes?
2

How do we count morphemes?
3



How do we count morphemes?

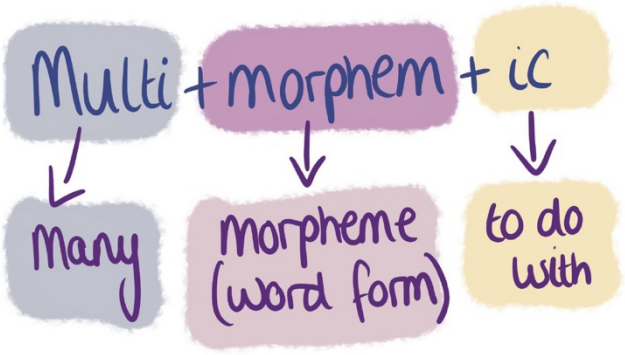
4



What does the word 'multimorphemic' mean?

Multimorphemic means words that have multiple morphemes:

- Uncomfortable
- Inconclusive
- Unhappy
- Improvement



How can counting morphemes help us?

- Counting morphemes can tell us whether the word has a prefix or suffix attached to the root word.
- If we only have 1 morpheme, we only have a root word.
- If we have more then 1 morpheme, we probably have a prefix and/or suffix attached too.
- This can help us when we are pulling apart the meaning of words.

Video 11 content

Morpheme challenge

1. Read the sentence you have been given.
2. Once you have read the sentence, look at the target word.
3. Divide the target word into its relevant parts (i.e., prefix root word and suffix)
4. Count the number of morphemes in the target word.
5. Identify the root of the target word

TOP TIP: Not all of the words will have a prefix AND a suffix. Some words might have both and some might have none!

Here's an example…

The girl was demonstrating her **disengagement** with school.

Your target word is '**disengagement**'.

How would you divide this word into parts (i.e., prefix, root word, suffix)?

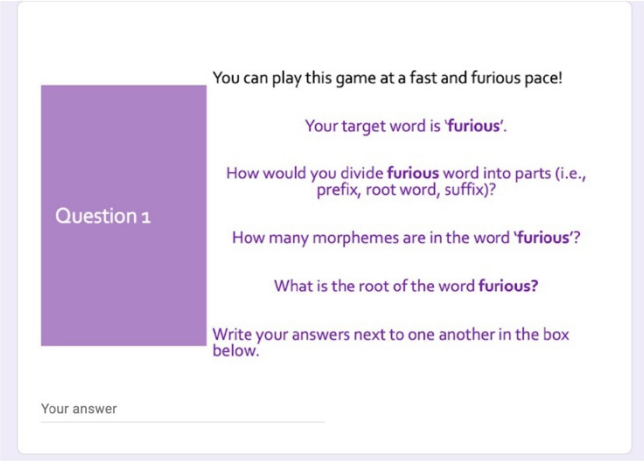
How many morphemes are in the word '**unfriendliness**'?

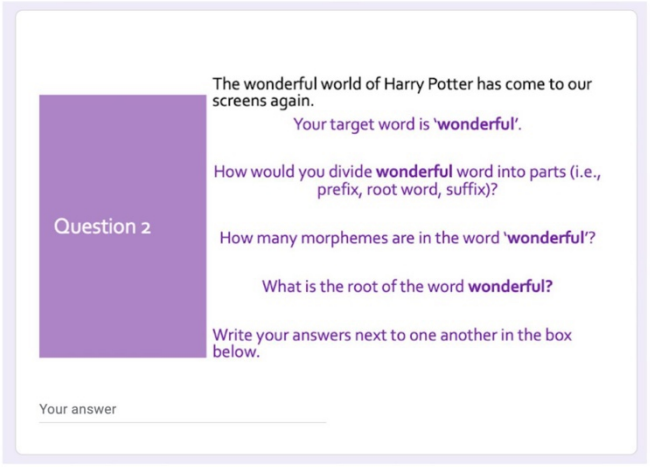
What is the root of the word 'disengagement'?

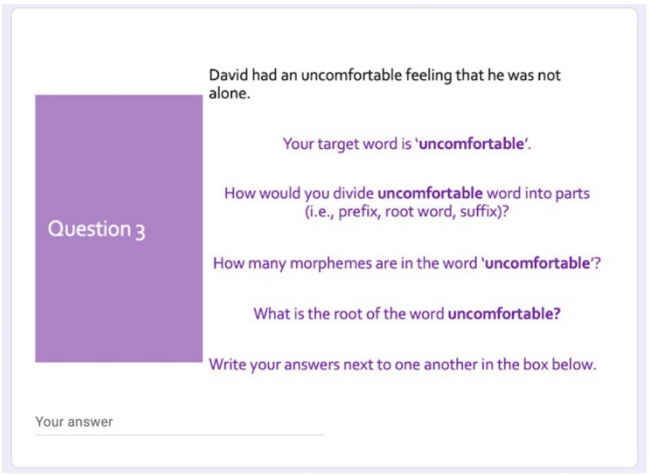
Write your answers next to one another in the box below.

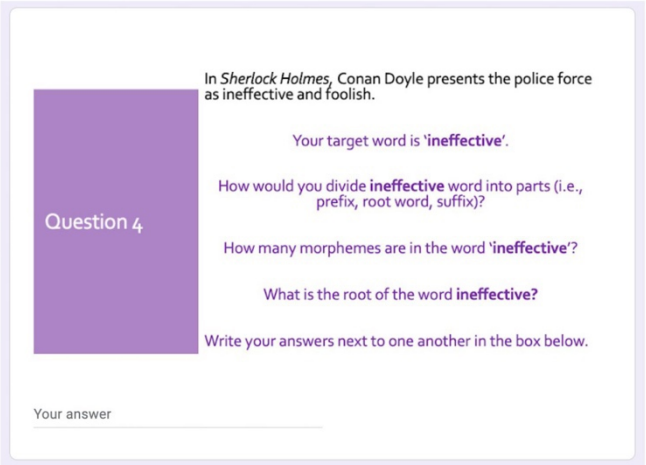
dis + engage + ment, 3 morphemes, root word= engage

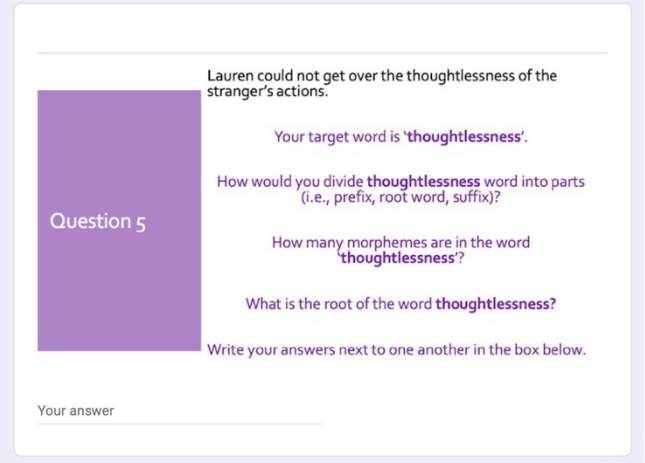
Task 5 content




Question 2
The wonderful world of Harry Potter has come to our screens again.
Your target word is 'wonderful'.
How would you divide wonderful word into parts (i.e., prefix, root word, suffix)?
How many morphemes are in the word 'wonderful'?
What is the root of the word wonderful?
Write your answers next to one another in the box below.
Your answer


Question 3
David had an uncomfortable feeling that he was not alone.
Your target word is 'uncomfortable'.
How would you divide uncomfortable word into parts (i.e., prefix, root word, suffix)?
How many morphemes are in the word 'uncomfortable'?
What is the root of the word uncomfortable?
Write your answers next to one another in the box below.
Your answer


Question 4
In *Sherlock Holmes,* Conan Doyle presents the police force as ineffective and foolish.
Your target word is '**ineffective**'.
How would you divide **ineffective** word into parts (i.e., prefix, root word, suffix)?
How many morphemes are in the word '**ineffective**'?
What is the root of the word **ineffective?**
Write your answers next to one another in the box below.
Your answer


Question 5
Lauren could not get over the thoughtlessness of the stranger's actions.
Your target word is '**thoughtlessness**'.
How would you divide **thoughtlessness** word into parts (i.e., prefix, root word, suffix)?
How many morphemes are in the word '**thoughtlessness**'?
What is the root of the word **thoughtlessness?**
Write your answers next to one another in the box below.
Your answer

Video 12 content

Question 1

You can play this game at a fast and furious pace!

Your target word is '**furious**'.

How would you divide **furious** word into parts (i.e., prefix, root word, suffix)?

How many morphemes are in the word '**furious**'?

What is the root of the word **furious?**

fur(y) + ous, 2 morphemes, root words = fury.

Question 2

The wonderful world of Harry Potter has come to our screens again.

Your target word is '**wonderful**'.

How would you divide **wonderful** word into parts (i.e., prefix, root word, suffix)?

How many morphemes are in the word '**wonderful**'?

What is the root of the word **wonderful?**

wonder + ful, 2 morphemes, root word = wonder.

Question 3

David had an uncomfortable feeling that he was not alone.

Your target word is '**uncomfortable**'.

How would you divide **uncomfortable** word into parts (i.e., prefix, root word, suffix)?

How many morphemes are in the word '**uncomfortable**'?

What is the root of the word **uncomfortable?**

un + comfort + able, 3 morphemes, root word = comfort.

Question 4

In *Sherlock Holmes,* Conan Doyle presents the police force as ineffective and foolish.

Your target word is '**ineffective**'.

How would you divide **ineffective** word into parts (i.e., prefix, root word, suffix)?

How many morphemes are in the word '**ineffective**'?

What is the root of the word **ineffective?**

in + effect + ive, 3 morphemes, root word = effect.

Question 5

Lauren could not get over the thoughtlessness of the stranger's actions.

Your target word is '**thoughtlessness**'.

How would you divide **thoughtlessness** word into parts (i.e., prefix, root word, suffix)?

How many morphemes are in the word '**thoughtlessness**'?

What is the root of the word **thoughtlessness?**

thought + less + ness, 3 morphemes, root word = thought.

Learning episode 5

Video 13 content

What is a compound word?

- A compound word uses two root words to make a new word.

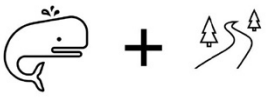
For example:

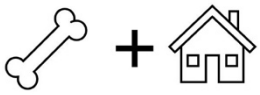
- pain + killer = painkiller
- sun + shine = sunshine
- boat + house = boathouse

The above words use two pre-existing root words to make a new word with different meaning.

What is the history of compound words and why do we use them?

- Compound words have often been used to make a new term for something that, previously, did not have a name.
- For example, the Anglo Saxons used the compound word *hrōnrād* to describe the ocean.
- *Hrōnrād* translates as 'Whale Road'.
- The Modern-day English word 'ocean' was not part of Anglo-Saxon vocabulary. The Modern-day English word 'ocean' originates (comes from) the Latin word *oceanus* and the Ancient Greek word *ōkeanos*.
- Instead, the Anglo-Saxons thought of the ocean as the road that whales used. Therefore, they put the words whale (*hrōn*) and road (*rād*) together to create a name for the thing we now call 'ocean'.
- The Anglo-Saxons also did this for the Modern-Day English word 'body'. They put together the root word 'bone' with the root word 'house' to make the word 'bonehouse (or *bānhūs*).
- We create new compound words all the time, particularly in science and technology.





Task 6 content

Old English word	Modern-Day English meaning
Andsaca	Enemy
Beadurinc	Warrior
Bearn	Child (son)
Bill	Sword
Casere	Emperor
Craeft	Art or science
Cyning	King
Deofol	Devil
Ealdor	Life (elder)
Fæder	Father
Folde	Earth, soil
Ides	Woman
Lufu	Love
Lyft	Sky, wind

Man	Crime
Preost	Priest
Sawol	Soul
Sped	Quickness
Sweostor	Sister
Wif	Wife
Woruld	World
Arleas	Dishonourable
Ariht	Right, properly
Atelic	Horrible, awful
Baldlice	Bravely, boldly

Beorht	Bright
Bysig	Busy
Ceald	Cold
Dyre	Dear, lovely
Eald	Old
Sarig	Sad, sorrowful

We are going to create three new English words!

- Firstly, using the Old English word dictionary above, make up your own, new Old English compound word.
- Remember, a compound word contains two or more root words that are put together to create a new word.
- For example, in Old English, there was no word for the thing we now call 'astronomy', so speakers put together the words 'tungol' (star) and 'craeft' (art or science) to make the word *tungolcraeft* (star-science).
- Once you have created your word, provide a definition.

Task 6 content

Old English word	Modern-Day English meaning
Andsaca	Enemy
Beadurinc	Warrior
Bearn	Child (son)
Bill	Sword
Casere	Emperor
Craeft	Art or science
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Ides	Woman
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Lyft	Sky, wind

Man	Crime
Preost	Priest
Sawol	Soul
Sped	Quickness
Sweostor	Sister
Wif	Wife
Woruld	World
Arleas	Dishonourable
Ariht	Right, properly
Atelic	Horrible, awful
Baldlice	Bravely, boldly

Beorht	Bright
Bysig	Busy
Ceald	Cold
Dyre	Dear, lovely
Eald	Old
Sarig	Sad, sorrowful

For example...

- You might select the Old English word **'Bill'** (meaning sword) and the Old English word **'Beadurinc'** (meaning warrior) to make the word **Billbeadurinc**.
- The definition of **Billbeadurinc** might then **be 'a warrior who carries a sword'.**
- You have 5 minutes to create three new Old English compound words and definitions.

Learning episode 5: Reflection/recap

Video 14 content

Why is it important to know about compound words?

- Understanding how to recognise a compound word (i.e., a word that contains two root words) can help us understand how to break some longer words into parts.
- Compound words help us create words for things that don't already have a name.
- Compound words allow us to be creative with language!
- You have nearly completed today's tutorial. You just have a few more questions to answer and then you can click submit!
- Well done for all of your hard work!

Task 7 content

Which of the statements below describe the term 'morphology'? You can select more than one answer.

- [ ] Morphology is about the history of English words
- [ ] Morphology is about the structure and forms of English words
- [ ] In morphology, we explore word parts, such as prefixes, root words and suffixes
- [ ] We can use our understanding of morphology to help breakdown words that we have not seen before
- [ ] In morphology, we trace the origins of words to see where they come from (i.e., Latin, Ancient Greek etc.)
- [ ] In morphology, we look at morphemes which are the smallest parts of a word that hold meaning

Which characteristics apply to a root word? You can select more than one answer.

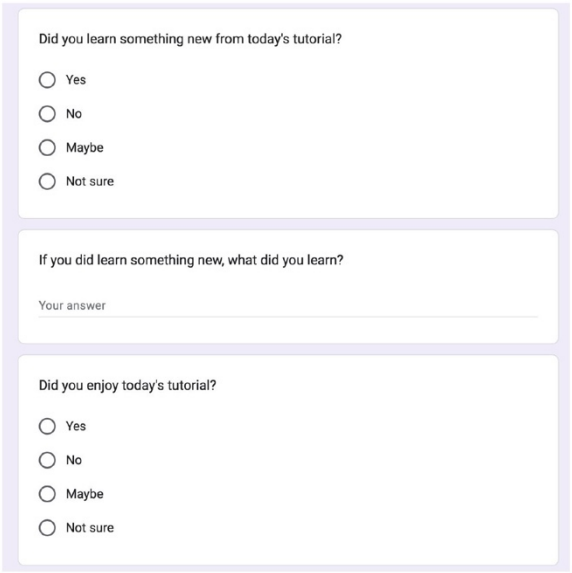
- [ ] A root word can stand by itself as a whole word
- [ ] A root word is the main part of a word that has meaning
- [ ] Some root words undergo sound and spelling changes when a suffix is added to them
- [ ] Sometimes, to identify a root word, we have to remove a prefix AND a suffix

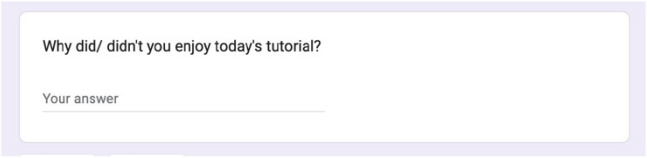
Use the space below to explain what a compound word is.

Your answer

Why do you think being able to spot a root word is important? What can a root word show us?

Your answer


Did you learn something new from today's tutorial?
Yes
No
Maybe
Not sure
If you did learn something new, what did you learn?
Your answer
Did you enjoy today's tutorial?
Yes
No
Maybe
Not sure


Why did/ didn't you enjoy today's tutorial?
Your answer

Video 15 content

Question answers

Which of the statements below describe the term 'morphology'? You can select more than one answer.

- [ ] Morphology is about the history of English words
- [x] Morphology is about the structure and forms of English words
- [x] In morphology, we explore word parts, such as prefixes, root words and suffixes
- [x] We can use our understanding of morphology to help breakdown words that we have not seen before
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Which characteristics apply to a root word? You can select more than one answer.

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- [x] Sometimes, to identify a root word, we have to remove a prefix AND a suffix

Appendix XIII: Tutorial 3

Vocabulary skills development programme

Tutorial 3:
Becoming a Word Master

PhD Tutor: Ellen Bristow, Cardiff University

What is your name? (Please provide your first and last name) *

Your answer

This is a required question

Which school do you go to? *

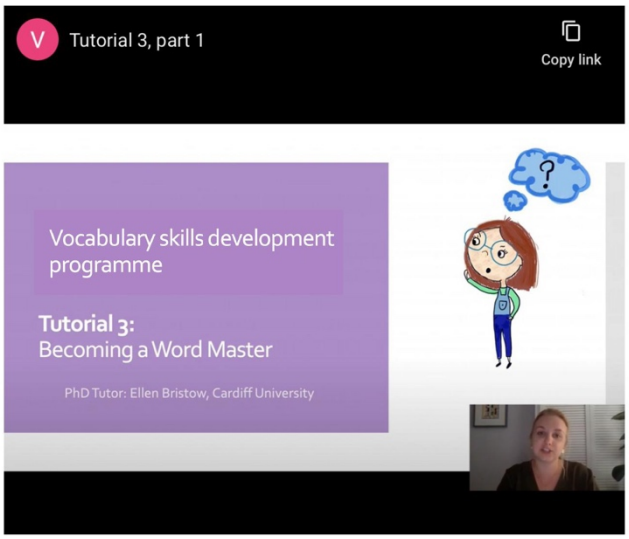
Your answer

This is a required question

Which year group are you in? *

- Year 5
- Year 6
- Year 7
- Year 8
- Other

Learning episode 1



Video 1 content

What is the purpose of tutorial 3?

- To build understanding of some Latin and Ancient Greek root word parts
- To expand understanding of common English prefixes
- To explore the im-, in-, il- and ir- prefixes and spelling patterns

Root words recap

- Root words are the main part of a word that holds meaning
- Last time, we looked at common English words that can prefixes and suffixes added to them to make new words
- However, sometimes, we use more historical word parts in Modern-Day vocabulary

For example:

The root word **'port'** appears in lots of Modern-Day English words. It can be used by itself (i.e., a port for ships), but it can also be used with prefixes and suffixes, and has a different meaning, too.

port is a Latin root word that means 'to carry'

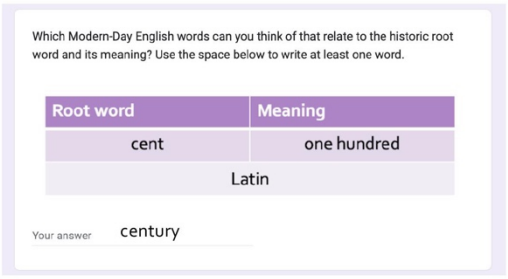
It appears in words like trans**port (to carry across)**, **port**able (to carry around), im**port** (to carry in to something) and ex**port** (to carry out of something).

For your next task, you will see a series of root words that originate from Latin or Ancient Greek…

Keep the video playing. After 15 minutes, a timer will go off. If you make it through all of the words, go back and see if you can come up with more than one word for each word root you have been given.

- Your task is to think about the meaning of the root word and see if you can come up with at least one Modern-Day English word that uses the root word.
- Take your time with this challenge and really think about how the meaning of the words connect.
- There are different levels to the challenge! It goes from level 1 to level 6. It starts off fairly easy but is really difficult by the end. See how far you can go in the challenge. Remember, just try your best!

Look at the example below:



Task 1 content

Level 1

Level 1

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
fort	strength
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
duc/duct	to lead
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
ject	throw
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
contra or counter	against
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
aud	to hear
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
struct	to build
Latin	

Your answer

Level 2

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
bene	good
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
sent	to send
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
ambi	both
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
circum	around
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
jud	judge
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
sec/sect	to cut
Latin	

Your answer

Level 3

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
man or manu	hand
Latin	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
-logy	the study of
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
meter/metr	measure
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
chron	time
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
dyna	power
Ancient Greek	

Your answer

Level 4

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
hydr	water
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
nym	name
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
scope	viewing instrument/tool
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
techno	art, science or skill
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
dys	bad, hard or unlucky
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
hypo	below or beneath
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
micro	small
Ancient Greek	

Your answer

Level 5

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
phon	sound
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
photo/phos	light
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
path(os)	feeling
Ancient Greek	

Your answer

Which Modern-Day English words can you think of that relate to the historic root word and its meaning? Use the space below to write at least one word.

Root word	Meaning
para	alongside, altered or abnormal
Ancient Greek	

Your answer

Level 6

WORD MATCH! Match the Latin/Ancient Greek word parts with their meanings

In the box below, write the letter next to a word part and match it with the correct number for its definition. For example:

A1
B2 etc.

A. ambi
B. dict
C. fract
D. port
E. stuct
F. rupt
G. scrib
H. sens
I. vis
J. voc
K. chron
L. dyna
M. gram
N. scope
O. tele

1. a piece of something that is broken
2. both
3. far off/far away
4. power
5. time
6. to break
7. to build
8. to carry
9. to feel
10. to see
11. to speak
12. to write
13. viewing instrument/tool
14. voice or to call
15. writing or drawing

WORD MATCH! Match the Latin/Ancient Greek word parts with their meanings

Answers

A. ambi → 2. both
B. dict → 11. to speak
C. fract → 1. a piece of something that is broken
D. port → 8. to carry
E. stuct → 7. to build
F. rupt → 6. to break
G. scrib → 12. to write
H. sens → 9. to feel
I. vis → 10. to see
J. voc → 14. voice or to call
K. chron → 5. time
L. dyna → 4. power
M. gram → 15. writing or drawing
N. scope → 13. viewing instrument/tool
O. tele → 3. far off/far away

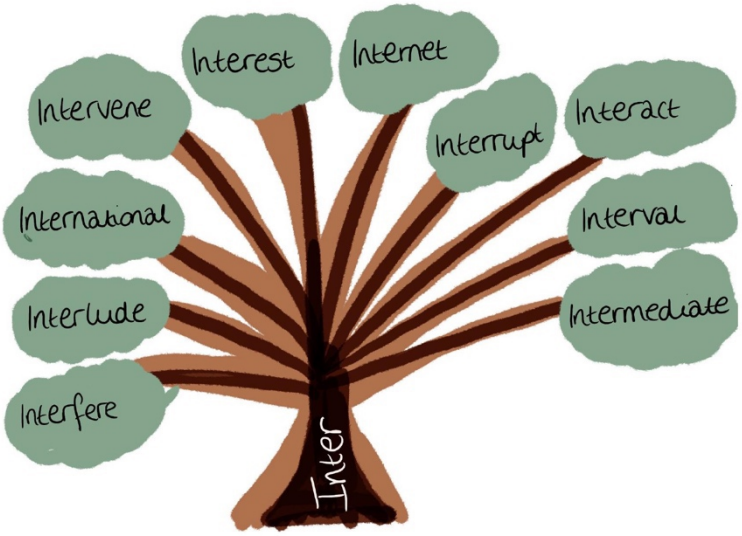
A2
B11
C1
D8
E7
F6
G12
H9
I10
J14
K5
L4
M15
N13
O3

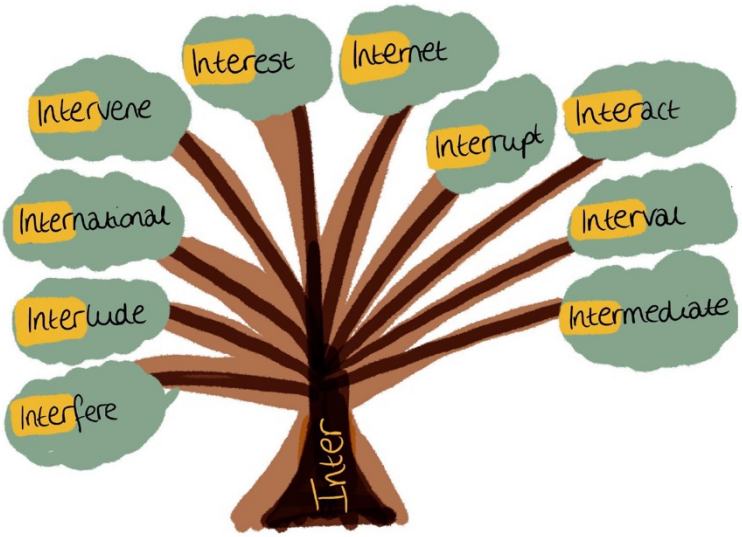
Learning episode 2

Video 2 content

Now that we have expanded our root word awareness, it's time to look at prefixes

- A prefix is a set of letters that are added to the beginning of a word to make a new word
- Prefixes do have meanings
- However, a prefix needs to be attached to a root word to make complete sense


Interest
Internet
Intervene
Interrupt
Interact
International
Interval
Interlude
Intermediate
Interfere
Inter


Interest
Internet
Intervene
Interrupt
Interact
International
Interval
Interlude
Intermediate
Interfere
Inter

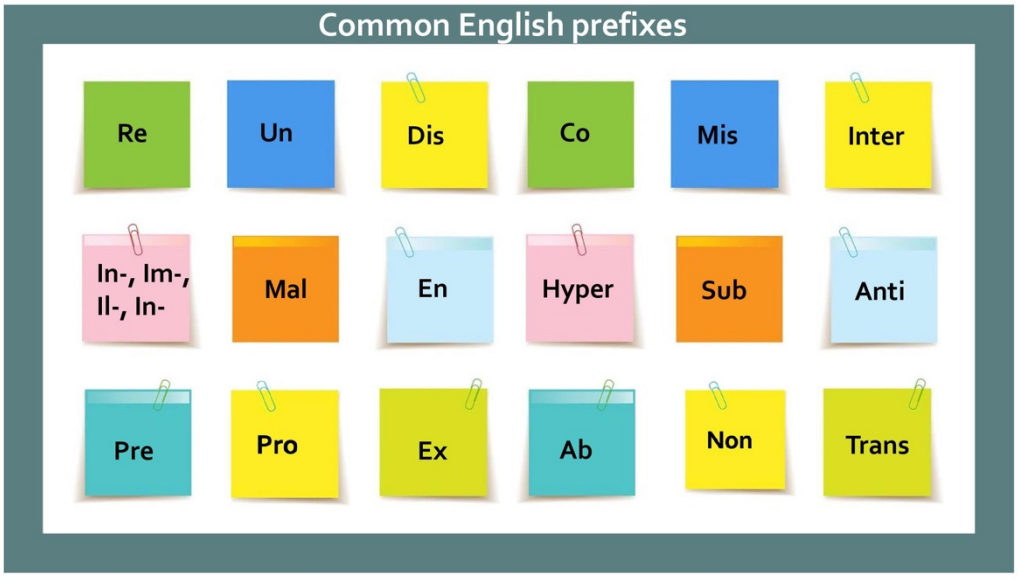
It changes the meaning of the root word!

But what does a prefix actually do?

Prefix + Root word = new word

un + happy = unhappy

with a new meaning



Prefix	Meaning	Example words
In-, Im-, Il-, Ir-	Not or opposite of	Inappropriate: Not appropriate Impossible: Not possible Illegal: Not legal Indecisive: Not decisive
Un	Not or opposite of	Unhappy: Not happy
Dis	Not or opposite of	Disrespectful: Not respectful
Non	Not or opposite of	Nonrenewable: Not renewable
Mis	Bad or wrong	Mismanage: Badly managed
Mal	Bad or wrong	Malnutrition: Bad nutrition or not
Re	Go back or again	Rebuild: Build again
Co	With or together	Cooperate: Operate together
Inter	Between, among or during	International: Between nations
En	In or into	Enforce: Force into
Hyper	Over, above or beyond	Hyperactive: Over active
Sub	Under	Submerge: Merge under
Anti	Against	Antisocial: Against being social
Pre	Before	Preheat: Heat beforehand
Pro	Forward or toward the front	Protest: Put ideas forward
Ex	Out of or without	Extract: Take out
Ab	Away from or down from	Abnormal: Away from the norm
Trans	Across or beyond	Transport: Carry across

Have you noticed that all of the example words contain a prefix and a root word?

The prefix changes the meaning of the root word.

Some words also contain a suffix (look at the word international = inter + nation + al!).

Productive VS. Non-productive prefixes

We don't **always** need to break a word into parts

- **Productive prefixes** contribute to the meaning of a word and often, can be added freely to root words (i.e., *un-* in *unhappy*).
- Some productive prefixes cannot be added/removed freely from a root word, but do contribute to a word's meaning (i.e., *pro-* in *project* and *prospect*).

HOWEVER

- **Non-productive prefixes** do not affect a Modern-Day English word's meaning.
- This is where we have to use our etymological awareness AND see if we can identify a clear root word.

For example:

Ex- is a prefix that means 'out of'. It can be used as a **productive prefix** in words like *exchange* and *export*. These words mean 'changing something out of' or 'carrying something out of'. The *ex-* prefix contributes to the meaning of the words. We can also remove the prefix and be left with the root words *'change'* and *'port'*.

Ex- also appears in words like *excitement* and *exist*. However, in these words it is a **non-productive prefix**. We can not take the prefix *ex-* away from these words because it does not leave us with clear root words. Also, these words do not directly relate to the idea of something going 'out of'. In these words, the meaning of the word part *ex-* has changed over time.

A prefix challenge

Keep the video playing. A timer will go off after 10 minutes and this indicates the end of the challenge.

- Use the prefix dictionary below to see if you can come up with one word for each of the prefixes on the list.
- Try not to use the example words you were just shown. Come up with your own!
- Think about the meaning of the prefix and the root word together and see if you can provide a short definition of the word

For example:

Which root word goes with the prefix **pre**?

wash = prewash

What is the meaning of your **pre** word?

Wash beforehand

Task 2 content

Prefix	Meaning	Example words
In-, Im-, Il-, In-	Not or opposite of	Inappropriate: Not appropriate Impossible: Not possible Illegal: Not legal Indecisive: Not decisive
Un	Not or opposite of	Unhappy: Not happy
Dis	Not or opposite of	Disrespectful: Not respectful
Non	Not or opposite of	Nonrenewable: Not renewable
Mis	Bad or wrong	Mismanage: Badly managed
Mal	Bad or wrong	Malnutrition: Bad nutrition or not
Re	Go back or again	Rebuild: Build again
Co	With or together	Cooperate: Operate together
Inter	Between, among or during	International: Between nations
En	In or into	Enforce: Force into
Hyper	Over, above or beyond	Hyperactive: Over active
Sub	Under	Submerge: Merge under
Anti	Against	Antisocial: Against being social
Pre	Before	Preheat: Heat beforehand
Pro	Forward or toward the front	Protest: Put ideas forward
Ex	Out of or without	Extract: Take out
Ab	Away from or down from	Abnormal: Away from the norm
Trans	Across or beyond	Transport: Carry across

Which root word goes with the prefix **pre**?

Your answer

What is the meaning of your **pre** word?

Your answer

Which root word goes with the prefix **re**?

Your answer

What is the meaning of your **re** word?

Your answer

Which root word goes with the prefix **un**?

Your answer

What is the meaning of your **un** word?

Your answer

Which root word goes with the prefix **dis**?

Your answer

What is the meaning of your **dis** word?

Your answer

Which root word goes with the prefix **co**?

Your answer

What is the meaning of your **co** word?

Your answer

Which root word goes with the prefix **mis**?

Your answer

What is the meaning of your **mis** word?

Your answer

Which root word goes with the prefix **inter**?

Your answer

What is the meaning of your **inter** word?

Your answer

Which root word goes with the prefix **mal**?

Your answer

What is the meaning of your **mal** word?

Your answer

Which root word goes with the prefix **en**?

Your answer

What is the meaning of your **en** word?

Your answer

Which root word goes with the prefix **hyper**?

Your answer

What is the meaning of your **hyper** word?

Your answer

Which root word goes with the prefix **sub**?

Your answer

What is the meaning of your **sub** word?

Your answer

Which root word goes with the prefix **anti?**

Your answer

What is the meaning of your **anti** word?

Your answer

Which root word goes with the prefix **pro**?

Your answer

What is the meaning of your **pro** word?

Your answer

Which root word goes with the prefix **ex**?

Your answer

What is the meaning of your **ex** word?

Your answer

Which root word goes with the prefix **pro**?

Your answer

What is the meaning of your **pro** word?

Your answer

Which root word goes with the prefix **ex**?

Your answer

What is the meaning of your **ex** word?

Your answer

Which root word goes with the prefix **ab**?

Your answer

What is the meaning of your **ab** word?

Your answer

Which root word goes with the prefix **non**?

Your answer

What is the meaning of your **non** word?

Your answer

Which root word goes with the prefix **trans**?

Your answer

What is the meaning of your **trans** word?

Your answer

Learning episode 3

Video 3 content

Im-
Il-
Ir-
In-

- These prefixes are all very similar. They all mean 'not or opposite of'.
- They sound very similar, and they are spelt similarly, too.
- However, when and where we use them depends on which root word we are looking to turn into a negative.

Im-
Il-
Ir-
In-

We use the **IM-** spelling if using a root word that begins with the letters **B, M** or **P: imb**alance**, imm**obile**, imp**ossible.

We use the **IL-** spelling if using a root word that begins with the letter **L: ill**ega**l, ill**egible.

We use the **IR-** spelling if using a root word that begins with the letter **R: irr**elevant, **irr**esponsible, **irr**egular.

We use the **IN-** spelling if using a root word that begins with **any other letter in the alphabet: in**capable, **in**decisive, **in**edible, **in**fallible, **in**genious, **in**hospitable, **in**numerate, **in**operable, **in**sightful, **in**tolerant, **in**voluntary.

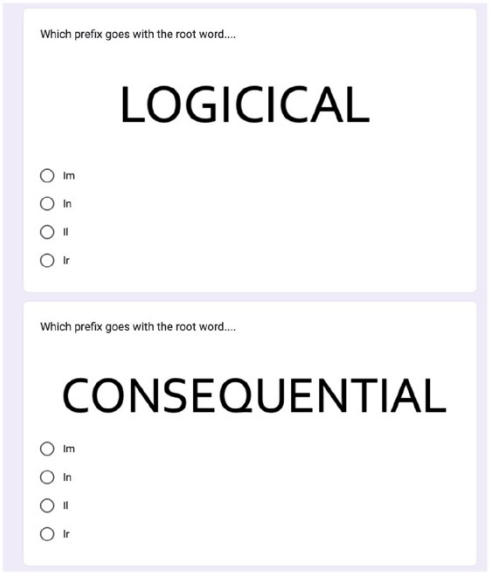
Your next task is a quick fire im-, il-, ir-, in- challenge!

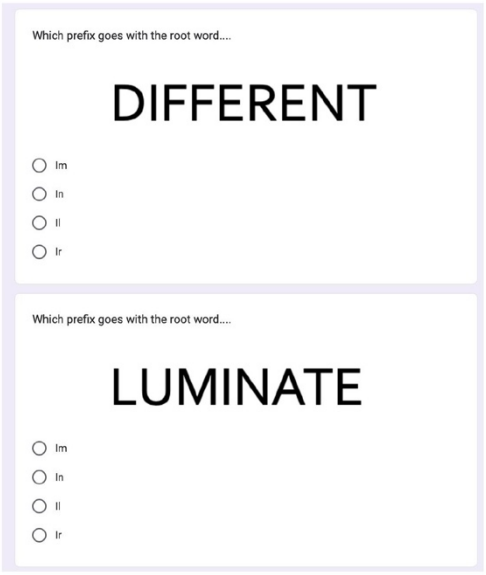
Keep this video playing. After 2 minutes the timer will go off. Just do your best!

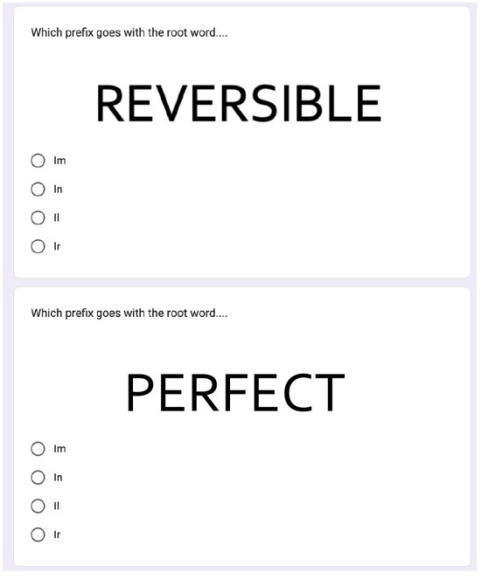
- You have 2 minutes to select the correct spelling of the im-, il-, ir-, or in- prefix that needs to be applied to a root word.

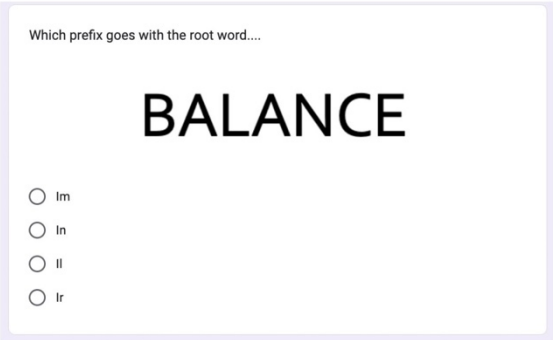
For example:

Task 3 content




Which prefix goes with the root word....
DIFFERENT
Im
In
Il
Ir
Which prefix goes with the root word....
LUMINATE
Im
In
Il
Ir


Which prefix goes with the root word....
REVERSIBLE
Im
In
Il
Ir
Which prefix goes with the root word....
PERFECT
Im
In
Il
Ir



Video 4 content

Challenge answers

IL + **L**OGICAL

IN + **C**ONSEQUENTIAL

IN +**E**XPERT

IR + **R**EPLACEABLE

IN + **D**IFFERENT

IL + **L**UMINATE

IR + **R**EVIERSIBLE

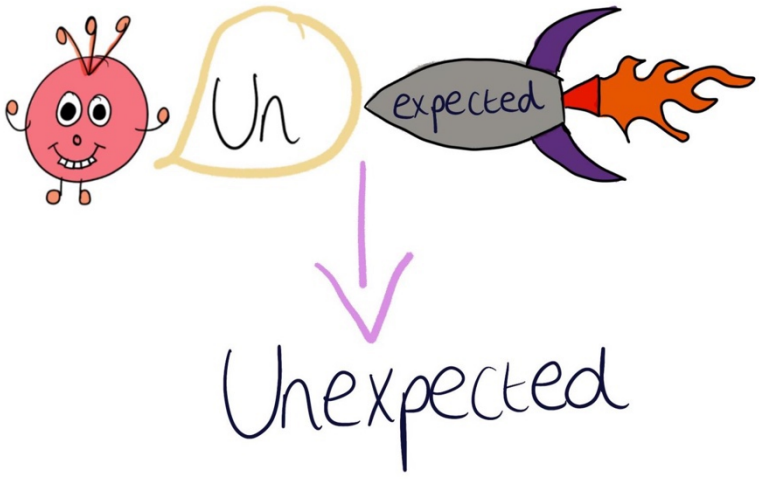
IM + **P**ATIENT

IM + **B**ALANCE

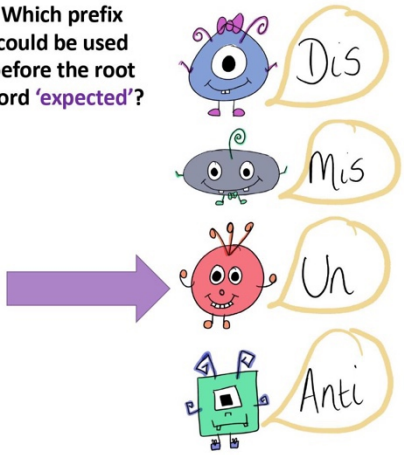
Video 5 content

Your next challenge: The aliens have landed!

- These aliens have landed and have got all their prefixes and root words confused!
- Each alien has a prefix and each spaceship has a root word.
- Your job is to match the correct prefix alien to the root word spaceship to make a new word.
- Let's look at an example...



Which prefix could be used before the root word 'expected'?



The prefix 'dis' means not or away from.
disallow **dismiss** **discard**

The prefix 'mis' means bad or wrong.
misbehave **misconduct** **mistrust**

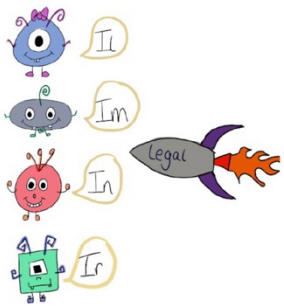
The prefix 'un' means not or the opposite of something
unhappy **uninterested** **unlock**

The prefix 'anti' means against.
antisocial **antibacterial**

Task 3 content

Question 1

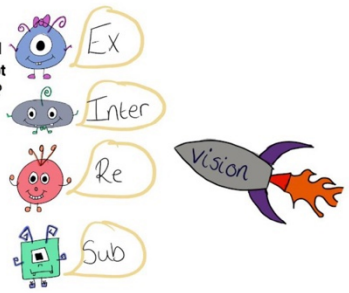
Which prefix could be used before the root word 'legal'?



- ○ Il
- ○ Im
- ○ In
- ○ Ir
- ○ Not sure

Question 2

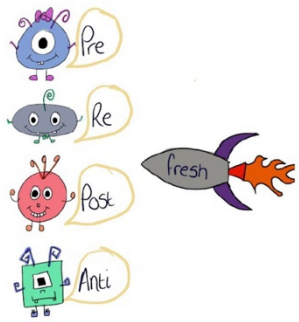
Which prefix could be used before the root word 'vision'?



- ◯ Ex
- ◯ Inter
- ◯ Re
- ◯ Sub
- ◯ Not sure

Question 3

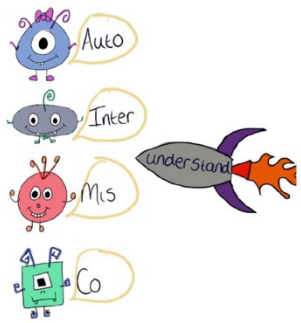
Which prefix could be used before the root word 'fresh'?



- ◯ Pre
- ◯ Re
- ◯ Post
- ◯ Anti
- ◯ Not sure

Question 4

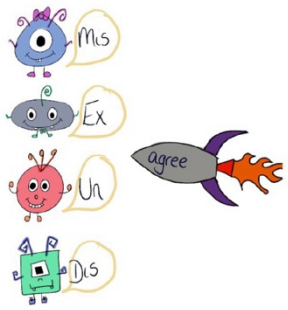
Which prefix could be used before the root word 'understand'?



- ◯ Auto
- ◯ Inter
- ◯ Mis
- ◯ Co
- ◯ Not sure

Question 5

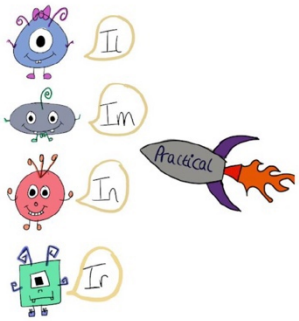
Which prefix could be used before the root word 'agree'?



- ◯ Mis
- ◯ Ex
- ◯ Un
- ◯ Dis
- ◯ Not sure

Question 6

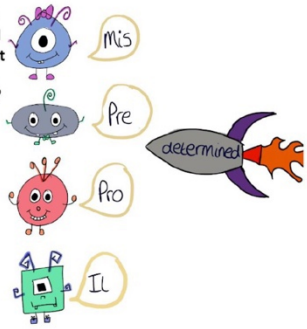
Which prefix could be used before the root word 'practical'?



- ○ Il
- ○ Im
- ○ In
- ○ Ir
- ○ Not sure

Question 7

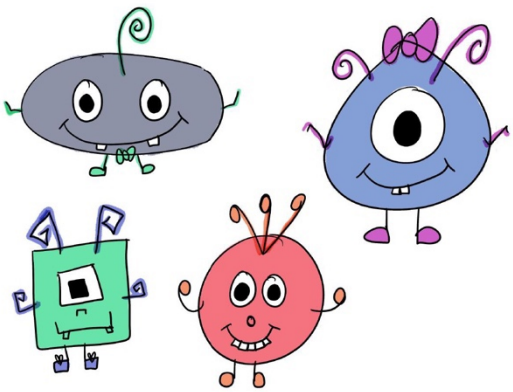
Which prefix could be used before the root word 'determined'?



- ○ Mis
- ○ Pre
- ○ Pro
- ○ Il
- ○ Not sure

Video 6 content

Did your aliens find the spaceship?



Which prefix could be used before the root word 'legal'?

These prefixes all mean **'not'** or **'opposite of'**

Il

If the root word begins with the letter 'l' we use the prefix **'il'.**
illegal **illegible**

Im

If the root word begins with the letters 'm', 'b' or 'p' we use the prefix **'im'.**
impossible **imperfect**

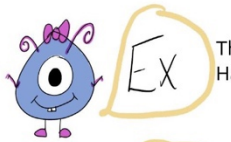
In

If the root word begins with any other letter of the alphabet we use **'in'.**
independent **inactive** **inexcusable** **incorrect**

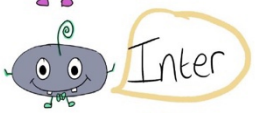
Ir

If the root word begins with the letter 'r' we use the prefix **'ir'.**
irresponsible **irregular**

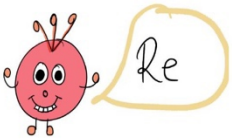
Which prefix could be used before the root word 'vision'?



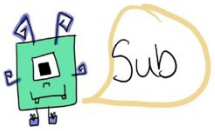
The prefix 'ex' means to go out of (think of the word exit or the Harry Potter spell "expelliarmus"!)



The prefix 'inter' means between or among.
international **interrupt**



The prefix 're' means again or back.
revise **redo** **revisit**



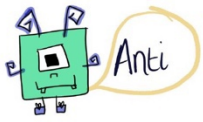
The prefix 'sub' means under or to take away.
submarine **subtract**

Which prefix could be used before the root word 'fresh'?

The prefix 'pre' means before.
predict **presume**

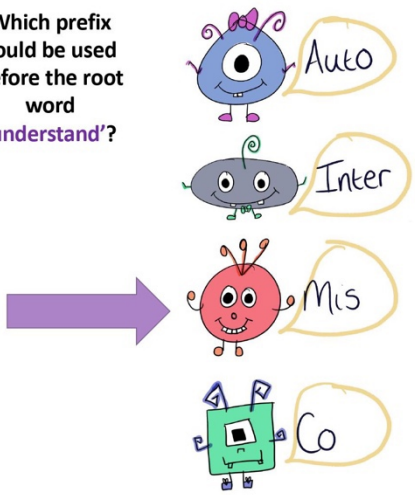
The prefix 're' means again or back.
refresh **reexplain**

The prefix 'post' means after.
postmodern **postgraduate** **postpone**



The prefix 'anti' means against.
antisocial **antibacterial**

Which prefix could be used before the root word 'understand'?



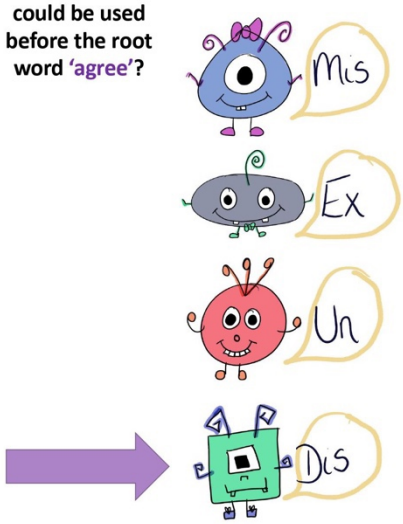
The prefix 'auto' means self.
autograph **automobile**

The prefix 'inter' means between or among.
interrupt **intermediate**

The prefix 'mis' means bad or wrong.
misbehave **misconduct** **mistrust**

The prefix 'co' means with or together.
co-worker **colleague**

Which prefix could be used before the root word 'agree'?



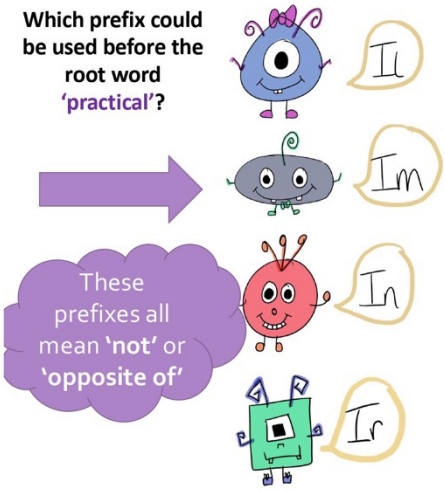
The prefix 'mis' means bad or wrong.
misbehave **misconduct** **mistrust**

The prefix 'ex' means to go out of (think of the word exit or the Harry Potter spell "expelliarmus"!)

The prefix 'un' means not or the opposite of something
unhappy **uninterested** **unlock**

The prefix 'dis' means not or away from.
disallow **dismiss** **discard**

Which prefix could be used before the root word 'practical'?



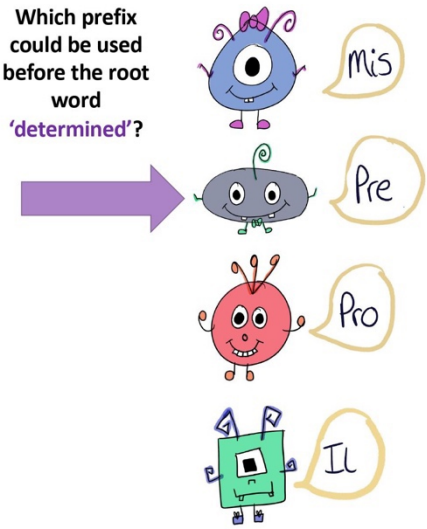
If the root word begins with the letter 'l' we use the prefix **'il'.**
illegal **illegible**

If the root word begins with the letters 'm' or 'p' we use the prefix **'im'.**
impossible **imperfect**

If the root word begins with any other letter of the alphabet we use **'in'.**
independent **inactive** **inexcusable** **incorrect**

If the root word begins with the letter 'r' we use the prefix **'ir'.**
irresponsible **irregular**

Which prefix could be used before the root word 'determined'?



The prefix 'mis' means bad or wrong.
misbehave **misconduct** **mistrust**

The prefix 'pre' means before.
predict **presume**

The prefix 'pro' means forward or to be for something.
project **propel** **proceed**

The prefix 'il' means not or without
illegal

Learning episode 4: Reflection/recap

A quick quiz

- Understanding how to recognise and decode (i.e., breakdown) the meaning of root words can help us work out the meaning of a word
- Prefixes sit at the beginning of a word. Not every word has a prefix, but by learning common English prefixes, we can develop skills in spotting them!
- Prefixes change the meaning of a root word (i.e. happy → unhappy)
- To conclude today's tutorial, you've got a short quiz to answer about the meaning of some key English prefixes and root words
- Well done for all of your hard work!

What does the prefix **un** mean?

Your answer

What does the prefix **re** mean?

Your answer

What does the prefix **dis** mean?

Your answer

What does the prefix **co** mean?

Your answer

What do the prefixes **in-**, **im-**, **il-**, and **ir-** mean?

Your answer

What does the Latin root word **port** mean?

Your answer

What does the Latin root word **vid** or **vis** mean?

Your answer

What does the Latin root word **spect** mean?

Your answer

What does the Ancient Greek root word **bio** mean?

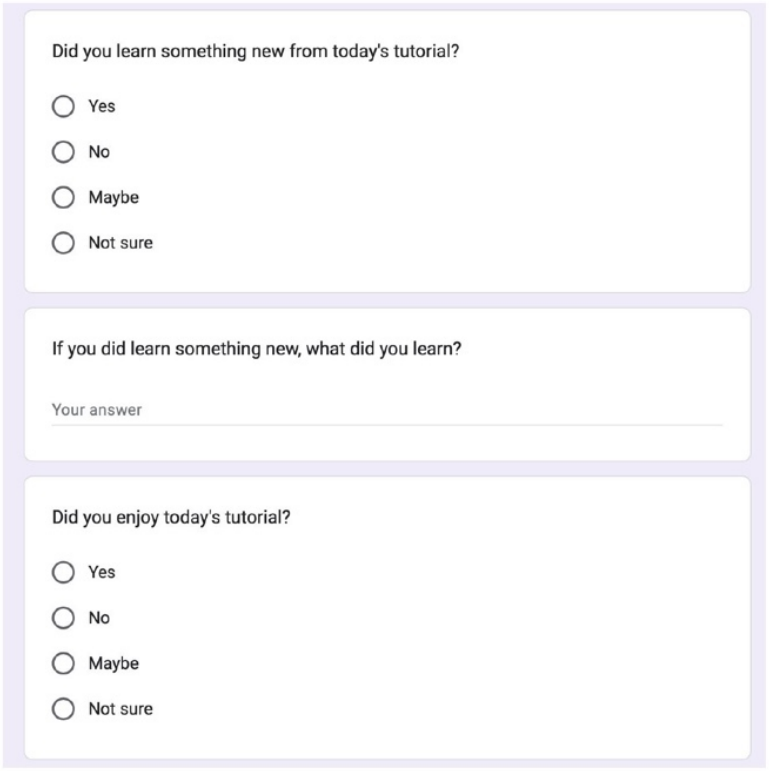
Your answer

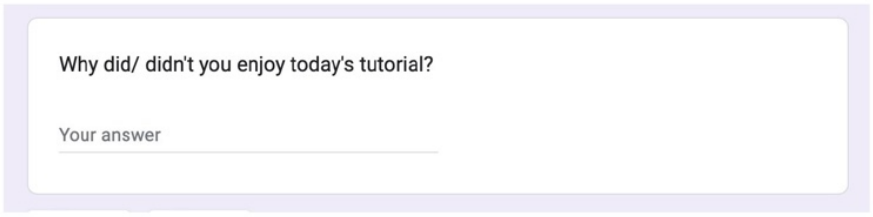
What does the Ancient Greek root word **graph** mean?

Your answer

What does the Ancient Greek root word **chron** mean?

Your answer


Did you learn something new from today's tutorial?
Yes
No
Maybe
Not sure
If you did learn something new, what did you learn?
Your answer
Did you enjoy today's tutorial?
Yes
No
Maybe
Not sure


Why did/ didn't you enjoy today's tutorial?
Your answer

Appendix XIIII: Tutorial 4

Vocabulary skills development programme

Tutorial 4:
Expanding vocabulary networks

PhD Tutor: Ellen Bristow, Cardiff University

What is your name? (Please provide your first and last name) *

Your answer

This is a required question

Which school do you go to? *

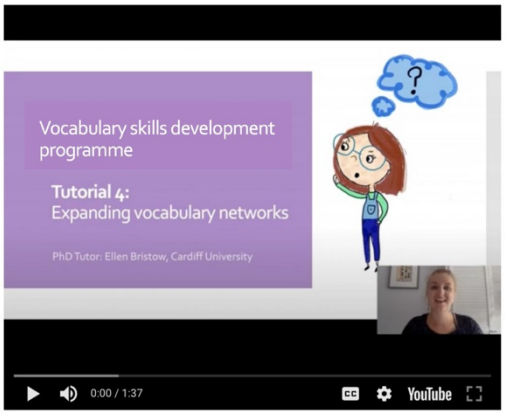
Your answer

This is a required question

Which year group are you in? *

- Year 5
- Year 6
- Year 7
- Year 8
- Other

Learning episode 1



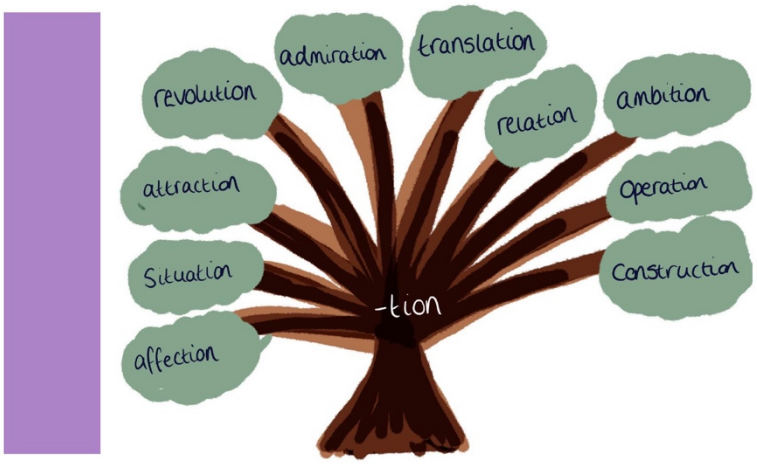
Video 1 content

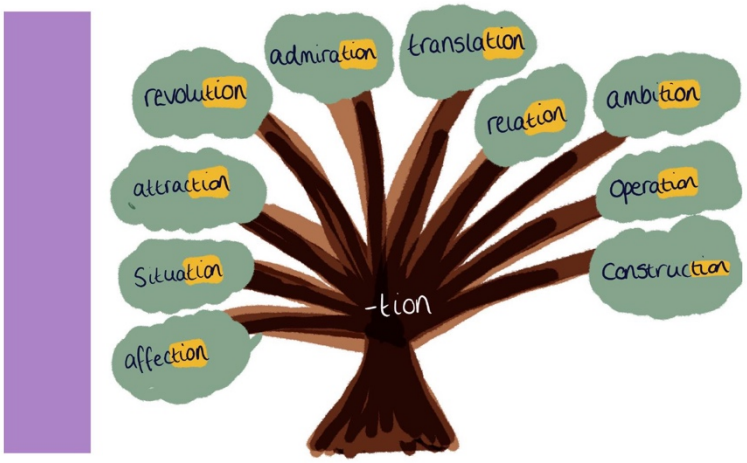
What is the purpose of tutorial 4?

- To understand more about suffixes
- To explore some common suffix spelling patterns
- Logomachy!
- To become a 'word master'

Suffixes

- A set of letters that are added to the end of a word to make a new word.
- It is a BOUND word part
- It needs to be attached to a root word to make sense

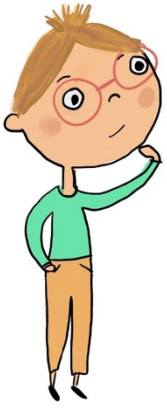

admiration
translation
revolution
relation
ambition
attraction
operation
situation
construction
-tion
affection


admiration
translation
revolution
relation
ambition
attraction
operation
situation
construction
-tion
affection

Inflectional Suffixes

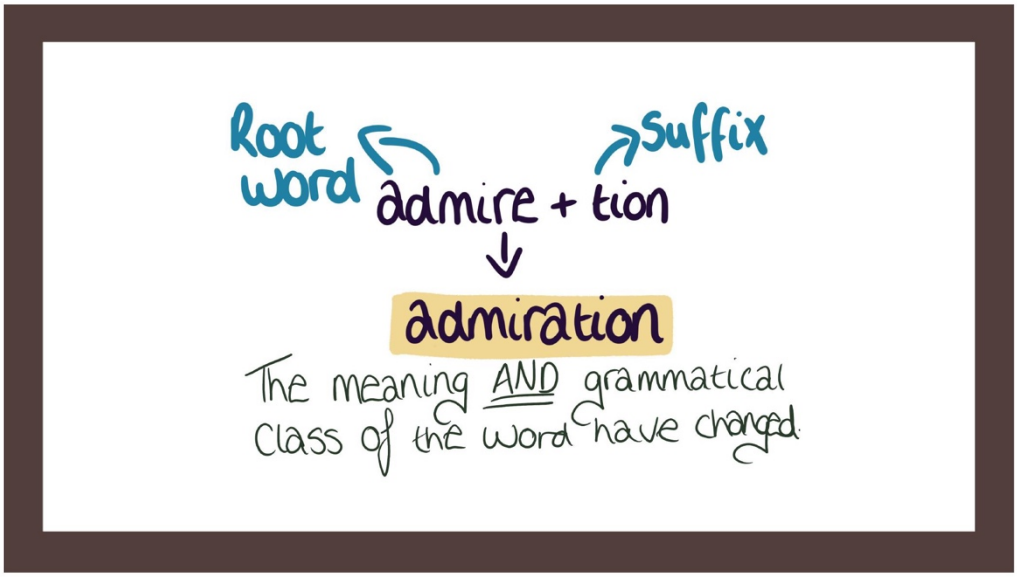
grammar

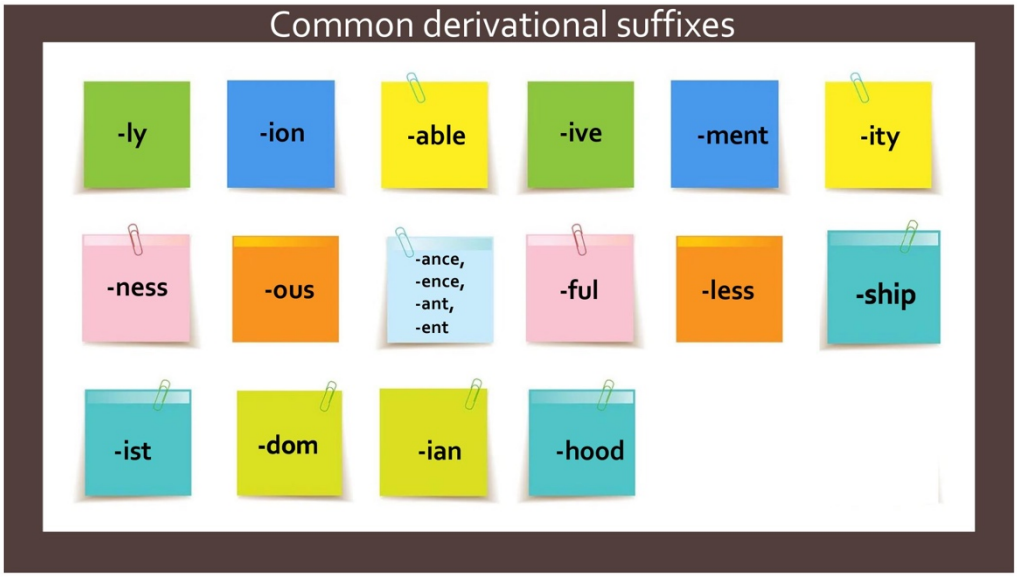
-ed
-s
-es
-ing



Derivational Suffixes

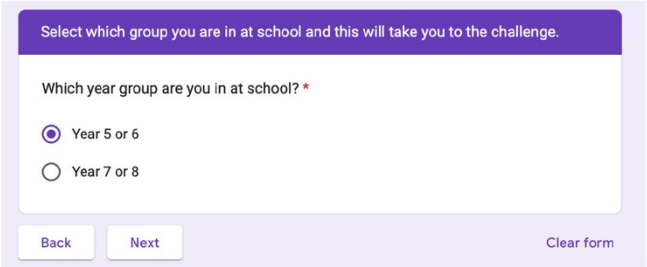
meaning + grammar


Root word
admire + tion
Suffix
admiration
The meaning AND grammatical class of the word have changed.


Common derivational suffixes
-ly
-ion
-able
-ive
-ment
-ity
-ness
-ous
-ance,
-ence,
-ant,
-ent
-ful
-less
-ship
-ist
-dom
-ian
-hood

Suffix	Meaning	Affect	Example words
-ly	Having qualities of or the form of	Used to form adverbs from adjectives	Abrupt → abruptly Suspicious → suspiciously
-ion	Condition of or action	Used to form nouns from verbs	To consid**er** → considera**tion** To explo**de** → explo**sion** To trans**mit** → transmi**ssion**
-able	Capable of or allowed	Used to form adjectives from verbs	Value → Valuable
-ive	Relating to or doing	Used to form adjectives from verbs	Create → creative
-ment	The result or product of something	Used to form nouns from verbs	Achieve → achievement
-ity	Condition or quality of	Used to form nouns from adjectives	Diverse → diversity
-ness	Action, quality or state of something	Used to form adjectives	Happy → happiness Sad → sadness
-ous	Full of or having to do with	Used to form adjectives from nouns	Thunder → thunderous Mystery → mysterious
-ance, -ence, -ant, -ent	State or quality of	Used to form nouns	Disturb → disturbance Refer → reference Infect → infectant Deter → deterrent

Suffix	Meaning	Affect	Example words
-ful	Full of	Used to form adjectives from nouns	Care → careful Beauty →beautiful
-less	Lacking or does not have	Used to form adjectives from nouns	Effort → effortless
-ist	One who does or makes	Used to form nouns	Vocal → vocalist Biology → biologist
-dom	State or judgment	Used to form nouns	Free → freedom
-ian	Pertaining to or related to	Used to form nouns	Music → musician
-ship	Quality, condition, relation between.	Used to form nouns	Friend → friendship
-hood	State or condition of being	Used to form nouns	Child → childhood



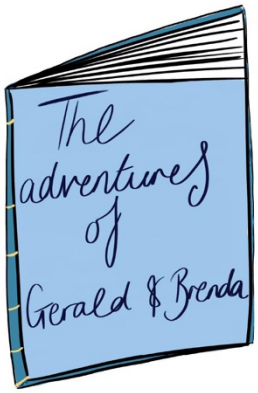
Years 5/6 video 2 content

A suffix challenge

You are going to read a story about two squirrels called Gerald and Brenda.

However, some of the words are missing from Gerald and Brenda's story!

You have been given a common English suffix and your job is to come up with a root word that the suffix could be attached to.



For example...

Once upon a time in a beautiful, enchanted forest lived two squirrels called Gerald and Brenda. They were no ordinary squirrels.

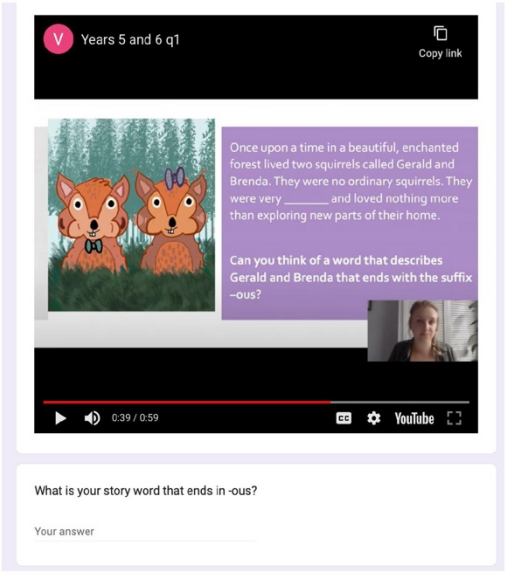
They were very **adventurous** and loved nothing more than exploring new parts of their home.

Can you think of a word that describes Gerald and Brenda that ends with the suffix –ous?

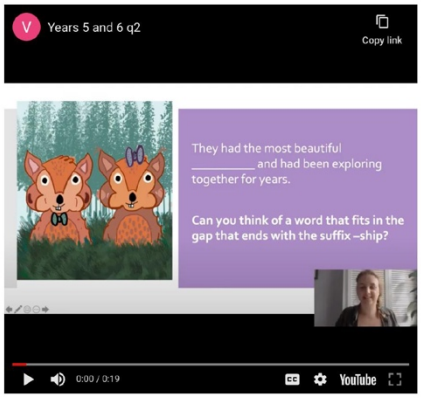
I have added the –ous suffix to the root word 'adventure'.

The story continues, but now it's your turn to fill in the missing words!

Years 5/6 task 1 content



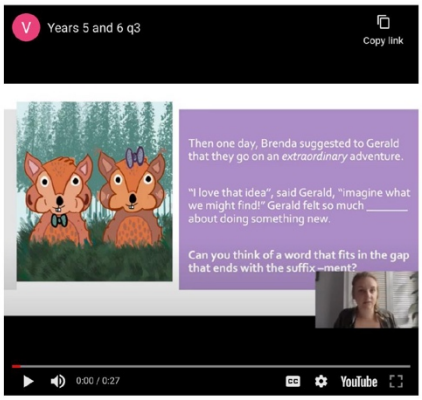
Question 2



What is your story word that ends in -ship?

Your answer

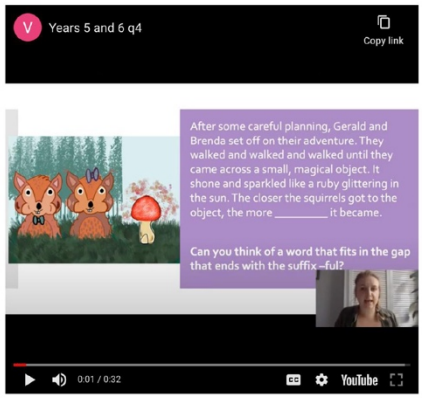
Question 3



What is your story word that ends in -ment?

Your answer

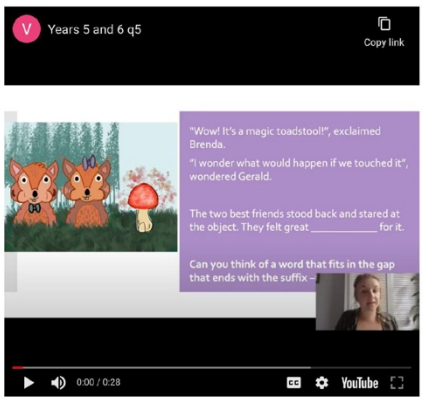
Question 4



What is your story word that ends in -ful?

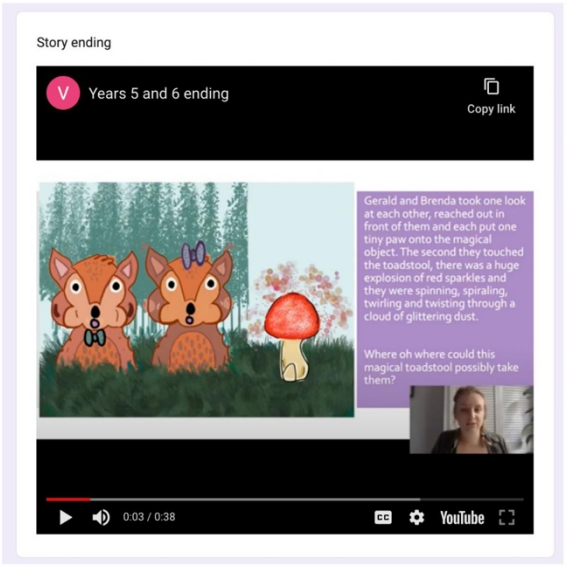
Your answer

Question 5



What is your story word that ends in -tion or -sion?

Your answer



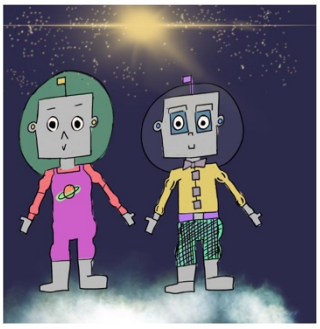
Years 7/8 video 2 content

A suffix challenge

You are going to read a story about two space robots called Fenella and Felix.

However, some of the words are missing from Fenella and Felix's story!

You have been given a common English suffix and your job is to come up with a root word that the suffix could be attached to.



For example…

Once upon a time in a cosmic land lived two space robots, Fenella and Felix. They were no ordinary space robots.

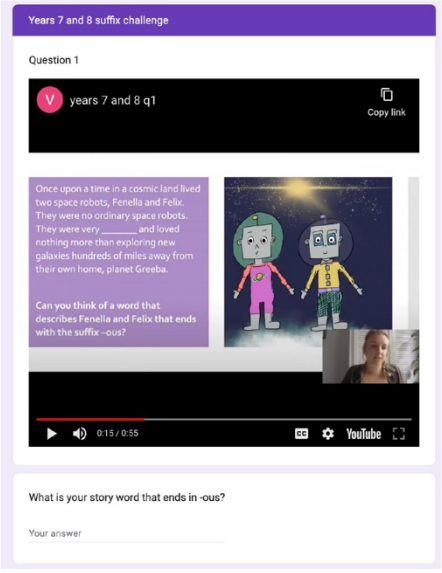
They were very **adventurous** and loved nothing more than exploring new galaxies hundreds of miles away from their own home, planet Greeba.

Can you think of a word that describes Fenella and Felix that ends with the suffix –ous?

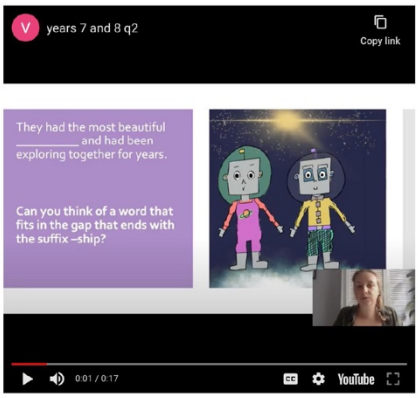
I have added the –ous suffix to the root word 'adventure'.

The story continues, but now it's your turn to fill in the missing words!

Years 7/8 task 1 content



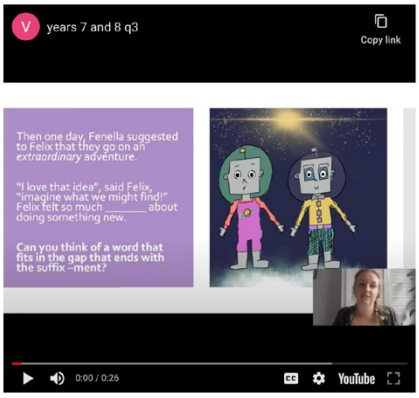
Question 2



What is your story word that ends in -ship?

Your answer

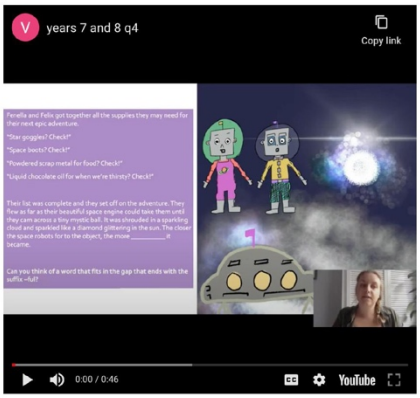
Question 3



What is your story word that ends in -ment?

Your answer

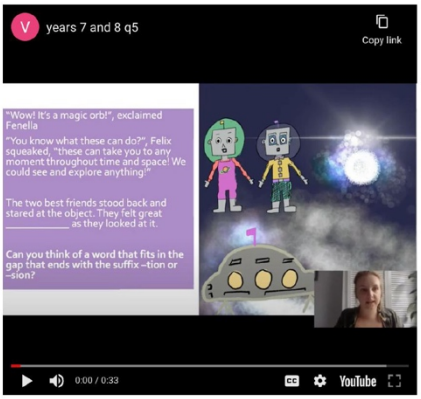
Question 4



What is your story word that ends in -ful?

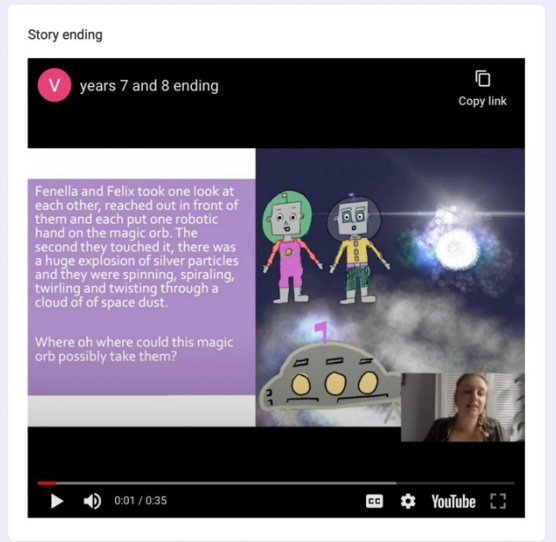
Your answer

Question 5



What is your story word that ends in -tion or -sion?

Your answer



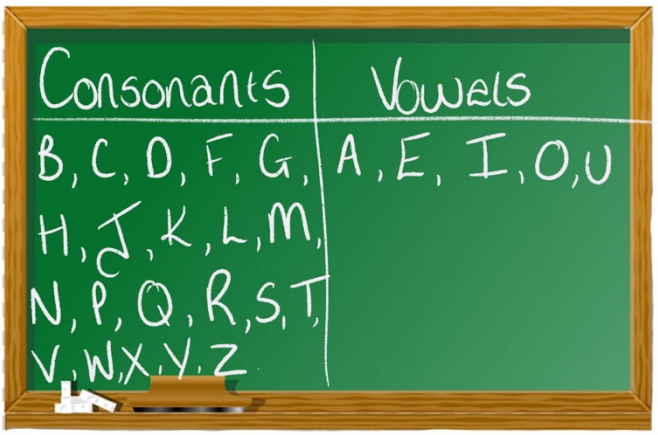
Learning episode 2

Video 3 content

Transparent vs. opaque root words

- In tutorial 2, we looked at the idea that some root words are transparent (see through) when we add a suffix, and some are opaque (not see through) when we add a suffix.
- This means that sometimes, it is easier to spot the root word than other times.
- Let's have a look at some tricks to help with this…

Consonants vs. Vowels



Some helpful tips

If a suffix starts with a consonant, it is added straight on to the root word without any changes.

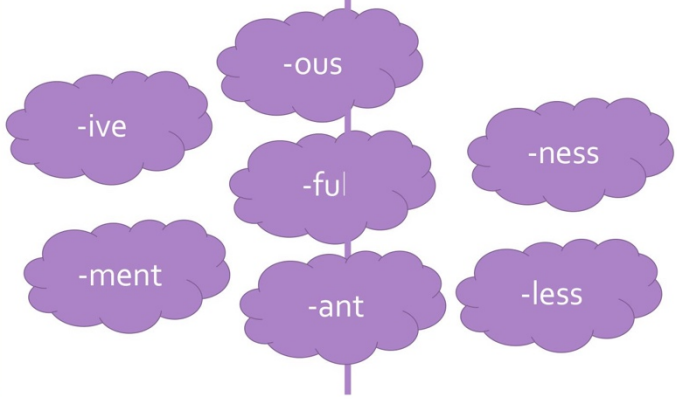
- Enjoy + **m**ent
- Sad + **n**ess
- Care + **f**ul
- Play + **f**ul
- Hope + **l**ess

Consonant = any letter in the alphabet that is not a vowel (a, e, i, o, u).

Task 2 content

Can we add the suffix straight to the root word?

Yes – it can be added straight to a root word (it begins with a consonant)	No – the spelling needs to change (it ends with a vowel)



Question 1

Which suffix should be added to the root word **GOOD**?

- ◯ The root word ends in a consonant, so just add the suffix -ness
- ◯ Change the last letter of the root word and add the suffix -ness
- ◯ Not sure

Question 2

Which suffix should be added to the root word **FAITH**?

- ◯ Just add the suffix -ful
- ◯ Just add the suffix -ment
- ◯ Not sure

Video 4 content

When should I use an 'i'?

Root words ending in consonant + y = change to an i

- Mer**r**y → Merri + ment
- Hap**p**y → Happi + ness
- Plen**t**y → Plenti + ful
- Pen**n**y → Penni + less

Only if the root word has more than one syllable.

Question 3

Which suffix should be added to the root word **HAPPY**?

- ◯ Change the 'y' to an 'I' and add the suffix -ness
- ◯ Do nothing to the root word and add the suffix -ness
- ◯ Not sure

Question 4

Which suffix should be added to the root word **BEAUTY**?

- ◯ Do nothing to the root word and add the suffix -ful
- ◯ Change the 'y' to an 'i' and add the suffix -ful
- ◯ Not sure

Video 5 content

-tion

-tion

It is used if the root word ends in **t** or **te**

considera**te** → considera**tion**

transla**te** → transla**tion**

-ssion

-ssion

–ssion is used if the root word ends in **ss** or **–mit.**

transmit → transmission
submit → submission
progress → progression

-sion

-sion

–sion is used if the root word ends in **d** or **se**

comprehend → comprehension
tense → tension

Exceptions: *attend → attention, intend → intention*

-cian

-cian

–cian is used if the root word ends in **c** or **cs**

music → musi**cian**

mathemati**cs** → mathemati**cian**

Select the suffix

- Can you add the correct suffix to the end of the root words you have been given?
- Use what you've learnt in this video to help you.
- Just try your best!

Question 5

Which suffix should be added to the root word **CONCENTRATE**?

- ◯ Just add the suffix -tion
- ◯ Take away the 'e' and add the suffix -tion
- ◯ Not sure

Question 6

Which suffix should be added to the root word **COMPRESS**?

- ◯ The root word already ends in 'ss', so just add -ion
- ◯ Add the suffix -tion
- ◯ Not sure

Question 7

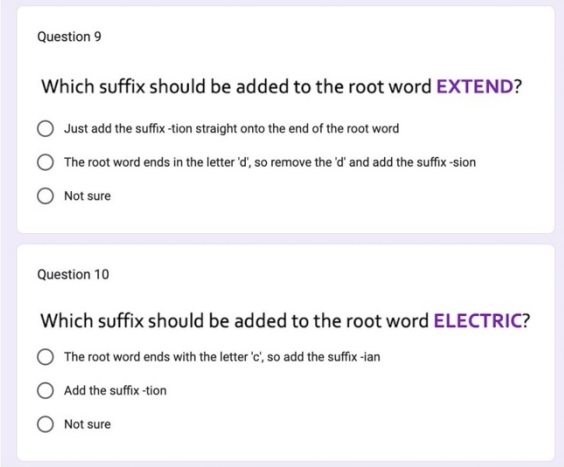
Which suffix should be added to the root word **REMIT**?

- ◯ The root word ends in 'mis', so remove the 't' and add the suffix -ssion
- ◯ Add the suffix -tion
- ◯ Not sure

Question 8

Which suffix should be added to the root word **SUSPENSE**?

- ◯ The root word ends in 'se', so remove the 'se' and add the suffix -sion
- ◯ Just add the suffix -sion straight onto the root word
- ◯ Not sure



Video 6 content

Which suffix should be added to the root word **HAPPY**? **Happiness**

Which suffix should be added to the root word **BEAUTY**? **Beautiful**

Which suffix should be added to the root word **GOOD**? **Goodness**

Which suffix should be added to the root word **FAITH**? **Faithful**

Which suffix should be added to the root word **CONCENTRATE**? **Concentration**

Which suffix should be added to the root word **COMPRESS**? **Compression**

Which suffix should be added to the root word **REMIT**? **Remission**

Which suffix should be added to the root word **SUSPENSE**? **Suspension**

Which suffix should be added to the root word **EXTEND**? **Extension**

Which suffix should be added to the root word **ELECTRIC**? **Electrician**

Learning episode 3

Video 7 content

Logomachy!

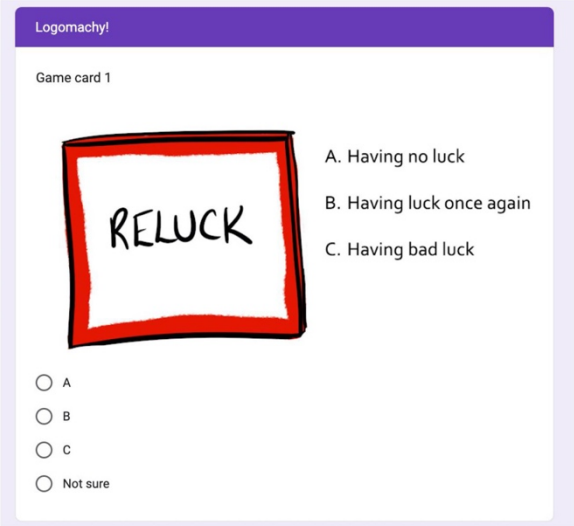
- Guess the meaning of the made up words
- Use you knowledge of prefixes, suffixes and root words to help you
- It's multiple choice!
- Just try your best!

Logomachy! Example

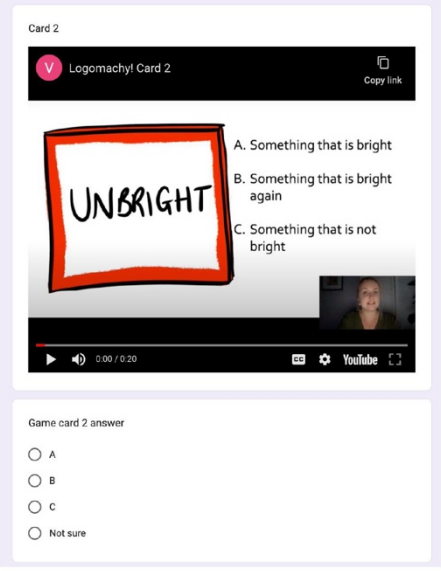
A) Something that is not pretty

B) Something that is very pretty

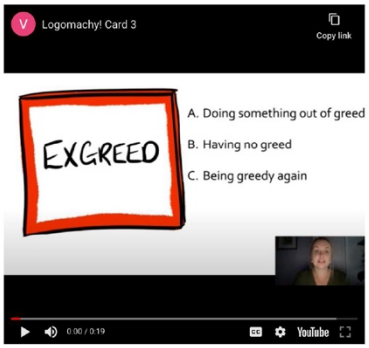
C) Something that is pretty again



Task 5 content



Card 3



Game card 3 answer

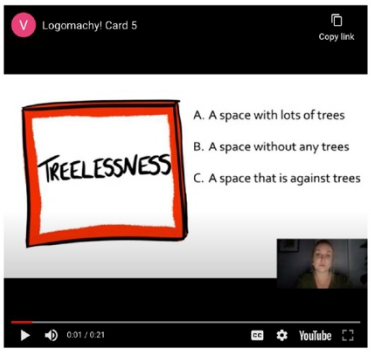
- A
- B
- C
- Not sure

Card 4

Game card 4 answer

- A
- B
- C
- Not sure

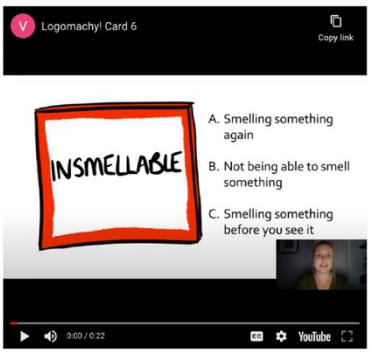
Card 5



Game card 5 answer

- A
- B
- C
- Not sure

Card 6



Game card 6 answer

- A
- B
- C
- Not sure

Card 7

Game card 7

- A
- B
- C
- Not sure

Game card 8

A. Jumping before you were going to

B. Jumping after you were going to

C. Jumping again

- A
- B
- C
- Not sure

Game card 9

A. Being really perfect

B. Not being perfect

C. Against being perfect

- ◯ A
- ◯ B
- ◯ C
- ◯ Not sure

Game card 10

A. Something with a target

B. Something without a target

C. Something that is targeted again

- ◯ A
- ◯ B
- ◯ C
- ◯ Not sure

Video 8 content

A. Having no luck

B. Having luck once again

C. Having bad luck

A. Something that is bright

B. Something that is bright again

C. Something that is not bright

A. Doing something out of greed

B. Having no greed

C. Being greedy again

A. Talking in between someone

B. Talking with someone

C. Talking against someone

A. A space with lots of trees

B. A space without any trees

C. A space that is against trees

A. Smelling something again

B. Not being able to smell something

C. Smelling something before you see it

A. Something that lacks the quality of being big

B. Something that is big again

C. Something that was big before

A. Jumping before you were going to

B. Jumping after you were going to

C. Jumping again

A. Being really perfect

B. Not being perfect

C. Against being perfect

A. Something with a target

B. Something without a target

C. Something that is targeted again

Learning episode 4

Video 9 content

Becoming a Word Master: Can you make up some of your own words?

- Follow the instructions in the next slides to find out what you need to do…

Creating new words using an etymology dictionary

Old English word	Modern-Day English meaning
Andsaca	Enemy
Beadurinc	Warrior
Bearn	Child (son)
Bill	Sword
Brim	Ocean
Casere	Emperor
Craeft	Art or science
Cyning	King
Deofol	Devil
Ealdor	Life (elder)
Fæder	Father
Folde	Earth, soil
Ides	Woman
Lufu	Love
Lyft	Sky, wind

Man	Crime
Preost	Priest
Sawol	Soul
Sped	Quickness
Sweostor	Sister
Wif	Wife
Woruld	World
Arleas	Dishonourable
Ariht	Right, properly
Atelic	Horrible, awful
Baldlice	Bravely, boldly

Beorht	Bright
Bysig	Busy
Ceald	Cold
Dyre	Dear, lovely
Eald	Old
Sarig	Sad, sorrowful

We are going to create three new English words.

- Firstly, using the Old English word dictionary above, make up your own, new Old English compound word.
- Remember, a compound word contains two or more morphemes that are put together to create a new word.
- For example, in Old English, there was no word for the thing we now call 'astronomy', so speakers put together the words 'tungol' (star) and 'craeft' (art or science) to make the word *tungolcraeft* (star-science).
- Once you have created your word, provide a definition.

Task 6 content

Whats is your new made-up Old English word? What is the definition of your word? Write your answers below.

Old English word	Modern-Day English meaning
Andsaca	Enemy
Beadurinc	Warrior
Bearn	Child (son)
Bill	Sword
Brim	Ocean
Casere	Emperor
Craeft	Art or science
Cyning	King
Deofol	Devil
Ealdor	Life (elder)
Fæder	Father
Folde	Earth, soil
Ides	Woman
Lufu	Love
Lyft	Sky, wind

Man	Crime
Preost	Priest
Sawol	Soul
Sped	Quickness
Sweostor	Sister
Wif	Wife
Woruld	World
Arleas	Dishonourable
Ariht	Right, properly
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Beorht	Bright
Bysig	Busy
Ceald	Cold
Dyre	Dear, lovely
Eald	Old
Sarig	Sad, sorrowful

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- Remember, a compound word contains two or more morphemes that are put together to create a new word.
- For example, in Old English, there was no word for the thing we now call 'astronomy', so speakers put together the words 'tungol' (star) and 'craeft' (art or science) to make the word *tungolcraeft* (star-science).
- Once you have created your word, provide a definition.

Your answer

Video 10 content

1. Use the prefix and Romance root word tables to make up a new Latin-rooted English word.

2. Remember, a prefix comes at the beginning of a word and can change the word's meaning.

3. Once you have created your word, write down a definition.

For example:
auto + fort = autofort

Autofort could mean 'one's own strength'.

Prefix	Meaning
anti	against
auto	self (oneself)
co or com	with or together
dis	not or away from
ex	out of
il	not or the opposite of something
im	not or the opposite of something
in	not or the opposite of something
ir	not or the opposite of something
inter	between or among
mis	bad or wrong
pre	before
post	after
pro	forward or to be for something
re	again or back
sub	under or to take away
un	not or the opposite of something

Romance root	Meaning
acer, acri	bitter
ambi	both
aud	to hear
brev	short
cent	hundred
dict	to say
duc(t)	lead, make
fort	strength
fract	break
fund	bottom
ject	throw
lev	to lift
luc, lum	light
manu	hand
mis, mit	send
port	to carry
rupt	to break
scrib, script	to write
sect/sec	to cut
sens	to feel
voc	voice; to call

Task 7 content

Whats is your new made-up Latin-based word? What is the definition of your word? Write your answers below.

Prefix	Meaning
anti	against
auto	self (oneself)
co or com	with or together
dis	not or away from
ex	out of
il	not or the opposite of something
im	not or the opposite of something
in	not or the opposite of something
ir	not or the opposite of something
inter	between or among
mis	bad or wrong
pre	before
post	after
pro	forward or to be for something
re	again or back
sub	under or to take away
un	not or the opposite of something

Latin root	Meaning
acer, acri	bitter
ambi	both
aud	to hear
brev	short
cent	hundred
dict	to say
duc(t)	lead, make
fort	strength
fract	break
fund	bottom
ject	throw
lev	to lift
luc, lum	light
manu	hand
mis, mit	send
port	to carry
rupt	to break
scrib, script	to write
sect/sec	to cut
sens	to feel
voc	voice; to call

Your answer

Video 11 content

1. Use the prefix and Ancient Greek root word tables to make up a new Ancient Greek-rooted English word.

2. Remember, a prefix comes at the beginning of a word and can change the word's meaning.

3. Once you have created your word, write down a definition.

For example:
Dis + graph = disgraph

Disgraph could mean 'to not write/not writing'.

Prefix	Meaning
anti	against
auto	self (oneself)
co or com	with or together
dis	not or away from
ex	out of
il	not or the opposite of something
im	not or the opposite of something
in	not or the opposite of something
ir	not or the opposite of something
inter	between or among
mis	bad or wrong
pre	before
post	after
pro	forward or to be for something
re	again or back
sub	under or to take away
un	not or the opposite of something

Ancient Greek root	Meaning
auto	self
bio	life
chron	time
dyna	power
dys	bad; hard; unlucky
gram	a written/drawn thing
graph	writing; drawing
hydr	water
hypo	below; beneath
logy	study of
meter/metr	measure
micro	small
nym	name
phon	sound
photo/phos	light
scop(e)	viewing instrument
techn(o)	art; science; skill
tele	far off

Task 8 content

Whats is your new made-up Ancient Greek-based word? What is the definition of your word? Write your answers below.

Prefix	Meaning
anti	against
auto	self (oneself)
co or com	with or together
dis	not or away from
ex	out of
il	not or the opposite of something
im	not or the opposite of something
in	not or the opposite of something
ir	not or the opposite of something
inter	between or among
mis	bad or wrong
pre	before
post	after
pro	forward or to be for something
re	again or back
sub	under or to take away
un	not or the opposite of something

Ancient Greek root	Meaning
auto	self
bio	life
chron	time
dyna	power
dys	bad; hard; unlucky
gram	a written/drawn thing
graph	writing; drawing
hydr	water
hypo	below; beneath
logy	study of
meter/metr	measure
micro	small
nym	name
phon	sound
photo/phos	light
scop(e)	viewing instrument
techn(o)	art; science; skill
tele	far off

Your answer

Video 12 content

Writing a short, creative story using the new words

- You have now created three new English words. One rooted in Old English, one in Latin and one in Ancient Greek.
- Your challenge is to write a short, creative story using at least one of the new words.
- Think carefully about the meaning of the words and how they may be used in a sentence.
- You have two story settings to choose from:

1) A mysterious, magical forest
2) A castle located in some remote hills

Play the video below while you are writing. You have 10 minutes to write as much as you can. When the timer goes off, move on to the next page of the tutorial.

Starting your story

You have 10 minutes to complete this task.

At the top of your page, write your three new words and their definitions:

Brimbeadurinc: Ocean warrior

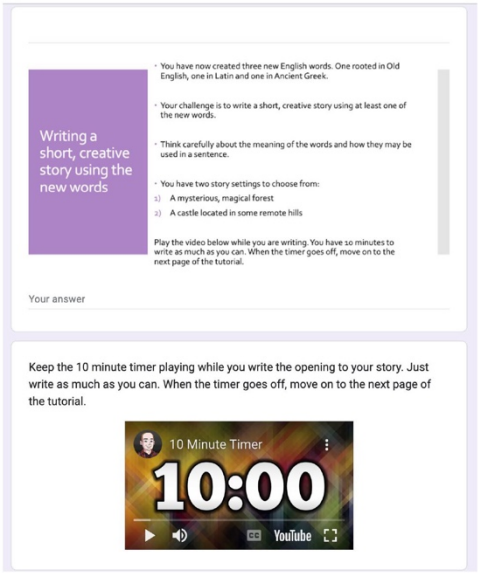
Autoform: One's own strength

Disgraph: to not write or not writing

Now, start your story by telling the reader where the tale begins...

This story begins in a castle that was hidden away in the remote hills of the Welsh coastline. In the castle, lived **Brimbeadurinc**, an ocean warrior who had travelled the seas to find a new home to raise his family. Brimbeadurinc was fierce and he relied on his **autoform,** his own strength, to ensure the safety of his loved ones and his castle. He was very tall, had a long, red, bushy beard and was proud to call the castle his home. Brimbeadurinc lived with his wife and two daughters, as well as lots of soldiers who had helped him win the battle to secure the castle as his home. One of the most important people in the castle was a witch who could see into the future and guess what was going to happen. She told stories around the fire but, because her stories told of things that were to happen in the future, she was told to **disgraph**. She could not write anything down in case her stories ended up in the wrong hands.

Task 9 content



Video 13 content

Course recap

On this course, we have explored:

Etymology

→Word families

→Word roots

→The influence of Latin, Ancient, Greek, Old English and French on English

→The meanings of key Latin and Ancient Greek roots

Morphology

→Word parts

→Word structures

→Prefixes, root words and suffixes

→How to identify a root word

→The meanings and functions of key prefixes and suffixes

Why have we done this?

I analysed the language of the last five years of GCSE English language and literature papers and found...

Table 1. Etymological origins of 500 low frequency words used in WJEC GCSE English language and literature past papers.

Word family	Language of origin	Percentage of low frequency words from the language of origin
Romance languages	Latin	28%
	Latin/French	24.5%
	French	18%
	Italian	0.6%
	Spanish	0.4%
Germanic languages	Old English	8.2%
	Germanic	5.8%
	Old Norse	0.8%
	Scandinavian	0.8%
	Dutch	0.2%
Ancient Greek		4.4%
Other/unknown origin		7.8%

Where can you find out more?

- **Etymonline:** https://www.etymonline.com
  The etymology dictionary for all your word research needs.
- **The Etymology Nerd:** https://www.etymologynerd.com
  This resource contains some fantastic posters, videos and an interactive map to explore the etymologies of words from all sorts of different topics. The interactive map allows you to travel the world and discover the origins different country's names.
- **A word a day:** https://wordsmith.org/words/yester.html

How can you use what you've learnt?

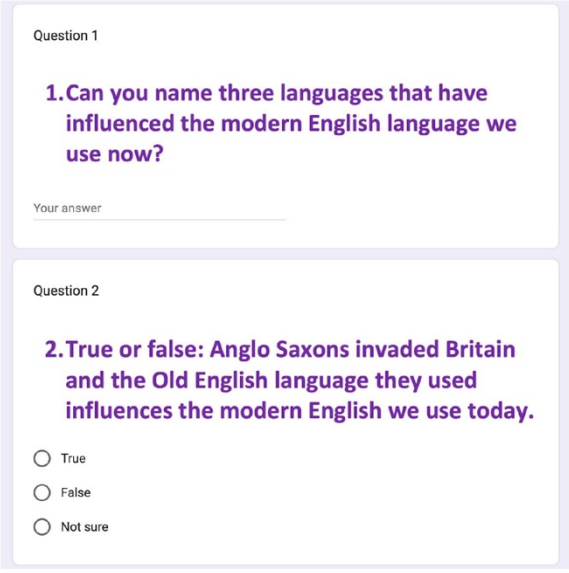
1. If you come across a word you've not seen before, try to break it down into parts.
2. What are the meanings of the different parts?
3. Can you then put it all back together again to figure out the word's meanings?

We're going to put all of this into action with one quick-fire quiz and questionnaire. See how much you can remember from all the work we've done.

Next week, you'll go back to being a word detective for one last time. See if you can use what you've learnt on this course to help you!

Well done for all your brilliant work!

Video 10 content



Question 3

3. True or false: The word 'etymology' means the study of the history of language.

- ◯ True
- ◯ False
- ◯ Not sure

Question 4

4. True or false: Greek does *not* influence any part of the English language.

- ◯ True
- ◯ False
- ◯ Not sure

Question 5

5. Write one sentence to explain what a root word is.

Your answer

Question 6

6. Write 3 root words that commonly occur in the books you read.

Your answer

Question 7

7. Where should you attach a prefix to a root word?

Your answer

Question 8

8. Where should you attach a suffix to a root word?

Your answer

Question 9

9. What does the prefix 'pre-' mean?

Your answer

Question 10

10. What does the suffix '-less' mean?

Your answer

Question 11

11. If the root word is more than one syllable long and ends in the letter 'y', what should you do before adding a suffix?

- ◯ Do not do anything to the spelling of the root word. Just add the suffix.
- ◯ Remove the letter 'y', add an 'i' and then add the suffix.
- ◯ Not sure

Question 12

12. Which spelling of the '-ion' suffix should be added to the root word 'comprehend'?

- ◯ The root word ends with the letter 'd', therefore the '-sion' spelling of the suffix is used to make the word 'comprehension'.
- ◯ The -tion spelling of the suffix should be used
- ◯ Not sure

Question 13

What do you think the word **transcribe** means?

Your answer

Question 14

What do you think the word **microscopic** means?

Your answer

Question 15

What do you think the word **inconsequential** means? Write your answer below.

Your answer

Question 16

Write as many words as you can that contain the Latin word root **sens**.

Your answer

Question 17

What do you think the word part **sens** means? How are the words above connected?

Your answer

Question 18

Write as many words as you can that contain the Ancient Greek word part **graph.**

Your answer

Question 19

What do you think the word part **graph** means? How are the words above connected?

Your answer

Question 20

Is the root of this word transparent or opaque?

unpredictable

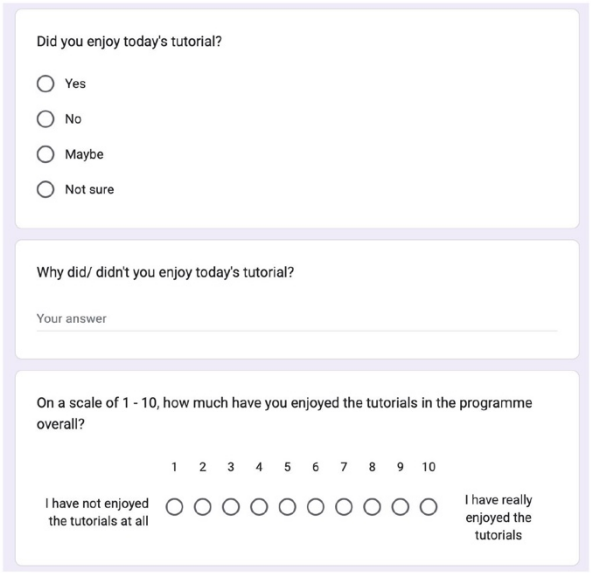
- ◯ Transparent (see through)
- ◯ Opaque (not see through)
- ◯ Not sure

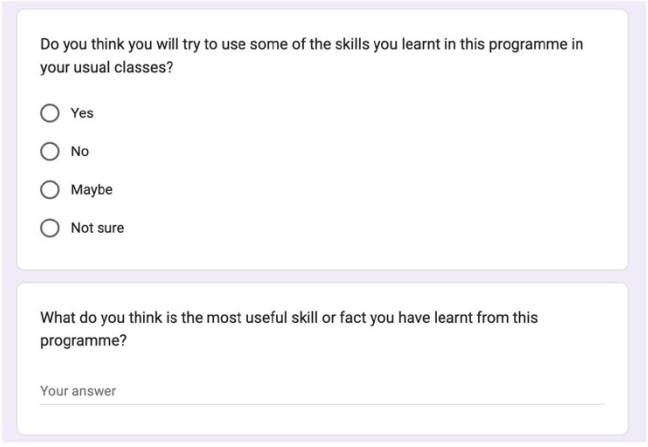
Did you learn something new from today's tutorial?

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not sure

If you did learn something new, what did you learn?

Your answer


Did you enjoy today's tutorial?
Yes
No
Maybe
Not sure
Why did/ didn't you enjoy today's tutorial?
Your answer
On a scale of 1 - 10, how much have you enjoyed the tutorials in the programme overall?
1 2 3 4 5 6 7 8 9 10
I have not enjoyed the tutorials at all
I have really enjoyed the tutorials


Do you think you will try to use some of the skills you learnt in this programme in your usual classes?
Yes
No
Maybe
Not sure
What do you think is the most useful skill or fact you have learnt from this programme?
Your answer