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2 **a replication study using Imitation Games about religion**

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3 **Abstract**

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5 are plausible and replicable. We tested this by conducting Imitation Games on religion  
6 in a range of European countries, returning approximately 12 months later to repeat the  
7 research. The idea was that non-Christian members of strongly Christian countries  
8 would find it easy to pass as members of the practicing majority because Christian  
9 beliefs and practices would be ubiquitous. In more secular countries, the expectation  
10 was that non-Christians would find it harder to pass as Christian because religious  
11 practices are less visible. We show that, despite some anomalous results, the data are  
12 consistent with expectations derived from survey data and that the claim to have  
13 replicated the results can be supported. We also suggest that our experiences show that  
14 questions of replication in the social sciences cannot be resolved by statistical meta-  
15 analysis alone.

16 **Authors**

17 Robert Evans, School of Social Sciences, Cardiff University ([EvansRJ1@Cardiff.ac.uk](mailto:EvansRJ1@Cardiff.ac.uk))

18 Harry Collins, School of Social Sciences, Cardiff University

19 Martin Weinel, School of Social Sciences, Cardiff University

20 Hannah O'Mahoney, Cardiff University

21 Jennifer Lyttleton-Smith, School of Education and Social Policy, Cardiff Metropolitan  
22 University

23 Rik Wehrens, School of Health Policy and Management, Erasmus University Rotterdam

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43 Keywords: Imitation Game, interactional expertise, replication, comparative  
44 research

45

## 46 **Evaluating the Imitation Game as a method for comparative research:** 47 **a replication study using Imitation Games about religion**

### 48 **Introduction**

49           The replication crisis sparked by John Ioannidis’s infamous claim that ‘most  
50 published research findings are false’ (Ioannidis, 2005) typically turns on the meaning  
51 of p-values and significance testing and associated assumptions about sampling and  
52 measurement (Gorard, 2016, 2019). Here we take a different approach and examine, in  
53 a reflexive way, how we determined if a result had been replicated. The problem is  
54 doubly difficult in the case reported here as the novel methodology means there is no  
55 readily available comparator data against which to judge results. It is, therefore, an  
56 example of the ‘experimenter’s regress’ (Collins, 1992) and the paper explores the  
57 linked problems of (a) determining, a priori, what the ‘right’ answer might look like and  
58 (b) deciding whether results were close enough to this to count as ‘the same’ (c.f. Kuhn,  
59 1961).

60           Our new research method – the Imitation Game – starts from the sociological  
61 axiom that everything we know is a result of our socialisation. We distinguish between  
62 socialisation through direct participation and socialisation that is acquired indirectly  
63 through linguistic interactions, and use the Imitation Game to explore what kinds of  
64 knowledge can be gained through language alone (Collins et al., 2006, 2017, 2019; for  
65 more on the Imitation Game see Collins & Evans, 2014; Evans, Collins, Weinel, et al.,  
66 2019; Evans & Crocker, 2013). The novel features of the Imitation Game are twofold:

67           (1) it maps the distribution of knowledge rather attitudes, examining what people  
68           know about a social group without being a member of that group or taking part  
69           in its practices.

70 (2) the method is designed to be ‘bottom-up’, putting participants at the centre of  
71 the research and enabling them to generate data that reflects local knowledge,  
72 traditions and priorities.

73 The aim of the research described in this paper was to conduct the first large-  
74 scale tests of the Imitation Game as a comparative method by first calibrating results  
75 against existing survey data and then seeking to replicate these results through repeated  
76 fieldwork visits.

77 The remainder of the paper is structured as follows. First, we explain the  
78 Imitation Game method in more detail, setting out the theory that informs its design and  
79 the way it is used in practice. Next, we describe a series of studies in which we explored  
80 knowledge about religion (specifically, the locally dominant form of Christianity)  
81 across a number of European countries, ranging from those traditionally seen as very  
82 religious (e.g. Italy and Poland) to those seen as more secular (e.g. Norway and  
83 Finland). We also explain how we classified each country as ‘Christian’ or ‘Secular’  
84 and how we derived the hypotheses that framed our work. Finally, we turn to the data  
85 generated. We explore how we determined if a replication had been successful and, if  
86 not, what this meant for the Imitation Game and the challenge of replication more  
87 generally.

## 88 **Imitation Game: theory and practice**

89 The Imitation Game was originally developed to test the idea of interactional expertise,  
90 which is explained in more detail below, but it can be used to explore the nature of  
91 groups and group membership more generally. For example, it can be used to explore  
92 the uniformity or diversity within a group or how widely knowledge of a particular  
93 group’s experience is shared, thus shedding light on both the character of that group and

94 the wider society of which it is a part. Used longitudinally, the Imitation Game can be  
95 used to track changes in both the content and distribution of this knowledge, again  
96 reflecting changes in both the experiences of the target group and their relationship with  
97 the wider society.

98 Other uses of the method include examining the strategies used by different players to  
99 create questions, to generate answers to these questions and to evaluate these answers. It  
100 is also possible to supplement Imitation Game data with demographic and/or  
101 psychometric data to explore whether specific player characteristics affect the outcome.  
102 Alternatively, the analysis might focus on the whole corpus of data, mapping the  
103 presence and absence of different themes or examining the use of language. In other  
104 words, much like the survey or interview, the Imitation Game is a generic method that  
105 can be adapted to a wide variety of research designs and questions, with qualitative or  
106 quantitative data foregrounded as appropriate. In what follows, we focus on the use of  
107 quantitative data to test theory that informed the development of the method. The  
108 rationale for this is to demonstrate that the range of potential uses hinted at above is  
109 built on a firm foundation.

#### 110 ***Theoretical foundations: interactional and contributory expertise***

111 Members of a social group or culture who have been successfully socialised  
112 share what the philosopher Ludwig Wittgenstein called a form of life (Winch, 1958;  
113 Wittgenstein, 1953). Sharing a form of life means acquiring the set of tacit and explicit  
114 knowledge used by members of the group to coordinate and moderate their actions. The  
115 inclusion of tacit knowledge is crucial as this can only be gained through social  
116 interaction and is, therefore, peculiar to that group (Collins, 2010; Evans, 2008).

117           There are two ways in which this socialisation can take place. The first is via full  
118 and active participation in the group's activities, such that tacit knowledge becomes  
119 embodied in the person (Dreyfus, 2004). The problem with this view is that it is too  
120 restrictive. If direct, personal experience were the only route to expertise, it would be  
121 impossible for ethnography and anthropology to succeed as researchers would have to  
122 experience every aspect of a culture for themselves in order to understand it.

123           As an alternative to this way of thinking, we distinguish between contributory  
124 and interactional expertise (Collins et al., 2016; Collins & Evans, 2002, 2007, 2015).  
125 Contributory expertise corresponds to the embodied form of expertise described above  
126 and describes the abilities and knowledge of an individual who has been fully socialised  
127 into a particular group. Interactional expertise, which is the new concept, refers to  
128 expertise in the language that contributory experts use to describe their practices.  
129 Interactional expertise is similar to contributory expertise in that it can only be gained  
130 through interaction with contributory experts but differs in that it does not require any  
131 practical experience (Collins, 2004, 2011). Ethnography and anthropology are thus  
132 possible as researchers can gain interactional expertise through their conversations with  
133 participants but do not have to engage in the associated practices: criminologists do not  
134 have to commit crimes; sociologists of religion do not have to be devout believers; and  
135 it does not matter that sociologists of childhood are no longer children.

136           Returning to the idea of the Imitation Game, by examining both the content and  
137 distribution of interactional expertise, the Imitation Game provides a new way of  
138 mapping the interactions between members of social groups. The more the actions and  
139 beliefs of one social group are visible to and engaged with by members of a different  
140 group, the more likely it is that the second group will develop the interactional expertise  
141 needed to understand the experiences of the first. The extent to which this occurs

142 reveals something about the relationship between the groups, whilst the content of that  
143 interactional expertise provides an insight into the life of the target group. It is this  
144 argument – that interactional expertise (a) has a distribution and (b) that this distribution  
145 can be measured by the Imitation Game – that the research described below was  
146 intended to test.

### 147 *Playing the Imitation Game: roles and data*

148         The Imitation Game is based on the Turing Test (Turing, 1950), in which a  
149 human judge asks questions of a human and a computer and must decide which answers  
150 come from the computer and which from the human. Turing’s claim was that, if the  
151 Judge cannot distinguish between the two sets of answers, then the computer should be  
152 classed as intelligent. Crucially, the Turing Test does not require that the computer have  
153 a body or do practical things in the way a human does; it is based solely on the  
154 convincing and contextual use of language (Collins, 1990, 2018). Re-framed in terms of  
155 contributory and interactional expertise, we say that, in the Turing Test, both the human  
156 players have contributory expertise (i.e. practical and linguistic fluency) whilst the  
157 computer needs only interactional expertise (i.e. linguistic fluency).

158         In our research, we take the parlour game that inspired Turing and develop a  
159 more formal set of protocols so that it can be used for social research. The basic setup,  
160 what we now call the ‘Classic Imitation Game’ and consists of three players:

- 161         • **Interrogator/Judge.** This player must be a contributory expert – that is a  
162             member of the target group – and plays two roles: an **Interrogator** who asks  
163             questions and a **Judge** who decides which answer comes from which player.
- 164         • **Non-Pretender.** This player is also a contributory expert and answers the  
165             Judge’s questions by referring to their own experiences and knowledge.



166       • **Pretender.** This player attempts to answer the questions posed by the  
167       Interrogator as if they were a member of the target group (i.e. as if they were a  
168       contributory expert). If the Pretender has interactional expertise, then the Judge  
169       should find it difficult to work out which answers come from the Pretender  
170       which from the Non-Pretender. In contrast, if the Pretender does not have  
171       interactional expertise, then the Judge should find it relatively easy to identify  
172       the players.

173       Each Imitation Game proceeds with the Interrogator setting a question, the  
174       Pretendent and Non-Pretender providing answers and the Judge then attempting to  
175       determine which answer came from which player. This generates a set of qualitative and  
176       quantitative data consisting of:

- 177       • **Questions:** these indicate the topics that Interrogators think differentiate their  
178       group from the Pretender group (i.e. the Non-Pretender will know the answer  
179       but the Pretender will not)
- 180       • **Answers from Non-Pretender:** these provide an indication of the range of  
181       experiences within the target group. Where the group's experiences are very  
182       homogeneous, Non-Pretender answers will be very similar. Where the group  
183       permits diversity, a wider range of answers are possible.
- 184       • **Answers from Pretenders:** these indicate the extent to which the Pretender  
185       population has the relevant interactional expertise. Where they do, Pretender and  
186       Non-Pretender answers will be equally plausible. Where they do not, Pretender  
187       answers will be deficient in some way.
- 188       • **Judgements:** these are available for individual questions or the set of questions  
189       as a whole and consist of an **identification** (e.g. Player 1 is the Pretender),

190 which might be right or wrong, an indication of the Judge's **confidence** in that  
191 identification on a scale of 1-4, and the **reason** for that decision.

192 This basic format can be adapted to suit different needs and resources. Of  
193 particular relevance here is the development of the method to use large samples needed  
194 for quantitative analysis (Collins et al., 2017, 2019). Other developments include: the  
195 use of small groups, rather than individuals, to play the three roles in the Classic version  
196 of the Game (Evans, Collins, Weinel, et al., 2019), using the data to explore how Judge  
197 decisions are made (Arminen et al., 2018; Collins, 2016; Segersven et al., 2020) and  
198 using the Imitation Game as an intervention to prompt dialog and reflection in a larger  
199 project (Wehrens, 2014, 2018).

200 When analysing the results, it is possible to focus on either the qualitative or  
201 quantitative elements or both (Collins et al., 2017). When looking at the quantitative  
202 results, the success of Judges is measured by the Identification Ratio (IR), which is  
203 calculated using the formula:

$$204 \quad \text{IR} = (\text{Right} - \text{Wrong}) \div (\text{Right} + \text{Wrong} + \text{Don't Know})$$

205 where:

- 206 • Right = Number of correct identifications with confidence rating of 3 or 4
- 207 • Wrong = Number of incorrect identifications with confidence rating of 3 or 4
- 208 • Don't know = Number of identifications with a confidence rating of 1 or 2

209 In what follows, however, we are more concerned with the success of Pretenders  
210 as that provides a more direct way of talking about the distribution of interactional  
211 expertise. The success of Pretenders is called the pass rate and is given by:

$$212 \quad \text{Pass Rate (\%)} = 1 - \text{Identification Ratio}$$

213           A high pass rate indicates that Pretenders were largely successful, suggesting  
214 that they possess the relevant interactional expertise and have the kinds of interactions  
215 with the target group that are necessary for this to be developed. In contrast, a low pass  
216 rate suggests that Pretenders do not possess the relevant interactional expertise and that  
217 they are, therefore, either isolated from or unaware of the social world of the target  
218 group.

## 219 **Research design**

220           In exploring the use of the Imitation Game as a tool for comparative, cross-  
221 national research we were particularly interested in whether pass rates varied between  
222 countries in ways that reflected important cultural characteristics. The hypothesis was  
223 that, where the integration of, or interaction between, similar social groups differs  
224 between societies then so will the distribution of interactional expertise about those  
225 groups and that this difference should be visible in the pass rates of Pretenders. We  
226 chose the topic of religion, with our initial hypothesis summarised as follows:

- 227       • Where a country has a strong, national religious tradition or identity, the  
228       practices and beliefs of that religion should be highly visible such that even  
229       those who are not religious will develop interactional expertise in that tradition.  
230       This would be made visible as a relatively high pass rate for non-religious  
231       players pretending to be religious.
- 232       • Where a country has a more secular tradition, religious practices will be hidden  
233       from those who do not directly engage in them, meaning that knowledge about  
234       them will not be widely shared. This lack of interactional expertise would be  
235       made visible as a relatively low pass rate for non-religious players pretending to  
236       be religious.

237 This, in turn, leads to two definitional questions: first, what do we mean by ‘religious’  
238 and ‘non-religious’ and, second, what does it mean to say pass rates are ‘high’ or ‘low’?

239 *Fieldwork sites*

240 We collected data in seven European countries – Finland, Hungary, Italy,  
241 Netherlands, Norway, Poland and the United Kingdom – in which the dominant religion  
242 is Christianity. To categorise these countries as ‘religious’ or ‘secular’, and hence derive  
243 a ranking against with Imitation Game results could be compared, we used survey data,  
244 with countries classified as ‘religious’ if surveys suggested religion played a significant  
245 role in the everyday life of a substantial majority of the population and ‘secular’ if it did  
246 not. Whilst not every survey covered every country, there were some clear patterns: <sup>1</sup>

- 247 • **World Values Survey (2005-6, wave 5)**: in response to a question that asked  
248 respondents to rate how important religion was in their life, 85% of respondents  
249 in Poland said either very or rather important, with only 13% saying religion  
250 was either not very or not at all important. The figures for Italy were 75% and  
251 24%, making these were the only two countries in our sample where the  
252 proportion saying religion was important was greater than the proportion saying  
253 it was not important. The comparable figures for the other countries were 45%

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<sup>1</sup> Sources are:

- For Gallup and Eurobarometer poll: [https://en.wikipedia.org/wiki/Religion\\_in\\_Europe](https://en.wikipedia.org/wiki/Religion_in_Europe)
- For World Values Survey: <http://www.worldvaluessurvey.org/WVSONline.jsp>

254 and 55% for Finland, 40% and 58% for the United Kingdom, 38% and 62% for  
255 Hungary, 33% and 67% for Norway, and 30% and 66% for the Netherlands.<sup>2</sup>

256 • **World Values Survey (2005-6, wave 5):** in response to a question that asked  
257 how often respondents attended a religious service, 75% of respondents from  
258 Poland said at least once a month, with only 11% saying they went no more  
259 once a year. The figures for Italy were 54% and 20%, making these the only two  
260 countries in the sample where more than half the population attends a religious  
261 service at least once a month. In all other cases, with the exception of Hungary,  
262 the majority of respondents attend a religious service no more than once a year.  
263 The comparable figures are 15% and 40% for Hungary, 15% and 62% for  
264 Finland, 18% and 65% for the Netherlands, 24% and 66% for the UK, and 11%  
265 and 74% for Norway.

266 • **Gallup (2009):** 75% of respondents in Poland and 72% of respondents in Italy  
267 said religion was important in their daily life compared to 39% in Hungary, 33%  
268 in the Netherlands, 28% in Finland, 27% in the United Kingdom and 21% in  
269 Norway.

270 • **Eurobarometer (2012):** Only 5% of respondents from Poland and 6% of  
271 respondents from Italy classified themselves as either atheists or agnostics. In  
272 contrast, 22% of Hungarian respondents, 32% of UK respondents, and 49% of  
273 Dutch respondents classified themselves in this way (Norway and Finland were  
274 not included in the survey)

275 Based on this data, we classified our fieldwork sites into two groups:

---

<sup>2</sup> Wave six of WVS is more recent but does not include all the countries on our list.

276 • Religious: Italy, Poland

277 • Secular: Finland, Hungary, Netherlands, Norway, United Kingdom

278 and refined our initial hypothesis to say that pass rates for participants who identify as  
279 non-religious and who are pretending to be religious, would be:

280 (1) Higher in the religious countries than in the secular ones.

281 (2) Similar within each of the two groups (e.g. within-group differences less than  
282 between-group differences)

283 In making these classifications, we recognise that there will be variations within  
284 each country. Nevertheless, some way of calibrating our new method by providing an  
285 independent rationale for the expected distribution of interactional expertise was  
286 needed. It should also be noted that, because the participants – principally Judges,  
287 Interrogators and Non-Pretenders – determine what is relevant, the ‘religion’ that forms  
288 the target expertise is the dominant religion in each country: Catholicism in Italy and  
289 Poland, Lutheranism in the Netherlands and Norway, and mixed denominations in all  
290 other locations.

### 291 ***Data collection***

292 Fieldwork followed a similar pattern in each location. First, contact was  
293 established with a local university and a ‘Local Organiser’ recruited to assist with the  
294 research. Recruitment of participants took place via an online survey, with students  
295 from that university asked to self-identify as ‘active Christians’ or not, according to  
296 criteria including attendance at church services and the importance of religion in their

297 everyday life.<sup>3</sup> Next, a number of real-time Imitation Games were played in which  
298 students who had identified as ‘active Christians’ played the role of Interrogator/Judge  
299 and Non-Pretender and students who did not self-identify as religious played the role of  
300 Pretender (Step 1 in Table 1).<sup>4</sup>

301         Next, each set of questions created during Step 1 was converted into an online  
302 survey, and a new, much larger sample of non-Christian Pretenders recruited to provide  
303 answers to these questions, with each new Pretender answering one set of questions  
304 (Step 2 in Table 1). These new answers were then linked to the questions and Non-  
305 Pretender answers created in Step 1 to produce a set of dialogs, one for each of the Step  
306 2 Pretenders (called Step 3 but not shown in Table 1 as it is a database operation that  
307 requires no participants).

308         These dialogs were then sent to a new sample of Judges (Step 4 in Table 1) who  
309 were asked to work out which set of answers came from the Pretender and which from  
310 the Non-Pretender. Step 4 Judges were always drawn from students who self-identified  
311 as active Christians. As the total number of transcripts created is set by the number of  
312 participants at Step 2, and each dialog was judged by two different Judges, each Judge  
313 got between 6 and 8 dialogs. Pass rates were calculated as described above, with the  
314 sample size given by the number of participants in Step 2.

315

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<sup>3</sup> The use of students was for practical and logistical reasons. It would, of course, be desirable to repeat the research with more representative samples.

<sup>4</sup> The software that hosts the Game allows participants to play different roles in multiple games simultaneously. This means that equal numbers of each group are needed and not the 2:1 ratio required for a single ‘Classic’ Imitation Game.

316 [Table 1 about here]

317

318 Before discussing the results, there are some caveats that should be noted:

319 (1) The terminology used to recruit participants varied in response to advice  
320 provided by our Local Organisers. For example, Pretenders were recruited as  
321 ‘secular’ in some cases and ‘non-Christian’ in others.

322 (2) Judges and Non-Pretenders may have been recruited as ‘active’ Christians in  
323 some cases and ‘practicing’ in others, again depending on advice from our Local  
324 Organisers

325 (3) The method and protocols evolved over the course of the project, as did the  
326 software, as each fieldwork trip identified some problem or bug that needed to  
327 be fixed for the next trip.

## 328 **Results**

329 The results of the Imitation Games are presented as follows:

330 (1) Pass rates for each of the fieldwork locations and visits

331 (2) Discussion of how and to what extent the differences hypothesised before the  
332 research are represented and replicated within the data.

### 333 *Pass rates by fieldwork locations*

334 There are two independent judgements for each transcript and hence two  
335 complete sets of judgements. The pass rate can be calculated for each set and this  
336 provides the first element of ‘replication’. Assuming there is no statistically significant  
337 difference between the two, the final pass rate is taken to be the average of the two pass



338 rates.<sup>5</sup> Each of these measures is reported in Table 2, which shows that in all cases, bar  
339 one (Helsinki, 2013) , there was no statistically significant difference between the two  
340 measures of the pass rate.

341

342 [Table 2 about here]

343

344 Table 2 also shows the ranking of the mean pass rates, which is consistent with  
345 expectations based on the survey data. For example, the mean pass rates in Palermo  
346 (Italy) and Wroclaw (Poland) are both very high (over 90%). The majority of the rest  
347 are much lower, typically below 70%, but there are some outliers at each end of this  
348 group. We now explore these results in more detail.

#### 349 *Measures of reliability*

350 Table 2 reports the pass rate calculated using each of the two sets of judgements.  
351 Comparing the two provides a measure of the reliability of judgements, though what  
352 counts as a ‘big’ difference between the two is unclear. Given the concern about the use  
353 of significance tests, we developed a bootstrap method for estimating the probability of  
354 the observed data occurring randomly. This method takes the number of Right, Wrong  
355 and Don’t Know answers used to calculate each pass rate as ‘weights’, simulates 10,000  
356 iterations of the Game and uses these to calculate a 95% confidence interval for the  
357 difference between the two pass rates.

358 The outcome is also shown in Table 2. As noted above, apart from data collected  
359 in Helsinki in September 2013, there is no statistically significant difference between

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<sup>5</sup> For a more detailed exposition of this and all other aspects of the Imitation Game method see  
(Evans, Collins, & Weinel, 2019)

360 the two estimates of the pass rate in any location. In this one case, therefore, a  
361 judgement is needed. On the one hand, the p-value is greater than 0.05 but, on the other,  
362 the results do not look particularly different to the previous year where there was no  
363 statistically significant difference. For example, the two pairs of values are relatively  
364 similar – 59 and 71 in 2012, 73 and 55 in 2013 – and so is the average – 65 in 2012 and  
365 64 in 2013. Whilst this does suggest that there is something unusual about the Finnish  
366 data, we do not think there is a strong reason to exclude the mean pass rate from the  
367 analysis and so treat it as a successful replication.

### 368 *Comparisons between fieldwork sites*

369 We now turn to our principal hypothesis, that pass rates will be higher in those  
370 countries classed as religious than in those countries classed as secular. Initial  
371 inspection of the Table 2 suggests that the results can be split into three groups rather  
372 than the two we originally hypothesised:

- 373 (1) **High pass rate** (i.e. above 90 per cent): Palermo (May 2012); Wroclaw (Oct  
374 2011).
- 375 (2) **Medium pass rate** (i.e. 50 to 75 per cent): Cardiff (Nov 2011); Helsinki (Nov  
376 2012); Helsinki (Sept 2013); Cardiff (March 2012); Budapest (May 2013);  
377 Trondheim (Oct 2012).
- 378 (3) **Low pass rate** (i.e. 25 per cent or less): Rotterdam (Dec 2012); Rotterdam (Dec  
379 2013).

380 There are also two results that sit in-between these categories – Budapest (April  
381 2012) and Trondheim (Nov 2013) – for one fieldwork visit but lie within the medium  
382 category for the other visit.

383           Were statistical evidence needed to support this interpretation, the bootstrap  
384 method described above can also be used to make pairwise comparisons between each  
385 of the fieldwork sites. The results of this exercise confirm the initial interpretation:

- 386       • **High pass rate:** There is no statistically significant difference between Palermo  
387       (2012) and Wroclow (2011) but both of these are different to every other case  
388       except for the anomalous result from Budapest in April 2012
- 389       • **Medium pass rate:** There are no statistically significant differences between  
390       Cardiff (Nov 2011), Helsinki (Nov 2012), Helsinki (Sept 2013), Cardiff (March  
391       2012), Budapest, (May 2013) and Trondheim (Oct 2012)
- 392       • **Low pass rate:** There is no statistically significant difference between the two  
393       results from Rotterdam but these are different to every other result, including the  
394       anomalous result from Trondheim in November 2013

## 395 **Discussion**

396           The aim of the research was to examine the extent to which data collected by a  
397 novel method would be (a) consistent with expectations derived from more traditional  
398 sources and (b) replicable over time. In what follows, we note the areas where the  
399 results of the Imitation Game research show good agreement with the expectations we  
400 derived from the existing data before looking in more detail at the three results that were  
401 more unexpected: the high pass rate recorded in Hungary in 2012, the low pass rate  
402 recorded in Trondheim in 2013 and the very low pass rate recorded in the Netherlands  
403 on both visits.

### 404 ***Conformity with survey-based expectations***

405           The hypothesis that informed the research design was that there would be a  
406 measurable difference in pass rates in ‘religious countries’ when compared against more

407 secular countries. Broadly speaking, this was what we found. Pass rates in Palermo and  
408 Wroclaw were very high (over 90%) and these were two countries that were highly  
409 ranked in all measures of ‘religiosity’ found in cross-national surveys. In contrast, pass  
410 rates in Trondheim, Cardiff, Helsinki and Rotterdam were much lower and this is  
411 consistent with their rankings in the same surveys.

412         Putting these findings in the language of interactional and contributory expertise,  
413 we would say that contributory expertise in the nationally dominant religious tradition,  
414 in this case Roman Catholicism, is ubiquitous in countries such as Poland and Italy.  
415 This means that members of these societies who are not religious or who do not follow  
416 the Christian faith are routinely immersed in the language of that religion and that, as a  
417 result, acquire a relatively high degree of interactional expertise about it. This is  
418 evidenced by their ability to provide plausible answers in an Imitation Game.

419         In contrast, where religious practices are less mainstream, as in Scandinavian  
420 countries, the UK and the Netherlands, the contributory expertise associated with  
421 actively practising a faith is less visible – e.g. religion is less likely to be classed as  
422 important in everyday life, attendance at services is lower – and this reduces the  
423 opportunities for others to develop the related interactional expertise. This is not to say  
424 there is no public discourse about the dominant religion but, given the relative paucity  
425 of face-to-face social interactions with those who are actively living their faith, we  
426 would expect the pass rate to be lower.

#### 427 *Successful replication of results*

428         We did not attempt to replicate results from Palermo or Wroclaw as the pass rate  
429 was close to the maximum of 100% and clearly consistent with expectations derived

430 from the survey data.<sup>6</sup> For other fieldwork sites, if successful replication is defined as a  
431 pass rate that appears in the same category on each occasion, we did successfully  
432 replicate results in Cardiff, Helsinki and Rotterdam.

### 433 *Outliers and failures to replicate*

434 In the case of Budapest and Trondheim, we did not replicate results: in each  
435 case, we had one result that fell within the ‘medium’ pass rate category and one that fell  
436 outside. In the case of Budapest fieldwork in 2012, the pass rate was higher than  
437 expected given the survey data so we initially wondered if this was due to some factor  
438 that was specific to Budapest. To check this, we recruited a new sample of Judges from  
439 Pécs, another city in Hungary but one that we expected to be more traditional. These  
440 Judges then rated the same transcripts as the Budapest Judges and returned a pass rate  
441 that was very similar to the one measured in Budapest.

442 This leaves two possibilities. One is that the Pretenders recruited in Budapest  
443 were genuinely knowledgeable about the beliefs and practices of the Christian faith and  
444 that this was reflected in authentic answers that Judges in both Budapest and Pécs found  
445 hard to distinguish from those provided by active/practicing Christians. In this case, the  
446 argument would be that the Imitation Game, by measuring knowledge rather than  
447 attitude or practice, has identified a degree of interaction between the two groups that is  
448 invisible to other methods.

449 The other possibility is that the results are an artefact. This would not be entirely  
450 surprising given that the research reported here was intended to develop the Imitation  
451 Game through using it, that the fieldwork in April 2012 was one of the earliest data

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<sup>6</sup> There were also some practical reasons, namely that we also wanted to conduct Imitation Games on sexuality and gender and had a limited number of visits available.

452 collection visits, that protocols were changing and developing over time, and that, in  
453 each case, we were effectively working with a convenience sample.

454 To investigate this scenario in more detail, we returned to Budapest in 2013 and  
455 ran another set of Imitation Games. In this case, the average pass rate came out as 59%,  
456 which is well within what we now call the ‘medium’ category and much closer to what  
457 we had initially expected. We also arranged for this second set of transcripts to be  
458 judged by a sample of Judges recruited in Pécs. Again, the results were much closer to  
459 our initial expectation, with a mean pass rate of 69%. Given the consistency between  
460 the 2013 pass rates and the data collected in other fieldwork sites, our view now is that  
461 the 2012 data represents an outlier, with sampling and the novelty of the method the  
462 most likely explanation for the difference.

463 Because the anomalous result in Trondheim occurred much latter in the  
464 fieldwork cycle, we have not been able return and conduct a third visit. As such, it is  
465 possible that either of the results could be the ‘correct’ one, though, given the other  
466 results and our increasing confidence in the Imitation Game method’s reliability, we  
467 would give more weight to the data that matches the a priori expectations. Again, more  
468 research would be needed to determine what might account for the difference.

#### 469 ***‘New’ finding***

470 The other unexpected results were the surprisingly low pass rates recorded in  
471 Rotterdam. As with the outlying result from Budapest, we were able to return to  
472 Rotterdam to repeat the research. In this case, the initial result was not only replicated  
473 but the difference became even clearer, with the pass rate falling from 24% to 17%.

474 To explain this unexpectedly robust result, we worked with a colleague in the  
475 Netherlands to better understand the context in which the data had been generated. Of  
476 particular importance, we now believe, is the transformation the Netherlands during the

477 20<sup>th</sup> Century from very religious society, with strong Catholic and Protestant  
478 communities, to a more secular society. Whilst this process of secularisation may seem  
479 to have undermined the traditional pillars of Dutch society – Catholics, Protestants and  
480 liberals – it has been argued that the separation continues, particularly for those within  
481 the orthodox Protestant tradition. For example, according to Oomen, Guijt and Ploeg  
482 (2010) members of the orthodox reformed church have their own newspaper, attend  
483 reformed schools, vote for the SGP (an orthodox Calvinist political party), and structure  
484 the major part of their social life around these institutions. Indeed, it is possible that  
485 while there are fewer Christians in the Netherlands today, the saliency of their belief has  
486 been strengthened rather than weakened (Houtman, 2008; Vollaard, 2013)

487         More importantly, this orthodox part of the protestant population is  
488 geographically distinct: most of them live in a region called the ‘Bible Belt’, which runs  
489 close to Rotterdam and may be a significant source of students at the Erasmus  
490 University where we conducted our Imitation Games.. Given this, we now believe that  
491 the distinct and robust nature of the results are explained by the fact that, in recruiting  
492 from a protestant religious community, we have tapped into the increasing social  
493 isolation those holding more orthodox religious views. In other words, rather than being  
494 an artefact, the low pass rate in Rotterdam reveals something real – and, to us,  
495 unexpected – about the lives of those taking part in the research.

#### 496 ***Calibration and Replication***

497 Calibration and replication are two different ways of assessing the success of a new  
498 method of data collection. We have described each in detail in order to show that  
499 judgement is a crucial element of each. In the case of calibration, judgement is needed  
500 to determine the suitable proxy measurement against which the new data can be  
501 compared. For the Imitation Game research reported here, we made the judgement that

502 survey data on religious attitudes and practices provided a suitable proxy for religious  
503 knowledge. In most cases the ranking and absolute value of the pass rate did seem  
504 plausible given the survey data. Where there were outliers, however, determining how  
505 to treat the anomalous result the solution required further investigation of the specific  
506 case.

507 The question of replication raised similar concerns. Whilst we have included some  
508 quantitative information – e.g. pairwise comparisons of between-country pass rates – it  
509 would be incorrect to say that our decision about whether a result had been ‘replicated’  
510 was, or could be, based purely on this. Instead, the quantitative analysis adds weight to  
511 an interpretation of the data that is based on our overall understanding of the fieldwork,  
512 something we have tried to convey in the detailed descriptions provided above. The  
513 more general point is, therefore, that for any statistical meta-analysis to be conducted, it  
514 would first be necessary to consider something like the analysis set out above – a meta-  
515 meta-analysis of the design, conduct and context of each study – in order to determine  
516 whether or not the data should be included (Collins, 2019, Chapter 9). Whilst this  
517 observation does not preclude the use of statistical meta-analysis it does, we hope,  
518 introduce a note of caution about the extension of meta-analysis from medical and  
519 biological sciences (e.g. Ioannidis, 2005) into social science more generally.

## 520 **Conclusions**

521 This paper has reported the results of an ambitious replication and calibration  
522 study in which a new method was used to collect data across Europe with the aim of (a)  
523 producing results that were consistent with existing national survey data and (b)  
524 demonstrating its reliability by replicating results from at least some of these fieldwork  
525 sites. Comparing results across twelve different fieldwork exercises, we have shown



526 that that Imitation Game method does work as advertised with more results replicated  
527 than not and with Imitation Game data generally matching that collected by larger and  
528 much more expensive cross-national surveys.

529         Where differences between expected and actual results occur, these fall into two  
530 groups. First, as with Budapest and Trondheim, it appears likely that the unexpected  
531 result is an outlier. More investigation is needed to establish whether methodological  
532 factors (e.g. sampling, time of year, phrasing of instructions etc.) contributed to the  
533 difference and hence to improving protocols. Second, and more importantly, the results  
534 in Rotterdam, suggest that Imitation Game is sensitive to local factors and variations,  
535 with the data picking up the importance of the local Protestant community, something  
536 which the research team had been unaware of prior to collecting data.

537         Finally, on the question of replication, we find that focussing purely and  
538 narrowly on statistical tests is unlikely to be productive given the complexity and  
539 variability of social science fieldwork. Instead, what is needed is a careful analysis of  
540 the context and conduct of each study that assesses its own unique strengths and  
541 weaknesses. That said, and as we have shown, this does not mean that replication in the  
542 social sciences is impossible. Rather the implication is that such conclusions need to be  
543 based on a holistic understanding of research data and not statistical testing alone.

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644

<b>Fieldwork site</b>	<b>Date</b>	<b>Type of Christian</b>	<b>No of Step 1 Games</b>	<b>No of Step 1 players</b>	<b>No of dialogs used in Step 2</b>	<b>No of Step 2 participants</b>	<b>No of Step 4 Judges</b>
<b>Wroclaw Poland</b>	Nov-11	Catholic	18	36	18	165	40
<b>Cardiff UK</b>	Nov-11	Mixed	18	36	16	198	36
<b>Cardiff UK</b>	Apr-12	Mixed	18	36	18	175	40
<b>Budapest Hungary</b>	Apr-12	Mixed	18	36	17	180	40
<b>Palermo Italy</b>	May-12	Catholic	27	54	6	189	72
<b>Trondheim Norway</b>	Oct-12	Lutheran	24	48	17	183	40
<b>Helsinki Finland</b>	Nov-12	Mixed	23	46	19	188	40
<b>Rotterdam Netherlands</b>	Dec-12	Lutheran	18	36	10	204	44
<b>Budapest Hungary</b>	May-13	Mixed	20	40	23	241	60
<b>Helsinki Finland</b>	Sep-13	Mixed	20	40	19	188	40
<b>Trondheim Norway</b>	Nov-13	Lutheran	23	46	21	211	55
<b>Rotterdam Netherlands</b>	Dec-13	Lutheran	25	50	23	184	40

646 Table1: Summary of fieldwork

Place (and date)	Pass Rate		Mean 'First' and 'Second' sets)	P value (diff. 'First' and 'Second' sets)
	'First' set of Judges	'Second' set of Judges		
Palermo, Italy (May 2012)	97%	100%	99%	0.567
Wroclaw, Poland (Oct 2011)	92%	93%	93%	0.904
Budapest, Hungary (April 2012)	88%	80%	84%	0.394
Cardiff, UK (Nov 2011)	74%	74%	74%	0.986
Helsinki, Finland (Nov 2012)	59%	71%	65%	0.104
Helsinki, Finland (Sept 2013)	73%	55%	64%	<b>0.033</b>
Cardiff, UK (March 2012)	66%	57%	61%	0.211
Budapest, Hungary (May 2013)	56%	61%	59%	0.416
Trondheim, Norway (Oct 2012)	58%	57%	57%	0.811
Trondheim, Norway (Nov 2013)	40%	36%	38%	0.520
Rotterdam, Netherlands (Dec 2012)	24%	25%	24%	0.809
Rotterdam, Netherlands (Dec 2013)	18%	16%	17%	0.776

649 Table 2: Pass rates for non-Christian Pretenders in individual fieldwork trips

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656



657 **Author information**

658 **Robert Evans** is a Professor in the School of Social Sciences at Cardiff University,  
659 where he specialises in science and technology studies. In addition to the Imitation  
660 Game, his research interests include the nature of expertise and its application to  
661 political decision making. He is currently working on a citizen science project  
662 examining community responses to a local incinerator.

663 **Harry Collins** is Distinguish Research Professor in the School of Social Sciences at  
664 Cardiff University and a Fellow of the British Academy. Widely acknowledged as a  
665 founder of the sociology of scientific knowledge, his work includes a 40 year study of  
666 gravitational wave physics, a sociological analysis of the limits and possibilities of  
667 artificial intelligence and, most recently, the role of science within democratic societies

668 **Dr Martin Weinel** is a research associate on the EU funded WaterWatt project that  
669 aims to improve energy efficiency in European Industries. His previous work includes a  
670 study of the controversy over the use of AZT to prevent Mother-to-Child transmission  
671 of HIV/AIDS in South Africa and the development of Imitation Game method.

672 **Dr Jennifer Lyttleton-Smith** is a Lecturer in Education at Cardiff Metropolitan  
673 University. Her research interests include identities and subjectivities, vulnerable and  
674 marginalised childhoods, gender and sexuality, well-being and co-production.

675 **Dr Hannah O'Mahony** currently works in the third sector. Her research interests  
676 include sociology of work, environmental sociology, and Arts and health research

677 **Dr Rik Wehrens** is Assistant Professor in the School of Health Policy and Management  
678 at the Erasmus University Rotterdam. With a background in science and technology  
679 studies, his previous research has examined the use of evidence and patient knowledge

680 in medical practice. His current research interests include the role and use of ‘big data’  
681 and artificial intelligence in the context of public health policies and chronic illness.