THE ROLE OF IMPLICIT AND EXPLICIT PREJUDICE IN CROSS-RACIAL EMOTION RECOGNITION

Paul Hutchings

School of Psychology

Cardiff University

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PUBLICATIONS

This thesis contains findings that have been presented in the following publication.

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ABSTRACT

This thesis examines whether individual differences in implicit and explicit prejudice, and the interaction between them, influence perception of in-group and out-group facial emotion displays. Study One found that viewing dynamic displays of emotion resulted in an in-group advantage (see Elfenbein & Ambady, 2002a), with White participants faster at recognising in-group displays of happiness and anger, and more accurate at recognising in-group anger. Participants high in implicit and explicit prejudice were significantly more accurate at recognising out-group anger than other participants. Study Two examined participants' ability to correctly recognise racial in-group and out-group faces and found no effect of prejudice on recognition accuracy, suggesting that prejudice may influence emotion perception and face perception differentially. Study Three utilised a paradigm devised by Ackerman et al. (2006) to explore this divergence, presenting emotion displays in a face recognition test. High implicit prejudice led to poorer recognition of out-group displays of anger when the facial display was manipulated between learning and test. Study Four examined whether emotion displays would lead to differential arousal dependent upon race of target and found that participants high in explicit prejudice were aroused by negative in-group displays (anger and sadness) and by out-group displays of anger, and an interaction between implicit and explicit prejudice influenced perception of out-group happiness. Finally, Study Five examined perception of emotion displayed by ambiguous race targets and found that participants high in implicit prejudice were more likely to classify an ambiguous angry face as Black, and also reported anger displayed by targets classified as Black as being of greater intensity than those classified as White. Overall, findings suggest that individual differences in implicit and explicit prejudice play a role in the perception of facial emotion; however, it is also important to examine the interaction between them.

INTRODUCTION

On the 40th anniversary of Enoch Powell's "Rivers of Blood" speech, in which Powell forecast animosity and hostility among races living together in the UK, the BBC commissioned a poll examining public attitudes towards race relations in the UK (BBC, 2008; Ipsos MORI, 2008). One of the main findings in the poll was that, despite 59% of respondents agreeing with the statement "there are too many immigrants" and 76% agreeing that "there is tension between different races and nationalities in the UK", only 20% of the sample classed themselves as racially prejudiced; 17% considering themselves 'a little racially prejudiced' and 3% 'very racially prejudiced'. This percentage of people classing themselves as prejudiced is slightly lower than in 2005, when 25% of respondents classed themselves as prejudiced (23% as 'a little racially prejudiced and 2% as 'very racially prejudiced'; Ipsos MORI, 2008).

The findings of this poll are of great interest, not just because they give us an insight into the current attitudes in British society towards racial and ethnic out-groups; they also highlight the apparent ambiguity that people suffer when attempting to understand and explain their own prejudices. Is it possible to believe that there is tension between races and that there are too many immigrants in the UK and still believe that one is not prejudiced towards other races or nationalities? Do our attitudes towards an out-group influence how we behave towards them without us necessarily being consciously aware of it? Existing research suggests that individual differences in prejudice may help provide answers to these questions. It is possible that through a combination of our explicit, public prejudices and implicit, subconscious opinions towards both out-groups

and our own in-groups, attitudes towards these issues may be expressed differently by the same person.

The area of interest for this thesis involves the ways in which individual differences in prejudice may influence the perception of emotion displayed by racial in-group and out-group members. Data from the 2001 National Census showed that 4.6 million people (7.9% of the United Kingdom population) reported themselves in the Census as non-White ethnic minorities (Office for National Statistics, 2003). This was an increase of 53% from the three million reported in the 1991 Census (Office for National Statistics, 2003). Whilst new data from the National Census will not be collected until 2011 and will not be published until 2013, population projections forecast by the Office of National Statistics suggest that, in England, ethnic minorities will make up between 13 - 16% of the overall population (Office for National Statistics, 2009). It can therefore be seen that, as immigration to the UK increases and as ethnic minority families already settled in Britain produce new generations of British citizens, opportunities for communication among different racial and ethnic groups increase. Many of these interactions may be fleeting and seemingly trivial; non-verbal communication such as emotion displays may play an important role in many social arenas, from merely passing someone in the street to more intimate contact between individuals. It is this component of interaction that is of interest in this thesis. Are the facial displays of emotion transmitted by one racial group interpreted accurately by other racial groups' members? Does the attitude of the message receiver influence their interpretation of those displays? Incorrect interpretation could have far-reaching implications for the subsequent interactions that may take place between the members of different racial groups.

The experimental chapters contained within this thesis will examine cross-cultural emotion recognition using several experimental paradigms, some that have classically been used to examine face and emotion recognition in previous research and some that are relatively novel to this type of work. By combining these methodologies with an underlying constant of examining individual differences in prejudice, it is hoped to carry out a robust exploration of the mechanisms behind the influence of prejudice on the perception of out-group emotion.

Chapter One will define the definitions and terminology used within this thesis, and also the boundaries of the literature to be covered in this research. It will set out the literature from the different perspectives most relevant to the current research. To understand the different areas that are covered in the experimental chapters, it is necessary to examine literatures from different domains within social and cognitive psychology. The classical literature of emotion recognition is a fundamentally important starting point for any such literature review, providing as it does the basis for cross-cultural emotion recognition research. However, it is also important to examine the face recognition literature, as the face itself has many important cross-cultural features that may influence emotion recognition. Finally, relevant work from the literature on prejudice will be examined. Each of these topics in themselves is vast and so, in order to maintain a literature review that focuses upon the issues relevant to this thesis, a broad overview of each will be given and then research more specific to cross-cultural emotion recognition will be focussed upon.

Chapters Two through Six will present the experimental methodology and findings from a set of experimental studies carried out throughout this PhD research. Finally, Chapter Seven will set out an overall summary of the findings, conclusions drawn from the research, as well as possible directions for future research on this topic.

CHAPTER ONE: LITERATURE REVIEW

Chapter Summary

The opening chapter of this thesis examines the literature relevant to the themes of the experimental chapters. It opens with an exploration of the early emotion recognition literature and examines cross-cultural emotion recognition in more detail, with particular reference to the in-group advantage (Elfenbein & Ambady, 2002a, 2002b). The face perception literature is covered from a general perspective and then, specifically, with regard to cross-racial emotion recognition and the other-race effect (Malpass & Kravitz, 1969). The prejudice literature is introduced with brief coverage of the broad theories of prejudice, followed by more detailed coverage of the issues of contemporary prejudice and the measurement of attitudes relating to race. The chapter concludes with a review of the literature that has incorporated the examination of how individual differences in prejudice may influence the perception of facial displays of emotion.

Emotion Expression Recognition

The Origins of Emotion Expression Research

Experimental evidence examining the ability to recognise emotion displayed by the human face stretches back many years. Whilst Darwin's (1859, 1872) work on the theory of evolution and the possibility of innate explanations for many human behaviours

are regarded by many as a starting point of experimental examination over philosophical theory, Darwin himself was quick to pay tribute to many others who had gone before him in the study of emotion. The introductory chapter of *The Expressions of Emotions in Man and Animals* (Darwin, 1872) acknowledged the many years of work by physiologists such as Duchenne de Boulogne (1862), who had examined and recorded in detail the muscular structure of the face. Duchenne also theorised a rudimentary form of universal emotion display, proposing that all faces would perform basic emotions in similar ways. In studying emotion expression displayed by humans from different cultures, Darwin largely relied upon reports from observers who were *in situ* and able to carry out direct observation of the people concerned. The cultures observed included Aborigines, Maoris, and Borneo Dyaks, as well as children and the mentally ill from British culture. Darwin concluded that some emotion expressions were largely governed by physiological responses producing muscular movement, and therefore visible expressions. This led Darwin to conclude

> That the chief expressive actions, exhibited by man and by the lower animals, are now innate or inherited – that is, have not been learnt by the individual - is admitted by everyone. So little has learning or imitation to do with several of them that they are from the earliest days and throughout life quite beyond our control (1872, p.348).

Through all of Darwin's work, his lasting impression can be seen on the formation and direction of experimental procedure and findings right through to the contemporary research; certain emotions being innate and then displayed in a similar fashion by all cultures due to the design of the facial muscles in the human face, and 'beyond control' of the individual (Darwin, 1872). Also, Darwin (1859) demonstrated how expressions serve as a tool for communication of inner states to others in social

interactions, evolved over a period before human language allowed us to vocalise our internal thoughts and feelings.

Despite continued interest in facial emotion recognition over the next few years, the major breakthrough came from a model of facial expression by Schlosberg (1954). He proposed three dimensions of emotion activation; *Pleasantness – Unpleasantness*; *Attention – Rejection*; and a *Level of activation* on a continuum from sleep to tension. These dimensions were able to account for many of the mistakes made by people in recognising emotions presented to them in pictures, by showing that the commonly confused emotions were often similar in their positions on the dimensions (Engen, 1971). Thus, errors made between items such as *mirth* and *happiness* could be accounted for by their similar position upon the pleasantness dimension, whilst the confusion of *surprise* and *fear* could be explained by their position upon the attention dimension. Furthermore, Engen claimed that facial emotion expression and recognition could now be measured in a psychophysical format as "the psychological scaling of attributes which can be measured on a physical continuum" (1971, p.55). Combining the physiological findings of discrete muscular movement for certain emotions with the ability to select emotions based upon their position on the Schlosberg model, pictures could be selected that displayed theoretically defined emotions to participants. If facial displays are truly representative of the emotional state of the person, then the facial expression could be used as an "observable indicator of unobservable emotional processes" (Kaiser & Wehrle, 2001, p. 61). It is this theoretical assumption that would form the basis for the methodology used throughout 1970s, arguably the zenith of the cross-cultural facial emotion recognition research.

Universal Emotion Expression

Possibly the most influential modern research in the study of facial displays of emotion is that of Ekman and colleagues (e.g., Ekman, 1993; Ekman & Friesen, 1971; Ekman, Sorenson, & Friesen, 1969). In studies of several different cultures, comprising of advanced literate (e.g., United States, Japan) and preliterate cultures (e.g., the Sadong of Borneo and the Fore of New Guinea), Ekman et al. (1969) presented participants with photographs showing emotion displayed by members of other cultures and asked them to identify the emotion being portrayed. Results indicated that several facial emotion displays were recognised at well above chance levels by *all* cultures, when viewing both their own culture displays and other culture displays. This led Ekman et al. (1969) to propose that emotions are categorical, in that there are distinct changes from one emotion to another, and that a number of emotion displays are *universal*, in that they are both displayed and recognised by all humans in all cultures. The emotions proposed as being universal are *happiness*, *sadness*, *anger*, *disgust*, *fear*, and *surprise* (Ekman & Friesen, 1969). Another emotion, *contempt*, has been proposed and examined in several of the articles mentioned in this thesis (e.g., Biehl et al., 1997; Matsumoto et al., 2000), but its inclusion as a universal emotion is still a contentious issue. Doubts have also been raised about whether *disgust* is a pure emotion or a mixture of other emotions (Kohler et al., 2004), but it remains recognised as a universal emotion due to the high recognition rate in studies.

The links between Ekman et al.'s (1969) universality theory and the early research findings, added to Darwin's beliefs of an evolution of emotion display and Duchenne's findings on muscle composition in the face, certainly appear to provide

strong evidence for these emotion displays being similar in many cultures. Many other studies carried out over the past few years have reported findings similar to those of Ekman et al. (1969), with the universal emotions displayed being correctly identified by participants in over 50% of trials in almost all studies (e.g., Ekman & Friesen, 1971; Izard, 1971; McAndrew, 1986). Participants in early studies (e.g., Ekman & Friesen, 1969; Ekman et al., 1969) showed recognition rates for all universal emotion displays of between 50% and 95%. Any accuracy rating over 50% means that the majority of participants correctly identified the displayed emotion. Happiness tends to produce the highest recognition accuracy rates, with fear usually showing the lowest (Ekman et al., 1987). Fear and surprise tend to show the highest rates of confusion, with the two of them sometimes being incorrectly labelled as the other (McAndrew, 1986). This may be attributable to their close proximity on the *attention* dimension, as was noted in Schlosberg's (1954) model, or may be due to many identical facial muscles being used for both emotions. The findings from these early studies led to an examination of constants that appeared in the facial expression whenever an emotion was displayed. For instance, in the *happy* emotion, the constant features of the cheeks rising and the lip corners pulling upwards could be argued to be characteristics of the expression. Ekman and Friesen (1978) compiled a list of the common features, termed *action units*, and used them to ensure that stimulus pictures matched the criteria for the portrayal of an emotion. Use of these pictures, created using the Ekman and Friesen (1978) Facial Action Coding System (FACS), across cultures has found a high degree of agreement as to which emotion was being displayed (e.g., Biehl et al., 1997; Matsumoto et al., 2000), although Shioiri, Someya, Helmeste, and Tang's (1999) study of a Japanese population found

deficits in recognition. The display of the required action units in order for a stimulus target to be classified as portraying a given emotion has been incorporated into many of the most commonly used stimulus materials in use for emotion recognition research (e.g., Ekman & Friesen, 1976; Matsumoto & Ekman, 1988; Matsumoto et al., 2000).

Finally, support for the universality hypothesis can be found to a certain extent away from the testing paradigm that has been discussed above. Studies by Eibl-Eibesfeldt (1973) found evidence for emotions expressed by children born deaf and blind being similar to those expressed by normally sighted children, including smiling, laughter, and anger. Similarly, studies of athletes either sighted, congenitally blind or noncongenitally blind found no differences in amount of displays of emotion upon winning a medal (Matsumoto & Willingham, 2009). This study also presents cross-cultural evidence, with athletes from 23 countries represented in the data. Whilst not ruling out some form of interactive learning, these findings strongly suggest an innate mechanism for the expression of emotion on the human face.

Criticisms of Universal Emotion Expression and Alternative Theories

Whilst seemingly a robust phenomenon, the universal emotion hypothesis has come under attack in recent years. One major focus of criticism has been the lack of convergence between correct recognition scores for specific emotions in different cultures. A 'strong' version of universality would hold that all cultures should recognise displays of the same emotion equally well, with no differences in correct recognition rates or mistakes made (e.g., mistaking 'surprise' for 'fear'). Russell (1994) analysed statistics provided in eight major studies and found that, whilst all cultures score well

above chance on correct recognition rates for each of the six emotions, there are sometimes quite large variations both within and among cultures. A study by McAndrew (1986) of American participants recorded a correct recognition rate of 92.5% for *disgust*, yet Russell reports Ekman's (1972) study as showing correct recognition rates for the same cultural group as 71.7%. Similarly, Izard (1971) reported correct recognition rates across cultures where American accuracy was 89.5% for *anger* but Japanese accuracy was only 56.8% and African accuracy was 50.8% for the same emotion. In standard emotion recognition paradigms, where the universal emotions are presented to participants and they are given a choice of the six universal emotion labels, the chance of a participant answering correctly purely by chance if answering randomly is 16.7%. However, whilst most studies produce results above chance levels, the differences in recognition that appear to exist both within and among cultures suggest that the strong version of universal emotion recognition should be rejected,.

Ekman's (1994) defence against Russell's (1994) criticisms highlighted that the initial universality theory was termed a '*pan-cultural theory*' (Ekman & Friesen, 1986; Ekman et al., 1969) precisely in order to account for differences among cultures. According to the pan-cultural theory, displays of anger in (for instance) American and Japanese faces may be identical at their outset, when the emotion is felt. However, in Japan the cultural expectations and social conventions (e.g., norms), may discourage the overt display of anger. This will then lead to a display of anger modified by these cultural norms, and this may produce differences in the expressions displayed by each culture. If the American culture does not discourage the display of anger in the same way then a different display will result, creating a disparity between the types of facial display of

emotion. These then become a culture's *display rules*, a set of conventions that exist but which may be modified as the culture changes. If this is true, claim exponents of universality, it would bring about the differences in recognition rates across cultures. The fact that in almost every study carried out cross-culturally, the correct emotion is chosen the majority of the time strongly suggests an underlying universal mechanism (Ekman, 1999). However, it is acknowledged that these mechanisms may be influenced by learnt display rules (Ekman & Friesen, 1986).

Russell (1994) also argues that the universal emotions are defined by the terms used in the culture of the researcher. By presenting other cultures with a forced choice method of answering, participants' opportunity to choose an emotion that may be relevant to their own culture is taken away. Russell (1994) reports that a study in which participants were given a free response choice to the emotion expression photographs showed results at, or just above, chance levels of correct recognition for some of the universal emotions. However, Rosenberg and Ekman (1995) contend that testing has also been carried out using a free-choice format, and that this has resulted in high compatibility between chosen words, validating the use of the forced choice format.

Finally, Russell (1994) also criticises the use of extreme displays of emotion, arguing that such extreme emotion is rarely seen in real life and recognition is therefore an artefact of the experimental paradigm rather than a true measurement of emotion recognition. Kilts, Egan, Gideon, Ely, and Hoffmann (2002) also argue that, based on studies using positron emission tomography (PET), static pictures of emotion elicit activation of separate brain areas to dynamic images of emotion, possibly suggesting a differential processing of stimuli in the human brain. It may therefore be the case that

static images do not accurately measure true emotion perception, leading to arguments that stimulus materials used for emotion recognition research should be of a dynamic quality to fully capture the abilities of humans to perceive emotion (Kilts et al., 2002). Dynamic displays of emotion do appear to show comparable levels of recognition to static images, within and across cultures (Hutchings, 2005). This is, however, an area of contention in the literature and one that remains to be fully addressed.

Russell's arguments against universal emotions are also supported by *social constructionism* (e.g., Gergen, 1994; Harré & Parrott, 1996). According to this paradigm, the values and beliefs of a culture directly influence the emotions felt and displayed by its members, and so cannot exist independently (Parrott, 2003). Gergen (1973) argues that the positivist approach of experimental examination such as the paradigms used to examine facial displays of emotion are largely redundant, as personal experience and knowledge of the culture is paramount. Evidence to support the arguments of social constructionism appear to exist through research into emotions that either existed in one cultural period but disappeared as the culture changed, or that exist in one culture but not another. Harré and Finlay-Jones (1986) give an example of *accidie*, an emotion described in pre-Renaissance times when one became bored and sad with religious duties and enthusiasm for them waned. Parrott (2003) describes accidie as an emotion linked to moral values. As values changed over time, with spiritual work playing a less important role in people's lives, so too did the emotion that was felt, until the term disappeared from usage. It is, however, a contentious issue as to whether the emotion itself ceased to exist, or whether the terminology in language altered to describe the emotion in a different way (Parrott, 2003). Similarly, the German term *schadenfreude*, meaning the

malicious pleasure taken in viewing another person's problems, is a term that does not appear to have an equal term in the English language (Rachels, 2004). It would be difficult to argue, however, that the emotion itself is not felt by English-speaking cultures (Ekman, 1999). This raises the question of how much emotion is defined by the terms in which it is described. Ekman (1999) suggests that, despite some of the cultures that have been studied possessing no word for certain emotions, the emotions themselves are still felt and displayed by that culture.

An alternative viewpoint to universality, and indeed much of emotion display research, is the theory of emotion expression as a purely communicative tool (Fridlund, 1991). Instead of a smile being produced as a positive emotion is experienced, Fridlund argues that it is a social gesture designed to encourage friendly interactions. Fridlund's (1994) Behavioural Ecology perspective uses as its foundation Darwin's theory of emotion expression, although in this case designed purely for social interaction. It would also seem to require intimate knowledge of the culture in which the person is immersed in order to understand the conventions of social interaction, although Fridlund did not consider this to be a vital component of the theory. Support for the theory has been provided by Yik and Russell (1999), who found that a choice of social messages conveyed by an expression could be chosen with a similar accuracy to a choice of emotions. Carroll and Russell (1996) described this as being based upon biological understanding of the natural world, where signalling one's true internal state may have adverse consequences for the organism concerned. Fridlund's (1994) own evidence in support of Behavioural Ecology showed that displays of facial emotion differed depending upon whether people were alone or with others. Zeman and Garber (1996) also

found that people display different facial expressions depending upon the type of audience that they are addressing a message to. However, to deny emotion as being involved in facial displays would involve ignoring much of the physiological and emotion research evidence. Studies examining both display rules and emotion (e.g., Jakobs, Manstead, & Fischer, 1999; Zaalberg, Manstead, & Fischer, 2004) suggest a combination of physiological emotion and knowledge of cultural display rules producing facial displays that are related to the internal emotion but which can be controlled to a certain extent. This also provides humans with the ability to deceive others with facial expressions (DePaulo & Friedman, 1998), an ability not accounted for in Darwin's theory of facial expressions as innate and uncontrollable. For instance, smiling has been classified as *Duchenne smiling*; incorporating a crinkling of the eyes and, according to Ekman and Friesen (1982), a sign of true felt emotion, or non-Duchenne smiling, which does not incorporate this eye-crinkling and may be a more socially facilitative expression. Facial expressions therefore appear to be indicators of people's mental states and their evaluative processes, a combination of emotion, cognitive reasoning, and motor abilities allowing people to interact with others (Kaiser & Wehrle, 2008).

An In-group Advantage for Emotion Recognition

If the pan-cultural theory was able to strongly suggest that six emotions are universal across cultures, a large gap in the explanation of data was left by the failure to account for differences caused by display rules. This part of the theory acts as a 'black hole' for discrepancies in the data, where differences in recognition rates across cultures can be accounted for through being labelled as 'cultural differences' and ignored.

Exploration of these differences was required to examine the possible causes of the discrepancies. Unfortunately, the terms *race* and *culture* appear to be used interchangeably in many papers on this subject, and this can cause confusion when examining the implications of both for cultural differences in emotion. Whilst the issue of what defines the term *race* is still a widely argued issue (Tate & Audette, 2001), most definitions propose that it has a physiological basis using features such as skin colour and physique as its basis (Jones, 2003). *Culture*, on the other hand, has been defined as the shared behaviours, attitudes and traditions of a group (Hofstede, 1980), transmitted across generations (Matsumoto & Juang, 2008). A term combining the physical and mental aspects of these two, *ethnicity*, sometimes serves to muddy the waters still further. It is, however, important to distinguish between race and culture when examining the cultural differences in emotion. Many of the studies already mentioned have tested participants from different cultures, and also used people from different cultures as stimulus materials, to examine the ability to recognise emotion displays. However in many cases not only did the culture differ but also the racial characteristics. For example, when American participants view pictures of their in-group and pictures of Japanese targets (out-group) can any differences that occur be explained as being caused by the cultural display rules of the targets being different, or the racial features of the target being different?

In emotion recognition, a meta-analysis by Elfenbein and Ambady (2002a) of emotion expression studies found an accuracy advantage when the picture target and the participant viewing the target were members of the same cultural group. Expressed by Kilbride and Yarczower (1983) as an *ethnic bias* in a similar way that the face

recognition literature recognises the *other-race effect*, Elfenbein and Ambady (2002a; 2002b) claim that this is in fact an *in-group advantage*. They argue that knowledge of the display rules used in one's own culture enables greater recognition of displays by that culture and that this is a feature of many experimental methods which can be seen across many forms of nonverbal communication such as tone of voice and body language (Elfenbein & Ambady, 2003a; 2003b). Elfenbein and Ambady draw parallels with the effects of vocal dialect; whilst English may be a common language amongst many people different dialects can exist even within relatively small geographical areas which may result in differences in understanding. Immersion within a dialect should lead to a greater understanding of the language, and Elfenbein and Ambady (2003a) argue that a similar approach may exist within emotion expression and recognition; immersion in a culture will lead to greater recognition of the emotions displayed by that culture.

Evidence in support of this theory comes from Elfenbein and Ambady's (2003b) findings that Chinese and American accuracy in emotion expression judgement was greater for those participants who recorded more exposure with the target culture. Furthermore, findings from their meta-analysis showed that increased exposure, such as living in the same country and increased communication, resulted in a smaller (but not negated) in-group advantage (Elfenbein & Ambady, 2002a). Some of these cross-cultural differences in emotion display and recognition may be due to differences in culture type. According to Hofstede's (1980) *Individualism – Collectivism* (I-C) and *Power Distance* (PD) dimensions, individualistic cultures (e.g., United States) would be expected to display more negative emotions to in-group members whereas the converse would be true for a collectivistic culture (e.g., Japan or India). This can be explained by the I-C

dimension where countries recognised as more collectivistic require greater harmony within their in-group, whereas individualistic cultures may have weaker but numerically more in-groups to which they belong (Triandis, 1995). The collectivist culture would also be expected to display more negative emotions about their out-groups, again in keeping with the I-C dimension. High scoring PD groups, such as the Japanese participants in Elfenbein and Ambady's (2003a) study, would also be expected to display more positive emotions to higher-status others, again in keeping with Hofstede's dimensions. Matsumoto (1992) did find some evidence of this, with American participants rating disgust and sadness towards in-groups as more appropriate than did Japanese participants on the I-C dimension, and Japanese participants rating anger as more appropriate to lower-status others on the PD dimension, even when emotions displayed were lowered in intensity (Matsumoto et al., 2002). Elfenbein and Ambady (2003c) have also found evidence for differences based upon these dimensions. However, Markham and Wang (1996) tested children from Japan and Australia and found no indication of differences based upon the I-C dimension. It appears that there are many aspects of emotion that do not match well to the dimensions, and this is an area of research that needs to be addressed in more detail.

Examining the in-group advantage within cultures would therefore appear to provide less ambiguous support for Elfenbein and Ambady's (2002a) theory, and this evidence is provided by the research of Thibault, Bourgeois, and Hess (2006), who examined whether individuals who identified more strongly with an in-group were better able to recognise emotions displayed by targets perceived to be from the same group. They found that this was the case and argued that the in-group advantage was caused by

perceivers expending more effort to *decode* the expressions displayed by the targets rather than differences in *encoding* displays on the part of the targets. Sporer (2001) argues that a shared social identity with a fellow in-group member will lead to increased attention being paid to that member. Rule, Ambady, Adams, and Macrae (2007) have also found an in-group advantage when viewing targets based on in-group and out-group sexual orientation, suggesting that increased identity with the in-group may lead to enhanced scrutiny of a target when they are also a member of the in-group. This suggests that the in-group advantage is a separate entity to the cultural display rules of Ekman and Friesen (1986), in that the decoding of the emotion expression has a role to play as well as the expression according to the display rules of the culture by the person displaying the emotion. Furthermore, an examination of different races within a culture (Weathers, Frank, & Spell, 2002) suggests that differences in emotion recognition may also be found across a racial dimension for several types of verbal and nonverbal communication. This study found that, even though they shared the same cultural domain, White and Black Americans showed differences in the recognition of facial emotion expressions displayed by racial in-group and out-group targets.

The methodology of these studies has been criticised by Matsumoto (2002) due to the testing of predominantly biased samples (e.g., only White participants instead of matched White and non-White participants) and the stimulus materials used. However, Elfenbein and Ambady (2002b) defended their meta-analysis by pointing out that meeting Matsumoto's criteria would have led to the exclusion of many studies that formed the basis for current emotion recognition literature, including much of Ekman's work. Whilst Matsumoto's criticisms may be theoretically justified in calling for an ideal

sampling population, the reality of the availability of many populations to researchers often makes this unfeasible. Research carried out may not have been perfect but it is, nevertheless, an attempt to focus the spotlight upon the cultural issues that have often been ignored in the emotion expression literature.

Neuropsychological and Physiological Influences of Emotion Expression

Whilst the above research suggests that recognition of several emotions is a universal, and possibly innate, ability, Scherer (1984) contends that is also susceptible to cognitive reasoning and motor function (Scherer, 1984). Research by Collins and Nowicki (2001) found that children's ability to accurately detect and discriminate between emotions develops with age. Collins and Nowicki suggest that this is a feature of a developing biological system. By the time they approach adulthood, humans show an extremely good ability to recognise emotions displayed upon the human face. This ability allows us to be capable of detecting certain emotions very quickly. McAndrew (1986) found that happiness could be recognised when presented to participants for only 25ms. Negative emotions took slightly longer to recognise, possibly because negative information is processed more thoroughly than positive information (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), with fear taking 300ms to recognise (McAndrew, 1986).

Studies of disorders such as autism and schizophrenia appear to lend support to Collins and Nowicki's (2001) biological development viewpoint. A consistent finding in the autism literature has been that people with autism have great difficulty recognising emotion displays and understanding the underlying emotion that the display reflects

(Baron-Cohen, 1991; Blakemore, Winston, & Frith, 2004; Martin & Weisberg, 2003). It is possible that activation of brain areas such as medial frontal lobe and superior temporal sulcus play an important role in the attribution of emotional state to a facial display (Blakemore et al., 2004). Other research in this area suggests that the amygdala in particular may play a vital role in recognition of the *happy* and *fear* expressions (Morris et al., 1996).

In people diagnosed with schizophrenia, depression and bipolar disorders, descriptions of impairment in emotion processing, including emotion recognition, are often recorded (Davison, Neale, & Kring, 2004; Habel et al., 2000; Kohler et al., 2004). This can cause problems in social interactions and may be an underlying cause of the social impairments often attributed to these disorders (Martin, Baudouin, Tiberghien, & Franck, 2005). Implications of dysfunction in the amygdala have been proposed (Martin et al., 2005; Young, Hellawell, Van De Wal, & Johnson, 1996), along with impairment of the frontal and prefrontal cortex (Sergeant, Ohta, MacDonald, & Zuck, 1994).

Impaired recognition of facial emotion expressions has also been found in people with degenerative diseases such as Alzheimer's (Hargrave, Maddock, & Stone, 2002), and in patients suffering from brain damage (Adolphs, Damasio, Tranel, Cooper, & Damasio, 2000). However, these data may be complicated by the findings of Calder et al. (2003) that aging can influence recognition of some facial emotion expressions, with evidence that recognition of disgust may remain stable but recognition of fear may deteriorate as a function of age. Calder et al. (2003) suggest that this could be due to differential damage to different neural areas in the brain, resulting in impairment to some

forms of recognition whilst others remain relatively intact. However, whilst Comblain, D'Argembeau, Van der Linden, and Aldenhoff (2004) found similar results they argue that this may be due to elderly participants focussing on their own feelings instead of focussing on the target stimuli in more detail (a cognitive difference) rather than a biological deterioration.

It therefore appears that some parts of the brain may be specialised in the recognition of emotion, but that different areas may be responsible for different emotions or types of emotion. It is not merely a case of one area being responsible for one emotion, and the complex links between different structures and under different circumstances need to be explored in far more depth before we will have an understanding of emotion recognition at a neuropsychological level.

One of the main issues within the literature pertaining to the neuropsychology of emotion expression is whether the stimulus materials used to display emotion are valid in their representations of emotion as perceived in everyday life. Following on from Russell's (1994) criticisms of the materials used in many emotion recognition studies, Kohler et al. (2004) complain that the pictures portray an emotion at a fixed point in time, an action that is rarely seen when actual emotions unfold over a time period. Wehrle et al. (2000) argue that the use of static pictures removes any dynamic attribute of muscle movement that may be an important component of true emotion recognition. Furthermore, several recent studies have suggested that the brain may process the dynamic movement of faces using different components to those used in the viewing of static photographs. Studies using fMRI have found increased activation of the amygdala when presented with a dynamic fear expression (Morris et al., 1996), increased activity in

the orbitofrontal and anterior cingulate cortex for dynamic anger (Blair, Morris, Frith, Perrett, & Dolan, 1999) and activation of the insula and basal ganglia for dynamic disgust (Calder, 2003; Calder, Lawrence, & Young, 2001). Research by Kilts et al. (2002) found that judgements of emotion activated separate neural areas depending upon the format of the stimuli displayed. In the case of static photographs, both happiness and anger were found to activate the prefrontal and parietal cortex. When presented dynamically, anger activated the cerebellum and many areas of the frontal cortex, whilst happiness activated the cuneus, temporal cortex, and areas of the frontal cortex. Kilts et al. (2002) point out that the areas activated by static photographs are those traditionally associated with motor activity. It is therefore possible that participants are trying to ascribe their own movement to the faces in order to make judgements.

It can be seen from the neuropsychology literature that this is still an area of research in its infancy; new techniques for the exploration of the neuropsychology of emotion expression are having an impact, both in terms of the understanding of the areas of the brain involved in emotion expression recognition and also the validity of the methods of testing throughout the last 50 years. Whilst research into the neuropsychology of emotion expression is beyond the scope of the work in this thesis, it has helped to formulate paradigms for testing of emotion expression and for informing of possible limitations of the testing processes.

Whilst neuropsychological structures appear to influence the perception of emotion, consideration must also be given to physiological responses. Emotion displays appear to elicit responses in others, as one would expect if their prime function is to inform others of our intentions and feelings (Russell & Mehrabian, 1977). A study by

Droit-Volet, Brunot, and Niedenthal (2004) presented participants with target faces displaying angry, happy, sad, and neutral faces for a number of lengths of time (between 400ms and 1600ms) and asked them to judge whether the faces had been displayed for a short (400ms) or long (1600ms) duration. Droit-Volet et al. (2004) found that participants significantly overestimated the 'long' displays of emotion faces compared to neutral faces and were more likely to classify them as having been displayed for a long length of time. Droit-Volet et al. (2004) explain this finding in terms of the target emotion faces activating arousal in the participant, speeding up a biological internal clock that then makes them overestimate time. Further research into this phenomenon (Effron, Niedenthal, Gil, & Droit-Volet, 2006) found that this arousal effect could be negated by preventing the participants from mimicking the displayed emotion, suggesting that physiological responses play a part in the perception of emotion.

Overall, whilst evidence for some form of universal emotions across different cultures appears to be compelling, further refinements of methodologies and measurement appear to show cultural variations in both displays and recognition of emotion. Displays of emotion appear to be controlled, to a certain extent, by the display rules of the target culture. However, it also appears that the cognitive processes and understanding of the culture on the part of the perceiver also have a role to play, and these factors must all be taken into account when exploring cross-cultural emotion expression recognition.

Face Recognition

Links Between Face Recognition and Emotion Recognition

The link between face recognition and emotion recognition appears to be quite strong, with evidence that the configural relationship between the features of a face may play an important role in emotion recognition (Calder, Young, Keane, & Deane, 2000). Children's ability to recognise faces accurately also appears to mirror their ability to recognise emotions accurately (Stevenage, 1995), with some deficiencies relative to adult abilities (Collins & Nowicki, 2001), but with no gender differences (Duhaney & McKelvie, 1993; Edwards, Manstead, & MacDonald, 1984).

Theories of Face Recognition

Any study of facial emotion expression must take into account the processing of faces themselves as part of the perceptual process. The ability to discriminate among different faces and correctly recognize them at a later date, despite differences that may occur in an individual face such as ageing or displaying different emotions, is a skill that is often taken for granted. Human faces almost invariably possess the same component features, and these features are almost invariably positioned in the same configuration; yet still we are able to make fine discriminations of size of features and ratios between these features in order to recognise different faces (Johnston & Ellis, 1995).

Faces appear to be important to us from a very young age. Evidence from Fantz (1961) and Salapatek (1975) suggests that, if not an innate process, babies learn within the first few months of their lives to channel their attention towards facial displays, in

particular the eyes and the mouth. Indeed, research by Goren, Sarty, and Wu (1975) suggests that babies less than 10 minutes old show a preference for head shapes configured with facial features in correct positions over scrambled faces or head shapes with no features. However, there is evidence that children below the age of 11 years show a decrement in correct recognition compared to adults (Goldstein & Chance, 1964), particularly when the recognition involves a change in state such as emotion expression (Ellis, 1992). It is widely believed that this may be due to the use of featural encoding by children below this age, using the specific features (such as eyes and nose) as guides to recognition, whereas adult encoding appears to use a more holistic configural form of encoding, viewing the face as a whole and taking into account distance between features (Johnston & Ellis, 1995). Research by Diamond and Carey (1977) suggests that, whilst recognition rates improve with age up until 11 years of age, there is a drop in recognition at around 12 years of age which, Diamond and Carey argue, is caused by the child moving from using featural encoding to the more accurate configural encoding.

Why might these strategies be used and then changed at such a relatively late stage of development? Studies in the field of face recognition strongly suggest that the sheer amount of time that humans spend studying and absorbing the faces around them produces an *expertise effect* (Stevenage, 1995). A test of expertise commonly used in the research literature is to examine the vulnerability of an item to disruption of encoding by inversion. Recognition of faces has been found to be more impaired by inversion when compared to other common items such as aeroplanes and houses (Yin, 1969). Similarly, tests of 'experts' in their field such as dog owners (Diamond & Carey, 1986) have found that their recognition for dogs is also impaired when they are shown inverted images.

Quite simply, the more we see something and become used to it, the more detrimental it is to our recognition abilities if it is not presented in a way that we would expect to see it. Indeed, training in inversion appears to aid participants (making them into 'experts' in inverted features with non-face objects such as computer-generated 'Greebles'; Gauthier, Williams, Tarr, & Tanaka, 1998) and produces similar brain responses in the occipitotemporal area of the left hemisphere to those found when viewing inverted faces (Rossion, Gauthier, Goffaux, Tarr, & Crommelinck, 2002; Mazard, Schiltz, & Rossion, 2006). However, the expertise ability may be influenced by issues such as processing strategies used during the early years with the featural encoding style of children showing less disruption than configural (holistic) encoding of adults (Carey, Diamond, & Woods, 1980; Johnston & Ellis, 1995). It appears that holistic encoding of faces occurs for upright faces but, when they are inverted, adults revert to using featural encoding (Murray, Yong, & Rhodes, 2000; Robbins & McKone, 2003). This would explain why children are less affected by the inversion of faces, as they are still using featural encoding in their processing of upright faces.

Theories of Cross-Racial Face Recognition

The face recognition literature suggests that race may play an important role in the recognition of faces. Evidence from Kelly et al. (2005) suggests that, whilst infants are not born with an innate preference for viewing faces of their racial in-group, they do appear to develop this preference within the first three months of their lives. Combined with the findings of general face perception in infants (e.g., Fantz, 1961; Goren et al., 1975; Salapatek, 1975), this suggests that the racial features of facial displays may play

an important role in the encoding of other-race faces from the outset of life. The predominant paradigm for testing face recognition - presenting a set of faces during a learning phase and examining correct recognition of these faces when presented with new faces during a test phase, has consistently found a deficit for the recognition of target faces of racial out-groups (Goldstein & Chance, 1980; Malpass & Kravitz, 1969; Meissner & Brigham 2001), a phenomenon termed the *other-race effect* (ORE; Valentine, Chiroro, & Dixon, 1995). People have difficulty telling other-race faces apart, with errors of inclusion (reporting that newly presented faces had been seen in the learning phase) appearing to be a common feature of many findings, leading to Brigham and Barkowitz (1978) claiming that the findings show a classic case of racial out-group faces "all looking the same to me" (p. 306).

A number of possible reasons for this deficit have been proposed. An increase in the amount of contact time with members of other races has been found to influence correct recognition of previously presented faces (e.g., Carroo, 1986; Cross, Cross, & Daly, 1971; Valentine et al., 1995). Participants from segregated neighbourhoods have been found to show a greater ORE compared to participants from non-segregated neighbourhoods (Cross et al., 1971) and minority group participants who have spent more time around the majority group show a decrease in the ORE (Carroo, 1986). Similarly, Lavrakas, Buri, and Mayzner (1976) reported a relationship between number of out-group friendships and ORE scores. However, other studies have failed to find a significant relationship between amount of contact and ORE (Brigham & Barkowitz, 1978; Malpass & Kravitz, 1969; Ng & Lindsay, 1994). It has been argued that it may be the quality of the contact rather than the quantity of the contact that is important, and that

this has not been adequately measured in these studies (Brigham & Malpass, 1985; Valentine et al., 1995). However, it appears that recognition rates for other-race faces, even when contact time is taken into account, remain below recognition rates for own-race faces. This may relate back to expertise (Stevenage, 1995), with different levels of expertise being achieved for different racial groups (Beaupré & Hess, 2005). Studies of inversion effects on same and other-race faces appear to show a smaller inversion effect for the other-race faces, suggesting that they are processed with less expertise than own-race faces (Rhodes, Brake, Taylor & Tan, 1989).

An alternative to the contact hypothesis has been offered by Levin (1996), who argued that a perceptual bias in the encoding of facial features may lead to a decrement in correct recognition of out-group targets. According to Levin's *race-feature hypothesis*, when confronted by an in-group target the feature of race is not used as a coding criterion and so other, more useful features are used to encode the target face. However, in the case of a racial out-group target, race is used as an explicit coding feature and so is used as an aid to identification at the expense of what could be more informative features. Support for this theory comes from Levin's (2000) findings that participants are faster at classifying an out-group face than an in-group face in a search paradigm, as they are correctly using race as a salient feature for this task. Similarly, Zaraté and Smith (1990) suggested that, for White participants, classification of a face is based on a default of 'White male', and that targets are categorized based upon their deviance from this norm. Therefore, a target face may be classified as belonging to a different race if a salient feature belongs to an out-group. Research by MacLin and Malpass (2001) appears to support this assertion. They found that changing a single feature (hairstyle) on a racially

ambiguous target led to classification of that target as belonging to the racial group most associated with that hairstyle. In turn, MacLin and Malpass (2001) found that this categorisation activated stereotypes associated with that racial group. This suggests that the perceptual processing and classifying of a face can lead to activation of schemas associated with the race of the target, and that this may then influence people's subsequent impressions of the target.

If race is used as a primary classification feature, as asserted by Levin (1996, 2000), and individual features such as hairstyle can also influence the classification of a target, as found by MacLin and Malpass (2001), this may suggest that other-race faces might be encoded in a different way to own-race faces. Meissner, Brigham, and Bennett (2003) used an eye-tracking paradigm to explore Black and White participants' fixation on faces presented in a learning phase of their study. They found that participants made more fixations and changed fixation points more frequently for their own race facial features than other-race faces, but that participants who self-reported higher levels of contact with the out-group showed a significant correlation with increased fixations on out-group facial features. Whilst an ORE still occurred, this was reduced for participants who had increased contact (and hence increased fixation on facial features during the learning phase). Similarly, training on recognition of salient out-group features in a study by Hills and Lewis (2006) has also led to a reduction in the ORE. This would appear to suggest that other-race faces may be being processed using some featural encoding; results certainly appear to suggest that same-race faces are processed *more* holistically than other-race faces (Michel, Caldara, & Rossion, 2006). However, research by Ito, Thompson, and Cacioppo (2004) has suggested that neural processing may occur

differently for in-group and out-group faces. Examining event-related potentials (ERPs) Ito et al. (2004) found that, whilst faces are discriminated from non-faces at around 170ms, ERPs that differentiate between in-group and out-group members appear at around 250ms, with deeper processing of in-group faces occurring at this point which they argue is in accordance with Levin's (2000) theory. Ito et al. found that participants high in explicit prejudice showed marginally larger ERPs towards in-group targets than out-group targets, suggesting more bias towards processing these targets.

Prejudice and the Other-Race Effect

If features of the target can activate stereotypes associated with a target group, as suggested by MacLin and Malpass (2001), do individual differences in prejudice influence the perception and correct recognition of out-group targets? It may be the case that the influence of prejudice on out-group face recognition is compounded by the same issues as those found in the contact literature, not least because higher levels of prejudice tend to be correlated with less contact with racial out-group members (Brigham, 1993; Brigham & Barkowitz, 1978). An initial study by Allport and Kramer (1946) suggested that participants high in prejudice were better at recognising racial out-group members. Similarly, Galper (1973) also found a relationship between racial attitudes and out-group recognition, but the methodology of this study (classifying participants who had enrolled on a Black Studies college course as low prejudiced) has been criticized (Valentine et al., 1995). More recent research has often failed to find any relationship between prejudice and out-group face recognition (Brigham & Barkowitz, 1978; Carroo, 1987; Ferguson, Rhodes, Lee, & Sriram, 2001; Lavrakas et al., 1976; Slone, Brigham, & Meissner, 2000).

However, in the majority of these studies only measures of explicit prejudice were used to examine prejudice. Therefore it seems that, whilst the literature on racial attitudes and out-group recognition has often been inconsistent, it is doubtful that prejudice towards the racial out-group is responsible for the ORE.

Storage of Faces in Memory

A final theory, whilst not directly aligning or opposing itself to the theories outlined above, does attempt to explain the reasons for the ORE in terms of the storage of previously-seen faces. It has been proposed that all seen faces are stored in a multi-dimensional 'face-space' around an exemplar face (Valentine, 1991; Valentine & Endo, 1992); greater similarity to the exemplar will lead to a face occupying a space close to the exemplar, whilst more distinctive faces are stored further away. As most faces are homogeneous, they will inhabit a more dense area and so are the most likely to be confused with one another. Distinctive faces, because they are further from the exemplar and have less faces stored around them, will be less likely to be confused. Valentine (1991) proposes that each race has its own face-space with its own exemplar around which the previously seen faces from that race will be gathered. As can be seen from the theories discussed above, there may be a number of reasons why the out-group faces may not be seen as distinctive and therefore inhabit a face-space close to the racial exemplar; the contact hypothesis would propose that limited contact will not result in the development of a sufficiently large face-space in order for satisfactory discriminations to be made, whilst Levin's (1996) race-feature hypothesis would suggest that features which may make the face distinctive may not have been encoded. Whilst the reasons for storage

of same and other-race faces in separate areas may still be a little ambiguous, there is empirical evidence for a difference between typical and distinctive faces. Valentine and Endo (1992) presented British and Japanese participants with typical and distinctive faces from both races. They found that the ORE still existed for typical faces but was reduced (although not negated) for distinctive faces. Similar research by Byatt and Rhodes (1997) showed that the caricaturing of racial in-group faces led to easier recognition but that this did not occur as much for caricatured out-group faces. This finding was explained as being due to a larger face-space for own-race faces allowing distinctive faces to move into a relatively sparsely populated area of the face-space area. Conversely, due to the racial out-group faces populating a smaller face-space area, distinctive out-group faces could not move as far away from the exemplar and so were still stored in a relatively dense area closer to the exemplar (Byatt & Rhodes, 1997).

Overall, whilst there can be little doubt that the other-race effect exists, there is still much debate concerning the causes of this phenomenon. It is possible that an interaction between contact with out-group races, encoding of individual features that will be useful for defining a face as distinctive, and the processing strategies of these features may all play a part in the correct or deficient recognition of out-group faces. It may therefore be possible that, instead of configural encoding of faces, a rapid featural encoding is taking place, but that this is slower for out-group faces as we lack the expertise to select the salient features which will be useful for encoding for retrieval in the future.

Prejudice and Recognising Other People

Theories of Prejudice

The prejudice literature has come a long way since its initial conception. Lippmann (1922) was the first to suggest that *stereotypes* were "pictures in our heads" (p. 16); representations stored for use in situations such as contact with other people. By using information garnered from prior experience we could simplify our social world and interactions, even though this may be at the expense of completely accurate information. Eagly and Diekman (2005, p. 19) define stereotyping as "beliefs about the attributes typically possessed by members of a social group". This definition, whilst not completely departing from Lippmann's, appears to be closer to the understanding of stereotyping as seen by contemporary researchers; personal beliefs formulated through the individual's personal experience *and* their exposure to prevailing cultural attitudes, whether correct or incorrect, about an individual based upon that individual's group membership.

If stereotypes are useful in helping us to navigate our social world, why is there such a negative connotation to the word? The main reason is the application of a stereotype about a group to an individual member of that group, leading to an attitude being formed based upon that individual's group membership and not on the individual themselves (Brewer & Brown, 1998). This prejudgement, or *prejudice*, can have many implications, particularly if the stereotype applied is negative in its nature. Whilst Allport (1954, p. 9) described prejudice as "an antipathy based upon a faulty and inflexible generalization" it can be seen from the literature discussed that this may not necessarily be the case; the stereotype may be positive and lead to a positive prejudgement, and it

may indeed be accurate to a certain extent. However, the focus of much of the research into prejudice has been on negative prejudgements, and how this may lead to differential treatment of people based solely upon their membership of a social group *(discrimination)*.

Prejudice and discrimination have changed over the years as society has changed its values and social norms. Pettigrew and Meertens (1995, p. 58) suggest that old-fashioned, blatant prejudice, is "hot, close and direct" and includes direct threat and abuse of the out-group. This has been seen through lynchings in the South of the United States, discrimination with institutional backing such as segregation between Whites and Blacks in the United States and South Africa, and overt discrimination against many social groups in many areas of the world such as Aborigines (Augoustinos & Reynolds, 2001; Garvey, 2001), African Americans (Benokraitis & Feagin, 1995), and Black British people (Brown, 1995). Whilst this type of prejudice and discrimination still exists to some extent, changes in law such as the Civil Rights Act (U.S. Congress, 1964) in the United States and the Race Relations Act (U.K. Government Offices, 1983) in the United Kingdom have not only given ethnic minority groups protection under the law but have also changed attitudes towards the notion of prejudice and discrimination.

However, Pettigrew and Meertens (1995) argue that whilst overt, blatant prejudice may have become a lesser issue, this does not mean that prejudice has disappeared; instead, they suggest that it has been replaced by a *subtle prejudice*, a covert form of prejudice that is not as obvious as blatant prejudice. Where blatant prejudice was "hot, close and direct", subtle prejudice is "cool, distant, and indirect" (Pettigrew & Meertens, 1995, p. 58). Whilst the symbols of overt racism, such as signs outside of hiring centres

stating 'No Blacks', may have disappeared, the prejudices and discrimination may remain covertly, in the form of discomfort and differential treatment of racial out-groups. It is this more contemporary form of prejudice that will be examined next.

Contemporary Prejudice and Research

Studies of contemporary prejudice owe as much to the abilities to examine them empirically as they do to the theories underpinning prejudice. Old-fashioned prejudice could often be studied using overt, explicit measures such as questionnaires. Participants could answer honestly with little concern about possible stigmatisation due to the permeating nature of prejudice throughout society. However, the legal acts and prevailing attitudes of society changed attitudes towards prejudice, particularly during the 1960s (Whitley & Kite, 2009). An analysis by Devine and Elliot (1995) of three studies (commonly known as the 'Princeton trilogy' studies; Gilbert, 1951; Karlins, Coffman, & Walters, 1969; Katz & Braly, 1933) that had examined White participants' attitudes towards African Americans found a reduction in overt stereotyping and prejudice since 1933. However, consideration must be given to whether this shows true reduction in prejudice or a mixture of changing prejudice and impression management on the part of the participants. Exploration of attitudes by means other than using self-report questionnaire measures suggest that the reduction in prejudice may not be as dramatic, as the studies analysed by Devine and Elliot (1995) suggest.

A number of studies have attempted to circumvent participants' desires to present themselves in a good light by informing them that their 'true' attitudes could be detected through a *bogus pipeline* (an artificial lie detector). A meta-analysis by Roese and

Jamieson (1993) found that participants expressed significantly more prejudice when they believed their true feelings could be detected than when there was no way of knowing their true feelings. This suggests that self-report measures of prejudice may be limited as participants are likely to give answers that are socially desirable rather than their true feelings and beliefs. Because of this, efforts have been made to explore prejudice through more covert measures. For example, Gabriel and Banse (2006) had confederates phone randomly selected people and claim that they had dialled a wrong number and needed the person to contact their partner for them. Significantly more people complied with their request when they believed they were passing on a message to a heterosexual partner than a homosexual partner. In a similar study, Gaertner (1973) had people contacted who were either registered as Democrat (liberal) or Republican (conservative) party members. They were contacted via telephone by either an obviously Black or obviously White person and asked to pass on a message to a garage mechanic that their car had broken down. As predicted, more liberal participants than conservative participants passed on the message from the Black confederate.

During the analysis of this study, Gaertner (1973) discovered an anomaly in the data that was to have a profound effect upon the prejudice literature. Whilst liberals had indeed helped more Blacks than conservatives did, they were significantly more likely to terminate the call before learning the complete nature of the problem than conservatives and, crucially, significantly more so for Blacks than Whites. Gaertner (1973) applied a possible explanatory theory by Kovel (1970) to explain these findings. Kovel (1970) suggested that the term *aversive racist* could be applied to a person who "tries to ignore the existence of black people, tries to avoid contact with them, and at most to be polite,

correct, and cold in whatever dealings are necessary between the races" (p. 54). Gaertner (1973) and Gaertner and Dovidio (2005) proposed that this early termination still left the person phoning in a state of 'no help received' but removed from the participant the feeling of not having helped which would have been made obvious if they had discovered the unambiguous nature of the emergency. Further research by Gaertner and Dovidio (1977) explored the nature of aversive racism by presenting participants with a dilemma in an experimental situation. White participants interacted with either a White or Black experimenter who later was heard to have an accident in another room. Participants had previously been informed that they were either carrying out the study alone or with other participants in other laboratories next to them. When participants thought they were alone they showed no difference in the help offered to the Black or White experimenter. However, when they believed that other people were in a position to help, significantly fewer participants offered help to the Black experimenter than the White experimenter (37.5% vs. 75% respectively). Gaertner and Dovidio (1977) explained these findings by stating that when there is an unambiguous situation, aversive racists will display no signs of prejudice but when the situation is ambiguous, and particularly when their actions can be explained away to other determinants, they will show these signs of prejudice. Further studies of aversive racism appear to support this theory, with research into selection for jobs (Dovidio & Gaertner, 2000) and university admission (Hodson, Dovidio, & Gaertner, 2002), and interactions between White and Black participants (Dovidio, Kawakami, Johnson, Johnson, & Howard , 1997) all providing supporting evidence for aversive racism.

According to Gaertner and Dovidio (2005), "aversive racists, in contrast to old-fashioned racists, endorse fair and just treatment of all groups, but they *unconsciously* [italics added] harbor feelings of uneasiness towards Blacks, and thus try to avoid interracial interaction" (p. 619). It is this *unconscious* element that has been of interest to many researchers, in that it may be possible for people to have explicit prejudices that we are aware of, but also implicit prejudices that may guide our actions without us even realising it. Dovidio, Gaertner, Nier, Kawakami, and Hodson (2004) describe these implicit prejudices as "... evaluations and beliefs that are automatically activated by the mere presence (actual or symbolic) of the attitude object. They commonly function in an unconscious and unintentional fashion" (p. 150), whilst Greenwald, McGhee, and Schwartz (1998) define implicit attitudes as "... actions or judgments that are under the control of automatically activated evaluation, without the performer's awareness of that causation" (p. 1464).

Exploration of this distinction has been carried out through the use of a number of measures, such as the Implicit Association Test (IAT; Greenwald et al., 1998; Greenwald, Nosek, & Banaji, 2003) and evaluative priming (Fazio & Olson, 2003; Wittenbrink, Judd, & Park, 2001). The IAT works on the principle that people who hold prejudicial feelings towards out-group members will perform better in a differential association task when asked to associate, for example, in-group faces with positive words and out-group faces with negative words (a racially congruent task), compared to associating in-group faces with negative words and out-group faces with positive words (a racially incongruent task). Attitude towards in-group and out-group members is typically revealed by the increased time taken to complete the incongruent task when compared to the congruent

task, and a greater disparity between the two is claimed to be an indicator of greater implicit prejudice (Greenwald et al., 1998). Subliminal priming measures, the displaying of stimuli designed to activate unconscious attitudes outside of the participant's awareness, also appear to show an effect of implicit prejudice. Wittenbrink et al. (2001) presented the words *Black* or *White* for 15ms before the presentation of target words that were either stereotypically White, stereotypically Black, or neutral, and asked participants to make a 'good' or 'bad' judgement of the word. They found that response times were facilitated by a stereotypical word having been presented with a congruent prime, suggesting an activation of the stereotype by the prime. These findings correspond with similar research carried out by Fazio, Jackson, Dunton, and Williams (1995). Priming has also been found to influence attitudes by asking people to describe categories such as 'the elderly' and 'a skinhead', activating evaluations and behaviours congruent with the primed group (Kawakami, Dovidio, & Dijksterhuis, 2003).

Controversy still exists about whether implicit measures actually measure unconscious prejudice or our understanding of the prevailing culture (e.g., Arkes & Tetlock, 2004; Tetlock & Arkes, 2004). Philip Tetlock has argued that "[I]t is where we are going to set our threshold of proof for saying something represents prejudice. My view is the implicit prejudice program sets the threshold at a historical low.... [W]e've come a long way from Selma, Alabama, if we have to calibrate prejudice in milliseconds," (Vedantam, 2005). Another issue with the IAT is that the measurement of congruent and incongruent attitudes towards in-group and out-group members can make it difficult to distinguish between prejudice towards the out-group and favouritism towards the in-group (Hutchings & Haddock, 2009). However, the overall evidence

appears to suggest that implicit measures of prejudice exist as a separate construct from explicit measures of prejudice. Indeed, analysis by Dovidio, Kawakami, and Beach (2001) suggests that the correlation between implicit and explicit scores in the research literature is, on average, .24 (Dovidio et al., 2001), although more recent analysis has found correlations varying between .20 and .75 (Nosek, 2007). If this is the case, is it possible to separate out individual differences in prejudice type according to a person's score on both implicit and explicit measures? That is, does the *interaction* between implicit and explicit prejudice produce different types of prejudice? Recent research by Son Hing, Chung-Yan, Grunfeld, Robichaud and Zanna (2005) and Son Hing, Chun-Yan, Hamilton, and Zanna (2008) has proposed a two-dimensional model of prejudice incorporating low and high scores on both implicit and explicit prejudice.

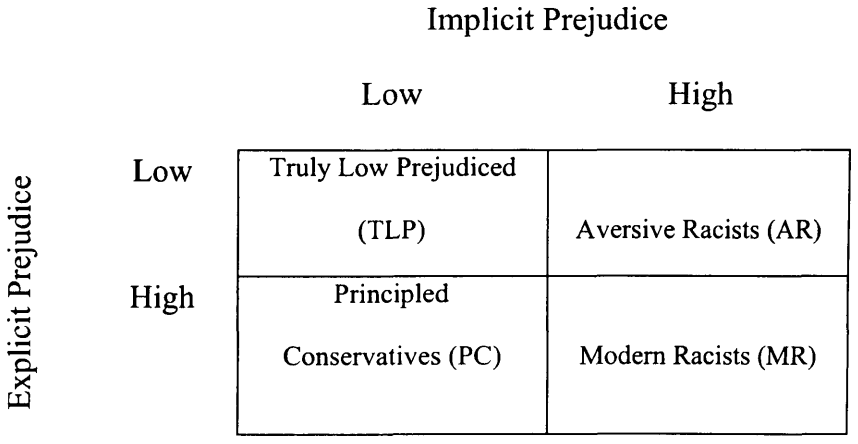

Figure 1.1. *Son Hing et al.'s (2008) Two-Dimensional Model of Prejudice*

Son Hing et al. (2008) tested participants on implicit and explicit measures of prejudice and dichotomised the scores for each, encapsulating each participant in one of four categories, as shown in Figure 1.1. Truly Low Prejudiced (TLP) participants are

those who score low on measures of implicit and explicit measures of prejudice; quite simply, they do not self-report prejudice on explicit measures and do not show high implicit prejudice. Conversely, participants scoring high on both measures are classified as Modern Racists (MR), in that they show signs of old-fashioned prejudice through self-report and implicit measures. Participants scoring high on implicit measures but low on explicit measures are classified as Aversive Racists (AR), and show the hallmarks of Gaertner and Dovidio's (1986) aversive prejudice theory; whilst they may be uncomfortable with other races and harbour unconscious concerns about them, they not only do not wish to appear prejudiced but also would find it aversive if they were seen to be racist (Gaertner & Dovidio, 2005). Finally, participants who are low in implicit prejudice but high in explicit prejudice are classified as Principled Conservatives (PCs). This group is possibly the most contentious, as the reasoning behind their views are uncertain. According to Sidanius, Pratto, and Bobo (1996) PCs are people who, despite a low level of implicit prejudice, are ideologically opposed to social policies and affirmative action that distinguishes between different groups. Sidanius et al. (1996) state that "... neither political conservatism nor conservative opposition to affirmative action policies is driven by racism but rather by concern for "equity," "color-blindness," and "genuine" conservative values" (p. 476). As many explicit self-report questionnaires tend to incorporate questions concerning views on affirmative action policies, this may increase PC's explicit prejudice scores as they will tend to disagree with them (Blatz & Ross, 2009). However, research by Reyna, Henry, Korfmacher, and Tucker (2005) suggests that, whilst the basic principle of opposition to affirmative action policies may be true, application of this rule may still be influenced by the group to which it is applied.

Their findings showed that opposition was greater for affirmative action for Black groups than for female groups, suggesting that the principles are not applied to all groups *per se*, but that discrimination may still occur within the PC ideology.

In summary, the prejudice literature and research methodology has changed dramatically over the last 100 years, both to keep up with the changing nature of prejudice as society has changed and also to explore prejudice in new ways. As society and our social world becomes more complex, through increased opportunities for contact with other-group members and changes in prevailing attitudes, so the notion of prejudice has also become more complex.

The Interaction Between Prejudice and Emotion Expression Recognition

It seems surprising that, considering the wealth of research carried out into emotion expression and prejudice, relatively little research has been carried out into the possibility of prejudice influencing people's perception of facial displays of emotion. This may be due to the failure of research findings in the face perception literature to find a conclusive link between prejudice and the recognition of in-group and out-group faces (e.g., Brigham & Barkowitz, 1978; Caroo, 1987; Ferguson et al., 2001; Lavrakas et al., 1976; Slone et al., 2000). Also, advances in research technology have now allowed researchers to create stimulus materials which are better able to discriminate finer reactions, such as the use of computer-generated moving images of emotion and the ability to manipulate racial features of materials (e.g., Hutchings, 2005; Oziem et al., 2004; Wehrle & Kaiser, 2000).

A study using this more advanced methodology to explore the influence of prejudice on cross-racial emotion recognition was carried out by Hugenberg and Bodenhausen (2003). They used Greenwald et al.'s (1998) IAT to measure implicit prejudice and a 'feeling thermometer' as a measure of explicit prejudice. To test emotion recognition, participants were shown dynamic morphed movies of White and Black target faces moving from an emotion (happy or angry) to a neutral expression (Study One) and from neutral to an emotion expression (happy or angry; Study Two). The use of computer software to create artificial faces, whilst losing some validity through not using real faces, nevertheless allows for control to be gained over the displays seen by participants and ensures that equivalent timings and emotion displays are maintained across faces. Hugenberg and Bodenhausen (2003) found that participants high in implicit (but not explicit) prejudice perceived anger as lasting for longer on the faces of Black targets compared to those low in implicit prejudice (Study One). High implicit prejudice participants also perceived anger significantly earlier on the faces of Black targets compared to those low in implicit prejudice (Study Two). Hugenberg and Bodenhausen (2003) found no effect of explicit prejudice on the recognition of anger, and no relationship was found between the perception of happiness (either onset or offset) and prejudice. They argue that these results suggest that prejudice may influence our perceptions of others from the outset of our interactions by activating a negative stereotype about the target immediately.

Further research by Hugenberg and Bodenhausen (2004) examined the categorisation of ambiguous racial targets based upon emotion display. MacLin and Malpass (2001) had previously shown that classification of an ambiguous-race face could

be altered by changing a feature (the hair) to one stereotypic of the classification group. Based upon their previous research, Hugenberg and Bodenhausen (2004) hypothesised that, if prejudiced participants faced with a racial out-group target were activating stereotypes about the emotion being displayed by that target, an ambiguous-race target displaying a negative emotion would be more likely to be classified by these high implicit prejudice participants. Hugenberg and Bodenhausen (2004) examined this idea by presenting participants with ambiguous-race faces displaying either happy or angry expressions. Participants were asked to categorise the face as either Black or White. As expected, participants high in implicit prejudice were significantly more likely to classify an angry face as Black, whilst there was no difference between happy faces by target race. Hugenberg and Bodenhausen (2004) argued that the display of anger, because it is culturally stereotypical of Black targets (Devine, 1989), activated the stereotype in high implicit prejudice participants and led them to categorise the target faces as Black. This, again, would appear to lend strong support to the theory that attitudes play an early role in the perception of out-groups.

If prejudicial attitudes can have such an influence on the perception of emotion at such an early stage, could this influence such a robust finding as the other-race effect (ORE)? Ackerman et al. (2006) carried out a study to explore this by using facial targets displaying emotion instead of the neutral faces usually used in this paradigm. As previously stated in this chapter the ORE, where participants are significantly better at recognising previously seen faces from their own racial group than a racial out-group, has been observed in many studies (Goldstein & Chance, 1980; Malpass & Kravitz, 1969; Meissner & Brigham 2001; Valentine et al., 1995). Ackerman et al. (2006) presented

Black and White faces displaying either happy, angry, or neutral emotion expressions alongside a cognitive load (abstract art pictures) and found that the ORE was reversed for Black faces displaying anger, in that they were recognised in a subsequent test phase significantly more than White angry faces (an out-group heterogeneity effect; Ackerman et al., 2006). They argue that this finding is supportive of a functional perspective of perception, with cognitive resources being allocated to the source of the most threat. Whilst the findings may at first appear to argue against a functional perspective, in that threats from the in-group should appear to be more threatening as we spend more time with the in-group and disharmony within the in-group may have greater repercussions (e.g., *obligatory interdependence*; Brewer, 1997), there is some evidence to support this notion. As stated previously, the activation of a stereotype of Black anger may be pervasive as a cultural schema (Devine, 1989). Black males in particular are often stereotyped as violent and dangerous (Trewalter, Todd, Baird, & Richeson, 2008). Particularly in the case of people high in implicit prejudice, displays of Black male faces and even racial symbols activates brain areas such as the amygdala, an area of the brain linked to emotion (Cunningham et al., 2004; Phelps et al., 2000). Trewalter et al. (2008) have gone as far as to suggest that Black males may have evolved in the current consciousness as "evolved threats" similar to how people fear spiders and snakes, leading to enhanced attenuation to them as stimuli. This would then explain the Ackerman et al. (2006) findings as the out-group angry face, a target that should theoretically pose less of a threat to us compared to the in-group angry face, is given a greater weighting of threat due to the prevailing cultural stereotypes of that target.

Introduction to the Experimental Chapters

Whilst research on the influence of prejudice in facial emotion recognition is limited, findings appear to suggest that prejudice does play a role in the perception of out-group emotion. This implies that our attitudes towards other racial groups are activated early in our interactions and may shape the nature of the interaction, either through the attitudes of the actors or mistaken interpretation of feelings and intentions. It is these attitudes and how they may influence the perception of emotion that forms the main focus for this thesis.

The experimental chapters of this thesis utilise the model of Son Hing et al. (2008) to analyse the influence of implicit and explicit measures of prejudice, and their interaction, upon emotion and face perception. If Son Hing et al.'s (2008) model is correct then it should be possible to ascertain whether the interaction between implicit and explicit prejudice produces distinct groups who show differences in the way that they respond to out-group emotion. Whilst the findings in this area of research have largely focussed upon implicit prejudice (e.g., Hugenberg & Bodenhausen, 2003, 2004), this thesis also examines whether explicit prejudice influences emotion perception, and whether the interaction between implicit and explicit prejudice provides support for Son Hing et al.'s model.

Whilst the terms used by Son Hing et al. (2008) are maintained with regards to '*principled conservatives*', '*aversive racist*', and '*modern racists*' the term '*truly low prejudiced*' is replaced with the term '*egalitarians*'. The use of the term egalitarian suggests recognition and assertion of the equality of people (Woodburn, 1982), which

appears to fit with those who score low on self-reported measures of explicit prejudice; they are happy to endorse their belief in equality through explicitly reporting that they disagree with prejudice.

As can be seen from the publication dates of many of the studies reported in this literature review, whilst the fundamental theories behind the research may go back many years, the current studies are informed mainly by contemporary research. Often this literature has been published during the research carried out for this thesis; this has, at times, influenced the direction of this thesis and at others validated the presented findings.

The opening experimental chapter (Chapter Two) of this thesis uses dynamic images to explore the influence of the interaction between implicit and explicit prejudice on Elfenbein and Ambady's (2002a) theory of an in-group advantage. Chapter Three examines the Other-Race Effect and whether it is influenced by the interaction between implicit and explicit prejudice. Chapter Four reports four experiments carried out to examine the findings of Ackerman et al. (2006), that using emotion faces reverses the ORE, again exploring the influence of the interaction between implicit and explicit prejudice. Chapter Five extends the study on the influence of emotion faces on arousal levels by Droit-Volet et al. (2004), exploring the influence of the interaction between implicit and explicit prejudice on arousal levels created by viewing in-group and out-group target faces. Chapter Six extends Hugenberg and Bodenhausen's (2004) study of ambiguous targets by examining the interaction of implicit and explicit prejudice and how it may influence the classification of target and intensity of displayed emotion.

CHAPTER TWO: THE IN-GROUP ADVANTAGE

Chapter Summary

This first experimental chapter examines Elfenbein and Ambady's (2002a) conclusion that an in-group advantage exists in emotion recognition. Using dynamic morphed movies, which overcome some of the validity issues raised by many researchers (Kilts et al., 2002; Kohler et al., 2004; Russell, 1994; Wehrle et al., 2000), White participants displayed both a faster reaction time and a greater ability to accurately recognise angry displays of emotion by racial in-group targets than racial out-group targets. Furthermore, White participants high in both implicit and explicit prejudice (modern racists) were significantly more accurate at recognising out-group anger compared to other individuals, lending support to the notion that participants high in prejudice are more 'tuned in' to out-group displays of negative emotion.

Introduction

Cross-Cultural Emotion Recognition

Much of the modern experimental research on cross-cultural emotion recognition is based upon both the findings and the methodology of Ekman and colleagues (e.g., Ekman, 1993, 1994; Ekman & Friesen, 1969, 1971, 1976, 1978; Ekman, Sorenson, & Friesen, 1969). Ekman et al.'s (1969) studies of several different cultures, comprising advanced literate cultures (e.g., United States, Japan) and preliterate cultures (e.g., the Sadong people of Borneo and the Fore people of New Guinea) indicated that some facial

displays of emotion are recognised by all cultures at levels well above chance. This led Ekman et al. (1969) to propose that emotions are distinct and categorical and that some specific emotions (anger, disgust, fear, happiness, sadness, and surprise; Ekman & Friesen, 1969) are universal, in that they are recognised by all cultures regardless of the amount of contact with other cultures. For example, facial displays of happiness regularly show recognition rates of over 85% in many studies (Ekman, 1999). That said, the universal emotion hypothesis has come under attack from many sources (see Chapter One).

A recent meta-analysis by Elfenbein and Ambady (2002a) of in-group versus out-group cultures found an accuracy advantage when the picture target and the participant were members of the same cultural and ethnic group. Elfenbein and Ambady (2002a; 2002b) claim that this is in fact an *in-group advantage*. Knowledge of the display rules used in one's own culture enables greater recognition of displays by that culture, and this is a feature of many experimental methods with other forms of nonverbal communication such as tone of voice and body language (Elfenbein & Ambady, 2003b). Elfenbein and Ambady liken this in-group advantage to a dialectical issue; whilst members of a culture may share the same language, regional 'accents' and dialects may create changes in speech. Furthermore, an examination of different races within a culture suggests that differences in emotion recognition may also be found across a racial dimension for several types of verbal and nonverbal communication (Weathers et al., 2002).

Issues of Methodology

The methodology often used to examine the universal emotions has been heavily criticised almost since its inception. Many experiments use the same format, presenting static pictures of people displaying the universal emotions and eliciting participants' responses from a list of possible emotions. In more recent years, the static pictures used conform to a standard of emotion expression created by Ekman and Friesen (1978); the Facial Action Coding System (FACS). This coding system provides guidelines for the correct position of features and muscles for a facial display to be considered as the portrayal of an emotion. The extreme nature of the emotions displayed in the static photographs, combined with the rigid criteria for a display to be classified as an emotion according to the FACS, has been criticised by Russell (1994) as showing low levels of external validity. Russell (1994) argues that such extreme emotions are rarely seen in real life and that their use is designed to facilitate the high levels of agreement found within and between cultures in emotion recognition studies.

Naturally, a prime concern is whether dynamic images can produce the same levels of recognition as static images to enable them to be valid methodological tools that can be compared to the extant literature. Wehrle et al. (2000) tested dynamic movies of drawn pictures designed to conform to FACS standards. They allowed the movies to run 10 seconds from neutral to an emotion, and then asked participants to correctly identify the emotion from a forced-choice list. Recognition rates were compared to those reported by Ekman (1976) for the same stimulus in a static format, and results showed greater recognition accuracy

and less confusion between emotions such as surprise and fear when dynamic images were used. Whilst the use of drawn pictures instead of live images may appear to devalue ecological validity, the utility of dynamic images are supported by a study examining dynamic and static images (Hutchings, 2005). In this study, participants were presented with either validated static images (The Japanese and Caucasian Facial Expressions of Emotion (JACFEE) set of images; Matsumoto & Ekman, 1988) or dynamic movies created from the same JACFEE images. Although no significant differences were found between recognition rates of static and dynamic images for five of the six emotions (participants were significantly less accurate at recognising out-group displays of disgust than in-group displays when this emotion was presented dynamically), participants viewing the dynamic images correctly recognised emotions at significantly lower intensities than those displayed in the static images, replicating the finding of Matsumoto et al. (2002).

Prejudice and Emotion Displays

Surprisingly, little research has explored the influence of prejudice on the recognition of facial displays of emotion and the in-group advantage. This may be because, whilst the face recognition literature suggests that race may play an important role in the recognition of faces (e.g., Carroo, 1986; Valentine et al., 1995), many studies examining the influence of prejudice on face recognition have found no connection between the two (e.g., Brigham & Barkowitz, 1978; Caroo, 1987). However, as noted in Chapter One, recent studies by Hugenberg and Bodenhausen (2003, 2004) suggest that prejudice may influence the perception of emotion displayed by racial out-group

members. Hugenberg and Bodenhausen (2003) found that participants who scored high on a measure of implicit prejudice perceived anger on the faces of the (Black) out-group for a significantly longer time than did those scoring low in implicit prejudice. There were no significant differences for the happy emotion. A further study (Hugenberg & Bodenhausen, 2004) found that when high-implicit prejudice White participants were presented with a face of ambiguous race and asked to report which race it belonged to (Black or White), they were significantly more likely to classify that face as Black when the face was displaying anger. Furthermore, research by Dotsch, Wigboldus, Langner, and Van Knippenberg (2008) suggests that people high in prejudice may create more negative prototypes as their mental representations of the faces of racial out-groups. These findings suggest that our perception of facial displays of emotion are not purely a perceptual process, but are also influenced by a complex interplay of our beliefs and attitudes.

The Current Study

The emotion expression literature contains many arguments regarding the in-group advantage, methodology of emotion recognition, and the influence of prejudice on emotion perception. Elfenbein and Ambady's (2002a) meta-analysis incorporates almost exclusively results from studies using the static displays of emotion. The current study had a number of aims. First, it explored whether an in-group advantage would still exist if dynamic displays of emotion were used in place of static images. Second, given the previous findings by Hugenberg and Bodenhausen (2003), on the offset and onset of

given emotions (happy and angry), this study considered whether participants' level of prejudice would influence their general perception of an emotion display.

A study was devised to examine these outstanding issues. By utilising a set of dynamic displays of emotion, manipulating the racial group and ensuring equivalence of emotion display across the racial groups, a novel procedure for the examination of the in-group advantage was created. To examine and extend the findings of Hugenberg and Bodenhausen (2003, 2004), measures of implicit and explicit prejudice were used to explore the possibility that both may jointly influence emotion perception. Whilst Hugenberg and Bodenhausen (2003, 2004) found that implicit prejudice influences perception of angry displays of emotion by out-group members, research by Gaertner and Dovidio (1977, 1986, 2005) and Son Hing et al. (2005, 2008) suggests that aversive racists (those high in implicit prejudice but low on explicit prejudice) may react to overt displays of emotion recognition differently to modern racists (those high in both implicit and explicit prejudice). As the task in the current study involves an overt judgement of emotion displays by out-group members, it is likely that aversive racists will not show the same pattern of results as modern racists. As these two prejudice groups both show high levels of implicit prejudice but differ on explicit prejudice levels, an exploration of the interaction between these two prejudice types is required.

The current study therefore proposes that, when viewing emotions displayed by racial in-group (White) and out-group (Black) targets, White participants will be more accurate and faster at recognising emotion displayed by the White targets, an in-group advantage. This hypothesis is supported by the work of Elfenbein and Ambady (2002a) and Weathers et al. (2002). Additionally, when viewing racial out-group targets,

participants high in both implicit and explicit prejudice (modern racists) will be significantly better than others at recognising out-group displays of anger. Whilst participants in the egalitarians and principled conservatives prejudice type groups should not show this enhanced recognition due to their low implicit prejudice levels, aversive racists should also not show this enhanced recognition, as they are able to make an overt judgement about the task and modify their responses (Gaertner & Dovidio, 1986). Finally, the reaction times taken to recognise angry displays by the racial out-group is explored. In Hugenberg and Bodenhausen's (2003) study, participants high in implicit prejudice were faster at recognising out-group anger than those low in prejudice. However, there is also evidence from a study by Blascovich, Wyer, Swart, and Kibler (1997) that participants high in prejudice may take longer when examining an out-group member, as they want to 'make sure' of what they are seeing and not make errors. Whilst the outcomes of both Hugenberg and Bodenhausen (2003) and Blascovich et al. (1997) would appear to predict higher accuracy for high prejudice participants, they do so for opposite reasons. For this reason the reaction time data could shed light as to which is the more viable explanation.

Method

Creation and Pre-test of Morphed Movies of Facial Affect

To enable the examination of emotion onset detection, computer-generated morphed movies were created of White and Black British males. To create these movies males aged 18 to 25 fitting the required ethnicity were approached and asked to take part

in the creation of stimulus materials for a number of experimental studies.[1] The males all resided in Cheltenham, Gloucestershire, and so the chances of familiarity with an experimental sample population from Cardiff were remote. Each 'actor' gave their informed consent to be filmed and was paid five pounds for taking part in the filming. Filming took place in a laboratory setting with a digital video camera, with each actor filmed separately seated in front of a beige screen. Only the head and neck of each actor was filmed and any hats, glasses, or conspicuous items of clothing that might stand out or impinge upon the view of the face were removed. All actors were given imagery techniques for each emotion to be portrayed, such as imagining that a plate of rotting fish had been placed in front of them when portraying the emotion of 'disgust' (see Ekman, 1992; Ekman & Oster, 1979, for a similar approach).

Actors were asked to gradually change their facial expression from an emotion to a neutral expression and then to a different emotion over a 10 second period of time (e.g., moving from happy to neutral, and then from neutral to angry; see Figure 2.1). Whilst this period of time to display an emotion is highly artificial, in that it is far greater than the timeframe of a natural emotion, 10 seconds was chosen as it is a timeframe that has been utilised in other studies (e.g., Hugenberg & Bodenhausen, 2003) and also allowed for clear capture of discrete points of emotion development with the video camera.

[1] The participants in the filming (16 White men and 13 Black men) were originally approached by Paul Hutchings for a series of studies with Dr. Michael Lewis (Cardiff University), Dr. Hazel Willis (University of Gloucestershire) and Professor Carey Ryan (University of Nebraska). Filming was carried out between June 2002 and September 2003 by Paul Hutchings and Dr. Hazel Willis. Copyright for the images produced is held by Paul Hutchings and Cardiff University.

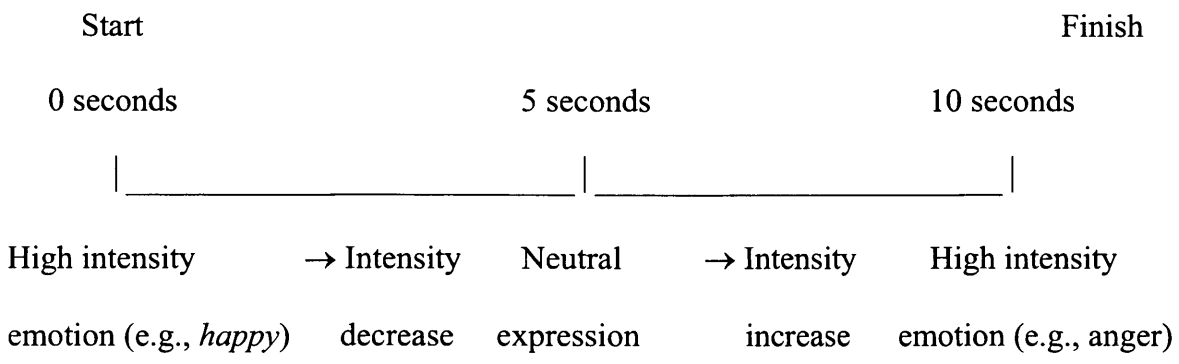

Figure 2.1. Actor's manipulation of facial displays across time

Actors were reminded of each imagery technique for each emotion. All emotion displays were captured on digital video camera maintained at a fixed distance for all actors. By filming the emotion portrayals in this way different intensities of each emotion were captured. Pairs of emotions were filmed to account for each of Ekman et al.'s (1969) six 'universal' emotions (anger, disgust, fear, happiness, sadness, and surprise).The digital videotape of each actor was transferred to a computer using Matrox 3.1b software (Matrox, 2003). This software enables individual frames from a digital movie to be isolated and captured as a single frame image. Thirteen of the White actors were selected from the 16 available, and all 13 of the Black actors were used for the selection stage of the study. Using the Matrox software, four images of each of the 13 actors of each race displaying angry, neutral, and happy expressions were captured as still images, resulting in a total of 312 images (4 images x 3 emotion expressions x 13 actors x 2 races). Five White British and five Black British participants, who were each paid five pounds to take part in a pre-test study, viewed the still images in order to choose pictures displaying the required emotion. This was carried out on a personal computer using the SuperLab Pro2 (Cedrus, 1999) computer programme. Participants viewed the 156 still

images of their own race only, to ensure that judgements of emotion displays were not affected by any cross-racial influences. For each racial group, all images were presented randomly for five seconds on the screen as a 12cm x 15cm photograph. The image was then replaced with a seven-point Likert scale. Participants were asked to rate each image based upon the emotion displayed (1 = angry; 4 = neutral; 7 = happy) and the intensity of the emotion (1 = strongly angry; 2 = fairly angry; 3 = slightly angry; 4 = neutral; 5 = slightly happy; 6 = fairly happy; 7 = strongly happy). Images consistently rated as '1' (*angry*), '4' (*neutral*) and '7' (*happy*) by all participants in that racial group were chosen to be used to create the morphed movies.

To create a morphed movie, two images from the same actor e.g., 'neutral' and 'angry' were loaded into the Winmorph v1.2 software programme (Winmorph, 2001). This software allows detailed mapping of the vector positions of features in one image, such as the eyes, nose, mouth, and head outline to be mapped on to the corresponding feature positions of the other image. If, for instance, the nose has moved position and the nostrils have flared in the 'angry' image compared to the 'neutral' image these changes can be accounted for in the movement of the vector positions (see Calder, Young, Perrett, Etcoff, & Rowland, 1996 for detailed accounts of morphing procedures). The Winmorph programme then creates artificial frames moving the positional vectors from one image to the other. Each morphed movie was designed to be 100 frames long, comprising of the two original images and 98 computer-generated images, at a speed of 10 frames per second. This created movies of faces moving from a neutral to an emotion expression (angry or happy) over a 10 second period of time.[2] This timeframe for presentation was

[2] Television displays operate at a rate of 24 frames per second (fps). Test morphs of 24fps and 10fps were created and examined on the computer monitor used for the experiment. No differences could be seen in

chosen as it is similar to that utilised in previous research of this nature (e.g., Hugenberg & Bodenhausen, 2003; Wehrle et al., 2000). The process was carried out with images from all White and Black actors.

Each morphed movie was transferred to Corel Photo-Paint 8 (Corel, 2002), and every tenth frame from frame 10 to frame 100 was captured as a still image. These images were placed in the SuperLab Pro 2 (Cedrus, 1999) software programme and images from each race were shown to the same five White British and Black British participants who had viewed the original images in the earlier part of the study. Participants again viewed only images of their own race and were asked to judge the emotion being expressed (angry, neutral, or happy) on a seven-point Likert scale. The images were randomised within the programme to ensure that there was no order as to when participants saw the images in relation to their positions in the movies. The mean frame at which participants moved away from a decision of 'neutral' and towards an emotion was calculated. These were then matched across races to ensure that, for instance, a movie of a White actor that had been recognised as 'slightly happy' (a '5' rating on the Likert-type scale) by frame 40 was matched with a counterpart Black actor movie that had also been recognised as 'slightly happy' by frame 40. Finally, after matching as many movies as possible across races it was ensured that no actor appeared more times than any other.

Due to the matching process, 24 movies for each emotion (12 of each race) were suitable for use in the experiment. The stimulus materials available, therefore, were 48 ten-second movies of actors moving from neutral to an emotion display: 12 Black-happy

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the quality of the presentations, and so it was decided to use 10fps movies to reduce the file sizes of the movies.

movies, 12 White-happy movies, 12 Black-angry movies, and 12 White-angry movies. Fifty-two distracter movies were also created using the same morphing procedure, featuring the same actors but showing other universal emotion expressions so as to vary the emotion expressions seen by participants. The images' emotion intensities of these distracter movies were chosen by the experimenter and not subjected to any of the controls used on the experimental images. To prevent participants from developing a response set to the timing of the experimental movies (which were each 10 seconds long) the distracter movies ranged from one to sixteen seconds in length (including 10 seconds, the same length as the experimental movies). Forty-eight of the distracter movies featured the experimental actors, to ensure that no actor appeared more than any other. Finally, two distracter movies from each of the actors discarded from the matching process (one Black and one White) were added to bring the total to 100 morphed movies.

In-Group Advantage Study

Participants

Participants were 67 self-reported White British undergraduate students from Cardiff University (58 women, 9 men; mean age = 21.0 years), who participated in the study for course credit. No restrictions were placed upon race or nationality of participants in order to give no prior information as to the nature of the study. Because of this, three additional participants took part in the study who self-reported their race or nationality as non-White British (one non-White, two non-British). The data obtained from these three participants were removed from the study data in order to focus on the White British population. Due to the research on gender differences in the recognition of

displays of emotion remaining inconclusive, with some studies finding differences between men and women (e.g., Hall & Matsumoto, 2004; Thayer & Johnson, 2001) and others finding no difference (e.g., Duhaney & McKelvie, 1993), it was decided to include the data of male participants and test for effects of gender prior to further analysis.

Materials

Laboratory equipment. A desk was provided to allow participants to complete the paper questionnaires, and plain envelopes were supplied to maintain the confidential nature of these questionnaires. Two personal computers were used, one to run the Implicit Association Test programme (Greenwald et al., 1998) and the other to run the RealPlayer programme displaying the morphed movies. This was done solely to facilitate the smooth running of the study and avoid the need to switch between different programmes on the same computer. No information was supplied on the unused computer whilst the participant was using the other computer.

Morphed movies. The 100 morphed movies (48 experimental movies and 52 distracter movies) were randomly allocated a number between 1 and 100, and this designated their order position in the experiment. Movies were presented to the study participants using RealPlayer computer software (RealNetworks, 2004) on a personal computer in an 18cm x 12cm window on the left side of the computer monitor. On the right side of the screen a playlist of the morphed movies was controlled by the experimenter, with each morph labelled from 1 – 100 to prevent information about the morph from being presented to the participant.

Measure of implicit prejudice. The Implicit Association Test (IAT; Greenwald et al., 1998) is a paired association test that is used as an implicit measure of prejudice via the Inquisit computer programme (Millisecond Software, 2003). In an initial training block, participants are presented with individual words, in 24 font, on a computer monitor screen and are asked to press one key if the word presented is positive (e.g., *love*) and another key if the word is negative (e.g., *bomb*; see Appendix 1 for full list of words used). Reminders of which key is to be used with positive words and which key is to be used with negative words remain at the top of the screen for the duration of the trial. In the next training block, participants are shown faces of Black and White targets, again individually, and are asked to press one key if the target is Black and another key if the target is White.[3] Again, reminders at the top of the screen act to inform participants which key to press for each target. During each practice trial participants are informed by an on-screen message if they make an error and at the end of each practice trial they are informed of their number of correct and incorrect responses. In the first test block, words and images are presented randomly on the screen. In a congruent trial, White participants are asked to press one key if they are shown a White target image or a positive word, and another key if they are presented with a Black target image or a negative word. For an incongruent trial, White participants are asked to press one key if they are shown a White target image or a negative word and another key if they are presented with a Black target image or a positive word. According to Greenwald et al. (1998) participants high in implicit prejudice should produce faster response latencies to congruent presentations (i.e., racial in-group matched with positive words and racial out-group matched with negative words) and longer latencies for incongruent targets, as they will find it harder to

[3] The targets in the IAT phase of the test were different from the actors used in the morphed movies.

match the racial in-group to negative words and the racial out-group to positive words. Reminders of the keys to press for positive and negative words *and* Black and White target images are presented at the top of the screen, but no feedback or final results are presented during the test trial. Further practice blocks and a second test block are then completed using opposite keys to the original practice and test phase (see Greenwald et al., 1998).

Measure of explicit prejudice. As a self-report measure of explicit prejudice, Lepore and Brown's (1997) measure was chosen as it is developed from existing modern and subtle racism scales, shows strong correlations with other measures, and uses questions worded in such a way to be relevant to British participants. This is a 15-item questionnaire measure with responses ranging from 1 (*strongly agree*) to 7 (*strongly disagree*). A sample item from the measure is "There are too few Black MPs and measures should be taken to address this". Higher scores on the questionnaire indicate higher prejudice levels. Some questions are reverse scored to prevent participants from developing a response set (see Appendix 2 for questionnaire). The explicit prejudice questionnaire is presented in a paper and pencil format to allow participants to change their responses if they so wish.

Biographical information. A questionnaire gathering biographical information was administered prior to testing to gather additional participant data. The questionnaire asked participants to indicate their age, sex, and ethnicity, and was used to allocate a participant number to maintain anonymity of data throughout the study (see Appendix 3

for copy of the questionnaire). Names were not recorded on the questionnaire. Due to the possibility of non-White participants being offended by the nature of the questions in the Lepore and Brown (1997) explicit prejudice questionnaire, the researcher noted if a participant had recorded their ethnicity as non-White and ensured that the explicit prejudice questionnaire was not administered to these participants (as requested by the School's Ethics Committee).

Design

In order to examine the possible influence of individual differences in prejudice on emotion judgements, scores on the implicit and explicit measures of prejudice were dichotomised to allow for categorisation of individuals into prejudice types. Participants scoring below the IAT mean were classed as being low in implicit prejudice and those scoring above the mean were classified as being high in implicit prejudice. Scores on the explicit measure were used in the same way to classify participants as being high or low in explicit prejudice. Individual scores on both implicit and explicit measures therefore allowed for each participant to be categorised into prejudice types as set out by Son Hing et al. (2008). As noted in Chapter One, this approach of dealing with data of this nature has been used to good effect in the exploration of prejudice (e.g., Son Hing et al., 2005, 2008) and provides clear categorical boundaries with which to work. This allowed for the use of a 2 (emotion: angry, happy) x 2 (target race: Black, White) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) mixed-model ANOVA, with emotion and target race as within-subject variables and prejudice type as a between-subject variable. Dependent variables were the number of emotions correctly

recognised by the participants for each race. A similar design was incorporated to examine reaction time taken to correctly identify an emotion.

Some parts of the procedure were kept constant across all trials to prevent participants from gaining information that might bias their responses. The biographical data was always collected first to ensure no non-White participants were subjected to the explicit prejudice questionnaire. The IAT was administered before the morphed movies as responses could have been biased if administered later. The order of presentation of morphed movies was counterbalanced, with half of the participants seeing the movies from 1 – 100 whilst the other half were shown the movies from 100 – 1. Finally, the explicit prejudice questionnaire was always administered last as it was felt that administering it earlier in the study may provide information as to the nature of the study and bias subsequent trials.

Procedure

Each participant was tested separately in a closed laboratory setting. A consent form informed participants that their responses to all sections of the study would be anonymous. A code number was assigned to all questionnaire forms and computer programmes for each participant.

The participant was presented with a biographical information sheet which they completed and returned to the researcher. After noting the ethnicity of the participant, the researcher placed the information sheet into an unmarked envelope and informed the participant that all other questionnaires were to be placed in the envelope by the participant.

The participant was then seated in front of a personal computer with the Implicit Association Test (IAT) set up on the monitor. The IAT is a completely automatic programme with all instructions presented to the participant on the computer monitor. The researcher then left the room whilst the participant completed the IAT. Upon returning, the researcher asked the participant to sit at the other computer. They were presented with an instruction sheet (Appendix 4) explaining that they would be shown short movies of actors moving from a neutral state to one of six emotional states. The emotion states (the six universal emotions) were listed on the instruction sheet, and participants were allowed to refer to the instruction sheet if they wished to. The instructions informed them that, when they recognised the emotion being displayed, they were to stop the movie using the computer keyboard 'Space Bar' and verbally report to the experimenter the emotion being shown. Each participant was shown one practice movie to orient them to the position of the movies on the screen and to pressing the Space Bar. Each participant then viewed the 100 short morphed movies which were individually activated by the researcher.[4] The participant stopped each movie when they recognised the emotion displayed and the response time, displayed by a timer on the movie screen, was recorded by the researcher on a response sheet (Appendix 5) alongside the verbal response given by the participant. The researcher then started the next movie. No feedback was given to the participant. If a movie ran to the end of its run time the participant was given five seconds to respond verbally. If no response was given the sheet was marked with 'no response' and the experimenter played the next movie. If a response

[4] To record the time at which the participant stopped the movie and to activate the controls it was necessary for the researcher to sit close to the participant. However, it had been noted in practice trials that the researcher's familiarity with the stimuli could result in mimicry of the emotions displayed. To avoid affecting results, the researcher sat slightly behind the participant to prevent them from seeing his face.

was given that was not on the list of universal emotions in the instructions (e.g., 'cheerful') the experimenter asked the participant to refer to the instruction sheet and to give the listed response that best described the emotion.

After completion of the morphed movies task the participant was presented with the explicit prejudice questionnaire and asked to complete it and place it in the envelope when completed. The researcher then left the participant alone to complete the questionnaire. Upon completion of the questionnaire the participant informed the researcher that they had finished and the researcher re-entered the room. The participant was thanked for their participation, presented with a debrief sheet explaining the nature of the study and informed that they were free to ask any questions of the researcher.

Results

Counterbalance and Effect of Gender

The counterbalance data for the morphed movies were analysed, and all data met Lavine's test for equality of variances and showed no significant differences between counterbalance groups (White happy correct, Mean difference (M_{diff}) = .53, t = 1.19, *ns*; White angry correct, *Mdiff* = .15, t = .25, *ns*; Black happy correct, *Mdiff* = .44, t = 1.13, *ns*; Black angry correct, *Mdiff* = .01, t = .02, *ns)*. In the case of the reaction time (rt) scores, there were again no significant differences between the counterbalance groups (White happy rt, *Mdiff* = .20, t = .60, *ns*; White angry rt, *Mdiff* = .12, t = .41, *ns*; Black happy mean, *Mdiff* = .16, t = .68, *ns*; Black angry mean, *Mdiff* = .37, t =.83, *ns*). These data were therefore treated as one dataset for all subsequent analyses.

Analyses of gender differences were also carried out for correct responses and reaction time scores. There were no significant differences between men and women for correct recognition scores, all *p*s > .40. Similarly, there were no differences for reaction times, all *p*s > .20. Therefore, the data were collapsed across gender.

Correct Recognition of Emotion Expression

To examine whether individual differences in implicit and explicit prejudice influence perception of emotion expression, participants' scores on implicit and explicit measures of prejudice were calculated. Data for the happy and angry emotions displayed by in-group and out-group targets were analysed for number of correct responses. Twelve of each emotion was displayed by each of the target races.

To calculate participants' implicit prejudice, their score on the Implicit Association Test (IAT; Greenwald et al., 1998) was analysed using the improved algorithm method devised by Greenwald et al. (2003). Higher scores indicated higher levels of prejudice (range of scores from this sample was 1.62, with a high score of 1.28, low score of -.34, and a mean score of .52), and the results of all participants were dichotomised to produce two sub-groups (high implicit prejudice participants > .52 IAT score versus low implicit prejudice participants <.52 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997) were also calculated, with higher scores on this measure indicating higher levels of prejudice (range of scores from this sample was 68, with a low score of 27 and a high score of 95, with a mean of 56.18). The scores on this measure were dichotomised using the mean score, with participants scoring 56 or below classified as low explicit prejudice, and participants scoring 57 or above classified

as high explicit prejudice. Whilst there was a significant correlation between the implicit and explicit measures, $r = .27$; N= 62; $p = .03$, this effect did not result in a violation of the assumptions of ANOVA with regard to the four sub-groups as described by Son Hing et al. (2008). Whilst use of continuous variables such as those provided by the IAT and Explicit measurement score also lend themselves to correlational analyses, the dichotomising of scores is necessary to enable the examination of the prejudice sub-type groups highlighted in the extant literature, and has also been used by other researchers within this literature (e.g., Son Hing et al., 2008). Participants' group membership in both implicit and explicit prejudice subtype groups was used to calculate their overall prejudice type. This resulted in the following groups: low (implicit prejudice)/low (explicit prejudice) = egalitarian (n = 20); low/ high = principled conservative (n = 11); high/low = aversive racist (n = 15); high/high = modern racist (n = 21).

To address whether correct recognition was influenced by target race and prejudice type, I conducted a 2 (emotion: happy versus angry) x 2 (target race: Black versus White) x 4 (prejudice type: egalitarian versus principled conservative versus aversive racist versus modern racist) Mixed-ANOVA. The mean correct recognition scores are presented in Table 2.1. The ANOVA revealed a significant main effect of target race, $F(1, 63) = 20.58$, $p < .001$. Overall, participants were better at recognising emotions displayed on in-group faces ($M = 8.68$) compared to emotions displayed on out-group faces ($M = 7.74$). These findings replicate the in-group advantage effect. There was also a significant main effect of emotion, $F(1, 63) = 449.80$, $p < .001$. Overall, participants were better at recognising happiness ($M = 10.84$) compared to anger ($M = 5.58$). These data suggest that there was a near ceiling effect for recognition of happiness.

Both of these main effects were qualified by the significant interaction of target race and emotion, $F(1, 63) = 31.13, p < .001$. When participants viewed happy faces, there was no difference in the recognition of the emotion on White or Black faces, $t(66) = 1.02$, *ns*. When participants viewed angry faces, there was better recognition of the emotion on White faces ($M = 6.63$) compared to the emotion on Black faces ($M = 4.52$), $t(66) = 6.01, p < .001$.

Although the three-way interaction was not significant, for exploratory purposes the influence of prejudice type on the emotion recognition scores for White and Black happy and angry faces were examined. Contrast analyses revealed that modern racists were found to recognise significantly more displays of Black anger ($M = 5.48$) than any other prejudice group, $t(63) = 2.15, p = .04$. There was also a marginal contrast effect in the case of aversive racists correctly recognising Black happy more than other prejudice groups, $t(63) = 1.80, p = .07$.

Prejudice Type	*Target Emotion*			
	White Happy	*Black Happy*	*White Angry*	*Black Angry*
Egalitarian	10.95_a	10.90_a	6.80_b	4.15_c
Principled Conservative	10.64_a	10.18_a	6.55_b	4.09_c
Aversive Racist	10.33_a	11.53_a	6.47_b	4.00_c
Modern Racist	10.72_a	11.00_a	6.62_b	5.48_b

Table 2.1. *Mean Correct Recognition Scores for Emotions as a Function of Target Race and Prejudice Type (Maximum Score = 12).*

Note. Means in the same row that do not share subscripts differ at $p<.05$.

Emotion Expression Recognition Reaction Times

The prejudice type groups were used to analyse whether speed of response differed as a function of target race and prejudice type, using a 2 (emotion: happy versus angry) x 2 (target race: Black versus White) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA. The mean response times are presented in Table 2.2. The ANOVA revealed a significant main effect of target race, $F(1, 63) = 63.94, p < .001$. Overall, participants were faster at recognising in-group faces ($M = 5.52$) compared to out-group faces ($M = 6.41$). There was also a significant main effect of emotion, $F(1, 63) = 17.47, p < .001$. Overall, participants were faster at recognising happiness ($M = 5.66$) compared to anger ($M = 6.27$). No other effects were significant. Whilst the participants high in explicit prejudice (principled conservatives and modern racists) appeared to take longer to recognise out-group displays of anger ($M = 6.97$ for high explicit prejudice) in comparison to those low in explicit prejudice (egalitarians and aversive racists; $M = 6.43$), this difference was not significant.

From these data it appears that there is an in-group advantage to emotion recognition. Participants where significantly faster at recognising both anger and happiness displayed by racial in-groups, and were significantly more accurate at recognising anger displayed by the racial in-group.

Prejudice Type	*Target Emotion*			
	White Happy	*Black Happy*	*White Angry*	*Black Angry*
Egalitarian	4.82_a	6.07_b	5.69_c	6.55_d
Principled Conservative	5.27_a	6.12_b	5.85_b	6.90_b
Aversive Racist	5.29_a	5.87_b	5.68_b	6.30_c
Modern Racist	5.49_a	6.32_b	6.06_b	7.03_c

Table 2.2. *Mean Reaction Time Scores (Seconds) for Emotions as a Function of Target Race and Prejudice Type*

Note. Means in the same row that do not share subscripts differ at $p<.05$.

Discussion

The first aim of this study was to examine whether an in-group advantage existed for the recognition of facial displays of emotion, as reported by Elfenbein and Ambady (2002a) and Weathers et al. (2002). White participants were significantly better at recognising emotions displayed by their racial in-group than their racial out-group, supporting the argument for a racial in-group advantage. In the case of the happy emotion, a ceiling effect occurred, with in-group and out-group displays of emotion being recognised at near perfect levels. This is not surprising, as happiness has been noted to produce the highest recognition levels of all the universal emotions, often in excess of 85% even across cultures (Ekman, 1999). However, this in-group advantage was present for correct recognition of angry displays. Further, participants were significantly faster at recognising in-group emotion displays compared to out-group emotion displays. These

data also suggest that dynamic images show patterns that match those found with static images.

The second aim of this study was to examine whether individual differences in prejudice type would influence the perception of out-group emotion as found by Hugenberg and Bodenhausen (2003, 2004). These results provide perhaps the most intriguing findings. In the case of the high implicit/high explicit prejudice group (modern racist), it was found that they were more accurate than other groups at recognising racial out-group displays of anger. It was not the case that they were better at anger recognition *per se*, and so it appears to be something about the racial out-group which brings about this heightened ability. Also, the aversive racist group (high implicit/low explicit prejudice) did not show the same responses to out-group anger. Their correct recognition rates were on a par with the groups low in implicit prejudice (egalitarians and principled conservatives). This would appear to support Gaertner and Dovidio's (1986) proposal that aversive racists will only display prejudicial tendencies when the situation is ambiguous, and that when there is an overt racial element to a task they will conform to a non-prejudicial position. This idea is supported by the present study; not only do the aversive racists perform worse than modern racists on correct recognition of out-group displays of anger, a result that would not be predicted if only implicit prejudice was a factor in recognition of out-group anger, as proposed by Hugenberg and Bodenhausen (2003, 2004), but they also showed marginally significantly better ability to recognise out-group happiness. This could suggest that they are attempting to pay more attention to the out-group positive displays to present themselves as non-prejudiced.

When examining the reaction time data, it was hoped to be able to provide insight to the discrepant positions of Hugenberg and Bodenhausen (2003, 2004) and Blascovich et al. (1997). According to Hugenberg and Bodenhausen, prejudiced participants should respond faster to out-group anger as they are more prepared to allocate a negative response to that group member. In comparison, Blascovich et al. would expect the prejudiced participant to take longer over the viewing of the display to justify their response and to reaffirm their beliefs about the out-group. Unfortunately, as there were no significant differences between prejudice groups, the study cannot lend support to either explanation. However, the trend in the data appeared to be towards participants high in explicit prejudice taking longer to accurately recognise out-group displays of emotion. Further research with a larger sample size may help to clarify whether Blascovich et al.'s position is supported.

Whilst the current study has provided the opportunity to explore some relatively new issues from different perspectives, a ceiling effect of recognition for the happy display limited the scope of the study to examining effects of the negative emotion display (anger). It was expected that recognition of happiness may be high, but recognition accuracy of between 86% and 94% for all groups made it impossible to ascertain any differences. It is highly likely that a degraded image, making the emotion harder to detect, would be the best tool to examine racial differences in recognition of the happy emotion. However, as all images in the study would have to be degraded to maintain equivalence across the stimuli in the study, this would most likely have resulted in a floor effect for the angry emotion. Quite simply, it may be necessary to examine the

emotions separately whilst still maintaining an experimental format of displaying all of the images to the participant.

Conclusions

In the instance of angry facial displays of emotion, it appears that an advantage is afforded to the viewer by the display being presented by a racial in-group face. Further, individual differences in prejudice appear to influence the correct perception of out-group displays of anger, with modern racists particularly able to recognise out-group displays of anger. It may be that this group is more '*tuned in*' to the expression of out-group anger and so are better at detecting it. Although not significantly slower than other groups, it appears that participants high in explicit prejudice may take more time to scrutinize out-group displays of anger, as suggested by Blascovich et al. (1997). Again, this is an area of research that would benefit from analysis in further research.

The findings from the current study therefore appear to suggest that individual differences in prejudice may play a role in the perception of out-group emotion. Whilst not providing clear categorical support for Son-Hing et al.'s (2008) model, in that the four distinct categories did not produce clear differential results from one another, the results from the modern racist group suggest provide a basis for further exploration with this model. However, emotion is played out on the face, and it is possible that these results may be due to differential scrutiny of in-group and out-group faces rather than the emotions themselves, particularly in the case of individuals high in implicit and explicit prejudice. To address this issue, the next experimental chapter will examine whether face

recognition is influenced by individual differences in prejudice, or whether this modern racist effect is particular to the recognition of emotion.

CHAPTER THREE: THE OTHER-RACE EFFECT

Chapter Summary

This chapter examines whether individual differences in prejudice influence the correct recognition of previously seen faces. The previous chapter of this thesis found that individual differences in prejudice influenced the correct recognition of displays of emotion. If no significant differences are found for the influence of prejudice on the correct recognition of out-group faces, it would suggest that face perception and emotion perception might be separate entities with regard to individual differences in prejudice. A finding that individual differences in prejudice also influence facial recognition would, however, provide support for the notion that face *and* emotion perception are part of a global process in the recognition of racial out-group faces. In the current study, static images of racial in-group and out-group targets were presented to participants to test their ability to recognise previously seen faces. Whilst an other-race effect was found, with previously seen racial in-group faces being recognised more accurately than racial out-group faces, this result was not influenced by individual differences in prejudice. These findings suggest that the influence of prejudice is specific to the processing of emotions displayed by the racial out-group and operates independently of face-processing tasks.

Introduction

It has been argued that errors in discrimination between members of a racial out-group may be due to the perception that 'they all look the same' (Brigham & Barkowitz, 1978; Malpass, 1981). It can often seem that it is easier to correctly recognise faces from our own racial group than it is to recognise faces from a racial out-group, a view supported by research from the face perception literature. The classic face-recognition paradigm of Malpass and Kravitz (1969) has been the most common paradigm used for examining participants' ability to recognise faces. In a learning phase, participants are presented with a series of racial in-group and out-group target faces. After some form of distracter task, the previously seen faces are randomly presented along with 'new' faces in a test phase, and participants are asked to report if they have seen the face before. Statistical analysis has examined both the recognition of previously seen faces and the incorrect reporting of new faces as being previously seen (false positives), to enable an understanding of ability to recognise own-race and other-race faces (Sporer, 2001). Use of this paradigm has led to one of the most robust findings in the face perception literature, with studies consistently finding that participants are more accurate at recognising previously-seen racial in-group targets than previously-seen racial out-group targets (Brigham & Malpass, 1985; Chance & Goldstein, 1996; Malpass & Kravitz, 1969; Shapiro & Penrod, 1986; Valentine et al., 1995), a phenomenon termed the 'own-race bias' (ORB; Valentine et al., 1995) or 'other-race effect' (ORE; Malpass & Kravitz, 1969).

Several explanations have been proposed for this effect, some on a global level of race and some more specific to individual races. For example, Bothwell, Brigham, and Malpass (1989) proposed that Caucasian faces are more heterogeneous, leading to individual faces being more distinguishable from other Caucasian faces and therefore easier to differentiate. Whilst some studies have supported this proposal (Ng & Lindsay, 1994; Sporer, 2001), Goldstein (1979) argued against this notion, citing anthropological literature suggesting that physiological variability *within* Black, White, and Japanese faces is largely similar. Furthermore, Goldstein and Chance (1976) found that White participants were able to discriminate between Japanese faces in a same/different task as accurately and as fast as they could discriminate between White faces. This suggests that physiology and homogeneity of certain groups are unlikely to be at the root of the ORE (Meissner & Brigham, 2001).

On a more global scale, Lavrakas et al. (1976) argued that the amount of contact with ethnic out-groups influences correct recognition of these out-group targets, with higher levels of contact leading to higher recognition. However, the research findings for contact have been mixed, with some studies supporting the contact hypothesis (Carroo, 1986, 1987; Chiroro & Valentine, 1995; Li, Dunning, & Malpass, 1998) and other studies finding no relationship between contact and correct out-group face recognition (Brigham & Barkowitz, 1978; Malpass & Kravitz, 1969; Ng & Lindsay, 1994; but see Sporer, 2001 for an alternative explanation of these findings). Brigham and Malpass (1985) and Valentine et al. (1995) suggest that the *quality* of interaction with the out-group may be more important than the *quantity* of interaction.

In an alternative to the contact hypothesis, Levin (1996, 2000) has argued that the ORE may be the result of a perceptual difference in the encoding of in-group and out-group features. In his *race-feature hypothesis,* Levin (1996) argued that race is used as a salient feature when we are confronted by an out-group member and is then used in the recall of the face at a later time. However, when presented with a number of racial out-group faces race then becomes a redundant feature. When viewing in-group targets, race is not used as a salient feature and so there is more scrutiny given to other features which may aid discrimination between targets at a later time. When presented with a number of in-group targets at a later time these features will then be much more useful for discriminating between them. We should therefore be able to recognise previously seen in-group faces and discriminate between them and new in-group faces much better than we can discriminate between new and previously seen out-group faces (Levin, 1996). In support of this proposal, Levin (1996) found that participants are faster at classifying an out-group face than an in-group face in a visual search task, as they are correctly using race as the salient feature for this task. According to Zaraté and Smith (1990), White people use a default classification system of 'White male' and any target to be categorized is then judged on its deviance from this norm. A target face may therefore be classified as belonging to a different race if a salient feature belongs to an out-group. By presenting features of African males transformed onto White male faces, they found that participants would find it harder to classify the target. This is also supported by the findings of MacLin and Malpass (2001), who reported that changing the hairstyle of an ambiguous race target led to participants classifying the target as belonging to the racial group most associated with the presented hairstyle. Furthermore, participants also

activated and used stereotypes associated with the racial group they had categorised the target as in their descriptions of the target.

If features of the target are activating stereotypes associated with the target group, as is suggested by the MacLin and Malpass (2001) findings, do individual differences in prejudice influence the perception and correct recognition of out-group targets? An initial study by Allport and Kramer (1946) found that participants high in prejudice towards Jewish people were better at recognising Jewish targets compared to low prejudice participants. It was argued that their prejudices made them pay more attention to the out-group faces (Allport & Kramer, 1946). Galper (1973) reported the inverse of this, finding that participants low in prejudice were better at recognising out-group members. However, Galper's methodology (automatically classifying participants who had enrolled on a Black Studies college course as being low prejudiced) has been criticized for confounding attitudes and amount of contact with the out-group (Valentine et al., 1995). Apart from a few studies, the research has consistently failed to find any relationship between out-group face recognition and explicit prejudice (e.g., Brigham & Barkowitz, 1978; Carroo, 1987; Lavrakas et al., 1976; Slone et al., 2000) or implicit prejudice (Ferguson et al., 2001). Therefore it seems that, whilst the literature on racial attitudes and out-group recognition has often been inconsistent, it is doubtful that prejudice towards the racial out-group is responsible for the ORE.

Whilst the ORE appears to be a consistent finding, a study by Ackerman et al. (2006) suggests that some displays of emotion can actually reverse the ORE. Ackerman et al. (2006) used a standard face-recognition paradigm but presented participants with angry racial in-group and out-group faces, alongside standard neutral faces. They found

that out-group displays of anger produced a reversal of the ORE, with participants correctly recognising more out-group than in-group targets, whilst the ORE remained for targets displaying a neutral emotion. Ackerman et al. (2006) argue that this phenomenon is due to the functionality of heightened awareness of out-group threat, with increased scrutiny being paid to an out-group member displaying hostile intent.

Overall, individual differences in prejudice appear to have no influence on correct recognition of out-group faces. However, findings that displays of emotion can influence the other-race effect (Ackerman et al., 2006) and that prejudice can influence the perception of emotion displayed by racial out-groups (previous chapter) make the exploration of the influence of individual differences in prejudice on the ORE important for this thesis. If, as expected from previous findings, individual differences in prejudice have no effects on correct recognition of out-group targets, the findings from the previous chapter would suggest that the influence of prejudice on the perception of out-group emotion possibly occur through a different mechanism from the recognition of out-group faces.

The hypothesis for this study, therefore, was that an other-race effect will be found, with White participants showing higher accuracy for the correct recognition of previously seen faces and the correct rejection of new faces. However, although the literature has shown no effects of explicit and implicit measures of prejudice in isolation on the ORE, research has not addressed the joint influence of the two constructs. This study will therefore also examine whether individual differences in the interaction between implicit and explicit prejudice influence the ORE.

Method

Participants

Participants were 104 Cardiff University undergraduate students (93 women, 11 men; mean age = 19.96 years) who participated in the study for course credit. To avoid providing information that may have informed participants of the nature of the study, no restrictions were placed upon race or nationality of participants signing up to the study; however, all participants reported themselves as White British. Participants from the previous (in-group advantage) study were excluded from taking part in this study. As in the previous study, data from male and female participants were included in the study but were analysed to ensure there were no significant differences between genders.

Materials

ORE programme. Forty-eight static images (24 Black targets and 24 White targets) of human faces were selected from the 24 targets used in the previous (In-group Advantage) study and from an additional 24 targets not used in the In-group advantage study.[5] All images were screened for distinguishing features (such as moles, scars, etc.) and these features were removed from the images using blending tools in Corel Photo-Paint 8 (Corel, 2002). Twenty-four images (12 Black and 12 White) were randomly selected to be presented in the 'learning' phase. The other 24 images were then used as distracter images in the 'test' phase.

[5] These pictures were not used in the In-group Advantage study because they did not portray the desired emotion displays. However, the ORE study only required neutral images of the targets and so they were deemed suitable for use in this study.

The SuperLab Pro 2 (Cedrus, 1999) computer programme was used to randomly display the 24 images in the learning phase of the trial, with each image being displayed for three seconds with a two-second inter-stimulus interval between each presentation and a fixation point displayed in the centre of the screen before each image was presented. After the learning phase, a distracter task was automatically presented, with 10 images of landscapes displayed on the screen for 30 seconds each (a total time of five minutes). After this distracter task finished, an instruction screen informed participants that they would be presented with a number of faces, some that had been seen previously and some that were new, and informed participants to press separate keys for the new and previously-seen faces. The SuperLab programme then randomly displayed 48 images in the 'test' phase; the 24 images previously seen in the learning phase and the 24 new distracter images (12 Black and 12 White). Each image remained on the screen until the participant made a response with the designated computer keys.

Laboratory equipment. A desk was provided to allow participants to complete the paper questionnaires, and plain envelopes were supplied to maintain the confidential nature of these questionnaires. Two personal computers were used, one to display the Implicit Association Test programme (Greenwald et al., 1998) and the other to display the ORE programme. This was done to facilitate the smooth running of the study and avoid the need to switch between different programmes on the same computer. No information was supplied on the unused computer whilst the participant was using the other computer.

Measures of prejudice and biographical information. The measures of implicit and explicit prejudice, plus the capture of biographical data used in the previous chapter were also used in this study.

Design

As in the previous chapter, measures of implicit and explicit prejudice were dichotomised to allow for categorisation of individuals into prejudice types (see Son Hing et al., 2008). This enables the use of a 2 (target race: Black, White) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-model ANOVA, with target race as the within-subject variable and prejudice type as a between-subject variable. The dependent variable is the number of correctly identified previously-seen faces and the number of correctly rejected new faces (measured with A') for each target race.

Again, some parts of the procedure were kept constant across all trials, to prevent a participant from gaining information that might bias their responses. The biographical data were always collected first to ensure no non-White participants were subjected to the explicit prejudice questionnaire (as requested by the School of Psychology Ethics Committee). The IAT was administered before the ORE task as responses could have been biased if administered later.[6] The ORE task itself was randomised for every participant by the random presentation of the pictures in the learning and test phases, but further randomisation of key responses was also used. Finally, the explicit prejudice

[6] During debriefing participants were questioned as to whether they had realised that the experiment was trying to ascertain the influence of prejudice on emotion perception. No participant admitted to this, and most said that they thought the study was about face perception or emotion perception, and had not considered the link between the emotion/face tasks and the prejudice tasks.

questionnaire was always administered last as it was felt that administering it earlier in the study may provide information as to the nature of the study and bias subsequent trials.

Procedure

Each participant was tested separately in a closed laboratory setting. A consent form informed participants that their responses to all sections of the study would be anonymous. A code number was assigned to all questionnaire forms and computer programmes for each participant.

The participant was presented with a biographical information sheet that they completed and returned to the researcher. After noting the ethnicity of the participant, the researcher placed the information sheet into an unmarked envelope and informed the participant that any other questionnaires were to be placed in the envelope by the participant.

The participant was then seated in front of a personal computer with the Implicit Association Test (IAT; Greenwald et al., 1998) set up on the monitor. The researcher then left the room whilst the participant completed the IAT. Upon returning, the researcher asked the participant to sit at the other computer and began the ORE task. On-screen instructions asked the participant to view what was displayed on the computer monitor. Upon starting the programme the researcher left the participant alone in the room.

Each participant took part in a learning phase, viewing 12 white and 12 black faces displaying neutral expressions, presented on the computer screen for three seconds in random order. They then viewed 10 landscape pictures on the computer screen for a

total time of five minutes. Participants were then presented with information on the computer screen telling them that they would be shown a number of faces, some of which had been seen in the previously in the learning phase and some of which had not been previously seen. If presented with a face previously seen in the learning phase they were to press the 'a' key on the computer keyboard, and the '5' key if the face presented was new and had not been presented in the learning phase (key order was randomised across participants). Upon completion of the ORE task an on-screen instruction asked participants to complete the questionnaire measure of explicit prejudice (Lepore & Brown, 1997) which had been left on the other desk by the researcher. Participants were instructed at the end of the questionnaire to place the questionnaire in the envelope provided. In this way the researcher had no interaction with the participant throughout the procedure. Upon completion of the study the researcher returned to the room and debriefed and thanked the participant.

Results

Signal detection theory was used to calculate correct responses to previously displayed faces and false positive hits to new faces, a standard procedure for calculating *A'* in forced-choice procedures (Stanislow & Todorov, 1999). Due to the inability of *A'* to be calculated where a perfect hit rate (100%) or perfect miss rate (0%) has been achieved by a participant, these scores were changed to 99% and 1% respectively, a technique used in many signal detection procedures (Hugenberg, 2005).

Counterbalance and Effects of Gender

The counterbalance data for responses on the White and Black *A'* were analysed, and all data met Lavine's test for equality of variances and showed no significant differences between counterbalance groups, all *p*s > .50. Analyses of gender differences were also carried out for *A'* scores, with no significant differences between men and women found, all *p*s > .10. Therefore, analyses were collapsed across these dimensions.

Influence of Prejudice Type on Correct Face Recognition

As in the previous experimental chapter, measures of implicit and explicit prejudice were used to calculate the four prejudice subtypes. There was a significant correlation between the measures $r = .24$; n = 104; $p = .01$, but prejudice subtypes did not violate assumptions of ANOVA. For implicit measures of prejudice, higher scores indicated higher levels of prejudice (range of scores from this sample was 2.09, with a high score of 1.24, low score of -.85, and a mean score of .32), and the results of all participants were dichotomised to produce two sub-groups (high implicit prejudice participants > .32 IAT score versus low implicit prejudice participants <.32 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997) were also calculated, with higher scores on this measure indicating higher levels of prejudice (range of scores from this sample was 60, with a low score of 20 and a high score of 80, with a mean of 52.80). The scores on this measure were dichotomised using the mean score, with participants scoring 52 or below classified as low explicit prejudice, and participants scoring 53 or above classified as high explicit prejudice. The subgroup samples were egalitarians (n = 29); principled conservatives (n = 24); aversive racists (n = 22); and

modern racists (n = 29). *A'* scores (correct recognition of previously-seen faces and correct rejection of new faces) were calculated for participants across all prejudice types (see Table 3.1).

To address whether correct recognition was influenced by target race and prejudice style, a 2 (target race: Black versus White) x 4 (prejudice type: egalitarian versus principled conservative versus aversive racist versus modern racist) Mixed-ANOVA was conducted, with target race as a within-subject variable and prejudice type as a between-subject variable. There was a main effect of race, $F(1, 100) = 11.07$, $p = .001$, with correct hits and rejections of White targets ($M = .66$) significantly better than Black targets ($M = .57$). These data support the ORE. Analysis of the influence of individual differences in prejudice found a significant difference of recognition by egalitarians, who recognised more White targets ($M = .71$) than Black targets ($M = .54$). No other effects were significant.

	A' *score*	
Prejudice Type	*White target*	*Black target*
Egalitarian	$.71_a$	$.54_b$
Principled Conservative	$.62_a$	$.55_a$
Aversive Racist	$.61_a$	$.58_a$
Modern Racist	$.69_a$	$.62_a$

Table 3.1. *Correct Recognition of Learned Faces and Correct Rejection of New Faces (A') as a Function of Target Race and Prejudice Type*

Note. Means in the same row that do not share subscripts differ at $p<.05$.

Exploratory analysis of the previously seen and new faces data revealed that there was no significant difference between the correct recognition of previously seen White faces ($M = .76$) and previously seen Black faces ($M = .74$), $t\,(103) = 1.13$, *ns*. However, there was a significant difference between correct rejection of new White faces ($M = .92$) and rejection of new Black faces ($M = .82$), $t\,(103) = 5.72$, $p < .001$. This finding suggests that the ORE was caused, in this case, by new Black faces being reported as previously seen rather than by previously seen Black faces being correctly recognised less than previously seen White faces. Individual differences in prejudice did not significantly influence this finding.

Discussion

The aims of this study were to examine whether an other-race effect could be found and, if so, whether individual differences in prejudice type influenced this finding. The results from the present study support the primary hypothesis. Specifically, an other-race effect (ORE) was found, with White participants performing significantly better when recognising previously-seen faces and correctly rejecting new faces displayed by the racial in-group than the racial out-group. This finding is not surprising given the plethora of literature that supports this effect (e.g., Brigham & Malpass, 1985; Chance & Goldstein, 1996; Malpass & Kravitz, 1969; Shapiro & Penrod, 1986; Valentine et al., 1995). The finding that there are no significant differences between the correct recognition of previously-seen faces suggests that features are being selected across both

races in a similar fashion that will be helpful in later recognition, contrary to Levin's (1996) assertion that race is used as a feature when viewing racial out-group targets. Levin's *race-feature hypothesis* would predict that, whilst false-positives would be higher for the new faces in the test phase, recognition from the learning phase should be poorer in the test phase as participants are now faced with many more instances of the race that they have used to code the previously-seen face. If it was the case that participants were selecting false-positive new faces at the expense of previously-seen faces in the test phase because they were using race as a feature, it would be expected that false-positives for out-group faces should be high. Whilst Levin's hypothesis would suggest that correct rejections should be greater than .5, the correct rejections of out-group targets, despite being significantly lower than those for in-group targets, are still higher ($M = .82$) than would generally be expected.

The second issue addressed in the study was whether the ORE would be influenced by individual differences in prejudice. Participants of all prejudice types performed similarly on the task. However, whilst this finding converges with the previous research regarding the influence of prejudice (or lack of) on correct recognition of out-group faces, the previous research has focussed upon explicit measures of prejudice (Brigham & Barkowitz, 1978; Caroo, 1987; Lavrakas et al., 1976; Slone et al., 2000) or implicit measures of prejudice (Ferguson et al., 2001) independent of each other. As far as I am aware, this is the first study to look at the interaction between implicit *and* explicit prejudice.

Conclusion

The other-race effect was found utilising the current set of stimuli, but does not appear to be influenced by individual differences in prejudice, a finding that supports much of the previous literature. In light of this, and the findings of the previous chapter with regards to emotion recognition (increased recognition of angry displays in out-group targets by modern racist participants), it appears that a difference may exist between perception of out-group faces and perception of out-group emotion. A possible way to examine this may be to explore the paradigm used by Ackerman et al. (2006), who used the ORE paradigm but substituted facial emotion displays for neutral displays. Ackerman et al. (2006) found that displays of out-group anger resulted in a reversal of the ORE, with White participants correctly recognising more Black faces than White faces when they were displaying anger. By incorporating a number of emotion recognition tasks into a face recognition task it should be possible to examine the findings of Ackerman et al. (2006) that displays of anger by out-group targets result in enhanced recognition of these targets, and also explore the influence of prejudice type on recognition of facial displays of emotion. As the current study findings suggest that prejudice does not influence out-group face recognition, a study of this nature should allow further exploration of the separation of perception of emotion recognition and face recognition. This issue is addressed in the next chapter.

CHAPTER FOUR: EMOTION AND THE OTHER-RACE EFFECT

Chapter Summary

In Chapter Three, the other-race effect (ORE) was examined using the traditional face perception paradigm, presenting Black and White target faces expressing a neutral emotion display in the learning and test phases. However, recent research by Ackerman et al. (2006) presented participants with target faces displaying emotion and found that angry out-group (Black) targets were recognised more than angry in-group (White) targets, a reversal of the normal ORE findings. The series of experiments in this chapter aimed to further examine the findings of Ackerman et al. (2006) and consider whether individual differences in implicit and explicit prejudice might influence the ORE when viewing target faces displaying emotion. Experiment 3.1 examined whether in-group and out-group targets displaying happy, neutral, and angry emotions during the learning phase could still be recognised when they displayed neutral emotions in the test phase, and found that participants high in implicit and explicit prejudice (modern racists) were faster at responding to out-group targets that they correctly recognised from the learning phase, and also that participants high in implicit prejudice were significantly poorer at recognising out-group displays of anger than participants low in implicit prejudice, but that overall the ORE remained. Experiment 3.2 examined whether targets displaying a neutral expression in the learning phase could be recognised if they displayed emotion in the test phase and again found that participants high in implicit prejudice were poorer at recognising out-group displays of anger but that the ORE remained. Experiment 3.3

examined participants' ability to recognise Black and White faces displaying angry, happy, and neutral displays at both learning and test phase, and found that the ORE remained for happy and angry Black emotions. Finally, Experiment 3.4 explored the ability to recognise Black and White faces displaying neutral and angry faces at learning and test phase, as was carried out in the original Ackerman et al. (2006) study, and found a standard ORE.

The overall findings suggest that out-group displays of anger do not reverse the ORE, a finding that contradicts that of Ackerman et al. (2006). Furthermore, the findings also suggest that people high in implicit prejudice may have problems recognising out-group targets that have altered in the display of anger. This is discussed with regards to a functional perspective of emotion recognition.

Introduction

As explained in the previous chapter, the other-race effect (ORE) is a robust finding in the face perception literature (Valentine et al., 1995). Many theories have been put forward to explain the own-race bias, including homogeneity of racial features (Bothwell et al., 1989), amount of contact with racial out-groups (Lavrakas et al., 1976), quality of contact with racial out-groups (Valentine et al., 1995), and the use of race as a coding feature for out-group but not in-group faces (Levin, 1996, 2000). In a number of studies, participants' level of prejudice has been found to have no effect on the other-race effect at either an explicit (Brigham & Barkowitz, 1978; Carroo, 1987; Lavrakas et al., 1976; Slone et al., 2000) or implicit level (Ferguson et al., 2001).

The standard paradigm for measuring the ORE has been to show participants neutral emotion expression own-race and other-race faces in a learning phase and then to present these faces, along with new faces, in a later test phase. Participants tend to not only more accurately recall previously seen own-race faces but also to make more errors in reporting that new other-race faces have been previously seen (false positives; Valentine et al., 1995). However, a recent study by Ackerman et al. (2006) examined the ORE by presenting angry emotion expression faces in addition to neutral faces. Displaying racial in-group and out-group faces for three separate time periods (500ms, 1000ms, or 3000ms) and with a cognitive load either present or absent, Ackerman et al. (2006) found that the ORE was reversed when participants viewed angry faces, with angry out-group faces being recognised better than angry in-group faces. This effect was most powerful when viewing faces displayed for a low period of time and with a cognitive load present. The ORE remained stable for neutral facial expressions, leading Ackerman et al. (2006) to theorise that out-group displays of anger were perceived as particularly threatening and that this led to an increase in allocation of attentional resources to ensure that encoding of that face took place.

This functional perspective of perception would suggest that heightened attention is paid to the stimulus that poses the greatest threat to us (Öhman, Flykt, & Esteves, 2001). The Ackerman et al. (2006) findings would therefore suggest that White people will pay more attention to Black targets displaying anger because they are seen as more of a threat to the individual than racial in-group members who are displaying anger. The functional perspective may be supported somewhat by Devine's (1989) findings demonstrating that Black male faces are culturally seen as stereotypically threatening.

Similarly, Trewalter et al. (2008) argue that this has become a cultural norm to such a large extent that Black male faces may have taken on the role of an automatic threat that is worthy of enhanced attention, in much the same way that snakes and spiders capture attention because they are perceived in the human psyche as potentially threatening.

Current Studies

Whilst there is little evidence of prejudice influencing the ORE in the face perception literature, there is evidence that implicit prejudice influences the perception of emotion, particularly anger (Hugenberg & Bodenhausen, 2003, 2004). It is therefore feasible that the perception of emotion displays may be influenced by prejudice levels of the perceiver in an ORE paradigm containing facial displays of emotion. In light of this, the current series of studies set out to examine and extend the findings of Ackerman et al. (2006). To explore some of the issues raised in the previous literature and also in this thesis, the paradigm used by Ackerman et al. (2006) was expanded to incorporate the happy emotion as well as the angry and neutral emotions. If Ackerman et al.'s (2006) argument for a functional perspective is correct and fear of threat is causal in greater perception being paid to out-group angry faces, the ORE should remain for neutral and happy faces but be reversed for the angry faces. By incorporating measures of implicit and explicit prejudice into the study, it should also be possible to examine whether prejudice can influence the ORE in light of Hugenberg and Bodenhausen's (2003) finding that participants high in implicit prejudice are more likely to perceive out-group displays of anger but not happiness.

Experiment 3.1

If the functional perspective is correct, and people do perceive out-group displays of anger as more threatening and so pay increased attention to those target faces, it should be the case that they are able to correctly recognise the target face even when it no longer displays the angry emotion. A target cannot be expected to maintain the same facial features in every interaction, and so functionally humans should have the ability to adapt to this possibility, particularly if anger displays are seen as threatening to us. If the out-group angry face is scrutinised more closely and a functional process is used, the out-group angry faces should be correctly recognised more often than out-group happy faces and out-group neutral faces. This proposal is explored in the current study by presenting emotion faces at learning phase but only neutral faces at test phase.

The hypotheses for this study are that, in accordance with the findings of Ackerman et al. (2006), out-group angry faces will be recognised as well as, if not better than, in-group angry faces. Neutral faces, however, are expected to display an in-group advantage as found by Ackerman et al. (2006) and would be expected from a standard paradigm ORE study. Finally, extrapolating from the Hugenberg and Bodenhausen (2003) findings, if participants high in implicit prejudice are more likely to see anger in neutral faces, they should be worse at recognising previously seen angry faces, as they will be harder to differentiate from neutral faces. If this is particularly the case for modern racist participants, it would suggest that explicit prejudice also has a role to play in this process.

Method

Participants

Seventy-two White psychology undergraduate students from Cardiff University (64 women; 8 men, with a mean age of 19.5 years) took part in the study for course credit.

Design

A 2 (target race: Black, White) x 3 (target expression: happy, neutral, angry) x 2 (distracter presence: present, absent) x 3 (presentation duration: 500ms, 1,000ms, 4,000ms) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA design, with target race and target expression as within-subject variables and distracter presence, presentation duration and prejudice type as between-subject variables was used for the current study. Analysis of recognition responses to targets and reaction times to targets were carried out independently.

Materials

The procedure followed that developed by Ackerman et al. (2006). Stimuli for the recognition task were twenty-four 5" x 3.5" frontal colour photographs of male faces (12 Black and 12 White faces, with each racial target group consisting of four happy, four neutral, and four angry faces). In the distracter present condition, twenty-four 5" x 3.5" abstract pictures were randomly paired with the target pictures. The abstract pictures were made up of different coloured shapes and were controlled for number and colour of

shapes in each picture. In the distracter absent condition the pictures were presented in the same screen position but without the distracter image. For the test phase of the study, 24 neutral photographs of the Black and White target faces were presented with 24 new neutral faces (12 Black and 12 White) presented as foils. All photographs had been judged in a pilot test for type of emotion displayed, intensity of emotion, and attraction levels of each face. These were then matched across races for the current study. To calculate individual differences in prejudice the measures were the same as those used in experiments one and two.

Procedure

Participants were randomly assigned to one of six experimental groups: pictures displayed for either 500ms, 1000ms, or 4000ms, with cognitive load present or absent. Each participant was tested individually, seated in front of a personal computer screen. On-screen instructions asked the participant to watch the images displayed on the computer screen, but they were not informed that they would be tested on recall at a later stage. The participant viewed the emotion stimulus faces in the training phase, presented randomly with a 3000ms inter-stimulus interval between each presentation and a fixation point displayed before each presentation. Upon completion of the learning phase the participant was again asked to watch the images displayed on the computer screen, and ten landscape scenes were presented for 30 seconds each (five minutes in total). The participant was then informed that they would be shown a number of faces displaying neutral emotion expressions and that they were required to indicate on the keyboard whether they had seen the face previously in the learning phase or whether it was a new

face. In this test phase the original 24 targets faces were presented displaying a neutral facial expression. They were randomly presented with 24 new target foil faces (12 Black and 12 White) also displaying neutral facial expressions. For each picture the participant was asked to respond on a 6-point scale, ranging from *Definitely did not see* to *Definitely did see*. After completion of the recognition task, the participant completed an IAT (Greenwald et al., 1998) and then a questionnaire measuring explicit prejudice (Lepore & Brown, 1997).

Results

Calculating Overall Responses

In order to measure results against the Ackerman et al. (2006) study, the six-point confidence scale was converted to a binary no/yes judgement (1 – 3 = *no* (not previously seen); 4 – 6 = *yes* (previously seen); see also Ackerman et al., 2006). Scores were calculated for foil targets incorrectly reported as being seen in the learning phase (false positives) and were applied to each measurement of previously seen faces to calculate sensitivity of recognition (Stanislow & Todorov, 1999). This measurement produced results of .45 for Black foils and .31 for White foils, showing that Black foils were incorrectly recognised as previously seen significantly more than White foils, $t\,(71) = 4.7$, $p = .001$. [7] These judgements were then transformed to *A'*, a measurement of correct recognition responses to previously seen pictures controlled for incorrect reporting of foil pictures as previously seen (false positives; Stanislow & Todorov, 1999). This produces

[7] Due to the foils in the test phase all being neutral, they could not be matched to the emotion groups in the learning phase (4 angry, 4 happy, 4 neutral) for each race. An overall false positive was therefore calculated for each race and used with each group within race.

an overall sensitivity measurement of old faces correctly recognised as old combined with new faces correctly recognised as new, with a score of 1 representing perfect accuracy and a score of .5 representing chance levels of accuracy.

Statistical analysis of the *A'* measures for the overall interaction of target race (Black, White) x emotion (angry, neutral, happy) x time (500ms, 1000ms, 4000ms) x load (present, absent) using a Mixed-ANOVA found no significant differences, F (4, 132) = .44, $p > .70$. Whilst it was expected that the load and time manipulations would lead to differences between the conditions, as was found in the Ackerman et al. (2006) study, this did not occur. For ease of presentation, the data were subsequently analysed combining the load and time variables.[8]

Scores on the implicit and explicit measures of prejudice were calculated and the correlation between implicit and explicit measures was .21. A median split was carried out on the implicit and explicit prejudice data and each participant was allocated to one of the four prejudice types highlighted by Son Hing et al. (2008). For implicit measures of prejudice, higher scores indicated higher levels of prejudice (range of scores from this sample was 1.47, with a high score of 1.10, low score of -.37, and a mean score of .41), and the results of all participants were dichotomised to produce two sub-groups (high implicit prejudice participants > .41 IAT score versus low implicit prejudice participants <.41 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997) were also calculated, with higher scores on this measure indicating higher levels of prejudice (range of scores from this sample was 58, with a low score of 29 and a high score of 87, with a mean of 55.44). The scores on this measure were dichotomised using the mean score, with participants scoring 55 or below classified as low explicit prejudice,

[8] Including these variables does not influence the pattern of results.

and participants scoring 56 or above classified as high explicit prejudice. This resulted in 20 participants being classified as egalitarian, 16 as principled conservatives, 17 as aversive racists and 19 as modern racists. No violation of ANOVA assumptions were found for these groups.

Influence of Prejudice Type

In order to analyse the effect of prejudice style on the *A'* data a 2 (target race: Black, White) x 3 (emotion: angry, neutral, happy) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA was carried out, with target race and emotion as within-subject factors and prejudice style as a between-subject factor. Table 4.1 shows the mean scores for *A'* of each of the prejudice types as a function of emotion expression displayed and target race. The results revealed a significant main effect of emotion $F(2, 67) = 6.78, p = .002$. Overall, the correct recognition for neutral faces at test phase ($M = .68$) was significantly greater than that for either happy ($M = .64$; $t(71) = 2.33, p = .02$) or angry faces ($M = .61$; $t(71) = 3.36, p < .001$). *A'* scores for happy and angry faces (at test phase) did not differ ($p > .10$). There was also a significant main effect of race, $F(1, 71) = 13.13, p = .001$. Overall, correct recognition for White faces at test phase ($M = .68$) was significantly greater than that for Black faces ($M = .60$).

These main effects were qualified by the significant interaction between race and emotion, $F(2, 67) = 4.46, p = .02$. This shows that there was higher recognition accuracy for neutral White targets ($M = .72$) than neutral Black targets ($M = .63$), $t(71) = 3.24, p = .002$, and also higher recognition of angry White targets ($M = .67$) than angry Black

targets (M = .54), t (71) = 4.1, p = .001. There was no effect of race for happy targets (t < 1). There was also an interaction between emotion and prejudice type, F (6, 136) = 2.63, p = .02. This interaction shows that modern racists recognised significantly more neutral faces (M = .71) than angry faces (M = .58), t (18) = 2.95, p = .01, and aversive racists recognised significantly more neutral faces (M = .72) than angry faces (M = .56), t (16) = 3.75, p = .002, and also significantly more happy faces (M = .67) than angry faces, t (16) = 3.00, p = .01. There were no significant differences among either egalitarians or principled conservatives.

Due to the significant effects highlighted above only being found for participants high in implicit prejudice (modern racists and aversive racists) it was decided to examine the prejudice data at an implicit level, analysing *A'* using a 2 (target race: Black, White) x 3 (emotion: angry, neutral, happy) x 2 (implicit prejudice: low, high) Mixed-ANOVA. The results revealed a main effect of emotion, F (2, 69) = 7.18, p = .001, and a main effect of race, F (1, 70) = 13.57, p < .001, as highlighted in the analysis above. However, these main effects were qualified by a significant interaction between emotion and implicit prejudice, F (2, 69) = 6.32, p = .003, a significant interaction between emotion and race, F (2, 69) = 4.51, p = .01, a marginal interaction between race and implicit prejudice, F (2, 69) = 3.39, p = .07, and a significant three-way interaction between race, emotion, and prejudice, F (2, 69) = 3.37, p = .04. Whilst participants low in implicit prejudice showed no significant differences between correct recognition of happy (M = .63), neutral (M = .64) and angry (M = .64) emotion displays (all ps > .51), participants high in implicit prejudice recognised significantly more neutral (M = .71) than happy (M = .65) targets, t (35) = 2.67, p = .01, significantly more happy targets than angry targets

(M = .57), t (35) = 2.58, p = .01), and significantly more neutral targets than angry targets, t (35) = 4.73, p < .001. Contrasts across prejudice type showed a significant effect for Black anger, with participants low in implicit prejudice recognising significantly more Black angry targets (M = .61) than those high in implicit prejudice (M = .47), F (1, 70) = 8.66, p = .004. No other comparisons showed significant differences.

Target Race	*Target Emotion*	*Egal*	*PC*	*AR*	*MR*
Black	Happy	.67 (.21)$_a$	.62 (.23)$_a$	.61 (.18)$_a$	.62 (.18)$_a$
	Neutral	.58 (.23)$_a$	.60 (.24)$_a$	.67 (.22)$_a$	.68 (.21)$_a$
	Angry	.60 (.24)$_a$	.63 (.20)$_a$	.44 (.22)$_b$	.49 (.19)$_b$
White	Happy	.62 (.22)$_a$	.58 (.26)$_a$	.73 (.13)$_a$	.64 (.27)$_a$
	Neutral	.71 (.17)$_a$	.67 (.20)$_a$	.77 (.15)$_a$	.72 (.16)$_a$
	Angry	.63 (.21)$_a$	.72 (.17)$_a$	.67 (.19)$_a$	.67 (.24)$_a$

Table 4.1. *Experiment 3.1 A' Recognition Accuracy as a Function of Target Race, Emotion, and Prejudice Type (Standard Deviations in Parentheses)*

Note. Contrast effects displayed as subscripts, means in the same row that do not share subscripts differ at p < .05.

Reaction Times

Reaction times of participants were also calculated to examine whether individual differences in implicit and explicit prejudice would influence speed of responses to new and old faces. Participants who failed to correctly identify any of a subset of previously seen faces (and who would therefore have a mean reaction time of zero for correct responses) were excluded from this analysis, leaving 53 participants (14 egalitarian, 12 principled conservative, 15 aversive racists, and 12 modern racists).

The results of an ANOVA on correct response times revealed a number of effects. First, there was a significant interaction between race and emotion, F (2, 48) = 5.87, p = .01. For angry faces, response times were significantly faster for Black faces (M = 1892ms) compared to White faces (M = 2264ms), t (52) = 2.55, p = .01. There was no effect of race for either happy or neutral faces (both ps > .25). There was also a marginally significant interaction between emotion and prejudice type, F (6, 96) = 1.85, p = .09.

Both of these interactions were qualified by the marginally significant three-way interaction, F (6, 98) = 1.94, p = .11. Analysis of the emotion displays by the out-group for different prejudice types with contrast effects showed a significant difference between the groups for reaction times to correct scores on Black anger, with modern racists being faster to respond than any other group t (49) = 2.08, p = .04. Aversive racists were also found to be significantly faster than any other group for Black neutral targets, t (49) = 2.41, p = .02. No other differences were found.

To examine whether modern racist participants were simply faster overall on Black angry faces or whether their speed was specific to correctly answered previously seen faces, a paired-samples t-test was carried out. There was a significant difference between the average reaction time to Black angry targets (M = 1917ms) and the correct reaction time to Black angry targets (M = 1457ms), t (11) = 3.02, p = .01, suggesting that the speed of response was found only when responding to a previously seen *and* correctly recognised Black angry target. Finally, to examine whether this was an effect of implicit prejudice, as found in the correct recognition analysis, or whether this finding was limited to the modern racist group, analysis of average time and correct time were carried out

across high and low implicit prejudice. No significant differences were found for average time taken to view Black angry targets (low prejudice $M = 2103$ms, high prejudice $M = 1952$ms), $F(1, 51) = .46$, *ns*, or time taken to view correctly recognised Black angry targets (low prejudice $M = 2043$ms, high prejudice $M = 1745$ms), $F(1, 51) = 1.71$, *ns*. This shows that, in this case, speed of correctly recognising a previously seen Black angry target could only be accounted for by the interaction between implicit and explicit prejudice, and not by implicit prejudice alone.

Discussion

This study set out to examine whether the ORE could be reversed by the presentation of targets displaying emotion even when the emotion was no longer displayed at test phase. Whilst Ackerman et al. (2006) reported a reversal of the ORE when using angry displays of emotion, with previously seen Black angry faces being recognised more than previously seen White angry faces, the current study did not replicate this finding. Whilst the ORE was negated for the happy emotion, with out-group and in-group displays being recognised at similar levels, the ORE remained for neutral faces (as expected) but also remained for angry faces, contrary to the findings of Ackerman et al. (2006). Also, participants high in implicit prejudice (aversive racists and modern racists) showed a decrement in recognition of out-group anger compared to those low in implicit prejudice, whilst explicit prejudice appeared to have no significant effect upon the correct recognition results. However, participants high in explicit and implicit prejudice (modern racists) were significantly faster at responding to out-group faces

which they had correctly classified as being previously seen, a finding that could not be accounted for by implicit or explicit prejudice alone. If human perception is designed according to a functional perspective (see Ackerman et al., 2006; Trewalter et al., 2008), then participants should have shown a good ability to recognise faces that had previously displayed anger even when that emotion is was no longer displayed. Furthermore, if out-group faces are more memorable because they have displayed anger (Ackerman et al., 2006) then these faces should have been recognised well. This was not the case in this experiment.

In light of these findings, a second study was conducted to examine differences in prejudice type and whether the ability to recognise a face could be influenced by a neutral face changing to an emotion face in the test phase.

Experiment 3.2

Whereas Experiment 3.1 examined whether participants could correctly recognise a target with a neutral facial expression that had been previously seen displaying anger or happiness, this study was designed to examine the opposite; whether a face learned at neutral could be recognised if displaying an emotion at test. It would be expected, in this case, that a standard ORE should occur, as participants have no reason to encode the out-group faces with respect to enhanced threat from that out-group. However, due to the finding in the previous experiment that participants high in implicit prejudice were poorer at recognising out-group displays of anger when they subsequently displayed a neutral emotion, it is possible that these participants will again be poorer at recognition of out-

group anger, as the current experiment will again involve a change in the display of the target face.

Due to the failure to find an effect of cognitive load or presentation time in study one, combined with the inability to control the prejudice type of participants going into each group, it was decided to remove these conditions from the study and to present target faces for 1000ms (the central time display in the Ackerman et al. study) and to focus on the ORE and prejudice data.

Method

Participants

Thirty-nine White psychology undergraduate students from Cardiff University (33 women; 6 men, with a mean age of 22.7 years) took part in the study for course credit.

Design

A 2 (target race: Black, White) x 3 (target expression: happy, neutral, angry) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA design was used, with target race and target expression as within-subject variables and prejudice type as the between-subject variable. Analysis of correct target responses and reaction times were carried out independently.

Materials

The materials used in Experiment 3.1 were also used in this experiment. The 12 Black and 12 White faces displaying a neutral emotion expression were used in the learning phase, whilst the same targets displaying emotion were used in the test phase. Twenty-four foil faces used for this study (12 Black and 12 White) were also the same as previously used targets but now displaying angry, neutral, and happy emotion expressions.

Procedure

All participants viewed target faces for 1000ms with no cognitive load presented. Each participant was tested individually as before, but was presented with neutral poses of the 24 targets in the learning phase. After the learning phase the participant viewed identical landscape scenes to those used in Experiment 3.1 for 5 minutes. The participant was then informed that they would be shown a number of faces displaying either happy, angry, or neutral emotions and that they were required to indicate on the keyboard whether they had seen the face in the learning phase or whether it was a new face. These instructions made explicit that the emotion displays may be different but that the participant's task was to attempting to recognise the target regardless of the facial display presented. In this test phase the original 24 targets were shown, now displaying either an angry, neutral, or happy facial expression, randomly presented with 24 new foils (12 Black and 12 White) also displaying either an angry, happy, or neutral facial expression. Participant responses were coded the same as for Experiment 3.1. After completion of the

recognition task the participant completed an IAT (Greenwald et al., 1998) and the Lepore and Brown (1997) explicit prejudice questionnaire.

Results

Overall Responses

Participant responses were again converted to a binary no/yes judgement (as in Experiment 3.1 and Ackerman et al., 2006). They were then transformed to a measurement of *A'* using hit rate for correct responses to previously seen faces and incorrect responses to new faces as previously seen (Ackerman et al., 2006; Stanislow & Todorov, 1999).[9]

Influence of Prejudice Type

Scores on the implicit and explicit measures of prejudice were calculated and the correlation between implicit and explicit measures was -.08. A median split was carried out on the data for each measure and each participant was allocated to one of the four prejudice types. This resulted in 10 participants being classified as egalitarian, 8 as principled conservatives, 9 as aversive racists and 12 as modern racist. No violation of ANOVA assumptions were found for any of the prejudice groups. For implicit measures of prejudice, higher scores indicated higher levels of prejudice (range of scores from this sample was 1.75, with a high score of 1.16, low score of -.59, and a mean score of .49), and the results of all participants were dichotomised to produce two sub-groups (high

[9] Unlike the false positive responses in Study One, the false positives for this study can be calculated for each emotion as foils can be directly matched to previously seen targets, as emotion displays for each target race and emotion are categorical in the test phase.

implicit prejudice participants > .49 IAT score versus low implicit prejudice participants <.49 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997) were also calculated, with higher scores on this measure indicating higher levels of prejudice (range of scores from this sample was 58, with a low score of 28 and a high score of 86, with a mean of 55.08). The scores on this measure were dichotomised using the mean score, with participants scoring 55 or below classified as low explicit prejudice, and participants scoring 56 or above classified as high explicit prejudice.

To analyse the effect of prejudice style on the *A'* data a 2 (target race: Black, White) x 3 (emotion: angry, neutral, happy) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA was carried out, with target race and emotion as within-subject factors and prejudice type as a between-subject factor. The results revealed a number of significant effects. First, there was a main effect of race, $F(1, 35) = 6.15, p = .02$. Overall, correct recognition at test was greater for White faces ($M = .82$) compared to Black faces ($M = .78$). There was also a significant main effect of emotion, $F(2, 34) = 15.11, p < .001$. Overall, correct recognition of angry faces presented at test phase ($M = .88$) was greater than that for happy ($M = .81$; $t(38) = 1.82, p = .08$) and neutral faces ($M = .74$; $t(38) = 5.41, p < .001$). Happy faces at test showed greater recognition than neutral faces, $t(38) = 3.23, p = .003$. Emotion faces at test phase led to greater subsequent recognition than neutral faces.

These effects were qualified by the significant interaction between race and emotion, $F(2, 34) = 8.98, p < .001$. Angry White faces ($M = .92$) were significantly more likely to be correctly recognised compared to angry Black faces ($M = .78$), $t(38) = 6.27$, $p < .001$. Happy Black faces ($M = .84$) showed a tendency to be better recognised than

White happy faces (M = .78), t (38) = 1.65, p = .10. Therefore, the ORE was found for angry faces.

This effect was further qualified by the three-way interaction, F (6, 70) = 2.46, p = .03 (see Table 4.2), with egalitarians recognising White neutral targets (M = .88) significantly more than any other group (M = .74), t (35) = 2.46, p = .02, and modern racists significantly recognising White neutral (M = .66) less than any other group (M = .82), t (35) = 2.89, p =.01. To follow up on the findings from the previous study regarding implicit prejudice, a 2 (target race: Black, White) x 3 (emotion: angry, neutral, happy) x 2 (implicit prejudice: low, high) Mixed-ANOVA was carried out, with target race and emotion as within-subject variables and implicit prejudice as a between-subject variable. There was a significant main effect of race, F (1, 37) = 5.84, p = .02, a significant main effect of emotion, F (2, 36) = 15.31, p < .001, and an interaction between race and emotion, F (2, 36) = 9.80, p = .001 (as seen previously). However, there was also a significant three-way interaction, F (2, 36) = 5.43, p = .01. Analysis of contrast effects found a predicted significant effect of prejudice type for Black anger with participants low in implicit prejudice (M = .83) recognising more angry Black faces than participants high in implicit prejudice (M = .74), F (1, 37) = 3.65, p = .06). Low implicit prejudice participants were also marginally better at recognising White displays of anger (M = .83) compared to those high in implicit prejudice (M = .73; F (1, 37) = 3.60, p = .07). All other contrast differences were nonsignificant.

Target Race	*Target Emotion*	*Egal*	*PC*	*AR*	*MR*
Black	Happy	.80 (.20)$_a$	.84 (.09)$_a$	.87 (.06)$_a$	.85 (.09)$_a$
	Neutral	.66 (.28)$_a$	.67 (.23)$_a$	.82 (.10)$_a$	.71 (.18)$_a$
	Angry	.84 (.17)$_a$	.83 (.09)$_a$	.76 (.17)$_a$	.73 (.17)$_a$
White	Happy	.77 (.19)$_a$	.83 (.25)$_a$	.88 (.06)$_a$	.69 (.28)$_b$
	Neutral	.88 (.07)$_b$	.76 (.15)$_a$	.81 (.13)$_a$	.66 (.21)$_b$
	Angry	.94 (.04)$_a$	.90 (.07)$_a$	.93 (.06)$_a$	.90 (.05)$_a$

Table 4.2. *Experiment 3.2 A' Recognition Accuracy as a Function of Target Race, Emotion, and Prejudice Type (Standard Deviations in Parentheses).*

Note. Contrast effects displayed as subscripts, means in the same row that do not share subscripts differ at $p<.05$.

Reaction Times

Reaction times of participants were also calculated to examine whether prejudice type would influence speed of responses to new and old faces. Participants who failed to correctly identify any of a subset of previously seen faces (and who would therefore have a mean reaction time of zero for correct responses) were excluded from this analysis, leaving 29 participants (eight egalitarian, five principled conservative, eight aversive racists, and eight modern racists). The ANOVA revealed no significant effects.

Discussion

Experiment 3.2 again displayed an ORE for the angry emotion, contrary to the findings of Ackerman et al. (2006). However, the other-race effect was negated in both the happy and neutral emotion displays, with the happy emotion showing a trend towards

reversal. Whilst no effects of reaction time were found in the current study, once again participants high in implicit prejudice were significantly poorer at recognising out-group displays of anger than participants high in implicit prejudice, replicating the findings of Experiment 3.1. This finding across both studies suggests that participants high in implicit prejudice may have difficulties in the mental manipulation of the out-group target face between emotions; from an angry face to a neutral face in Experiment 3.1, and from a neutral face to an angry face in Experiment 3.2. To expand upon this, and also to further examine the ORE finding in their original study, it was decided to replicate the paradigm used in the original Ackerman et al. (2006) study, presenting emotion faces at learning and test phase. As the two studies presented thus far have failed to replicate Ackerman et al.'s findings regarding a reversal of the other-race effect for the angry emotion, this should also allow more direct comparisons with their data. This will also allow for exploration of whether implicit prejudice influences recognition of out-group anger when the target emotion does not change between the learning and test phases.

Experiment 3.3

Method

Participants

Eighty-seven White psychology undergraduate students from Cardiff University (74 women; 13 men, with a mean age of 19.7 years) took part in the study for course credit.

Design

A 2 (target race: Black, White) x 3 (target expression: happy, neutral, angry) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA design was used, with target race and target expression as within-subject variables and prejudice type as the between-subject variable.

Materials

Materials used in Experiment 3.1 were also used in this study. The 12 Black and 12 White faces displaying angry, happy and neutral emotion expressions (4 targets from each race displaying each emotion) were presented in the learning and test phases. The 24 foil faces used for this study (12 Black and 12 White displaying angry, happy, and neutral emotions) were presented in the test phase only.

Procedure

All participants viewed target faces for 1000ms with no cognitive load presented, as in Experiment 3.2. Each participant was presented with the 24 Black and White faces displaying angry, happy, and neutral emotions in the learning phase. After viewing landscape scenes in the distracter task for five minutes participants were informed that they would be presented with faces that had either been previously seen or were new, and that their task was to report whether they had seen the target face before. After completing this task, participants completed an IAT (Greenwald et al., 1998) and then the Lepore and Brown (1997) explicit prejudice questionnaire.

Results

Overall Responses

Participant responses were again converted to a binary no/yes judgement (as in previous experiments and Ackerman et al., 2006). They were then transformed to a measurement of *A'* using hit rate for correct responses to previously seen faces and incorrect responses to new faces as previously seen (Ackerman et al., 2006; Stanislow & Todorov, 1999).

Due to the high number of participants who did not recognise at least one of the target faces from each of the emotions in either the previously seen or foil groups (N = 58), reaction time measures were not calculated for this experiment.[10]

Influence of Prejudice Type

Scores on the implicit and explicit measures of prejudice were calculated and the correlation between implicit and explicit measures was -.11. A median split was carried out on the data for each measure and each participant was allocated to one of the four prejudice types. For implicit measures of prejudice, higher scores indicated higher levels of prejudice (range of scores from this sample was 1.97, with a high score of 1.09, low score of -.88, and a mean score of .37), and the results of all participants were dichotomised to produce two sub-groups (high implicit prejudice participants > .37 IAT score versus low implicit prejudice participants <.37 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997) were also calculated, with higher scores on

[10] In order to calculate reaction times, participants were required to recognise at least one of the emotion faces in both the learning and test phases (see Footnote 7). Failure to recognise one emotion from each target meant that no comparison could be made for that participant for reaction times.

this measure indicating higher levels of prejudice (range of scores from this sample was 63, with a low score of 24 and a high score of 87, with a mean of 51.40). The scores on this measure were dichotomised using the mean score, with participants scoring 51 or below classified as low explicit prejudice, and participants scoring 52 or above classified as high explicit prejudice. This resulted in 23 participants being classified as egalitarian, 19 as principled conservatives, 23 as aversive racists and 22 as modern racist. Table 4.3 displays the mean scores for *A'* of each of the prejudice types as a function of emotion expression displayed and target race. No violation of ANOVA assumptions were found for any of the prejudice groups.

In order to analyse the effect of prejudice style on the *A'* data a 2 (target race: Black, White) x 3 (emotion: angry, neutral, happy) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA was carried out, with target race and emotion as within-subject factors and prejudice style as a between-subject factor. The analysis revealed a main effect of race, $F(1, 83) = 117.48, p < .001$, with White targets ($M = .77$) being correctly recognised significantly more than Black targets ($M = .59$), $t(86) = 10.87, p < .001$. There was also a main effect of emotion, $F(2, 82) = 22.79, p < .001$, with neutral targets ($M = .76$) being recognised significantly more than happy targets ($M = .66$), $t(86) = 4.88, p < .001$, and angry targets ($M = .62$), $t(86) = 6.44, p < .001$. Happy targets were also recognised significantly more than angry targets, $t(86) = 2.00, p < .05$.

These main effects were qualified by a significant interaction between race and emotion, $F(2, 82) = 16.30, p < .001$. This shows that there was a significant difference between participant recognition of White happy ($M = .82$) and Black happy ($M = .51$)

targets, t (86) = 9.67, $p < .001$, and also between recognition of White angry ($M = .71$) and Black angry ($M = .53$), t (86) = 5.03, $p < .001$. Both of these emotions show an other-race effect. However, there was no significant difference between White neutral ($M = .78$) and Black neutral ($M = .74$) recognition. No other interactions were significant.

To follow up the previous findings regarding the influence of implicit prejudice, a 2 (target race: Black, White) x 3 (emotion: angry, neutral, happy) x 2 (implicit prejudice type: low, high) Mixed-ANOVA was carried out, with target race and emotion as within-subject factors and implicit prejudice type as a between-subject factor. However, unlike in the previous two experiments the three-way interaction was not significant, F (2, 84) = .02, $p > .90$. With particular regards to the Black angry targets, there was no significant difference between participants low ($M = .55$) and high in implicit prejudice ($M = .51$), F (1, 85) = .79, $p > .37$.

Target Race	*Target Emotion*	*Egal*	*PC*	*AR*	*MR*
Black	Happy	.59 (.18)$_b$	.42 (.28)$_c$	.53 (.24)$_a$	.49 (.26)$_a$
	Neutral	.77 (.23)$_a$	.73 (.19)$_a$	.74 (.17)$_a$	.74 (.20)$_a$
	Angry	.59 (.27)$_a$	.51 (.27)$_a$	.45 (.26)$_a$	.56 (.23)$_a$
White	Happy	.79 (.22)$_a$	.80 (.13)$_a$	.81 (.18)$_a$	.86 (.14)$_a$
	Neutral	.79 (.24)$_a$	.74 (.22)$_a$	.78 (.23)$_a$	.79 (.22)$_a$
	Angry	.77 (.20)$_a$	.66 (.26)$_a$	.65 (.25)$_a$	.74 (.21)$_a$

Table 4.3. *Experiment 3.3 A' Recognition Accuracy as a Function of Target Race, Emotion, and Prejudice Type (Standard Deviations in Parentheses).*

Note. Contrast effects displayed as subscripts, means in the same row that do not share subscripts differ at $p < .05$.

Discussion

As the current experiment is the closest to the Ackerman et al. (2006) study of those reported so far in this chapter, it was expected that this would show the clearest indication of a negation or reversal of the ORE for angry out-group faces. However, this did not occur; Black happy and Black angry displays both resulted in significantly less recognition than for White displays of these emotions. Indeed, the neutral expression (which would be expected to show a clear ORE) was the only emotion to show a negation of the ORE.

Following up on the findings from Experiments 3.1 and 3.2, that participants high in implicit prejudice were significantly poorer at recognising angry Black displays of emotion, no significant differences were found in the current experiment. Whilst it may be possible that the use of the same target emotion displays at learning and test is responsible for this, in that participants high in implicit prejudice are able to match those low in implicit prejudice on this task, it is also possible that this result may be due to low levels of recognition in the low implicit prejudice group; their recognition of out-group anger appears to have fallen to the levels of the high implicit group rather than the other way around.

Due to the ambiguous nature of these findings and the contrary findings to the previous two experiments, it was decided to reduce complexity by removing the happy emotion from the task. By presenting only the angry and neutral emotions, as in Ackerman et al.'s original study, this should give a clearer indication of any possible

reversal of the ORE for angry Black targets and also allow for further exploration of the prejudice measures.

Experiment 3.4

Method

Participants

Twenty-nine White psychology undergraduate students from Cardiff University (26 women; 3 men, with a mean age of 19.3 years) took part in the study for course credit.

Design

A 2 (target race: Black, White) x 2 (target expression: neutral, angry) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA design was used, with target race and target expression as within-subject variables and prejudice style as the between-subject variable.

Materials

Materials used in Experiment 3.3 were also used in this study, but with the happy targets removed. This left 8 Black and 8 White faces displaying angry and neutral emotion expressions (4 targets from each race displaying each emotion), and these were presented in the learning and test phases. The 16 foil faces used for this study (8 Black and 8 White displaying angry and neutral emotions) were presented in the test phase only.

Procedure

All participants viewed target faces for 1000ms with no cognitive load presented, as in Experiment 3.3. Each participant was presented with the 16 Black and White faces displaying angry and neutral emotions in the learning phase. After viewing landscape scenes in the distracter task for five minutes participants were informed that they would be presented with faces that had either been previously seen or were new, and that their task was to report whether they had seen the target face before. Participants then completed an IAT (Greenwald et al., 1998) and then the Lepore and Brown (1997) explicit prejudice questionnaire.

Results

Overall Responses

Participant responses were again converted to a binary no/yes judgement (as in previous experiments and Ackerman et al., 2006). They were then transformed to a measurement of *A'* using hit rate for correct responses to previously seen faces and incorrect responses to new faces as previously seen (Ackerman et al., 2006; Stanislow & Todorov, 1999).

Influence of Prejudice Type

Scores on the implicit and explicit measures of prejudice were calculated and the correlation between implicit and explicit measures was .09. A median split was carried

out on the data for each measure and so each participant was allocated to one of the four prejudice types. This resulted in seven participants being classified as egalitarian, eight as principled conservatives, seven as aversive racists and seven as modern racist. No violation of ANOVA assumptions were found for any of the prejudice groups. For implicit measures of prejudice, higher scores indicated higher levels of prejudice (range of scores from this sample was 1.56, with a high score of .96, low score of -.6, and a mean score of .34), and the results of all participants were dichotomised to produce two sub-groups (high implicit prejudice participants > .34 IAT score versus low implicit prejudice participants <.34 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997) were also calculated, with higher scores on this measure indicating higher levels of prejudice (range of scores from this sample was 60, with a low score of 23 and a high score of 83, with a mean of 50.18). The scores on this measure were dichotomised using the mean score, with participants scoring 50 or below classified as low explicit prejudice, and participants scoring 51 or above classified as high explicit prejudice. Mean scores for each group by race and emotion are displayed in Table 4.4.

In order to analyse the effect of prejudice style on the *A'* data a 2 (target race: Black, White) x 2 (emotion: angry, neutral) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA was carried out, with target race and emotion as within-subject factors and prejudice style as a between-subject factor. Results revealed a main effect of race, $F(1, 25) = 8.17, p < .01$, with White targets ($M = .86$) being recognised significantly more than Black targets ($M = .77$), $t(28) = 3.01$, $p < .01$. No other effects were significant.

When examining Black angry targets, there was no significant difference between participants low ($M = .79$) and high in implicit prejudice ($M = .71$), $F(1, 27) = .78$, $p = .39$.

Target Race	*Target Emotion*	*Egal*	*PC*	*AR*	*MR*
Black	Neutral	.88 (.10)$_a$	.68 (.23)$_a$	.74 (.19)$_a$	.85 (.16)$_a$
	Angry	.77 (.27)$_a$	.80 (.16)$_a$	.71 (.20)$_a$	.72 (.28)$_a$
White	Neutral	.89 (.06)$_a$	.84 (.09)$_a$	.74 (.23)$_b$	.88 (.10)$_a$
	Angry	.91 (.10)$_a$	.85 (.17)$_a$	.82 (.28)$_a$	.93 (.05)$_a$

Table 4.4. *Experiment 3.4 A' Recognition Accuracy as a Function of Target Race, Emotion, and Prejudice Type (Standard Deviations in Parentheses).*

Note. Contrast effects displayed as subscripts, means in the same row that do not share subscripts differ at $p<.05$.

Discussion

The current study set out to examine whether the ORE could be negated using a simplified task as used by Ackerman et al. (2006). However the ORE remained, with in-group targets being recognised significantly more than out-group targets. Also, whilst an increase in correct recognition was reported for all participants, this did not show any significant differences across participants' implicit prejudice levels.

General Discussion

The primary aim of the current set of experiments was to examine whether the other-race effect (ORE) could be reversed if targets displaying emotion were presented to participants, as found by Ackerman et al. (2006). Across all four experiments the ORE for angry displays was present, with participants recognising significantly more in-group (White) targets displaying anger than out-group (Black) targets displaying anger. In the case of the happy emotion the ORE was found to be negated in Experiment 3.1, but significantly different in 3.3. The ORE was found to be significant for Experiments 3.1, 3.2, and 3.4, with White displays recognised significantly more than Black displays, whilst the effect appeared to be negated in Experiment 3.3. It therefore appears that the current series of studies conflict with the findings of Ackerman et al. (2006), and instead appear to show an own-race bias of similar magnitude to those found in studies using traditional neutral target expressions, such as Brigham and Malpass (1985) and Chance and Goldstein (1996).

These findings would appear to lend doubt to the notion that a functional perspective can be used to explain the Ackerman et al. (2006) findings. The fundamental tenet of the functional perspective argued by Ackerman et al. (2006) rests largely on the achievement of a reversal of the ORE for these angry targets. If anger is the emotion that is most likely to capture our attention in order to promote our survival and save us from the out-group, then it should at least capture the attention as much as the happy and neutral displays of emotion and produce at least similar results. The failure to replicate

this part of the study asks questions as to whether a functional perspective can be used to explain these findings.

One possibility for the failure to replicate the ORE reversal may be the task difficulty. Whereas Ackerman et al. (2006) were relying upon an encoding of faces which were later displayed as they had been previously seen (a pure recall task), the tasks in Experiment 3.1 and 3.2 involved a certain amount of 'mental manipulation' of the targets. Only the neutral pictures could be said to equate to a recall of facial expression as used by Ackerman et al. (2006). The fact that neutral and happy targets achieved almost identical recognition rates across out-group targets whilst angry targets show a marked decrement across the results from these two experiments suggests that a use of featural configuration may be being used, as in Levin's (2000) theory. The contortion of features such as the nose, eye area and mouth in the angry emotion stand in contrast to the almost identical features displayed in the neutral poses, and contortion of only the mouth and slight change in eye area of the happy display. Whilst this does not explain why findings differ so vastly from those of Ackerman et al. (2006) on this emotion it is possible that this, combined with the added elements of the task (additional emotion to be remembered and the additional number of foils required as a result of this) may have diluted the influence that the angry emotion could have upon the participants. This is supported by a general failure of the group condition manipulations, a significant effect in the Ackerman et al. (2006) study but missing from the data in Experiment 3.1. One would imagine that having various cognitive load and time restrictions placed upon them would result in significant differences for the participants in different groups. The failure to find significant effects from these conditions suggests that task difficulty may have produced

a floor effect in even the most liberal of groups. However, the functional ability of recognising an angry display of emotion must be questioned. Threatening targets cannot be expected to continually maintain the same emotion display every time we meet them, and a need to extrapolate distinguishing features from the angry target to enable recognition at a later time and displaying a different emotion expression would appear to be a necessary tool. From the results of Experiment 3.1 and 3.2 it does not appear to be the case that people are able to extrapolate these features.

Experiments 3.3 and 3.4 bear closer resemblance to the study of Ackerman et al. (2006), and it is the failure to find an ORE in these data that is even more problematic for the functional perspective. Whilst Experiment 3.3 may have involved an increased number of stimuli over the Ackerman et al. (2006) study, Experiment 3.4 used an identical number of stimuli and so can be seen as the most comparable of the four experiments; the finding that an ORE still existed in this experiment is possibly the biggest argument against a functional perspective.

Examining the findings from the prejudice measures, the most interesting and compelling finding appears to come from dividing the experiments into a *change/no change* paradigm. When the recognition of target faces involved a change of emotion display between the learning and test phases (Experiments 3.1 and 3.2) participants high in implicit prejudice were found to perform significantly worse at recognition than participants low in implicit prejudice, but only for out-group displays of anger. When recognition involved no change between learning and test there were no significant differences between high and low implicit prejudice participants.

Due to the differences between 3.1 and 3.2 for the initial displays of emotion it is difficult to argue that this finding is due to a general encoding issue in the learning phase. As the stimuli in Experiment 3.2 were neutral at learning phase and emotion at test, participants had no way of knowing which of the faces would display anger. This, then, appears to leave two possibilities to explain this decrement in recognition. Firstly, it may be that neutral displays of out-group emotion are seen as more angry than in-group displays, and that this causes confusion when faced with both neutral and angry displays in either the learning or the test phase. Alternatively, it is possible that these participants are unable to correctly encode the necessary features required to make the mental manipulations required to correctly recognise a face that has changed features specifically to an angry display.

Whilst the first explanation may be supported to a certain extent by the Hugenberg and Bodenhausen (2003) finding that participants high in implicit prejudice see anger earlier on an out-group face moving from neutral to anger than participants low in implicit prejudice, further research would be needed to confirm that a still photograph of a neutral stimulus could have a similar effect. The second explanation, that a specific encoding problem may exist for participants high in implicit prejudice, may be possible to explore using Levin's (2000) theory as a basis. It may be possible that those high in implicit prejudice are so captured by the race of the target that they fail to encode further information which will help them to distinguish that target at a later time, particularly when the target is no longer displaying one of the items that they have encoded; the emotion (in the case of Experiment 3.1). However, for this to occur it would be a requirement that angry faces are more difficult than happy faces to recognise from an

original neutral display. The findings from Experiment 3.3, examining recognition of happy and angry emotions at learning and test, do not appear to support this at the moment. Nevertheless, either possibility would appear to argue against the functional perspective of Ackerman et al. (2006) and Trewalter et al. (2008). Surely those with the highest mistrust and dislike of the racial out-group should be the ones who are the most diligent when it comes to a threatening out-group member, and should try to devote even more resources to encoding the threatening target. By either confusing neutral targets with angry targets (leading to false positives for preparation for attack) or failing to encode sufficient information about the angry target, they are leaving themselves at a distinct disadvantage in future interactions with the target.

In the case of reaction times, it appears that participants high on both implicit and explicit prejudice, whilst being reasonably poor at recognising out-group anger, are particularly fast when recognising one of these faces. These findings suggest a general failure to correctly recognise angry out-group members, but an ability and desire to respond swiftly when one is recognised. As their reaction times to other emotion display targets and incorrect responses are no different to other groups this appears to be a definite and forceful response. The mechanisms behind this response to encoded angry out-group targets remains elusive at the moment, particularly as it was not possible to examine reaction times in two of the four experiments, and are definitely worthy of further investigation. However, this finding does highlight the need to examine the interaction between implicit and explicit prejudice. Previous research, such as Hugenberg and Bodenhausen (2003) has often looked at implicit prejudice and explicit prejudice separately, concluding that one is responsible for an effect whilst the other has no role to

play. The finding from this study, added to previous research by Aberson and Ettlin (2004), Son Hing et al. (2005) and other research contained in this thesis suggests that the interplay between the two should also be examined.

A major issue that should be highlighted across these four experiments is the large variation in participant numbers, and in particular the low number of participants in studies 3.2 and 3.4. Whilst this could not be avoided due to time constraints, it would be advantageous to ensure that larger numbers of participants are tested and a greater equality of participants across studies is achieved in any future replication.

In conclusion, the current studies provide no evidence for a reversal of the other-race effect in face perception if the faces are displaying anger. However, participants high in implicit prejudice appear to be poorer at correctly recognising out-group faces displaying anger when mental manipulation of the target face is required. Modern racist participants also appear to be faster than any other prejudice type at recognising faces which they have correctly recognised as previously displaying in-group anger. The findings from the prejudice data suggest that implicit and explicit prejudice have the ability to provide important information in the study of emotion perception and face perception, but that the interaction between the two may also be of interest and provide us with a more comprehensive account.

Whilst the current chapter has examined possible perceptual and encoding issues as reasons for differences between prejudice types in the perception of emotion, a study by Droit-Volet et al. (2004) has shown that emotions may provoke an emotional response

in the perceiver by way of increased arousal. The next chapter uses the Droit-Volet et al. (2004) paradigm to examine whether arousal could influence perceptions of in-group and out-group emotion and whether it differs as a function of individual differences in implicit and explicit prejudice.

CHAPTER FIVE: PREJUDICE AND TEMPORAL PERCEPTION OF EMOTION

Chapter summary

The current chapter examines whether facial emotion expressions displayed by a target results in different arousal levels in the perceiver, dependent upon the target's race. Using the paradigm of Droit-Volet et al. (2004), participants viewed Black and White faces displayed for between 400ms and 1600ms and judged whether they had been displayed for a long or short time, with overestimation of display times considered to be a measure of arousal (see Droit-Volet et al., 2004). Measures of implicit and explicit prejudice were also recorded and it was found that, whilst the Droit-Volet et al. (2004) findings were not replicated, differences were found across prejudice types with regards to their temporal judgments. Participants who scored high on explicit measures of prejudice (modern racists and principled conservatives) showed overestimation for all displays of anger and for in-group displays of sadness. However, they differed in response to out-group displays of happiness, with principled conservatives showing more arousal than modern racists for these displays. These findings suggest that people with differing levels of implicit and explicit prejudice may be aroused by different displays of emotion displayed by in-group and out-group members. It is also possible that the participants high in explicit prejudice are particularly aroused by emotions that may be felt as threatening to their state of well-being (anger displayed by any target member and in-group sadness).

Introduction

Physiological Effects of Emotion Perception

When people view faces expressing different emotions, different physiological responses occur. Ekman, Levenson, and Friesen (1983) found that by presenting participants with stimuli designed to provoke several emotional responses, they could differentiate between the physiological responses to these emotions. For instance, Ekman et al. (1983) reported that displays of happiness appeared to result in decreased heart rate, while displays of anger resulted in an increased heart rate and an increase in temperature. However, the results of further research have often been inconsistent, with a meta-analysis by Cacioppo, Berntson, Larsen, Poehlmann, and Ito (2000) finding many ambiguities in the data. It is possible that this is due to the ways in which emotional responses are elicited across studies; a meta-analysis by Stemmler (2004) suggests that the use of imagery, presentation of facial displays of emotion, and experience of real-life fear may all result in different proportions of physiological arousal that may explain the equivocal findings. Whilst the autonomic activation literature may be relatively unclear, support from the study of proprioceptive feedback appears to provide stronger support for the influence of facial displays of emotion. Several studies have found that the positioning of facial muscles may influence the emotion felt by participants. Asking participants' to hold a pen in their mouths without it touching their lips (activating the muscles used in a smile) has been found to result in higher ratings of the funniness of cartoons (Strack, Martin, & Stepper, 1988) and faster recognition of positive emotions (Niedenthal, Brauer, Halberstadt, & Innes-Ker, 2001).

It therefore appears that our own facial expressions may influence our cognitive and physiological responses. But how might the emotion expressions of others transmit to our own facial expressions? Studies have found that participants viewing facial displays of emotion will often mimic the expression being displayed (Dimburg, 1982, 1990; Dimburg, Thunberg, & Elmehed, 2000; Niedenthal et al., 2001). Neuropsychological changes also appear to occur when we view targets displaying emotion (Adolphs et al., 2000) and attempts to suppress the feedback through control of facial muscles appears to influence the arousal levels of those viewing facial displays of emotion (Effron, Niedenthal, Gil, & Droit-Volet, 2006). Taken together, these findings suggest that the viewing of facial displays of emotion does have an effect upon the physiological state of the perceiver. Droit-Volet et al. (2004) suggest that one of the ways in which the emotion expressions of others may affect the perceiver is through an increase in arousal when viewing the target. They claim that this can be viewed experimentally through the overestimation of the passage of time that will occur when viewing an emotion that may be considered arousing.

Temporal Judgement in Humans

Examination of the perception of the passage of time was first carried out in the study of animals (e.g., Allan, 1979; Cantor & Wilson, 1981; Church, 1984; Church & Gibbon, 1982; Fraisse, 1984; Gibbon, 1977). Many of these explanations of how animals are able to monitor time are based upon theories of scalar timing ability, the notion that all animals possess an internal clock. In order to measure a period of time, an accumulator is used to collect timed 'beats' of the clock and releases them at the end of a

given time. The counting of these accumulated beats is thought to allow for accurate judgement of the passage of time in the accounted-for period (Gibbon & Church, 1984). Human abilities to monitor time, through the use of a 'biological clock' that may possess scalar properties, have also been proposed (Wearden, 1991). Studies using human participants appear to show that they possess good temporal perception ability, even when 'counting' to monitor the passage of time has been discounted (Wearden, 1991). It must be recognised, though, that the variety of temporal judgements made by humans, combined with the complexity of circumstances under which these judgements may be required to be made, makes the study of temporal perception in humans relatively unique from the animal literature (Wearden, 1991). Nevertheless, the similarities between the animal and human findings suggest the possibility of a basic counting process occurring through the use of an internal clock (Wearden & McShane, 1988).

Two possible mechanisms which may influence the function of an internal clock in humans have been proposed: *attention* and *arousal* (Effron et al., 2006). The attention model proposes that, during times of cognitive load, attention may not be paid to the beats of the internal clock, and so some of them may not be entered into the accumulator (Zakay, 1989). When counting of the beats processed in the accumulator is carried out at the end of the given temporal period, this would lead to the counting of less beats than had actually occurred and so would lead to subjective *underestimation* of the time that had actually passed. Support for this theory has been found in studies by Brown (1997), using tasks such as mental arithmetic and visual search which are high in demand on cognitive resources, and Orme (1969), who examined the influence of pain and stress on temporal judgement.

In contrast, the arousal model proposes that when we are viewing an item that has a high level of arousal the increase in bodily responses, such as greater activation of the autonomic nervous system (ANS), will lead to a quickening of the internal clock. This will then produce more beats than would be expected in the monitored time. These extra beats would therefore enter the accumulator and so would be counted when the temporal duration to be measured had ended (Meck, 1983). This counting of the extra beats would therefore lead to an *overestimation* of time (counting the correct number of subjective beats, but nevertheless counting more than should have occurred objectively). This theory is supported by the work of Watts and Sharrock (1984) who found overestimation in a fear condition, and Harrington and Haaland (1999) who found that the administration of stimulants led to an increase in the speed of the internal clock, and therefore an overestimation of time.

The dichotomy of these competing theories, with either a cognitive load placing attentional demands leading to underestimation *or* an emotional response leading to an increase in arousal and overestimation, was exploited by Angrilli, Cherubini, Pavese, and Manfredini (1997). They carried out a study matching across the emotion-inducing features of the stimulus materials, with a test of pleasant and unpleasant pictures showing high intensity or low intensity items. They found an interaction between the stimuli, such that temporal duration of unpleasant slides was underestimated more than for pleasant slides, but only for low-intensity pictures, suggesting temporal processing based upon attentional mechanisms. In the case of the high-intensity slides, the duration of unpleasant slides was overestimated more than that of pleasant slides, suggesting processing based upon an arousal mechanism. However, Droit-Volet et al. (2004) pointed out two issues

with this study that required further attention. First, the Angrilli et al. (1997) study used time durations that may have lent themselves to counting strategies (2, 4, and 6 seconds). Second, although overestimation of time was found when comparing unpleasant to pleasant slides in the high intensity stimulus phase, this was relative and, overall, participants underestimated all types of stimuli in comparison to actual time. Angrilli et al. (1997) explained this as being an artefact of the test itself, as the images used were requiring some attention to be paid to them, and that this was moderating the amount of overestimation that arousal was allowed to contribute (Droit-Volet et al., 2004).

In order to address these issues, Droit-Volet et al. (2004) used a temporal bisection task to train female participants on short and long durations of exposure to a stimulus (400ms and 1600 ms respectively) and then presented participants with pictures of female faces displaying either happy, angry, sad, or neutral faces for these short and long durations and for other durations at 200ms increments (600ms, 800ms, 1000ms, 1200ms, and 1400ms). Droit-Volet et al. (2004) found that the emotion faces, when compared to neutral faces, consistently produced overestimation in temporal judgements. This was particularly the case for the angry emotion, with the happy emotion also producing significant overestimation and the sad emotion showing marginally significant overestimation. Droit-Volet et al. (2004) argue that the viewing of emotion faces affects arousal in the perceiver and that it is this, and not the allocation of attentional resources as suggested by Angrilli et al. (1997), that influences judgments of temporal perception.

Current Study: Influence of Prejudice on Temporal Perception

If viewing facial displays of emotion influences arousal levels in the perceiver (Droit-Volet et al., 2004), will the race of the target displaying the emotion also influence arousal? Literature covered earlier in this thesis, such as Devine (1989) and Trewalter et al. (2008) suggests that Black male faces are stereotyped as dangerous and may even grab our attention disproportionately. It would therefore be reasonable to assume that the viewing of Black target faces will result in an increased amount of arousal relative to White target faces. This should particularly be the case for Black faces displaying anger, as Droit-Volet et al. (2004) argued that anger resulted in higher levels of participant arousal, and Ackerman et al. (2006) have argued that Black target displays of anger are seen as particularly threatening and so should result in increased scrutiny. However, there is a problem in using male Black target faces as, if Angrilli et al. (1997) are correct in their assertion that attention is responsible for underestimation of time, the increased attention that would result from using Black male faces may produce underestimation and therefore act in opposition to arousal, thus confounding the aims of the current study. In order to avoid this possible complication, and also to replicate the Droit-Volet et al. (2004) study which presented female faces, Black and White female faces will be used as stimulus materials for the current study. Whilst this may not produce arousal in a similar way to male faces it will hopefully avoid the potential issues outlined above, as Black female faces are not perceived to be as threatening as Black male faces (Devine, 1989; Trewalter et al., 2008).

A further question to be examined is whether individual differences in prejudice influence the amount of arousal produced by different targets displaying different

emotions. Cunningham et al. (2004) and Phelps et al. (2000) have presented evidence that the presentation of Black male faces activate brain areas such as the amygdala, while Ito et al. (2004) found differential neural processing of in-group and out-group target faces by participants high in explicit prejudice. Furthermore, the evidence from Hugenberg and Bodenhausen (2003) suggests that people high in implicit prejudice show differences in the perception of out-group anger (but not happiness) compared to people low in implicit prejudice, and that they are more likely to classify ambiguous faces displaying anger as belonging to a racial out-group (Hugenberg & Bodenhausen, 2004).

From these findings, it is hypothesised that participants will show more arousal, by way of overestimation of the time targets have been displayed, for out-group targets over in-group targets. A second hypothesis, from the findings of Droit-Volet et al. (2004) and the prejudice literature, is that out-group displays of emotion will produce more overestimation of emotion displays compared to in-group displays of emotion. This should particularly be the case for angry displays of emotion. Participants scoring high on implicit prejudice measures (modern racists and aversive racists) should show higher arousal for out-group displays of threat (Black anger) than those low on implicit prejudice (egalitarians and principled conservatives), as the literature suggests that they are most attuned to this emotion (Hugenberg & Bodenhausen, 2003). Also, as Ito et al. (2004) found that people who score high on explicit prejudice measures show a greater neural bias towards in-group faces, it is also possible that modern racists and principled conservatives will be more influenced by in-group displays of emotion compared to those low in explicit prejudice (egalitarians and aversive racists).

Method

Participants

The sample consisted of 52 White psychology undergraduate women (mean age = 20.2 years) from the Cardiff University School of Psychology, who took part in the study in return for course credit. Three of these participants indicated on the background information proforma that they were not of White ethnicity and so their data were removed, leaving 49 participants data to be used in subsequent analyses.

Materials

The time perception task was based upon the study carried out by Droit-Volet et al. (2004). It was presented to participants on a personal computer in a laboratory setting and each participant was tested individually. The Superlab 2 programme (Cedrus, 1999) was used to present the stimulus materials to participants and record their responses and reaction times from the computer keyboard. Responses for the emotion perception task were made using keys on the left and right of the keyboard (*A* and *L*) and were overlaid with labels *long* and *short*. These keys were counterbalanced across participants. Stimulus materials for the emotion perception task were of four female faces (two Black and two White) from the Montreal Set of Facial Displays of Emotion (MSFDE; Beaupre, Cheung, & Hess, 2000) showing each face portraying happy, angry, sad, and neutral emotions for exposure durations of 200, 400, 600, 800, 1000, 1200, 1400, and 1600ms. These pictures were chosen from a pre-test of 20 participants who were Cardiff University students from outside of the School of Psychology, who viewed 18 sets of

faces from MSFDE. The pictures chosen for the time perception study were judged by these participants as showing equal intensity and portrayal of the correct emotion, and similar attractiveness and likeability ratings.

Measures of implicit and explicit prejudice of each participant were recorded using the IAT (Greenwald et al., 1998) and Lepore and Brown's (1997) prejudice questionnaire, as in the previous studies in this thesis. Participants were also asked to complete a proforma asking for background information such as age, sex, and ethnicity.

Design

As in previous chapters, measures of implicit and explicit prejudice were dichotomised to allow for categorisation of individuals into prejudice types (see Son Hing et al., 2008). This enables the use of a 2 (target race: Black, White) x 3 (target emotion: angry, happy, sad) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-model ANOVA, with target race and target emotion as the within-subject variables and prejudice type as a between-subject variable. The dependent variable is the *d'* scores calculated from the difference between the *z-score* of the emotion face and the *z-score* of the neutral face displayed for the same amount of time (Droit-Volet et al., 2004; Macmillan & Creelman, 1990) for the same target race.

Again, some parts of the procedure were kept constant across all trials, to prevent a participant from gaining information that might bias their responses. The biographical data were always collected first to ensure no non-White participants were subjected to the explicit prejudice questionnaire (as requested by the School of Psychology Ethics Committee). The IAT was administered before the time perception task as responses

could have been biased if administered later. The time perception task itself was randomised for every participant by the random presentation of the pictures in the learning and test phases, but further randomisation of key responses was also used. Finally, the explicit prejudice questionnaire was always administered last as it was felt that administering it earlier in the study may provide information as to the nature of the study and bias subsequent trials.

Procedure

Participants completed the study individually in a laboratory. They were first asked to complete the background information proforma and were then presented with the time perception task. They were first trained on a temporal bisection task with a display showing a pink oval, measuring 12 x 16cm, used to train the participants on the short standard stimulus (S) of 400ms and the long standard stimulus (L) of 1600ms, with responses made on the computer keyboard. The training phase presented eight alternating short and long response ovals. In the test phase participants were presented with a block of eight trials in which the short and long ovals were presented randomly, with S and L having a 50% chance of being presented, and a random intertrial interval of between 1s and 3s (see Droit-Volet et al., 2004). Feedback was presented to participants after each response ("correct" in green or "incorrect" in red) for 2s on the computer screen.

The experimental phase presented participants with faces instead of ovals, and the feedback was discontinued. Each of the faces (2 Black and 2 White) was presented in separate blocks three times each, producing a total of 12 trial blocks. These blocks were counterbalanced across participants. Each block consisted of 28 trials, displaying each of

the four emotion face stimuli (angry, happy, sad, and neutral) seven times each (the standard durations S and L, and intermediate durations of 600, 800, 1000, 1200, and 1400ms, in random order, for a total of 336 trials. Participants were given an opportunity to rest after each block of faces, and the testing time took an average of 22 minutes. After completion of the time perception task, participants were presented with the Implicit Association Test (Greenwald et al., 1998) on the computer. Finally, participants were asked to complete a measure of explicit prejudice. This questionnaire was completed with no-one else in the laboratory, and was placed inside an envelope and sealed by the participant at the end of the study. Participants' were then thanked for their participation and fully debriefed as to the nature of the study.

Results

Explicit and implicit measures of prejudice were calculated for participants as in previous chapters. Analysis of the implicit and explicit prejudice measures showed no significant correlation between the two measures r (47) = -.19. A median split was performed upon each dataset and the participants prejudice subtype was calculated from their classification as high or low prejudiced on both tests. For implicit measures of prejudice, higher scores indicated higher levels of prejudice (range of scores from this sample was 2.08, with a high score of 1.14, low score of -.94, and a mean score of .40), and the results of all participants were dichotomised to produce two sub-groups (high implicit prejudice participants > .40 IAT score versus low implicit prejudice participants <.40 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997)

were also calculated, with higher scores on this measure indicating higher levels of prejudice (range of scores from this sample was 62, with a low score of 30 and a high score of 92, with a mean of 56.53). The scores on this measure were dichotomised using the mean score, with participants scoring 56 or below classified as low explicit prejudice, and participants scoring 57 or above classified as high explicit prejudice. Fourteen participants were classified as egalitarian, 11 as principled conservatives, 10 as aversive racists, and 14 as modern racists.

Temporal Perception by Target Group

Similar to Droit-Volet et al. (2004), the responses of each participant were recorded as either 'short' or 'long' for each emotion display (angry, happy, sad, and neutral) across 7 time durations and 12 trials. Therefore, each emotion was displayed 84 times to each participant. The proportion of "long" responses was calculated across angry, happy, sad and neutral displays of emotion.

To examine in-group versus out-group arousal, long responses were calculated for each of the displays by in-group and out-group targets. Responses to all emotion displays plus neutral were included in this analysis. A 2 (target race: Black, White) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA was calculated with target race as the within-subject variable and prejudice style as the between-subject variable. The results revealed a significant main effect of race F (1, 45) = 4.16, $p < .05$. Overall, White targets ($M = .57$) were significantly more likely to be classified as long displays compared to Black targets ($M = .55$). Comparisons of long responses to chance (.5) showed that both Black (t (48) = 3.55, $p < .01$) and White (t (48)

= 4.98, $p < .01$) faces were significantly reported more as long responses. Therefore, whilst participants appeared to show significant levels of arousal to all faces, it was the in-group target faces and not the out-group targets that appeared to be the most arousing.

Emotion Displays as a Function of Target Race and Prejudice Type

Proportions of long responses for each participant were transformed to *z-scores*, and *d'* was calculated as the difference between the *z-score* of the emotion face and the *z-score* of the neutral face displayed for the same amount of time (see Droit-Volet et al., 2004; Macmillan & Creelman, 1990) and by the same-race target. The *d'* therefore represents the overestimation or underestimation of an emotion face *relative* to the neutral face for that time duration, and was used as the dependent variable to test the judgment of temporal duration in all subsequent analyses.

To examine the effect of target race and prejudice on the perception of emotion duration, the proportion of long responses was calculated for each of the target races (White and Black). Each emotion (happy, angry, sad, and neutral) was seen by each participant across the 7 time durations for 6 trials each. Therefore, each emotion was presented 42 times for Black and White targets. This allowed the underestimation and overestimation of each emotion, relative to neutral, displayed by each target group to be found. In order to concentrate on the effects of prejudice style and its effect on the perception of temporal duration, the data were collapsed across time to allow for clearer analysis, with positive *d'* indicating overestimation and negative *d'* indicating underestimation of time compared to neutral displays.

Comparison of d' Scores to Neutral

To analyse these data, each emotion was compared with the neutral baseline score (0) to examine whether the *d'* scores for Black and White targets differed from neutral (see Figure 5.1). These analyses revealed that no emotion displays differed significantly from the baseline score when all targets were analysed together.

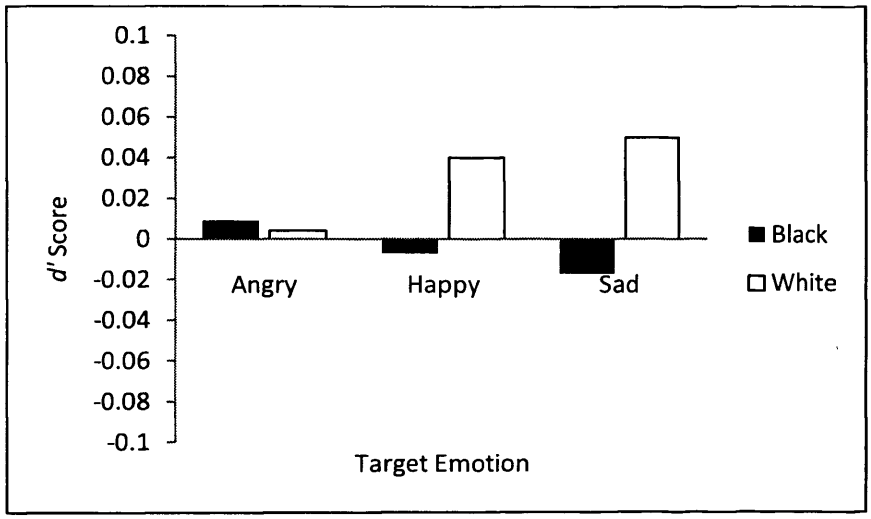

Figure 5.1. *d' Comparisons with Neutral for Emotion Displays as a Function of Target Race.*

Note. Scores above zero indicate overestimation of time, below zero indicates underestimation.

Effects of Prejudice on Perception of Emotion

A 2 (target race: Black, White) x 3 (emotion: angry, happy, sad) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA was used to analyse the data with emotion and target as within-subject variables and prejudice style as the between-subject variable. The results revealed a significant interaction between emotion and prejudice, F (6, 90) = 2.25, p = .04. Modern racist

participants marginally overestimated angry displays (d' = .06) compared to all other groups (d' = -.01; t (45) = 1.83, p = .07), whilst egalitarians significantly underestimated displays of anger (d' = -.06) compared to all other groups (d' = .03; t (45) = 1.99, p = .05), and marginally underestimated displays of sadness (d' = -.04) compared to all other groups (d' = .04; t (45) = 1.95, $p < .06$).

The interaction between race and emotion was marginally significant, F (2, 90) = 2.45, p = .09. There was greater overestimation for sad White faces (d' = .05) compared to sad Black faces (d' = -.07; t (45) = 1.90, p = .06). Target race did not impact d' scores for the other emotions.

These effects were qualified by the three-way interaction, F (6, 90) = 2.21, p=.04. Egalitarians showed significantly less affect for sad White faces (d' = -.07) than any other groups (d' = .09), t (45) = 2.66, p = .01. There were no other significant differences (see Figure 5.2).

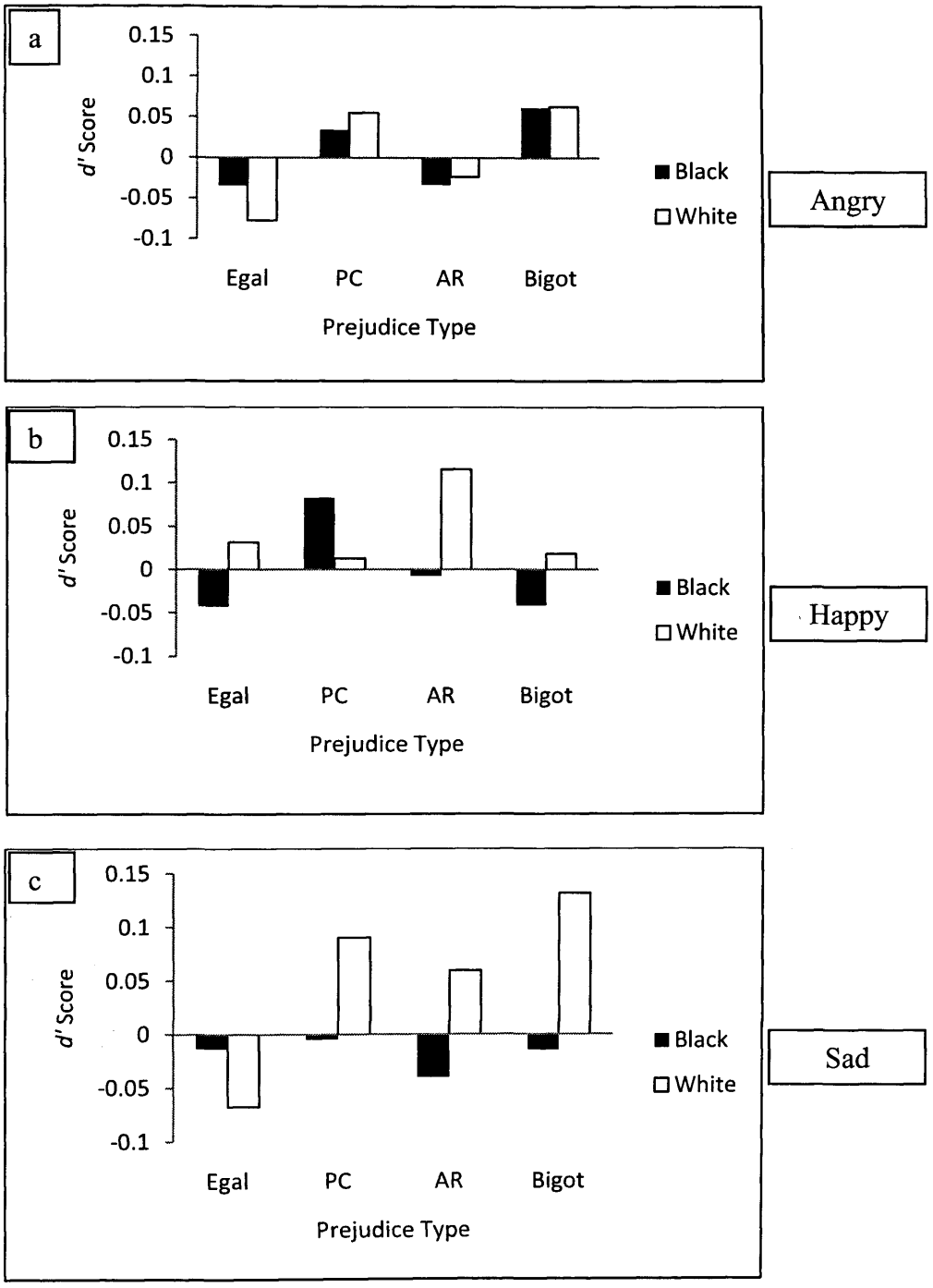

Figure 5.2. *Estimation of (a) Angry Targets (b) Happy Targets (c) Sad Targets Compared to Neutral as a Function of Target Race and Prejudice Type*

Due to the similarities between recognition of emotion by principled conservatives and modern racists (both high on explicit prejudice measures), a supplementary analysis of temporal perception with a 2 (target race: Black, White) x 3 (emotion: angry, happy, sad) x 2 (explicit prejudice: high, low) Mixed-Anova was carried out. This revealed no main effects but a significant interaction between emotion and explicit prejudice, $F(2, 46) = 4.15$, $p=.02$, with participants high in explicit prejudice showing significantly more affect for anger ($d' = .06$) than participants low in explicit prejudice ($d' = -.04$), $F(1, 47) = 7.35$, $p < .01$, and significantly more arousal for sad faces ($d' = .05$) than participants low in explicit prejudice ($d' = -.02$), $F(1, 47) = 4.06$, $p = .05$. This was qualified by the three-way interaction, $F(2, 46) = 5.66$, $p=.01$, with arousal for White angry faces ($d' = .06$) being significantly higher for participants high in explicit prejudice than participants low in explicit prejudice ($d' = -.05$), $F(1, 47) = 5.01$, $p = .03$, and arousal for White sad faces ($d' = .11$) being significantly higher for participants high in explicit prejudice than for participants low in explicit prejudice ($d' = -.01$), $F(1, 47) = 5.4$, $p = .03$.

Discussion

The aims of the current study were to examine whether out-group and in-group displays of emotion would produce different levels of arousal in the form of increased temporal perception of duration of emotion, and also whether these arousal levels would differ as a function of prejudice type. The findings produced some intriguing and, at times, conflicting evidence. When all targets (Black and White) were analysed there

appeared to be no significant effect of emotion on levels of arousal produced by the target emotions, in conflict with the findings of Droit-Volet et al. (2004). When analysing the in-group and out-group targets separately, it was expected that the out-group targets would produce more arousal. However, the opposite occurred to a certain extent; participants showed significantly more arousal for in-group targets than out-group targets. This appears to have been largely driven by the higher levels of arousal for in-group sadness. As this was the weakest of the overestimation emotions in the Droit-Volet et al. (2004) study this was not expected. In fact the current findings, whilst still finding some overestimation of in-group target faces, produces converse evidence to Droit-Volet et al. (2004), who found that the angry emotion produced the most arousal, followed by happiness and then sadness.

Individual differences in implicit and explicit prejudice type showed that participants high in explicit prejudice were significantly more aroused by displays of White Sad and White Angry displays of emotion, a finding not observed with the Black targets. This is understandable from the point of the White targets, as the findings from Ito et al. (2004) suggest that participants high in explicit prejudice show greater neural activity for in-group targets. However, it would be expected that out-group displays of emotion would also lead to overestimation in participants high in explicit prejudice, and this was not found. Individual differences in implicit prejudice did not appear to show any significant differences in temporal estimation which, again, would not be predicted by the prejudice literature. The findings of Hugenberg and Bodenhausen (2003) would suggest that participants scoring high on measures of implicit prejudice should be more

attuned to out-group displays of anger and so should show more arousal to these displays, but this was not the case in the current study.

Examining the interaction between implicit and explicit prejudice provided some insight into how prejudice may influence the perception of emotion. Modern racists were expected to overestimate negative but not positive out-group emotions and this was the case for the angry and happy displays. However, the study also found an overestimation for the negative emotions displayed by the in-group, with both angry and sad in-group displays overestimated, suggesting increased arousal levels when viewing these emotion targets. The principled conservative results also appear to mirror the findings for modern racist participants with regards to the negative emotions. As both of these groups are high in explicit prejudice, this suggests that explicit prejudice may play an important role in the arousal caused by perception of negative emotions. Where these two groups diverge is in the finding that modern racists show no arousal for out-group displays of happiness whilst principled conservatives appear to show arousal for this emotion. This is an area of research that is worthy of further study to explore whether there are definite differences between these two groups. If it is the case that there is divergence between the two groups on this emotion for this target group then this would provide good evidence to support Son Hing et al.'s (2008) dual-process theory.

The finding that modern racists show arousal for both out-group and in-group displays of anger, combined with arousal for in-group but not out-group displays of sadness and no arousal for happy displays, suggests that they may be 'tuned in' to negative displays (see Baumeister et al., 2001). It is possible that the angry emotion may be globally negative for these individuals, but that only in-group sadness is seen as a

negative emotion worthy of arousal, with out-group sadness being of little concern to them. This increased perception of negativity could possibly influence their perceptions of emotions by all social groups, and colour their interactions with them from this perception. This raises the question, is it possible that in some cases a modern racist person who acts in a racist manner may also be negative in their actions towards members of the in-group, but that this negativity is seen as a general character trait by in-group members? A global negativity may easily attract the label 'modern racist' or 'racist' when directed at the out-group, when the person is in fact negative towards all targets.

Data from the aversive racists are difficult to interpret from the results of the current study. These participants showed some overestimation for in-group targets, particularly happiness and sadness, but no overestimation for out-group targets on these emotions. It could be argued that the ambiguous nature of this task did not lead these participants to perceive a racial element to this task, and so concerns that they would have about being perceived as prejudice were not activated. According to Gaertner and Dovidio (1986, 2005) it is when aversive racists are aware that they may be evaluated on their race-related actions that they will show discomfort and therefore should be aroused by the out-group targets. It may be of interest in future research into aversive racists to inform them of the racial nature of the task to examine whether this influences their arousal for out-group targets.

Study Limitations

A major issue with the study carried out has been the strength of arousal achieved by the stimuli. The *d'* scores achieved in this study were well below those found by Droit-Volet et al. (2004). Whilst it is unclear as to why such low levels of *d'* were recorded, as stimulus materials and participant numbers were similar to those used by Droit-Volet et al. (2004), it may be possible to increase arousal levels by using male faces as stimuli. Devine (1989) and Trewalter et al. (2008) have argued that Black male faces are stereotyped as threatening and this may increase arousal in participants, particularly those high in prejudice. Whilst it was decided in the current study not to use male faces, as this may have resulted in increased attentional processes that may have produced underestimation (Angrilli et al., 1997), it may be that the benefits of using them may outweigh the possible costs in terms of attentional processes used.

An additional issue pertains to whether arousal is in fact being measured at all. Despite the assertions of Droit-Volet et al. (2004) and Angrilli et al. (1997) as to the validity of the measure, the fact remains that no physiological measurement of arousal has been taken to show that arousal is actually being measured. Future research could address this issue by incorporating galvanic skin response measures within the paradigm to examine whether physiological responses are exhibited which would support the contention that arousal is actually taking place.

Finally, it is recognised that the number of participants utilised for this study was lower than that of the Droit-Volet et al. (2004) study, which may also have contributed to the lack of concordance with their findings. A greater number of participants, whilst not

possible to gather at the time of this study, may also clarify some of the trends in the data and show whether significant differences do occur between prejudice groups.

Conclusions and future research

In the case of the effect of prejudice styles on emotion, it appears that individual differences in explicit prejudice interact with the perception of emotion expression targets. It is also possible that there may be distinctions between the participants based upon their interaction of implicit and explicit prejudices, particularly in the case of principled conservatives and modern racists in the case of negative emotions. However, this needs to be examined with a more powerful study design. The use of the emotion perception paradigm itself may prove useful in the study of prejudice styles, in that it offers a relatively subtle testing paradigm that appears to show distinct differences between the prejudice styles. Refinement of the testing procedure through selection of stimuli to maximize differences between perception of emotion and neutral, may allow us to explore in greater detail the possible differences between these prejudice groups and how they view both their in-group and out-groups. The possibility of a global negativity in modern racist participants, towards both in-groups and out-groups for certain emotion displays, appears worthy of further study, possibly by examining not only their attitudes towards the out-group but also towards the in-group. It may be that a general character trait of negativity could be responsible for the attitudes behind their classification of being modern racist.

In the final experimental chapter this thesis turns to the examination of whether displays of happiness and anger can influence our perception of racially ambiguous faces, and whether prejudice type can influence the perception of these emotions.

CHAPTER SIX: PERCEPTION OF AMBIGUOUS-RACE FACES

Summary

Research by Hugenberg and Bodenhausen (2004) demonstrated that participants high in implicit prejudice were more likely to classify a racially ambiguous angry face as Black than White compared to participants low in implicit prejudice. This chapter replicates and extends the Hugenberg and Bodenhausen research by examining whether the *same* expression of anger on a racially ambiguous face is perceived to be differentially intense when the face is judged to be Black or White. Eighty-two White participants viewed racially ambiguous, White, and Black faces displaying angry, neutral, or happy emotions. The participants' task was to identify the race, emotion, and intensity of emotion display. Results revealed that participants high in implicit prejudice reported significantly more of the racially ambiguous angry faces as Black compared to participants low in implicit prejudice. There was also an interaction between perceived intensity of emotion display and implicit prejudice level for racially ambiguous angry faces. Participants high in implicit prejudice reported the intensity of the angry emotion as greater when the same face had been categorised as Black compared to White. The results suggest that implicit prejudice not only influences the racial categorisation of an ambiguous face but also the perceived intensity of the emotion displayed.

Introduction

Whilst much of the research literature refers to the terms Black and White, this terminology can encompass a large variation in physiological terms. Research has also shown that, through factors such as having biracial parents, skin tone variation, hair colour, and hair style, racial ambiguity can make it difficult to classify a target as Black or White (Hugenberg & Bodenhausen, 2004; MacLin & Malpass, 2001). However, classification as belonging to one particular group or another may still occur. Stereotypic information may be used to make judgements of classifications in ambiguous situations (e.g., Hugenberg & Bodenhausen, 2004; MacLin & Malpass, 2001; Rule et al., 2007). In the case of racial ambiguity, MacLin and Malpass (2001) found that ambiguous race faces given a hairstyle stereotypical to a particular race are more likely to be seen as members of that racial group. In another study, Hugenberg and Bodenhausen (2004) presented participants racially ambiguous faces and asked them to make a choice whether the person was Black or White. These faces expressed the emotion of anger or happiness. Hugenberg and Bodenhausen found that White participants high in implicit prejudice were more likely than low implicit prejudice participants to judge a face as Black when displaying anger, but that displays of happiness did not show a racial judgement bias as a function of individual differences in implicit prejudice.

Individual differences in implicit prejudice have also been found to influence perceptions of facial threat through dynamic presentation. Hugenberg and Bodenhausen (2003) showed participants movies of Black or White faces moving from an angry

expression to neutral or a neutral expression moving to anger. Participants were tasked with stopping the movie with by pressing a button when they perceived the offset or onset of anger. It was found that White participants high in implicit prejudice reported seeing anger on the faces of Black targets for longer than participants low in implicit prejudice (Hugenberg & Bodenhausen, 2003).

Building upon extant research, the current study first examined whether individual differences in prejudice influence racial categorisation of faces displaying emotion. To further these findings, it also examined whether the judgement of race would influence the perceived intensity of the emotion display. For example, is an ambiguous angry face judged to be Black perceived to be more angry than the *same* ambiguous angry face judged to be White? Do these differences in perceived intensity depend upon individual differences in prejudice? If implicit prejudice influences perception of out-groups and their displays of emotion, it would be expected that participants high in implicit prejudice are more likely to perceive ambiguous angry faces as Black, and that intensity ratings of angry emotions displayed by ambiguous targets judged to be Black would be greater than that of the same target when it is judged to be White.

Method

Participants

Eighty-two White British Cardiff University undergraduate students (73 women, 9 men; mean age = 20.2 years) took part in the study in return for course credit.

Design

A 3 (emotion: happy, neutral, angry) x 4 (prejudice type; egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA analysis was used to examine the data, with emotion as a within-subjects measure and prejudice type as a between-subjects measure.

Materials

Nine individual template faces were created using the Poser 6™ software programme. This programme creates computer-generated facial displays and allows the user to manipulate and select settings for ethnicity, racial features, and intensity of emotion, ensuring continuity of these facial aspects across stimuli. Having this control, nine different faces were created and applied as the central face of a template. Each of these faces then had race and emotion manipulated uniformly, based on a three (emotion; happy, neutral, angry) x three (race; Black, Ambiguous, White) matrix that ensured that

each race face had identical emotion faces. Thus, the Black, Ambiguous, and White versions of each face all had identical happy, angry, and neutral expressions and differed only on race. Similarly, the happy, angry, and neutral faces all had identical Black, Ambiguous, and White ethnicity and differed only on expression type (see Figure 6.1). Pre-tests of the template emotions, intensity of emotions, and ambiguity of race were carried out and ensured equivalence across all stimuli. The nine images from the nine templates provided our stimuli of 81 separate images. Although presentation of the stimuli was randomised using SuperLab Version 2, each of the nine equivalent stimuli were placed in a separate block to minimise the possibility of concurrent display of faces from the same template.

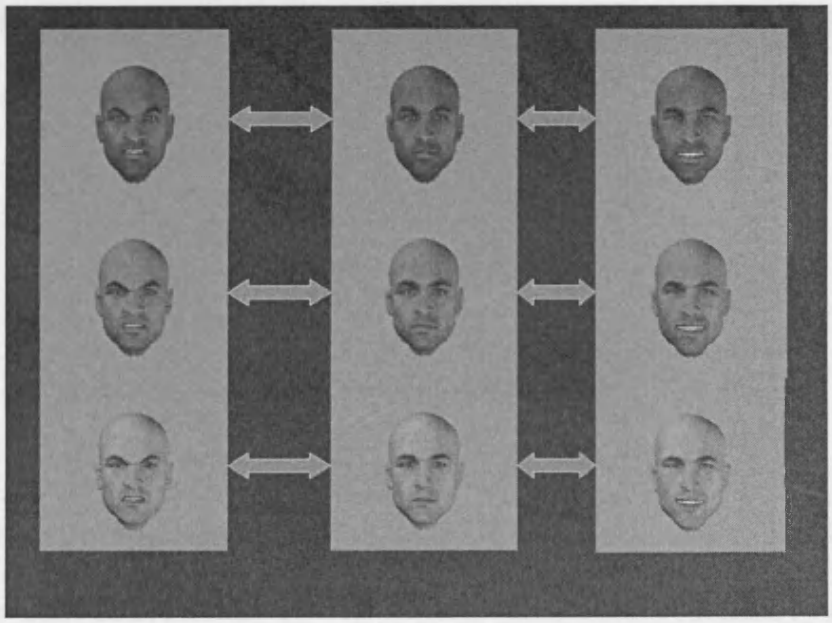

Figure 6.1. *Faces Differing as a Function of Emotion and Race.*

Procedure

Participants were presented with computer-generated faces displayed on a computer monitor. For each face the following questions were asked: What emotion is being displayed? (happy; neutral; angry); How confident are you in this decision? (1 - *not at all confident* to 9 - *very confident*); How intense is the emotion being displayed? (1 - *not intense* to 9 - *very intense*)[11] and What race is this individual? (Black / White). Responses were made via the computer keyboard using keys indicated in the instructions, and reminders of the key choices were displayed below each question. A practice trial was completed before the experimental trials to ensure participants were using the correct response keys. After the task, participants completed the Implicit Association Test (Greenwald et al., 1998) and then the Lepore and Brown (1997) explicit prejudice questionnaire.

Results

Judgements of Black and White faces were, as expected, close to 100% accurate. The main aim of the forced-choice item (i.e., was the face Black or White?) was to examine how the ambiguous race faces would be categorised. The number of times that

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[11] The intensity question was excluded from faces displaying a neutral emotion.

an ambiguous face was classified as Black was calculated for each of the emotions (happy, neutral, angry). The confidence measurements taken during the questioning were used as a manipulation check measurement and were not included in the final analysis.

Explicit and implicit measures of prejudice were calculated for participants as in previous chapters. Analysis of the implicit and explicit prejudice measures showed no significant correlation between the two measures r (82) = -.17. A median split was performed upon each dataset and the participants prejudice subtype was calculated from their classification as high or low prejudiced on both tests. For implicit measures of prejudice, higher scores indicated higher levels of prejudice (range of scores from this sample was 1.58, with a high score of .93, low score of -.65, and a mean score of .36), and the results of all participants were dichotomised to produce two sub-groups (high implicit prejudice participants > .36 IAT score versus low implicit prejudice participants <.36 IAT score). Results from the explicit prejudice measure (Lepore & Brown, 1997) were also calculated, with higher scores on this measure indicating higher levels of prejudice (range of scores from this sample was 66, with a low score of 22 and a high score of 88, with a mean of 53.40). The scores on this measure were dichotomised using the mean score, with participants scoring 53 or below classified as low explicit prejudice, and participants scoring 54 or above classified as high explicit prejudice. Nineteen participants were classified as egalitarian, 22 as principled conservatives, 22 as aversive racists, and 19 as modern racists.

Race Categorisation

A 3 (emotion: angry, neutral, happy) x 4 (prejudice type: egalitarian, principled conservative, aversive racist, modern racist) Mixed-ANOVA was used to analyse the data with emotion as a within-subject variable and prejudice type as the between-subject variable (see Table 6.1). The results revealed a significant main effect of emotion, F (2, 77) = 7.02, $p < .01$, with ambiguous angry faces being classified as Black ($M = 4.76$) significantly more than either ambiguous neutral faces ($M = 4.24$), t (81) = 2.92, $p < .01$, or happy faces ($M = 4.12$), t (81) = 3.61, $p = .001$. There was no significant difference between classification of neutral and happy faces, $p > .40$.

This main effect was qualified by a significant interaction between emotion and prejudice type, F (6, 156) = 2.21, $p < .05$. Contrast effects revealed that modern racists were marginally more likely to classify ambiguous faces as Black than any other participants, for anger, t (78) = 1.92, $p = .06$, and neutral targets, t (78) = 1.82, $p = .07$. Aversive racists were marginally less likely than any other participants to classify ambiguous happy faces as Black, t (78) = 1.84, $p = .07$. No other contrast effects were significant.

As the Hugenberg and Bodenhausen (2004) study had found an influence of implicit prejudice on the perception of anger, it was decided to explore whether categorization of the emotion faces differed as function of individual differences in implicit prejudice. A 2 (emotion: happy, angry) x 2 (implicit prejudice: high, low) Mixed-ANOVA analysis was carried out.[12] The analysis revealed a significant main effect of

[12] An analysis in which the neutral data are included does not impact the nature of the interaction.

emotion, $F(1, 80) = 7.93, p < .01$. Overall, the ambiguous angry face ($M = 4.76$) was judged to be Black more often than the ambiguous happy face ($M = 4.12$), $F(1, 80) = 13.70, p < .01$. This main effect was qualified by the interaction between emotion and implicit prejudice, $F(1, 80) = 5.19, p = .03$. Subsequent analyses revealed that participants high in implicit prejudice were more likely to judge the racially ambiguous angry face as Black ($M = 5.12$) compared to participants low in implicit prejudice ($M = 4.39$), $t(80) = 1.91, p < .05$. Implicit prejudice did not influence judgements of the racially ambiguous happy face, $t(80) < 1$ (high implicit prejudice $M = 4.15$; low implicit prejudice $M = 4.10$). Overall, this pattern of findings is consistent with Hugenberg and Bodenhausen (2004).

Emotion	Egal	*PC*	*AR*	*MR*
Angry	4.26 $(1.66)_a$	4.50 $(2.06)_a$	4.86 $(1.67)_a$	5.42 $(1.50)_a$
Neutral	4.58 $(2.17)_a$	3.68 $(2.01)_a$	3.86 $(1.86)_a$	5.00 $(2.00)_a$
Happy	4.47 $(2.32)_a$	3.86 $(1.96)_a$	3.50 $(1.65)_a$	4.79 $(1.65)_a$

Table 6.1. *Mean Ambiguous Faces Classified as Black by Prejudice Type.*

Emotion Intensity

In order to examine whether the judgement of race influenced the perceived intensity of the emotion display, the average intensity was calculated for each ambiguous

face when it was categorized as Black or White. For example, if a participant perceived the ambiguous angry face as Black on 5 of 9 trials, their Black intensity score for anger was computed by averaging their intensity ratings for those 5 trials (with the White intensity score based on the average on the 4 trials they perceived the angry target as White). This was done for both the happy and angry emotion displays.[13] Given the importance of implicit prejudice on the categorisation data, the intensity data were subjected to a 2 (emotion: happy, angry) x 2 (target judgement: Black, White) x 2 (implicit prejudice: low, high) Mixed-ANOVA, with emotion and target judgment as within-subjects factors and implicit prejudice as a between-subjects factor. The results of this analysis revealed a significant three-way interaction, $F(1, 75) = 8.25$, $p < .01$. This interaction was decomposed as a function of whether the ambiguous face was angry or happy. When the racially ambiguous face was angry, there was a significant interaction between implicit prejudice and target judgement, $F(1, 75) = 8.44$, $p < .005$. As can be seen in Table 6.2, participants high in implicit prejudice judged racially ambiguous faces as being significantly more angry when they were judged as Black ($M = 8.02$) compared to when the same face was judged as White ($M = 7.45$), $t(40) = 3.45$, $p < .001$. Participants low in implicit prejudice did not differ in perceived intensity of the racially ambiguous angry face, $t(35) < 1$ (Black $M = 7.73$; White $M = 7.85$). When the racially ambiguous face was happy, there was a marginally significant main effect of implicit prejudice. Overall, participants low in implicit prejudice ($M = 7.98$) tended to perceive greater happiness than participants high in implicit prejudice ($M = 7.62$).

[13] Four participants' data were excluded from the intensity analysis as they had judged all of the faces for either the happy or angry emotions to be of one race, thus not making analysis of intensity across races possible.

Emotion Display		*Low Implicit*	*High Implicit*
Angry	Black	7.73 $(1.26)_a$	8.02 $(0.98)_a$
	White	7.85 $(0.99)_a$	7.45 $(0.82)_b$
Happy	Black	8.07 $(1.17)_a$	7.58 $(1.08)_b$
	White	7.89 $(0.98)_a$	7.67 $(0.96)_{a,b}$

Table 6.2. *Mean Emotion Intensity Ratings for Ambiguous Faces Classified as Black or White by Implicit Prejudice Style.*

Note. The higher the score, the higher the perceived intensity of the emotion display. Within the angry and happy face conditions, means with different subscripts differ at $p < .05$.

Discussion

The current study examined whether individual differences in prejudice influence the perception of race and intensity of emotion displayed by racially ambiguous faces. Specifically, to replicate and extend the findings of Hugenberg and Bodenhausen (2004), would participants high in implicit prejudice be more likely to classify angry ambiguous faces as belonging to a racial out-group, and would they perceive the angry emotion displayed by that out-group to be more intense?

The findings showed that White participants high in implicit (but not explicit) prejudice were significantly more likely to classify an angry ambiguous face as being Black, compared to participants low in implicit prejudice. Furthermore, a significant interaction was found when examining the effects of implicit prejudice and target judgement on perceived intensity of emotion. In particular, when evaluating the intensity of anger displayed by a racially ambiguous face, participants high in implicit prejudice judged the face to be more angry when they perceived the face to be Black compared to when they perceived the face as White.

The initial findings of the study, that ambiguous angry faces are more likely to be seen as Black by participants high in implicit prejudice, is consistent with the findings of Hugenberg and Bodenhausen (2004). The intensity data extend previous research by demonstrating that implicit prejudice levels also influence the very perception of the emotion displayed. As Hugenberg and Bodenhausen (2003) found that participants high in implicit prejudice were faster and also recognised for longer anger displayed by a Black face, the current findings show that individuals high in implicit prejudice also perceive the intensity of that display to be greater. In the current research, the happy display was seen as less intense by high prejudice participants regardless of whether the face was judged to be Black or White. This different pattern of effects for negative and positive emotion displays is consistent with previous research. For example, regarding the interpretation of a lack of an interaction between implicit prejudice and target evaluation for happy faces, it is worth noting that previous research by Hugenberg and Bodenhausen (2004) also failed to find an influence of prejudice on recognition of happy displays of emotion. Similarly, research on face perception and emotion failed to find

evidence for happy emotions influencing perception (e.g., Ackerman et al., 2006). Nevertheless, it appears that individual differences in prejudice influence intensity of both positive and negative emotions based upon categorisation of the face displaying the emotion.

One of the major issues still to be resolved is whether racial categorisation influences the perception of emotion intensity or vice versa. Are participants high in implicit prejudice classifying the face as Black because they perceive anger as more intense and happiness as less intense, or are they making these intensity judgements based upon the classification of race? It may be possible to resolve this question by asking the questions of race and intensity intermittently amongst other non-related questions, and manipulating the questions to appear before or after each other. Not knowing whether they will be asked about racial classification, intensity, or both in a set of questions may activate the stereotypic information for each independently, allowing us to examine responses to each.

In conclusion, levels of implicit prejudice appear to influence both the racial categorisation of ambiguous faces and the rating of intensity of emotion displayed by that face. Those high in prejudice are more likely to classify an angry face as Black and are more likely to see this display of anger as more intense than those displayed by faces classified as White.

CHAPTER SEVEN: SUMMARY, LIMITATIONS, DIRECTIONS FOR FUTURE RESEARCH, AND CONCLUSIONS

The experimental chapters reported within this thesis have covered several areas of research exploring emotion recognition and individual differences in prejudice. The main findings of the research will be briefly summarised and conclusions drawn. This will be followed by a discussion of the study limitations and suggestions for future research.

Summary of Main Findings

The first experimental chapter of this thesis examined the in-group advantage by using dynamic displays of Black and White happy and angry emotions. It was found that participants were significantly faster at recognising in-group displays of anger and happiness, and were also significantly better at correctly recognising in-group anger than out-group anger. These findings corroborate those of Elfenbein and Ambady (2002a), who argued that people are better at recognising emotion displays presented by their racial in-group than their racial out-group. The methodology employed also lends support to the notion that dynamic displays of emotion can provide accurate information with regards to displays of emotion (Hutchings, 2005; Wehrle et al., 2000). Furthermore, if the findings of Kilts et al. (2002) are correct and dynamic and static images influence dissociable neural pathways, the use of dynamic images may prove to be an important tool in neuropsychological research on emotion recognition.

When examining the influence of individual differences in prejudice on perception of emotion in experimental chapter one, the most striking finding was that

participants high in implicit and explicit prejudice (i.e., modern racists) were most accurate at correctly recognising out-group displays of anger. Whilst Hugenberg and Bodenhausen (2003) found that participants high in implicit prejudice were faster to classify a Black face as displaying anger, it was not the case in the present study that these modern racist participants were faster; instead, they were more accurate at recognising anger. This greater accuracy may suggest a heightened attention to out-group faces displaying negative emotion on the part of the modern racist participants. Certainly, it seems plausible to suppose that the difference in recognition accuracy lies with the perceptions of the modern racist group rather than the alternative explanation, that participants in all three of the other prejudice groups were under-reporting recognition of out-group anger. This is an area of research that needs to be explored in much more detail in future studies by incorporating the two-dimensional model of prejudice suggested by Son Hing et al. (2008) and examining the interaction between implicit and explicit prejudice. However, whilst this finding supported the notion of differential out-group anger recognition in participants high in explicit and implicit prejudice, it must also be recognised that the other three groups proposed by Son-Hing et al. (2008) did not differ significantly from each other.

The second experimental chapter, examining the other-race effect, serves as a fundamentally important lynch-pin to the current thesis. Using static images that provided the majority of stimuli for the other chapters, an other-race effect was found, with no moderating influence of individual differences in prejudice apparent. This finding is prevalent in the literature (e.g., Brigham & Barkowitz, 1978; Carroo, 1987; Lavrakas et al., 1976; Slone et al., 2000) and supports the notion that the other-race effect is caused

by mechanisms independent of attitudes. However, the findings from the other experimental chapters contained within this thesis suggest that racial attitude does influence the *perception of emotion*. This would appear to suggest that cross-racial face perception and cross-racial emotion perception are not part of a global face processing mechanism, but instead are controlled by separate mechanisms that are either unrelated or weakly related. Future research in this area will undoubtedly benefit from the neuropsychological research examining emotion expression and facial recognition, particularly that exploring cross-racial recognition (e.g., Adolphs et al., 2000; Cunningham et al., 2004; Ito et al., 2004). Aside from the neuropsychological aspect, further research on whether people use the similar encoding of in-group and out-group faces may inform us further on this topic.

The third experimental chapter examined whether angry displays of emotion could reverse the other-race effect, as reported by Ackerman et al. (2006). The findings from the present set of studies suggest that this may not be the case. Indeed, a systematic exploration over four separate studies failed to produce any evidence that anger could negate the other-race effect. However, examination of individual differences in prejudice found that participants high in implicit prejudice performed significantly worse than other participants at correctly recognising faces that had shown out-group anger when the task involved a change in the emotion displayed in the learning and test phases of the experiment. This finding was not apparent in tasks where the emotion display remained the same at learning and test phases. It is possible that these participants may have a problem mentally manipulating the emotion displays to facilitate correct recognition, but the fact that this deficit was found only for out-group anger rather than globally across

races and emotion suggests that it is the specific perception of this emotion displayed by this racial target which might be the issue. Study 3.1 presented faces displaying emotion in the learning phase and neutral faces at test. Could it be that participants high in implicit prejudice did not sufficiently encode the face during the learning phase because of the emotion displayed? The alternative would be to suggest that the neutral faces displayed in the test phase were perceived by participants high in implicit prejudice as displaying anger, and that this led to confusion between previously seen and new faces. However, this would not explain why the errors were specific to those out-group targets that had displayed anger in the learning phase. However, as the targets in Study 3.2 were presented as neutral in the learning phase and displayed anger in the test phase, general encoding of the neutral faces at learning may have been influenced by perception of these faces as angry and this could lead to confusion in this case. Whilst an argument for two separate factors influencing these findings is not ideal, it is difficult to determine one factor that completely encompasses the findings from this set of studies. As the initial focus of this series of studies was to explore the Ackerman et al. (2006) theory of emotion influencing the other-race effect, the findings relating to the poorer recognition by high implicit participants were not expected and the experimental manipulation was not designed to explore this issue further. Future research examining encoding and mental manipulation of faces would be able to address this issue more fully.

In experimental chapter four, utilising the temporal perception of emotion paradigm of Droit-Volet et al. (2004), it was found that participants high in explicit prejudice displayed increased levels of arousal, as conceptualised by overestimating temporal events for all negative displays of in-group emotion (anger and sadness) but

only overestimating anger displayed by out-groups. It could be argued that the out-group therefore only aroused participants high in explicit prejudice when they displayed a threat (anger) but not an emotion that may require empathy (sadness). As expected, participants low in implicit and explicit prejudice showed reduced arousal for the displays of negative emotion by the out-group. Surprisingly, however, participants high in implicit but low in explicit prejudice (aversive racists) did not show arousal for out-group displays of emotion. This, therefore, was the only study in the thesis in which explicit prejudice appeared to play a prominent role in the process of cross-racial emotion perception without the influence of implicit prejudice. Both prejudice types high in explicit prejudice (principled conservatives and modern racists) showed similar patterns of arousal for in-group and out-group displays of anger and sadness. However, a crucial distinction between these two prejudice types appears to be arousal from viewing out-group happiness, suggesting a role for the interaction between implicit and explicit prejudice in the temporal perception of emotion.

In the final experimental chapter, designed to build upon findings of Hugenberg and Bodenhausen (2004), participants high in implicit prejudice were significantly more likely to classify an angry ambiguous race target as Black than White and also rated the intensity of anger higher when displayed by those targets classified as Black. This is possibly the strongest indication of all of the studies contained within this thesis that individual differences in prejudice influence the perceptual processes regarding recognition and interpretation of emotion. These findings appear to support those of Hugenberg and Bodenhausen (2003; 2004) and also those of Devine (1989) and Trewalter et al. (2008) in suggesting that those high in prejudice may perceive a threat as

greater when displayed by an out-group target, and that this then influences the perception of that target.

Overall, the studies contained within this thesis appear to show evidence for the role of individual differences in prejudice upon the perception of displays of emotion, both from the in-group and the out-group. Moreover, the findings suggest that there may be processes influenced to a certain extent by implicit prejudice, explicit prejudice, and their interaction. This suggests that emotion perception is not merely the case of a passive observer viewing an emotion display upon the face of another person; the prior attitudes of the perceiver appear to play a significant role in this process. Whilst much of the early research into facial displays of emotion focussed largely upon the role of the displayer (e.g., Ekman et al, 1969; Schlosberg, 1954), more recent research has shown that the perceiver of the emotion display is also influential in the correct interpretation of the communication of emotion. MacLin and Malpass (2001) found that categorisation of a racial target could activate stereotypes associated with that race, whilst Hugenberg and Bodenhausen (2003, 2004) found that prejudicial attitudes could directly influence the perception of emotion. Devine's (1989) suggestion that Black male faces may influence perceivers by activating threat associations can also be seen as a possible influence upon the results of these studies. Underlying all of this has been the use of the Son Hing et al. (2008) two-dimensional model of prejudice, examining implicit and explicit prejudice, and also the interaction between them. Utilising this model has allowed comparisons to be made across many different tasks. Whilst individual differences in implicit and explicit prejudice have been found to underlie the findings in some of the studies, in many cases the interaction between the two has been vague or non-existant. Several of

the findings have suggested that participants high on both implicit and explicit prejudice (i.e., modern racists) show themselves to be differentially influenced, particularly with regard to out-group anger, when compared to other prejudice types. However, the fact that this has not been a consistent finding across all studies, coupled with the lack of clear differences between other groups in the Son-Hing et al. (2008) model, suggests that the categorisation which they have suggested may not be as clear as the model suggests.

With much of the research into the influence of prejudice on cross-cultural emotion recognition still in its relative infancy, it is hoped that these studies, both individually and collectively, will help to examine the role of individual differences in prejudice and possible ways to reduce its influence in the future.

Study Limitations

A major limitation of the study may be seen to be the nature of the dichotomous splitting of high/low prejudice types for implicit and explicit prejudice. Each experimental group was analysed separately, meaning that each experimental group had a different mean score at which the dichotomising of variables was carried out. It was decided to carry out the analysis in this way because there are, at present, no valid data to suggest that a certain score, on the IAT or explicit measure, constitutes high or low prejudice. However, the means for explicit and implicit prejudice across all studies do not differ dramatically (implicit prejudice range = .2, explicit range = 6.35 across all studies). Nevertheless, it is the case that a participant taking part in one study may be classified, for instance, as high prejudice with a score identical to that of a participant taking part in another study who is classified as low prejudice. At this moment in time it is felt that it is

necessary to treat each study individually, rather than attempt to create an arbitrary general mean for dichotomising implicit and explicit prejudice. However, this is an area that could be looked at in the future as more data is gathered from studies.

Another important issue to consider with research of this type is often the population sample tested, as highlighted by Matsumoto (2002). It is recognised that the participants in this study were exclusively White. This did not allow for an examination of differences that may have occurred across races when viewing Black and White targets, and the possible differences or similarities that may exist in both the perception of in-group and out-group emotion. Unfortunately, given the location of the research department where this series of studies took place, the use of exclusively White participants was unavoidable.

Similarly, it is also recognised that the exclusive use of White undergraduate students might, at first, appear to reduce the validity of the research. However, this may not be as much of a limitation as it first appears. Whilst it is recognised that a student population is not representative of the UK population as a whole, it is doubtful that the student population who took part in the study could be considered as more likely to be prejudiced against racial out-groups. However, this is recognised as a potential limitation and the testing of a more general population would certainly lend validity to all of the studies carried out in this thesis. Finally, it must also be recognised that several of the studies contained a relatively low number of participants. This was often due to the availability of potential participants during the time periods when individual studies were being carried out and, due to the schedule of research, there was little that could be done

to control for this. However, ideally many of the studies contained within this thesis would utilise a greater number of participants if replicated.

Turning to the studies themselves, there are some issues that require acknowledgment with regards to limitations, particularly the nature of the stimulus materials. The first experimental chapter, examining the in-group advantage using dynamic morphed movies, presented participants with emotions developing over a period of time. It is recognised that this is an extremely artificial situation; emotion tends to develop rapidly upon the human face. Indeed, recent research (Krumhuber & Kappas, 2005; Krumhuber, Manstead, & Kappas, 2007) has examined the influence of dynamic emotion using briefer displays of emotion and come to similar conclusions. However, at the time of this study the prevailing paradigm was that used for the current research (e.g., Hugenberg & Bodenhausen, 2003; Niedenthal et al., 2001; Wehrle & Kaiser, 2000).

Conversely, whilst the first experimental chapter attempted to provide new insights into the in-group advantage through the use of dynamic images, other experimental chapters reverted to the traditional paradigm of using static pictures as stimuli. This was partly due to the practicability of comparisons across studies, but also due to the time-consuming nature of the creation of dynamic images. It may be feasible in future studies to incorporate dynamic images to allow us to examine the nature of the perception of emotion displays as fully as possible.

Returning to the first experimental chapter, an area of research not incorporated into the study was an exploration of the errors participants made when incorrectly identifying emotions. Given that this was the only study that incorporated all of Ekman et al.'s (1969) universal emotions into its design (only happy and angry were measured but

all six emotions were displayed to participants), it would have been interesting to examine whether errors in recognition were influenced by individual differences in prejudice, e.g., mistaking anger for surprise or fear. Whilst this has been a feature of studies in the past (e.g., Schlosberg, 1954) examination of errors was not incorporated into the current design, but is a factor that will be taken into account if the opportunity arises to further explore with the current research paradigm.

The issue of a ceiling effect for the happy emotion, also in the first experimental chapter, is one that could not be avoided due to the design and requirements of the study. Degrading the image presented to participants would have reduced the ceiling effect of the happy emotion but would also have created an adverse effect for the recognition of the angry displays of emotion. Whilst the recording of reaction time data enabled some analysis of differences across target races for the emotions, to fully examine the influence of happiness on cross-cultural emotion recognition would require separate study of the emotions to allow for differential degrading of the stimuli.

Finally, a possible weakness of the studies may be seen to be the very notion of implicit and explicit prejudice. Whether this is seen as a weakness may depend upon the individual's interpretation of these approaches, particularly in light of the arguments between Greenwald et al. (1998) and Arkes and Tetlock (2004) as to whether the IAT measures implicit attitudes or knowledge of cultural stereotypes. Whilst the findings from the studies in this thesis remain sound with regard to this argument, the underlying causes of the findings may differ depending upon which theory is correct. As research into this area continues it may be possible to draw further conclusions from the current findings based upon new information.

Directions for Future Research

Each of the studies carried out in the experimental chapters has scope for further research in the individual paradigms, as well as the possibility of combining methodologies across paradigms. Exploration of emotion perception using dynamic morphed images will allow us to discriminate further the perceptual abilities of people in general and the influences of prejudice upon the perception of emotion in particular. As highlighted above, the examination of the errors made by participants would also enable the exploration of individual differences in prejudice lead to common errors being made when viewing displays of emotion by in-group and out-group targets.

It must also be recognised that, whilst steps were taken to explore the in-group advantage across racial groups within a culture, to carry out a complete analysis of the in-group advantage would require much further research. Collaboration with researchers in other cultures using an identical paradigm to that used in the first experimental chapter would allow for a fuller examination of the in-group advantage. By creating dynamic images of Black and White targets in other cultures, with emotions displayed and judged by members of that culture, and then displaying them to participants in that culture as well as the UK, it would be possible to examine whether an in-group advantage exists for both culture and race, and whether one has more explanatory power than the other. This would provide a comprehensive examination of the in-group advantage that was not possible for this thesis.

Many of the studies produced interesting findings that were not the primary focus of the current research. For example, the studies examining whether displays of anger

would lead to a reversal of the other-race effect produced some interesting findings with regards to the ability of participants high in implicit and explicit prejudice to recognise out-group targets who displayed changing states of negative emotions. These findings should be explored in greater detail, using paradigms that are set out specifically to manipulate and explore these issues in greater detail. For example, systematic examination of the manipulation of a number of target emotion expressions at learning phase and test phase may inform whether participants high in prejudice are specifically poor at recognising anger in racial out-groups, or whether this finding extends to other negative emotions such as sadness.

Understanding of the underlying mechanisms of how individual differences in prejudice may influence emotion recognition is still in its relative infancy. Whilst this thesis has explored *whether* individual differences in prejudice influence emotion perception, the main issues of *why* they influence perception has yet to be resolved. From the studies carried out it appears to be the case that attitude towards a group, whether one's own or of a different race, influences the perception of emotion expression. In order to explore the 'why' a combination of implicit, explicit, and neuropsychological techniques may be required to examine the link between attitude and perception. Through systematic examination of the prejudice types and how their differing attitudes may impact upon recognition of emotion displayed by both in-groups and out-groups, it is hoped that this type of future research will lead to a greater understanding of this process.

As highlighted in the study limitations, one of the main areas for future research is to take these experiments out of the university setting and to explore the perception of emotion and influence of prejudice types within the general population as a whole. This

would not only allow for a more diverse population of White participants, but would also enable the incorporation of other races and cultures as participants. Inclusion of other races in the British culture would allow examination of whether in-group advantages occur for other racial and cultural groups, and whether increased exposure to a majority racial group influences emotion recognition.

Conclusions

Whilst much of the classical literature into facial displays of human emotion has focussed upon the emotion displays themselves (e.g., Darwin, 1872; Ekman et al, 1969; Schlosberg, 1954), more recent research (e.g., Calder et al, 2001; Hugenberg & Bodenhausen, 2003, 2004) and the findings of this thesis strongly suggest that, whilst the display of emotion is of vital importance to the understanding of emotion expression, so too is the role of the person perceiving the expression. In a non-verbal interaction the person viewing the emotion expression is not merely a passive observer; their attitudes and beliefs appear to play a role in the perception of the emotion displayed. In the case of cross-racial emotion recognition, findings from this thesis suggest that, whilst people are generally better at accurately recognising emotions displayed by members of their own racial group, attitudes towards both the racial in-group and the racial out-group can play a role in this accuracy. In particular, people scoring highly on measures of implicit prejudice often appear to perceive out-group displays of anger differentially from those participants low in implicit prejudice, being more likely to classify ambiguous angry targets as Black and reporting a greater intensity of anger for targets classified as Black. Participants high in implicit prejudice also show a decrement in recognising previously

seen angry out-group faces when a change in facial configuration is involved, suggesting a possible deficit when encoding and decoding the target. These findings suggest that these participants' perceptions of emotion are influenced by their attitudes. Furthermore, examination of the interaction between implicit and explicit prejudice found that participants scoring highly on both measures (i.e., modern racists) show greater accuracy for recognising out-group faces that display anger. They also appear to be aroused by negative and positive emotions displayed by their own racial group, but are only aroused by displays that may involve negative consequences for themselves when viewing racial out-groups. Finally, the finding that individual differences in prejudice do not appear to influence recognition of faces in general suggests that attitudes act upon emotion recognition independently, making it reasonable to propose that the processing of faces and emotions are carried out by separate mechanisms.

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Appendix 1: Target Words Displayed in Implicit Association Tests.

Positive words	Negative words
Honour	Evil
Lucky	Cancer
Vacation	Sickness
Loyal	Disaster
Freedom	Poverty
Rainbow	Vomit
Love	Bomb
Honest	Rotten
Peace	Abuse
Friend	Murder

Appendix 2: Explicit Measure of Prejudice.

Questions adapted from the Lepore and Brown (1997) explicit racism questionnaire.

1. It makes sense for minority groups to live in their own neighbourhoods because they share more and get along better than when mixing with Whites.*

2. I consider our society to be unfair to Black people.

3. It should be made easier to acquire British citizenship.

4. The number of Black Members of Parliament (MPs) is too low, and political parties should take active steps to increase it.

5. Minority groups are more likely to make progress in the future by being patient and not pushing so hard for change.*

6. Given the present high level of unemployment, foreigners should go back to their countries.*

7. The rights of immigrants should be restricted.*

8. If many Black persons moved to my neighbourhood in a short period of time, thus changing its ethnic composition, it would not bother me.

9. If people move to another country, they should be allowed to maintain their own traditions.

10. Once minority groups start getting jobs because of their colour, the result is bound to be fewer jobs for Whites.*

11. Those immigrants who do not have immigration documents should be sent back to their countries.*

12. Some Black people living here who receive support from the state could get along without it if they tried.*

13. Suppose a child of yours had children with a person of very different colour and physical characteristics than your own. If your grandchildren did not physically resemble the people on your side of the family, you would be...*‡

14. It is unfair to the people of one country if the immigrants take jobs and resources.*

15. I would not be concerned if most of my peers at the university were Black.

Each question was presented with a scale ranging from 1 (Strongly agree) to 7 (Strongly disagree). * denotes reverse scoring of the answer. ‡ denotes that the scale for this question was labelled 1 (Very bothered) to 7 (Not bothered at all).

Appendix 3: Biographical Information Sheet.

Biographical Information

Participant number _____

Could you please indicate your age, gender, and ethnicity below

Age:_____

Gender: M / F (please circle)

Ethnicity (please tick one)

(1) Asian/Oriental..... ☐
(2) Black..... ☐
(3) Hispanic or Latino/Latina..... ☐
(4) White, Caucasian, European, not Hispanic..... ☐
(5) Indian..... ☐
(6) Mixed; parents are from two different groups ..... ☐

Other (write in): _____

Appendix 4: Instructions for Morphed Movies.

You are about to see short movies of people whose faces will be moving from a neutral state to one of six emotional states. The experimenter will start the movie running, and when you are confident that you recognise the emotion being displayed on the targets' face, please press the SPACE BAR and tell the experimenter what emotion you think is being displayed on the targets' face.

For this part of the experiment we require both speed and accuracy. Please be confident in your judgement, but do not wait to 'make sure' if you think you know what the emotion is.

The emotions displayed are;

ANGRY

DISGUST

FEAR

HAPPY

SAD

SURPRISED

Please only use these emotions for the judgements.

You may refer to this list during the experiment if you wish.

Appendix 5: Response Sheet and Position of Experimental Morphs.

MORPH RECOGNITION SHEET Participant no. ____Age____Sex___Race_____

01 wh.....	26	51	76 .....
02 wh.....	27 bh.....	52	77 .....
03	28	53 wa.....	78 ba.....
04 ba.....	29 ba.....	54 wa.....	79 .....
05	30	55	80 .....
06 wh.....	31 wh.....	56 bh.....	81 .....
07 wh.....	32 wh.....	57	82 .....
08 bh.....	33 ba.....	58	83 .....
09	34	59 ba.....	84 bh.....
10 bh.....	35 wh.....	60 wa.....	85 .....
11	36	61 wh.....	86 .....
12 wa.....	37	62	87 .....
13	38 ba.....	63	88 .....
14	39 wa.....	64 wh.....	89 .....
15 wa.....	40 wh.....	65	90 wa.....
16	41 ba.....	66	91 .....
17 wh.....	42 wh.....	67 wa.....	92 .....
18	43 wa.....	68 ba.....	93 .....
19	44 bh.....	69	94 ba.....
20 wa.....	45 bh.....	70 ba.....	95 bh.....
21	46	71	96 .....
22 wa.....	47	72	97 .....
23 ba.....	48	73 bh.....	98 bh.....
24 bh.....	49 bh.....	74	99 .....
25 wa.....	50	75 ba.....	100 .....

Wh=White	*Bh=Black*	*Wa=White*	*Ba=Black*
happy	*happy*	*angry*	*angry*