

# Replication: Knowledge and Luck

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## I. ABSTRACT

Is a belief true when it is due to a lucky guess? This study replicated Turri and colleagues' (2014) study investigating how we make judgments of others' knowledge (i.e., what they know). In this replication, 97 participants completed a short survey that compared three different conditions—one in which the character made the right decision due to their knowledge ("Knowledge"), one in which the character made the right decision due to a lucky guess ("Gettier"), and one in which the character was wrong ("Ignorance"). It was found that subjects attributed knowledge and reasonableness to the characters depending on the condition they were in. Subjects attributed higher knowledge ratings to the characters in the Gettier condition than in the Knowledge and Ignorance conditions. However, ratings for reasonableness, the soundness of the characters' conclusions, were higher in the Knowledge condition than the Gettier and Ignorance conditions. Overall, findings were in line with the Turri et. al (2014) study, demonstrating that these effects can replicate. We also found support for an additional hypothesis for the gender differences in knowledge ratings: the female character ("Emma") was rated lower in knowledge than the male characters ("Darrel" and "Gerald") regardless of the condition.

*Keywords:* Luck; Knowledge; Gettier

## II. INTRODUCTION

In 2014, Turri and colleagues conducted a study to understand how people perceive knowledge and make judgments about what others know and what is due to luck. Following this study, *Advances in Methods and Practices in Psychological Science* (AMPPS) (2015) conducted a worldwide replication to confirm his results and the conclusions that were made about the interaction between knowledge and luck-related factors <sup>1</sup>. In the original study, participants were required to read one of seven stories which represented three luck-related factors that influence people's judgments about knowledge (threat, disruption, and replacement) and answer questions about the character (Emma) in the story. This allowed researchers to measure the rate at which they attributed knowledge to the character <sup>2</sup>. By doing so, researchers discerned whether or not a participant attributed Emma's conclusion to her knowledge or a lucky guess, alluding to how people make judgments about those around them.

In the replication study conducted by AMPPS (2015), researchers reduced the number of conditions to three to represent each of the general luck-related factors (threat, disruption, and replacement) <sup>1</sup>. Threat refers to a factor that inhibits one's perception of a situation. Disruption refers to a factor that can remove one's attention. Replacement refers to the subject of the character's attention being replaced by another subject. During the course of this study, participants were required to read all three stories, but they were presented in different orders to reduce any effects that may have resulted from

the previous story <sup>2</sup>. This was done through an online survey <sup>1</sup>, which consisted of the three short stories, comprehension questions, and demographic questions.

The results of both studies found that participants assigned knowledge to the character at a significant rate depending on the situation the character was in. This allowed researchers to conclude that knowledge attributions do not take into account the luck of a threat that fails to prevent a person from finding the truth. However, they were able to conclude that knowledge attributions take into account the luck that is involved with an unnoticed disruption and a change in the explanation for why a belief is true <sup>2</sup>. Turri and colleagues (2014) also found that when the explanation changes for why a belief is true, knowledge attributions are susceptible to changes in the truth, meaning that one is more inclined to declare that knowledge was involved when the new truth is similar to the original truth <sup>2</sup>.

Replicating the Turri et al. (2014) study proved to be important in proving the reliability and validity of their findings. The replication was also useful for understanding how people make judgments about those around them. These judgments often play a key role in the manner in which people interact with one another and the extent to which they give credit or assign blame for a certain outcome. This study allowed for an increased understanding of the relationship between knowledge and luck-related factors, and how people make decisions about the relationship between luck and success. As described by

Loveday (2018), people often attribute success to luck and failure to ability<sup>3</sup>. Combining the findings from this study and the Loveday (2014) study could be used for future social psychology studies that seek to understand interpersonal relationships, jealousy, and the phenomenon of social desirability<sup>3</sup>.

### **Literature Review**

The Turri et al. (2014) study has been frequently cited and prior research examining judgements about these Gettier Type Cases or lucky guesses have been mixed in the past<sup>2</sup>. Some studies supported the theory of Gettier Type Cases, while others disproved it. Further, according to Blouw et al. (2014), Gettier Cases are often used in experiments, in which the protagonist has a Justified True Belief (JTB) that is not considered to be knowledge<sup>4</sup>. A JTB is an idea that is supported by related information that allows it to be seen as a valid belief, which was traditionally perceived as knowledge<sup>3</sup>. However, subsequent studies on Gettier Cases found that lay people were able to make a clear distinction between the two concepts. This alludes to how people make judgments about the presence of knowledge and luck when interacting with those around them. A conflicting study done by Starmans and Friedman (2012) found that people typically attribute knowledge when a belief is both justified and true, which is in line with the traditional perception of JTBs<sup>5</sup>. This is similar to the findings of Turri et al. (2014), in that when beliefs were perceived to be the same as the truth, knowledge was assigned<sup>2</sup>.

## **III. METHODS**

### **Participants:**

97 participants took part in this study, ranging from the ages of 18-33, with 40 being females and 39 being males after exclusions. All of the subjects resided in the United States, however, 26.9% were born abroad, such as in China, India, and Bulgaria. When asked their race/ethnicity, 34.2% of participants identified as White, 5.1% as Black, 20.3% as Latino/a, 0% as Australian Descent, 36.7% as Asian, 2.5% as Southeast Asian Descent, 1.3% as Native American, 0% as Hawaiian Descent/Pacific Island, and 6.3% as Other. In order to demonstrate how college students view the interaction between knowledge and luck, only those over the age of 18 were recruited to participate in the study. Thus, participants under the age of 18 were excluded from the data. Furthermore, to ensure that all of the results are representative of the data, responses that were due to a computer malfunction were omitted. Responses that were incoherent or alluded to a prior understanding of the

study's purpose were also omitted to ensure that there were no outliers in the data.

### **Procedure:**

Before participants were run and data was collected, the study was registered on the Open Science Framework (OSF) (<https://osf.io/zje64/>) in order to make available all of the resources, data, etc. that were used. Subjects from the Illinois Institute of Technology were recruited in person via a booth in the McCormick Tribune Campus Center and online through SONA, a subject pool software. Participants who completed the study in person were given candy as an incentive and compensation for their time, while those who took part through SONA were awarded 0.5 SONA credits that could be used as credit for their psychology classes.

We followed the same procedure as the Turri et al. (2014) study<sup>2</sup>. Participants were exposed to three different conditions: Knowledge, Gettier, and Ignorance. Within each condition, different scenarios were presented involving a character (Emma, Darrel, or Gerald) making a decision. These conditions were presented in a random order to have a within-subject design. In the Knowledge condition, the character was required to make a decision that could be attributed to their knowledge. In the Gettier condition, the character's decision could be attributed to a lucky guess, and in the Ignorance condition, the character's decision was incorrect due to a lack of knowledge and luck. The nature of these conditions was not made clear to the participants in order to prevent biased decisions about the characters' knowledge and the role of luck in their decisions. Character names and the scenarios (e.g., identifying between a fake diamond and a real diamond in a jewelry store) were randomly presented across all three conditions.

This study was conducted via an online survey. Upon opening the link to access the study, the consent form was presented to thoroughly inform subjects about the study. The next page began with the first of three scenarios that the participants saw. Following each scenario, participants were prompted to answer a few short questions about their perceptions of how knowledgeable the participant was in that scenario, and how reasonable the conclusions they drew were. These questions will be explained in the Measures section.

The last few pages of the study prompted subjects to answer demographic questions (age, gender, country of residence, country of birth, race/ethnicity, number of years in school, and proficiency in English). Participants were also asked if their participation qualified them for the

lottery and if they were being compensated. In the case of this study, participants were asked to include that they were compensated with SONA credit and/or candy.

**Measures:**

After each scenario, participants were asked questions about the character to test their comprehension of the story. These questions asked the reader to attribute the character’s answer to ability/inability or good luck/bad luck, as well as if the character’s conclusion was reasonable or unreasonable among others that assessed whether or not they attributed the character’s understanding of their circumstances to knowledge or luck. The comprehension questions that were used were the same as those used by Nagel et al. (2013), and two answer choices were presented in a multiple-choice format as well as a sliding scale<sup>6</sup>. Answer options for the multiple-choice questions varied depending on the question. For the sliding scale, subjects were asked to slide the bar in the direction of their answer. Answer options were dependent on the question. For example, for the question asking if the character’s answer was due to knowledge or luck, subjects slid the bar in the direction of ability/inability or good luck/bad luck.

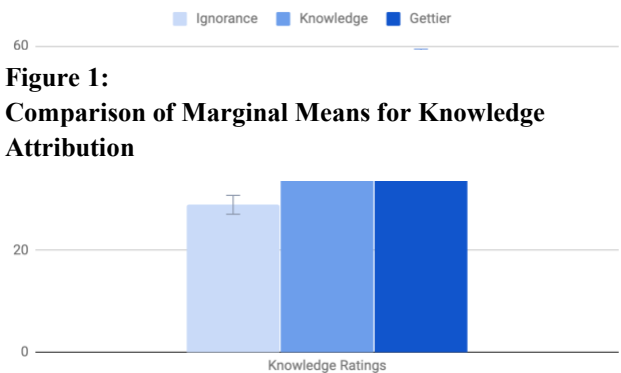
The feedback questions at the end of the study were the same as those used by AMPPS (2015)<sup>1</sup>. These questions asked participants about their experiences and thoughts while taking the survey. Answer options were on a scale similar to a Likert scale with nine points in which participants had to select the answer that they agreed with most. For example, when asked how much they enjoyed the study, answer choices ranged from “I enjoyed the study a lot” to “I did not enjoy the study at all”. At the end of this section, subjects were provided with spaces to leave comments, indicate what they thought the aim of the study was, etc. Answers to these questions were used to assess a person’s understanding of the study, and whether or not they had prior knowledge that may have impacted their responses.

**IV: RESULTS**

Descriptive analyses of the data found that participants ranged from 18 years old to 33 years old ( $M = 20.3, SD = 2.39$ ). 40 subjects identified themselves as female and 39 as male. Lastly, 34.2% of the subjects were White, 5.1% were Black, 20.3% were Latino/a, 36.7% were Asian, 2.5% were of Southeast Asian Descent, 1.3% were Native American, and 6.3% were of another race. None of the subjects identified as being of Hawaiian Descent/Pacific Island or Australian Descent.

A repeated-measures ANOVA was performed in order to evaluate participants’ ratings for knowledge in terms of the three conditions. The ANOVA showed a significant difference in ratings across the scenarios  $F(2, 158) = 8.30, p < 0.001, \eta_p^2 = 0.095$ . A Tukey’s Post Hoc Test evaluated the differences in subjects’ ratings of the characters knowledge across the conditions. The comparison found that there were significant ( $p < 0.001$ ) differences between the Ignorance ( $M = 28.9, SD = 38.1$ ) and Gettier ( $M = 55.8, SD = 40.2$ ) conditions. Subjects tended to assign a lower knowledge rating for the Ignorance condition and a higher rating for the Gettier condition (See Figure 1). The comparison also showed that there were no significant differences ( $p$ ’s  $> 0.05$ ) in knowledge ratings between the Ignorance and Knowledge conditions, as well as between the Knowledge and Gettier conditions.

Another repeated-measures ANOVA was created to examine subjects’ ratings for reasonableness across the three scenarios. The ANOVA depicted a significant difference in ratings for reasonableness across all of the conditions  $F(2, 158) = 3.45, p < 0.05, \eta_p^2 = 0.042$ . A Tukey’s Post Hoc Test was run to examine the differences in how subjects rated the reasonableness of the character’s conclusion between the conditions. It was found that there



**Figure 1:**  
**Comparison of Marginal Means for Knowledge Attribution**

were no significant differences ( $p$ ’s  $> 0.05$ ) in ratings for reasonableness between the Ignorance and Knowledge conditions, as well as between the Ignorance and Gettier conditions. This means that ratings for reasonableness for

*Note.* Based on the results of the ANOVA, it was found that there were significant differences in knowledge attribution between the Ignorance and Gettier conditions.

the Ignorance condition were similar to those of the Knowledge ( $M = 88.1, SD = 19.7$ ) and Gettier ( $M = 78.6, SD = 30.4$ ) conditions. However, the Post Hoc Test

indicated that there was a significant difference ( $p < 0.05$ ) in the reasonableness ratings between the Knowledge and Gettier conditions. Subjects' ratings for reasonableness in the Knowledge condition were higher than those in the Gettier condition (See Figure 2).

Moreover, a repeated-measures ANOVA was run to compare knowledge ratings based on the gender of the character. The ANOVA found that there was a significant difference in how the characters were rated for knowledge,

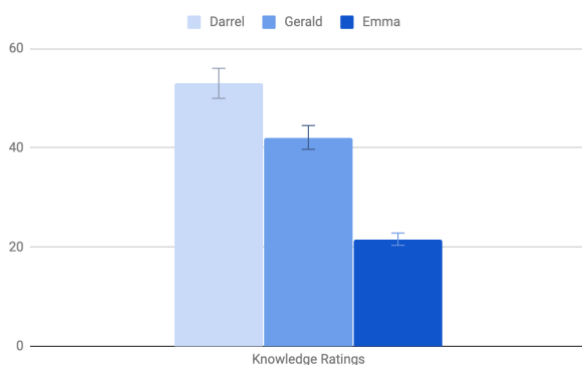
**Figure 2:**  
**Comparison of Marginal Means for Attribution of Reasonableness**



*Note.* The results of the ANOVA showed that there were significant differences in ratings for reasonableness between the Knowledge and Gettier conditions.

$F(2, 158) = 15.4, p < 0.001, \eta_p^2 = 0.163$ . A Tuckey's Post Hoc Test indicated that there were significant differences

**Figure 3:**  
**Comparison of Marginal Means for Knowledge Attribution Based on Character**



*Note.* The ANOVA sought to understand how participants assigned knowledge to the different characters. As seen in the graph, Emma was often rated as having less knowledge than Darrel and Gerald.

( $p$ 's  $< 0.001$ ) in how participants rated the characters' knowledge between Darrel ( $M = 53.0, SD = 42.7$ ) and Emma ( $M = 21.6, SD = 29.5$ ), as well as between Gerald ( $M = 42.1, SD = 40.5$ ) and Emma. As seen in Figure 5, subjects often rated Emma as having less knowledge than Gerald and Darrel.

Turri et. al (2014) found that gender did not influence how participants attributed knowledge and reasonableness to the characters, however, the t-tests demonstrated that this was not the case for the replication. Furthermore, the first ANOVA proved Turri and colleague's (2014) findings that knowledge attribution was not significantly different between the Knowledge and Gettier conditions, but that ratings did, in fact, differ between the Ignorance and Gettier conditions.

## V. DISCUSSION

It was found that, in general, participants often provided higher knowledge ratings in the Gettier condition as opposed to the Knowledge and Ignorance conditions. This difference was especially apparent between the Ignorance and Gettier condition, which may hint at the influence of luck. Subjects may have rated characters as having greater knowledge if the threat or disturbance in the story closely resembled the truth. Interestingly, participants tended to rate reasonableness in the Gettier condition lower than in the other two conditions. This contrasting finding (i.e. the higher ratings in knowledge and lower ratings in reasonableness) for the Gettier condition may be due to a number of other variables, such as a lack of understanding of the question or the wording used in the stories as ratings for reasonableness were highest in the Knowledge condition.

An additional test was run on the gender of the characters to see if gender biases and stereotypes were involved in knowledge attribution. The ANOVA comparing knowledge ratings based on the gender of the characters found that there was a significant difference in how Emma was rated compared to the two male characters, Darrel and Gerald. Emma was often rated as having less knowledge than the other characters. This may be due to possible gender biases relating to the knowledge and competence of men versus women, as seen in Fennema et al. (1990) and Dow (2009) <sup>7,8</sup>.

In the original study, Turri et al. (2014) ran tests comparing the impact when the threat or disruption was successful (i.e. resembled the truth) to when the threat failed (i.e. failed to distract the character). The replication

did not call for these specific tests to be run, however, similar results were found. Turri et al. (2014) found that when the threat resembled the truth, knowledge ratings were high in the Gettier condition, which was the same finding for the replication.

The final sample size for this study was relatively small ( $N = 79$ ), which poses a limitation for the results of this study, as a smaller sample size reduces the generalizability of results. Had there been more time to advertise the study and recruit participants, the sample size may have been larger and different results may have been found. Furthermore, the sample primarily consisted of college students who generally had the same level of education and proficiency in English which would have impacted their comprehension of the stories and their respective questions. If the sample had included people of different education levels and language proficiency, understanding of the scenarios would have varied and responses would have been more distributed, leading to different findings in terms of knowledge ratings. These findings could have been more suggestive of the influence of luck on knowledge and how we make judgments about those around us. Furthermore, while many studies have shown that gender biases can play a role in knowledge attribution as well as other areas, it cannot be said certainly that this is the reason why Emma received lower knowledge ratings than Darrel and Gerald. The wording of the stories may have resulted in the difference as well. If the names of the characters had been omitted or the wording was the same for all of the stories, it may have been easier to point out the reason behind the different ratings since gender of the characters and differences in the wording of the stories would have been controlled for.

Future research could include running the replication with a more diverse sample in terms of the level of education. As previously mentioned, this could lead to more varying ratings of knowledge and may indicate the influence of luck on knowledge. A study using the same stories without the names of the characters would allow for a closer analysis of how gender impacted knowledge ratings. While this would not lend much to the question about the relationship between knowledge and luck, it would provide useful information on how gender plays a role when making judgments about those around us. This would also help in developing methods to address gender biases and stereotypes and create a broader understanding between people to prevent these factors from playing a role in employment, voting, gender gaps<sup>9</sup>, etc.

The results of this study prove that the findings from the Turri et al. (2014) study are reliable and that they can be reproduced. They also show that luck has an effect on knowledge and how we perceive the level of knowledge of others. The findings from the ANOVA on knowledge ratings based on the character lend support to previous studies that have found that women are rated differently in terms of knowledge and competence. These results raise new questions that can be implemented in future gender studies. Moreover, knowing how people make judgments about the knowledge of others could aid teachers and administrators in creating different types of testing environments, such as individual stations, so that students do not feel pressured to perform in a particular manner by the presence of others who may be perceived to have greater knowledge. Using written comprehension tests would help divide students based on reading level rather than how they respond to verbal questions, thus allowing those who need extra help and attention to obtain the resources they need.

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