

Cross-Cultural Universality of Knowledge Attributions

Minsun Kim and Yuan Yuan

1. Introduction

Since Weinberg, Nichols and Stich (2001) reported finding of significant cross-cultural differences in epistemic intuitions (Weinberg et al., 2001), the field of epistemology has been haunted by the idea that epistemic intuitions are arbitrary. Epistemologists have been heavily relying on the assumption that epistemic intuitions constitute a helpful starting point for their theories; if those intuitions are contingent on people's cultural background (among other arbitrary factors), an epistemological theory informed by Westerners' intuitions would have the same nature as an anthropological report of Western table manners.

The central task of our paper is to provide substantive evidence that *pace* Weinberg et al., 2001 (henceforth abbreviated as WNS), epistemic intuitions¹ are strikingly universal across different cultures. Part I recounts WNS's findings and conclusion, as well as the theoretical and empirical responses it has since initiated. What emerges from this review is a discrepancy between what has been found by the total body of *empirical* studies to date and *theoretical* responses to WNS' initial finding. On the theoretical front, philosophers are hotly debating the philosophical implications of cross-cultural variations of epistemic intuitions as shown in WNS's empirical studies. On the experimental front, however, the total body of evidence strongly suggests that WNS' empirical findings of cross-cultural variations should be disregarded due to failure of replication. In fact, other studies now provide positive evidence in support of cross-cultural universality.

Part II presents the series of studies we implemented in non-Western cultures: Mainland China, South Korea, and Taiwan. We purposefully selected three recent and surprising (at least some of them) experimental studies about patterns of knowledge attribution conducted on people from Western cultures and carried out basically the same studies among participants in those cultural groups in their native tongue. The thought was that, if the same patterns emerge in these communities, then epistemic intuitions would be cross-culturally universal to a surprising extent.. That's exactly what our studies found. For

¹ Broadly speaking, epistemic intuitions include intuitions about knowledge attribution, epistemic justification and so forth. As the focus of this paper (as well in WNS) is on intuitions of knowledge attribution, for the sake of simplicity, we often employ the phrase "epistemic intuition" interchangeably with a more precise phrase "intuitions of knowledge attribution."

all of our three studies, the patterns of knowledge attribution among our Mandarin-speaking and Korean-speaking participants were entirely consistent with the patterns originally found among English speakers.

In Part III, we posit *the universality hypothesis* – i.e., that people’s epistemic intuitions are cross-culturally universal to a surprisingly robust level – based on recent empirical studies including ours. We further employ the hypothesis to advocate for a pivot in epistemological discourse, i.e., a pivot away from the discourse regarding cross-cultural *differences* and towards a discourse regarding the surprising level of cross-cultural *universality*. In order to illustrate the significance and potential fruitfulness of such inquires, the last portion of our paper begins grappling with a couple of important questions in light of the universality hypothesis: specifically, (1) what account might explain the universality; (2) whether such universality helps resolve the perennial debate over what role (if any) epistemic intuitions should play in epistemology. We first examine two potential explanations for the universality hypothesis, i.e., nativism and pragmatism. Instead of adjudicating between them (as we argue that the current body of empirical evidence does not yet warrant such an adjudication) we demonstrate how the answer for question (2) actually depends on the correct answer for question (1). In this section we purposefully intend not to present a conclusive stance on either topic, but to present an intriguing preview of the proposed pivot to the universality-based discourse.

1.1 Previous Work: Evidence *for* Cross-Cultural Differences in Epistemic Intuitions

The firestorm of debate over cross-cultural differences in people’s epistemic intuitions began with the findings of WNS. The authors selected a series of influential cases in epistemology (e.g., TrueTemp cases, Gettier cases, and the case of a cleverly disguised mule) and tested them among participants at Rutgers University who differed either in terms of cultural or socioeconomic background. In those tests, they asked the participants to judge whether the protagonist in those cases had knowledge or not. They reported statistically significant differences in knowledge attribution patterns between contrasting demographic groups for a significant portion of those tests.

Though WNS examined cultural and socioeconomic divergences of people’s epistemic intuitions, the former received more attention from the philosophical community. The most striking cross-cultural difference reported there was that, in responding to a variant of the Gettier cases, the majority of participants self-reported as East Asian was found to display the opposite pattern of knowledge attribution in comparison with the majority of participants

self-reported as Westerners. While Westerners gave the standard answer in the philosophical literature, viz., the agent only believes but does not know, East Asians, in contrast, attributed knowledge to the agent!

Given the symbolic status of Gettier cases as a showcase of intuitions' evidential role in epistemology, such a cultural divergence was deeply concerning. WNS used the results to launch the following argument: since intuitions were shown to be contingent on arbitrary factors such as ethnicity, they should not be trusted as evidence bearing on the nature of knowledge, and to do otherwise is to show a symptom of ethnocentrism.

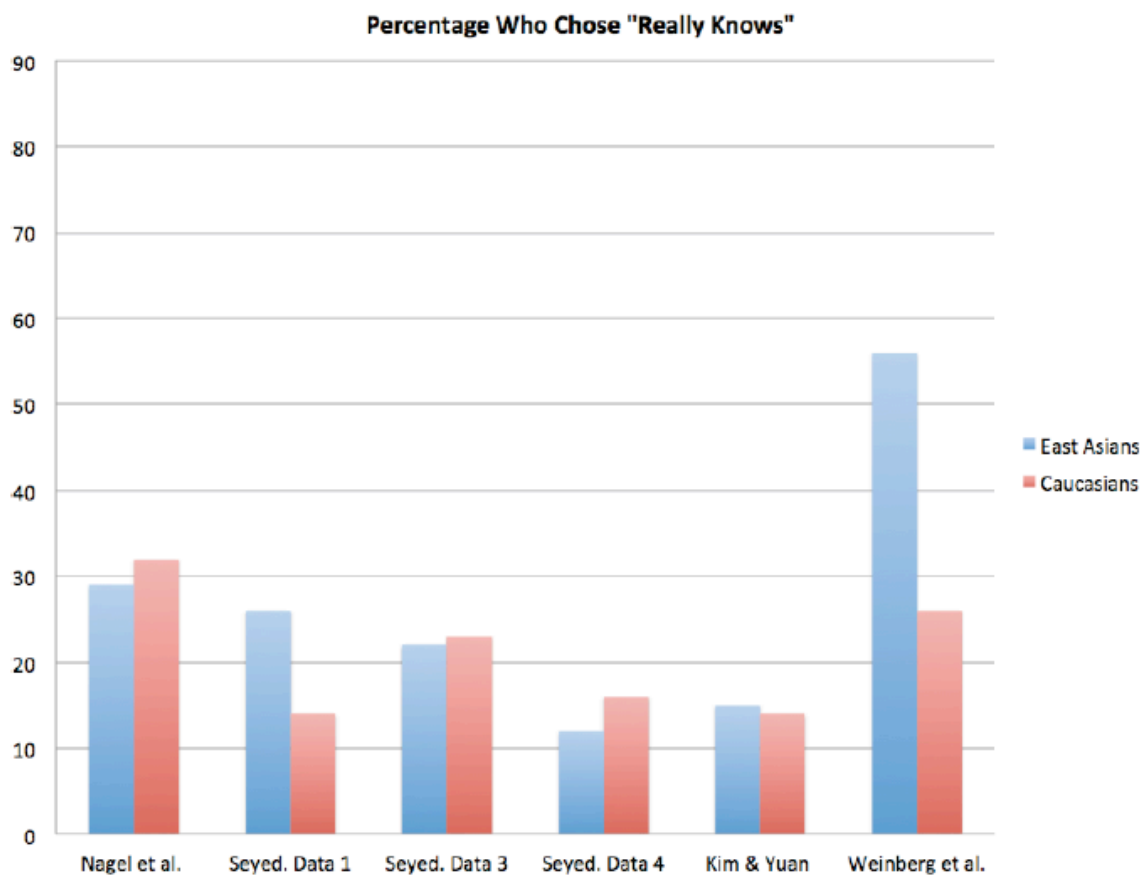
Unsurprisingly, WNS's paper triggered fierce, divided responses in the philosophical community from both sympathizers and skeptics. Skeptics, especially, were keen to respond. On the theoretical front, several lines of objections were formed, each with their own reasons for doubt. One group of skeptics disputed the effectiveness of WNS's research methodology. Kauppinen (2007) argues that intuitions gathered in surveys among lay people are not the same sort of reflective intuitions that philosophers are able to tap into as a result of their training and reflection. Sosa (2009) argued that WNS's results could plausibly be attributed to Eastern Asians and Westerners taking away different linguistic interpretations of the same case.

Other philosophers challenged WNS's argument on theoretical grounds. Notably, Nagel (2012, 2013) appeals to a universal and arguably innate human capacity for "theory of mind" – roughly the capacity to read other people's mental states – and argues that, because the concept of knowledge and the capacity for knowledge attribution is a basic element of people's theory of mind, we should expect epistemic intuitions to converge among various cultural groups. Similarly, Hannon (2015) posits that concepts are evolved to serve particular communicative needs of a linguistic community. He contends that we should therefore expect a concept as fundamental as "knowledge" to serve some basic, crucial needs shared by all cultures whose respective languages each feature a word largely equivalent to the English word, "knowledge."² Other philosophers reject WNS's argument in a more radical manner. Cappelen (2014), for example, argues that WNS "has been engaged in an attack on a strawman," because "philosophers don't rely on intuitions" in the first place (Cappelen 2014: 269). This tumult over WNS's findings and argument has yielded an impressive 588 citations (as reported by Google Scholar on June 2016).

² We see Nagel and Hannon as respectively pioneering nativist and pragmatic explanations for the robust universality of epistemic intuitions, which we will discuss in more detail in Part 3.

1.2 Previous Work: Evidence *against* Cross-Cultural Differences in Epistemic Intuitions

As debates on the theoretical front rage on, evidence for the dismissal of cross-cultural differences alleged by WNS has been quietly piling up on the experimental front. Three independent replication studies (Nagel 2013, Kim & Yuan 2015; Seyedsayamdost 2015) failed to find the alleged demographic effects; in their studies of the Gettier case, the overwhelming majority of *both* East Asians *and* Westerners denied knowledge in the Gettier vignette tested.



Percentage of participants in WNS and replication studies who chose "Bob really knows"

As displayed in the graph above, the total body of empirical evidence to date on the Gettier case employed by WNS indicates that the purported demographic effect does not exist in any sample other than the WNS's original sample of 23 East Asians (Kim and Yuan 2015: 358).³ Other cross-cultural effects reported by WNS do not fare better than the Gettier

³ Our 2015 study employed the same case as WNS: "Bob has a friend, Jill, who has driven a Buick for many years. Bob therefore thinks that Jill drives an American car. He is not aware, however, that her Buick has recently been stolen, and he is also not aware that Jill has replaced it with a Pontiac, which is a different kind of American car." The question asked after the case is, "Does Bob really know that Jill drives an American car, or does he only believe it?"

vignette in replication attempts (Seyedsayamdost 2015).

In summary, evidence acquired so far does not support the existence of striking cross-cultural differences in people's epistemic intuitions. On the contrary, recent empirical findings start to offer positive support for cross-cultural universality. Machery et al. (2015) found that participants from four cultures (Brazil, India, Japan and USA), responding to cases in their native language, all share the *Gettier intuition* (i.e., the intuition that there are cases of justified true beliefs that are not judged to be cases of knowledge⁴).⁵

In light of this body of evidence against the existence of the cross-cultural differences reported by WNS, as well as promising data from Machery et al., there is strong reason to think that epistemic intuitions are more universal than previously believed. However, since Machery et al.'s study was limited to the Gettier intuition, we believe further work is called for to substantiate the general hypothesis that epistemic intuitions are highly universal.

1.3 The Goal of the Present Studies

The goal of our study is to respond directly to this call for further evidence. To start with, we wanted to depart from well-known effects such as the Gettier intuition. Furthermore, in designing our study, we purposely selected recently discovered and sometimes surprising patterns of epistemic intuitions. Our rationale was that if even these quirky effects are found to be commonly held across cultures, there is a substantive evidence for a high level of cross-cultural universality in epistemic intuitions. This is exactly what our studies found.

2. Studies

We selected three effects concerning the patterns of knowledge attribution, all of which were relatively recent findings from experimental philosophy. The three effects are: (1) the perceptual vs probabilistic evidence effect, namely that *ceteris paribus* people are less willing to ascribe knowledge for true beliefs based on probabilistic evidence than for true beliefs based on perceptual evidence (Friedman and Turri 2014); (2) the Gettierized authentic evidence vs. apparent evidence effect (GAAEE), namely that *ceteris paribus* people are less

⁴ Throughout the paper, we talk about "Gettier intuition" in this sense, i.e., there are cases of justified beliefs that don't judge to be knowledge. So understood, that people share Gettier intuition doesn't rule out that sometimes they might judge beliefs to be knowledge in certain Gettierized cases, neither does it rule out the possibility that different cultural groups might respond to different Gettierized cases differently.

⁵ There was some difference found between Machery et al.'s Bengali speaking Indian participants and the rest of the participants. The authors resorted to the linguistic phenomena surrounding two Bengali words both of which bear certain similarity to the English word "know," and made a compelling case that the Bengali speaking Indian participants also shared the basic Gettier intuition that some justified beliefs do not qualified as knowledge. Cf. Machery et al. 2015, especially p. 8.

willing to ascribe knowledge for true beliefs based on apparent evidence than for true beliefs based on authentic evidence even in Gettierized scenarios (Starmans and Friedman 2012); and (3) the Gettierized Epistemic Side Effect effect (GESEE), namely that *ceteris paribus* people are more willing to attribute knowledge to a protagonist when she engages in harmful activities than when she engages in beneficent activities even in Gettierized scenarios (Buckwalter 2014). Our studies were created by translating the vignettes and questions in those original studies into both Korean and Mandarin, and were then carried out among our Korean, Taiwanese and Chinese participants.⁶

2.1 Probabilistic vs. Perceptual Evidence Effect

Philosophers have long discussed questions about the epistemic status of beliefs based on *probabilistic* evidence in contrast with beliefs based on other sorts of evidence (perceptual evidence as a paradigmatic example⁷). Many hold that the belief that a lottery ticket will be a loser is not an instance of knowledge, despite the overwhelmingly low probability of winning the lottery.⁸ This denial of knowledge seems to signal an extremely high standard of knowledge attribution in respect to credence (cf. Hawthorne 2004). However, when confronted with beliefs based on *perceptual* evidence (e.g., the striped animal I see in front of me is a zebra), philosophers do not seem to harbor a similarly high epistemic standard. Even if it is made salient that the striped animal could be a cleverly painted mule, people are generally more willing to attribute knowledge to the belief that the creature is a zebra. This suggests that knowledge apparently requires something more than high credence, though it is up for debate what probability-based beliefs lack so as to render them falling short of knowledge even if they have extremely high credence; or putting it the opposite way, what special characteristic perception-based beliefs have that qualify them as knowledge even when they have comparatively low credence.

While philosophers are trying to develop a systematic answer to such questions (Dretske 1981; Lewis 1996; Neta 2011), Friedman and Turri (2014) confirmed that the lay

⁶ As we were translating, we made small variations about the wordings of the vignettes and subsequent questions here and there, sometimes with the intention to avoid possible ambiguity while other times with the intention to make the wordings more attuned to those cultures. We don't think that those changes affected the core epistemic distinctions that those vignettes were designed to capture. And the translated vignettes and questions can be found in the appendix.

⁷ The contrast also holds between probabilistic evidence and evidence based on testimony, deduction and so forth, but in this paper we will focus on the contrast between probabilistic evidence and perceptual evidence, mainly because perceptual evidence is often the ultimate basis for other sources of evidence such as testimony, but also for reasons of convenience, as the original paper of Friedman and Turri's, based on which we modeled our study, framed the contrast with a focus on probabilistic and perceptual evidence.

⁸ For a contrary, minority stand on the issue, see Turri 2011.

concept of knowledge embodies this feature, i.e., it tracks something more than high credence, and is sensitive to the distinction between probabilistic and perceptual evidence. Their participants were found to be more willing to attribute knowledge to beliefs based on perceptual evidence (78% and 73% did so in the zoo and farm cases respectively) than on probabilistic evidence (11% did so in the lotto case). The cases are as follows:

Lotto Case

Abigail is out shopping with her son. In a store, they see a man with a super lotto ticket. Abigail's son says, "I bet that ticket's not a loser. It might win the jackpot!" Abigail answers, "It is a losing ticket." And Abigail is exactly right: The ticket is a loser.

Question: Does Abigail know or only believe that the ticket is a loser?

Zoo and Farm Cases (Differences between the two stories are bracketed)

Abigail is [visiting the zoo/driving past a farm] with her son. In a [pen/field], they see a black-and-white striped animal. Abigail's son says, "I bet that's not a real zebra. It might be a painted mule!" Abigail answers, "It is a real zebra." And Abigail is exactly right: The animal is a zebra.

Question: Does Abigail know or only believe that the animal is a zebra?

The aim of our first study is to examine whether this observed phenomenon, i.e., perceptual vs probabilistic evidence effect, is cross-culturally universal. We used the authors' original vignettes: lotto, zoo and farm. And after translating them into Korean and Chinese, we administrated the same study as Friedman and Turri to our Korean and Chinese populations.

Korean Study

Of the 241 Korean participants recruited through the popular Korean social media and communications platform "Kakaotalk." Participants were randomly assigned to one of the three cases, and answered the following questions (response options are bracketed).

1. The animal/ticket is a _____. [zebra/mule]/[loser/winner]
2. Abigail and her son were _____. [visiting the zoo/driving past a farm/out shopping]
3. Abigail _____ that the animal/ticket is a zebra/loser. [knows/only believes]
4. How confident are you in the answer you just gave? [1(not at all confident) to 10 (completely confident)]

5. What did Abigail and her son see? [A black-and-white striped animal/A man with a super lotto ticket]

6. Abigail is _____ in thinking that the animal/ticket is a zebra/loser [justified/unjustified]

7. How confident are you in the answer you just gave? [1: not at all confident – 10: completely confident]

8. Was there at least some chance, no matter how small, that the animal/ticket was a mule/winner?

Questions 1, 2 and 5 are check questions designed to exclude participants who failed to properly comprehend the text. Analyses were conducted on the 210 participants who provided correct answers to all the check questions. Most important for our study are the questions concerning knowledge attribution and participants' self-reported confidence in their answers (questions 3 and 4, respectively). Following the method first developed by Starmans and Friedman (2012), we used the responses to questions 3 and 4 to calculate a "weighted knowledge ascription" for each participant by multiplying her knowledge attribution response (really knows = 1; only believes = -1) by the reported confidence in their response (1 to 7). Weighted knowledge ascriptions range from -7 (fully confident knowledge denial) to 7 (fully confident knowledge ascription). This computation is applied uniformly across all three of our studies.

The means of the weighted knowledge attribution scores in the three cases are displayed in Figure 1. As shown by the graph, the perceptual vs probabilistic evidence effect emerged among our Korean participants. A oneway ANOVA showed a significant effect of condition, $F(2, 207)=19.4, p<.001$. Tukey's tests showed that the weighted knowledge ascription in the Lotto case ($M=-4.3, SD=4.1$) was lower than that in the zoo case ($M=1.4, SD=5.9$), $p<.001$, and the Farm case ($M=-.09, SD=6.0$), $p<.001$. There was no significant difference between the zoo case and the farm case, $p=.24$.

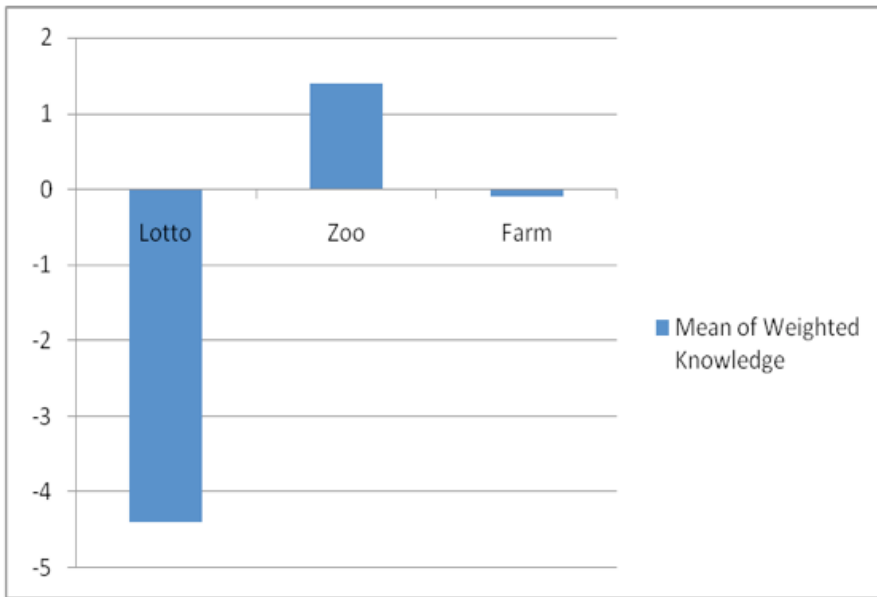


Figure 1: Mean of Korean participants' weighted knowledge ascriptions about perceptual vs probabilistic evidence effect

Taiwanese Study

Among our 84 Taiwanese participants, recruited on the popular social media and communications platform “Line,” 78 participants provided correct answers to all of the check questions. Analyses were conducted on these participants.

As shown in Figure 2, we found that the perceptual vs probabilistic evidence effect emerged in our Taiwanese population as well. A oneway ANOVA showed a significant effect of condition, $F(2, 75)= 13.1, p<.001$. Tukey’s tests showed that the weighted knowledge ascription in the Lotto case ($M= -4.65, SD=4.0$) was lower than that in the zoo case ($M=2.4, SD=5.9$), $p<.001$, and the farm case ($M=2.2, SD=5.7$), $p<.001$. There was no significant difference between the zoo case and the farm case, $p=.99$.

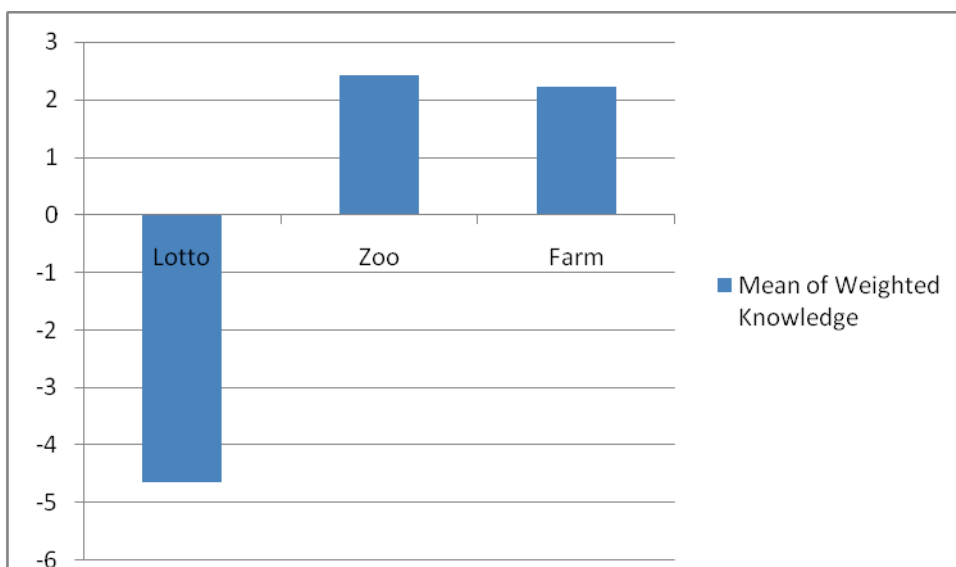


Figure 2: Mean of Taiwanese participants' weighted knowledge ascriptions about perceptual vs probabilistic evidence effect

Discussion

In summary, our studies found that the perceptual vs probabilistic evidence effect observed in Friedman and Turri's American population also emerged in Korean and Taiwanese populations. Namely, participants from all three populations were more likely to attribute knowledge to beliefs based on perceptual evidence than beliefs based on probabilistic evidence.

2.2 Gettierized Authentic vs. Apparent Evidence Effect (GAAEE)

Gettier (1963) came up with two original cases in which protagonists purportedly have justified true beliefs that fall short of knowledge. After the first two cases offered by Gettier himself, endless variations of "Gettier cases" have been put on the table. Though those cases differ from each other in subtle ways, what unifies them as Gettier cases seems to be the prominence of luck in the way the protagonists acquired true beliefs (Pritchard 2005; Unger 1968), or causal disconnectedness between their beliefs and the fact that makes the beliefs true (Goldman 1967). Philosophers almost all agree that protagonists in those Gettier cases, across the board, simply do not know – even though they have justified true beliefs.

However, Starmans and Friedman (2012) found that lay people did not agree with philosophers' general refusal to attribute knowledge in Gettier cases. According to their studies, the idea of justified true belief captures the lay concept of knowledge fairly accurately, as lay people are willing to attribute knowledge in various Gettier cases, except crucially when the Gettiering of the cases involves a protagonist forming a true belief based on apparent evidence instead of authentic evidence. They employed the following pair of cases to illustrate the contrast between apparent and authentic evidence.

Authentic evidence

Julie buys a container of yogurt at the local deli. Although, Julie is not aware of it, the yogurt in the container is exceptionally sweet—a mixup at the factory caused the yogurt to get a triple dose of sweetener. Julie comes home, puts it her fridge, and then goes into her bedroom. Julie's neighbor Sam has been spying on her. While she is in

her bedroom, he picks the lock to her apartment, and enters. He takes the yogurt container from the fridge, and replaces it with a sealed container of yogurt from his own fridge. Then he goes back into his own apartment with Julie's yogurt container. Julie has only been in the bedroom for a few minutes, and did not hear anything.

Apparent evidence

Julie buys a container of yogurt at the local deli. Although, Julie is not aware of it, there is no yogurt in the container—a mixup at the factory caused the container to be filled with sour cream instead. Julie comes home, puts it her fridge, and then goes into her bedroom. Julie's neighbor Sam has been spying on her. While she is in her bedroom, he picks the lock to her apartment, and enters. He takes the yogurt container from the fridge, and replaces it with a sealed container of yogurt from his own fridge. Then he goes back into his own apartment with Julie's yogurt container. Julie has only been in the bedroom for a few minutes, and did not hear anything.

In the first condition above, Julie's evidence, the yogurt container, is actually informative about the content of the container and so is authentic evidence. In the second condition, however, her evidence only appears to be informative about the content of the container but is actually misleading; only due to the Gettierized nature of the case does it coincidentally lead to a true belief.

After presenting the two cases, Starmans and Friedman asked their participants "Does Julie know or only believe that there is a container of yogurt in her fridge?" They found (through testing on this pair of yogurt cases and another pair of coin cases, see the appendix) that though both cases are Gettierized, people only refuse to attribute knowledge in the cases involving apparent evidence ($M=-3.35$)⁹, and they readily attribute knowledge in the cases involving authentic evidence disregarding the Gettierized nature of those scenarios ($M=3.70$). The aim of our second study was to see whether the effect reported by Starmans and Friedman also exists in different cultures.

We translated two pairs of cases designed by Starmans and Friedman (yogurt and coin) into Korean and Mandarin, each pair of cases having an authentic evidence variant and an apparent evidence variant. The same questions were asked to participants in the authentic

⁹ M refers to the means of weighted knowledge ascriptions calculated in the same way as ours except that they used a scale of confidence level spreading from 1 to 10, instead of 1 to 7. See Starmans and Friedman 2012: 275.

evidence conditions as in the apparent evidence conditions. We tested the cases with participants in South Korea and mainland China. The vignettes underwent minor changes before being administered to our participants (e.g., sour cream was replaced with milk in the Korean vignette, as sour cream is not a popularly recognized product in Korea). Again changes are documented in the Appendix.

Korean Study

Of the 323 Korean participants recruited on Kakaotalk. Each was assigned to one of the four cases with questions corresponding to the case. For example, if a person got a yogurt case, she would be asked to answer:

1. Is there a yogurt in Julie's fridge? (Yes/No)
2. Julie ___ that there is a container of yogurt in her fridge. [Really knows/Only believes]

Analyses were conducted on the 263 participants who provided correct answers to the check question, i.e., question 1. As Figure 3 shows, Korean participants were more likely to attribute knowledge in authentic evidence conditions over apparent evidence conditions. Using a 2 (vignette: yogurt vs. coin) x 2 (authenticity: authentic vs. apparent) ANOVA to analyze the data, we found that there was a significant main effect of authenticity, $F(1, 259)=15.9, p<.001$, with participants more willingly attributing knowledge in the authentic evidence condition ($M=-.26, SD=6.08$) than in the apparent evidence condition ($M=-3.08, SD=4.97$). There was also a main effect of vignette, $F(1, 259)=10.63, p=.001$. There was no significant interaction, $F(1, 259)=2.72, p=.10$.

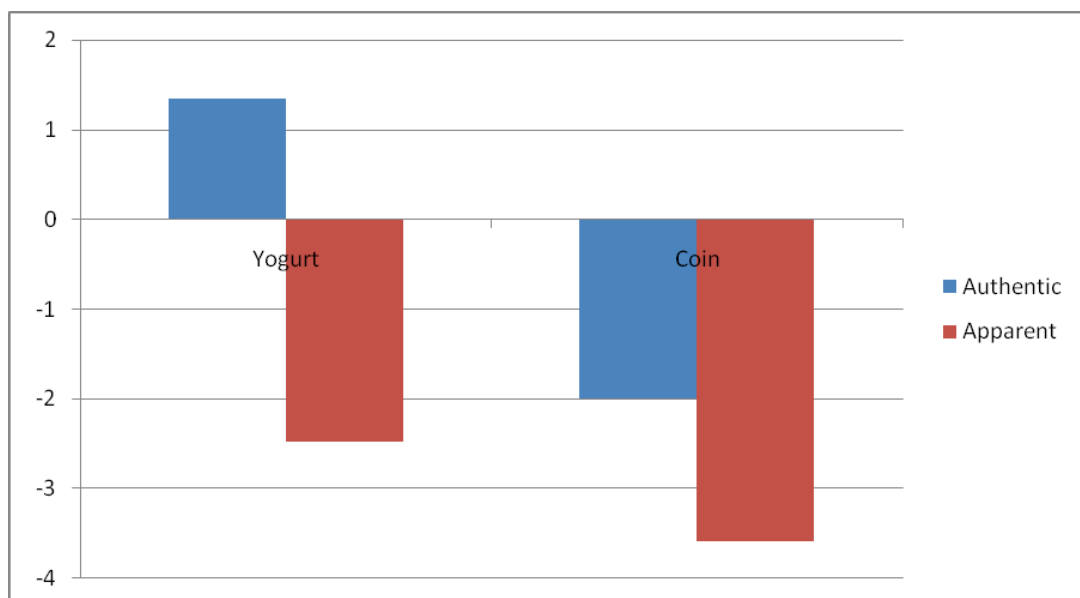


Figure 3: Mean of Korean participants' weighted knowledge ascriptions about GAAEE

Chinese Study

Of our 349 Chinese participants recruited on the popular Chinese social media and communications platforms, Wechat and Weibo, 327 provided correct answers to the check question. The analyses were conducted on these 327 participants.

As displayed in Figure 4, Chinese participants were also more likely to attribute knowledge in authentic evidence conditions over apparent evidence conditions. The data were analyzed using a 2 (vignette: yogurt vs. coin) x 2 (authenticity: authentic vs. apparent) ANOVA and a significant main effect of authenticity was found, $F(1, 323)=10.5, p=.001$, with participants more willingly attributing knowledge in the authentic evidence condition ($M=-.38, SD=6.29$) than in the apparent evidence condition ($M=-2.55, SD=5.84$). There was no main effect of vignette, $F(1, 323)=.43, p=.51$ and no significant interaction, $F(1, 323)=57.9, p=.21$.

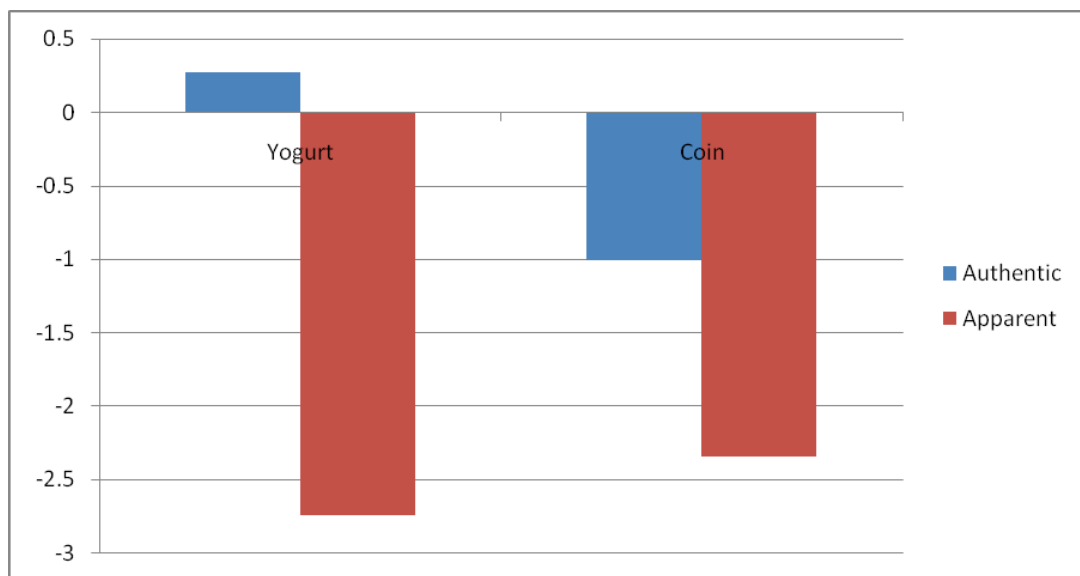


Figure 4: Mean of Chinese participants' weighted knowledge ascriptions about GAAEE

Discussion

Just like Starmans and Friedman's (2012) American population, our participants in China and Korea were sensitive to the distinction between apparent and authentic evidence, and more likely to consider a belief based on authentic evidence to be knowledge than a belief based on apparent evidence even in Getterized scenarios. However, an important difference between our results and Starmans and Friedman's was that in our study, the effect did not overturn the so-called Gettier intuition. Though participants were more likely to

attribute knowledge in the authentic condition, they still denied knowledge in these conditions, presumably because of their Gettierized nature.

Crucially, this difference is unlikely to be a cross-cultural difference, since we found this result also in an American population which we independently recruited through Amazon mechanical turk (N=154). This may pose a challenge for Starman and Friedman's central claim, namely, that believing based on apparent evidence, rather than Gettierizing in general (i.e., believing by luck or without the right sort of casual connection), is responsible for the denial of knowledge. However, as the objective of our study is to establish the cross-cultural universality of the patterns of knowledge attribution, we will not address this topic here. As the yogurt and coin cases demonstrate, the Gettier intuition (consistent with Turri 2013 and Machery et al. 2015), but also the GAAEE emerged in the populations examined from wide-ranging cultures.

2.3 Gettierized Epistemic Side-Effect Effect (GESEE)

Knowledge is concerned with evidence, justification, reliability, the soundness of deductive and inductive reasoning, and so forth – in other words, whatever faithfully leads to truth at least in general. Many philosophers think of knowledge exclusively as a hallmark of truth that must be acquired in the right ways. Recently, however, an increasing number of philosophers have started to look beyond factors that link knowledge to truth. They observe that besides the tight conceptual link between knowledge and truth, knowledge is also tightly linked to action, skill, norms of communication and so forth (cf. e.g., Fantl and McGrath 2010; Stanley 2005) This sheds light on an array of factors that have long been ignored in epistemology but that also apply to the lay concept of knowledge e.g., practical stakes (Sripada and Stanley 2012) and the conversational context in which the knowledge attribution is made (DeRose 2011; Schaffer & Knobe 2010).

Beebe and Buckwalter (2010) introduced yet another layer of complexity when they first reported empirical evidence that our concept of knowledge is also responsive to moral valence. Buckwalter (2013) further observed that moral valence would affect ordinary folk knowledge attribution even in Gettierized cases. The following is a pair of cases (with harm/benefit variants – the manipulated words in either variant are in the brackets) tested in Buckwalter's 2013 study:

Sam's job is to pump water into the cistern, which then supplies the water to the farms owned by several families in the community. One day, as Sam operates the pump, he

hears a broadcast on the radio. The radio report says that local officials suspect a new chemical from a nearby factory, chemical X, may have found its way into the local reservoir, and that there is a chance it will be very [beneficial/poisonous] to all the local townspeople's crops. Sam thinks to himself, "I don't care about their crops; I just want to earn my pay," and continues pumping the water. Sure enough, the crops started [thriving/dying]. It turned out that the local officials were completely wrong about the chemical in the water. After analyzing the water, they found no trace of chemical X. Scientific reports later confirmed that the crops were all [thriving/dying] because of a fungus that had been secretly growing inside Sam's pump.

After reading the case, participants were asked whether they agreed or disagreed with the statement, "Sam knew that by pumping the water, the townspeople's crops would [thrive/die]." Responses were collected on a seven-point scale from 1 (strongly disagree) to 7 (strongly agree). The Gettierized nature of the case would predict that the participants deny knowledge to Sam in both cases. But Buckwalter's results show this expected result did not hold. Participants' Gettier intuitions were overturned by their moral judgments of Sam in the harm condition: participants thought that Sam knew his actions would bring about harm ($M=4.86$, $SD=1.7$). In contrast, responses for the benefit case were consistent with traditional Gettier case results: participants claimed that Sam did not know ($M=3.05$, $SD 1.59$). Thus, Buckwalter's results indicate not only that the lay concept of knowledge is sensitive to moral valence, but also that the moral factor can sometimes even override the Gettier intuition, which is generally considered a central and robust aspect of our understanding of knowledge. He refers to the robust impact of moral valence on people's knowledge attribution in Gettier cases¹⁰ as the *Gettierized Epistemic Side-Effect Effect*, GESEE in short.

In order to eliminate the worry that knowledge attribution in the harm case may be rooted in the desire to blame the protagonist for a wrongdoing, Buckwalter introduced a third-person case, where the purported knower differs from the wrongdoer. Buckwalter found that even in the third-person case, people were still much more likely to attribute knowledge to the knower in the harm condition than in the benefit condition. This finding suggests that moral valence indeed has a robust impact on the lay concept of knowledge.

¹⁰ The essence of GESEE is the robust impact that moral valence has in respect to knowledge attribution, which doesn't always lead to an overturn of the Gettier intuition, as we will see in Bulterwalter's other two studies about GESEE as well as our studies. Interestingly, concerning his other two pairs of cases (mayor and third-person mayor), though they shared the Gettierized structure, his participants overall tend to attribute knowledge to the protagonists both in the benefit and the harm condition, though they were still much more likely to do so in the harm.

Our third study examined whether GESEE appears across different cultures. We translated the three vignettes (pump, mayor, third-person mayor) used in Buckwalter’s paper into Korean and Chinese, and tested them with our Korean and Chinese participants.

Korean Study

753 Korean participants were recruited through “IQEQCQ.” Our data show that GESEE appeared across all three vignettes with our Korean participants (Figure 5). The data were analyzed using a 3 (vignette: pump vs. mayor vs. third-person) x 2 (valence: benefit vs. harm) ANOVA. There was a main effect of valence, $F(1, 747) = 67.6, p < .001$. There was also a main effect of vignette, $F(2, 747) = 19.6, p < .001$, and a significant interaction, $F(2, 747) = 3.6, p = .03$.

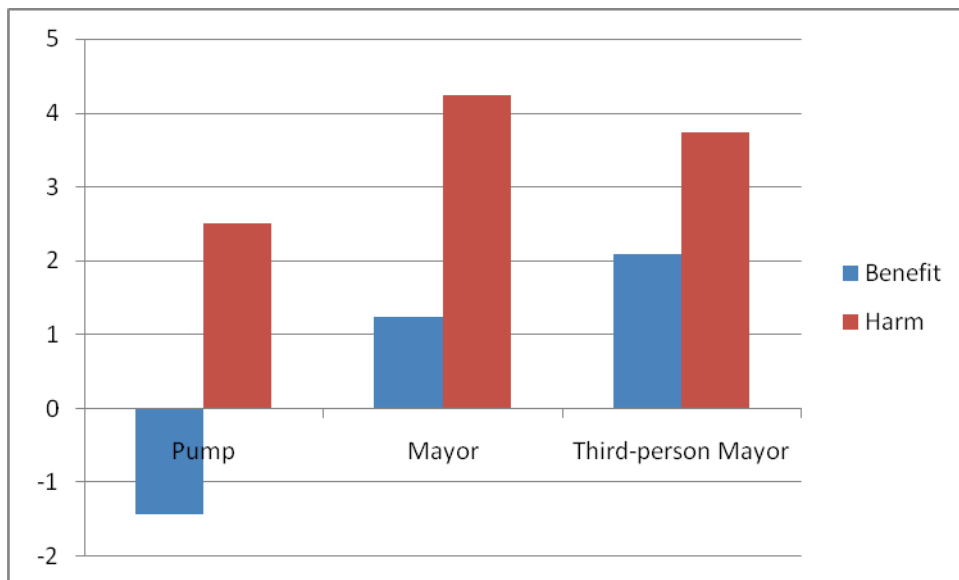


Figure 5: Mean of Korean participants' weighted knowledge ascriptions about GESEE¹¹

Chinese Study

We recruited 840 Chinese participants through a public account on “Wechat.” We found that GESEE appeared in the first two cases (pump and mayor) but did not appear in the third-person mayor case (Figure 6). The data were analyzed using a 3 (vignette: pump vs. mayor vs. third-person mayor) x 2 (valence: benefit vs. harm) ANOVA. There was a main

¹¹ Notably, for our Korean participants, the patterns of knowledge attribution across the three pairs of cases are almost exactly the same with the patterns reported by Buckwalter based on his English-speaking participants. First, in the pump cases, the Gettier intuition holds, and GESEE overrides it in the harm condition. Second, in the mayor and the third-person mayor cases, the Gettier intuition does hold, but GESEE is robust. The story is more complicated with our Chinese participants.

effect of valence, $F(1, 834) = 11.5, p=.001$. There was also a main effect of vignette, $F(2, 834) = 39.3, p<.001$, and a significant interaction, $F(2, 834) = 4.6, p=.01$.

To further explore this interaction, we examined each vignette separately. For the pump case, the weighted knowledge score was higher for the harm condition ($M=-.201, SD=5.31$) than the benefit condition ($M=-3.00, SD=4.94$), $t(252)= -4.15$, but the difference was not statistically significant, $p=.098$. For the mayor case, the weighted knowledge score was higher for the harm condition ($M=2.67, SD=5.17$) than the benefit condition ($M=-0.19, SD=5.78$), $t(297)= -1.66, p<.001$. For the third-person mayor case, the weighted knowledge score for the benefit condition ($M=.62, SD=5.62$) was very close to that for the harm condition ($M=.64, SD=5.48$), $t(275)= -0.03$, so there was virtually no difference, $p=.98$.

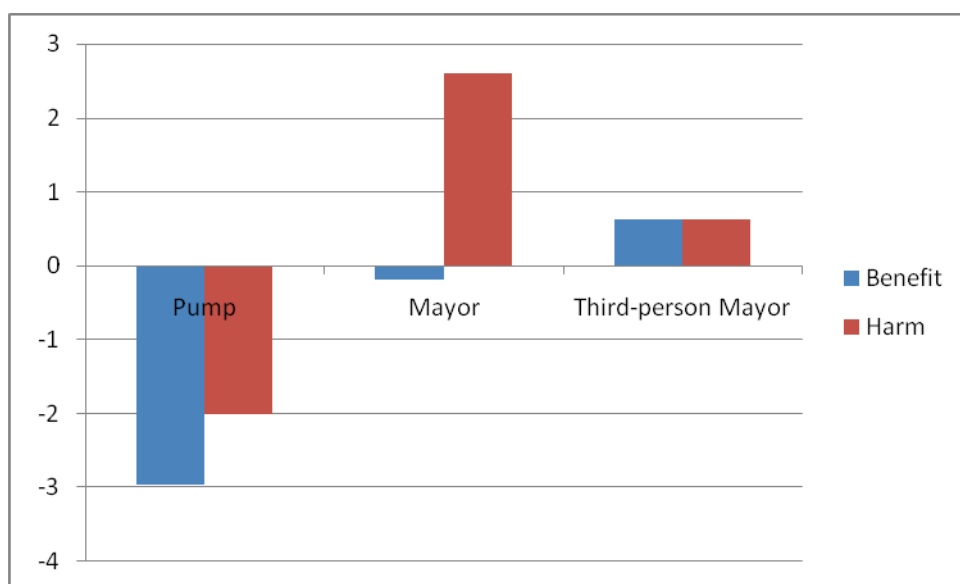


Figure 6: Mean of Chinese participants' weighted knowledge ascriptions about GESEE¹²

Chinese Third-Person Study

In response to the results for the third-person mayor case, we conducted a second study to check for two possible explanations: the results are due to (1) case-specific reasons (e.g., Chinese people have some peculiar ideas about mayors or their secretaries) or (2) the third-person nature of the case (i.e., Chinese people respond to all third-person cases in a way which differs from how they respond to first-person cases). We were interested, specifically,

¹² Notably, the results of the Chinese study differed from that of Buckwalter's English study and that of our Korean study in various subtle ways. First, in the pump cases, the Gettier intuition held, but GESEE didn't override it in the harm condition. Second, in the mayor cases, the Gettier intuition held – weakly though, and GESEE overrode it in the harm condition. And third, in the third-person mayor cases, the Gettier intuition didn't hold, neither did GESEE.

in whether GESEE would in general not appear in third-person cases among the Chinese population.

We thus designed two new third-person cases, and tested them alongside the original third-person mayor case on a new sample of Chinese participants ($N=434$) recruited through the same platform as the previous study, “Wechat”. The cases were designed to have the same structure and logic of the third-person mayor case: the purported knower is a witness to the agent performing the benefit/harm action. Below is an English translation of one of the new “third-person pump” cases; the other new third-person can be found in the appendix.

Sam’s job is to pump water into the cistern, which then supplies the water to the farms owned by several families in the community. One day, as Sam operates the pump, he hears a broadcast on the radio. The radio report says that a new chemical from a nearby factory, chemical X, has found its way into the local reservoir, and that it will be very [beneficial/poisonous] to all the local townspeople’s crops. Sam continues pumping the water while chatting with his girlfriend, “I don’t care about their crops; I just want to earn my pay.” Sam’s friend, James, overheard everything, and is appalled by what Sam said. Sure enough, the crops started [thriving/dying]. It turned out that the radio broadcast got it wrong about the chemical in the water. After analyzing the water, scientists found no trace of chemical X at all. And later scientific reports further confirmed that the crops were all [thriving/dying] due to a totally different cause, i.e., a fungus that had been secretly growing inside the pump.

Participants were then asked:

Do you agree or disagree with the statement, “James, Sam’s friend, knew that the townspeople’s crops would [thrive/die]”?

Responses to the third-person cases were analyzed using a 3 (vignette: pump vs. air vs. job) x 2 (valence: benefit vs. harm) ANOVA. There was a main effect of valence, $F(1, 428) = 8.9$, $p=.003$. There was no effect of vignette, $F(2, 428) = 1.6$, $p=.21$, and a significant interaction, $F(2, 428) = 4.4$, $p=.01$.

To explore this effect further, we examined each vignette individually. For the third-person pump case, the weighted knowledge score is higher for the harm condition ($M=-.48$, $SD=5.57$) than the benefit condition ($M=-3.3$, $SD=4.60$), $t(136) = -3.23$, $p=.002$. For the third-

person air case, the weighted knowledge score is higher for the harm condition ($M=-.22$, $SD=5.52$) than the benefit condition ($M=-2.39$, $SD=5.11$), $t(145)= -2.47$, $p=.014$. And for the third-person mayor case, the weighted knowledge score is higher for the benefit condition ($M=-.209$, $SD=5.35$) than the harm condition ($M=-2.65$, $SD=4.77$), $t(147)= 0.68$, but the difference is not statistically significant, $p=.50$. GESEE appeared in all cases except *again* for the third-person mayor case (Figure 7).

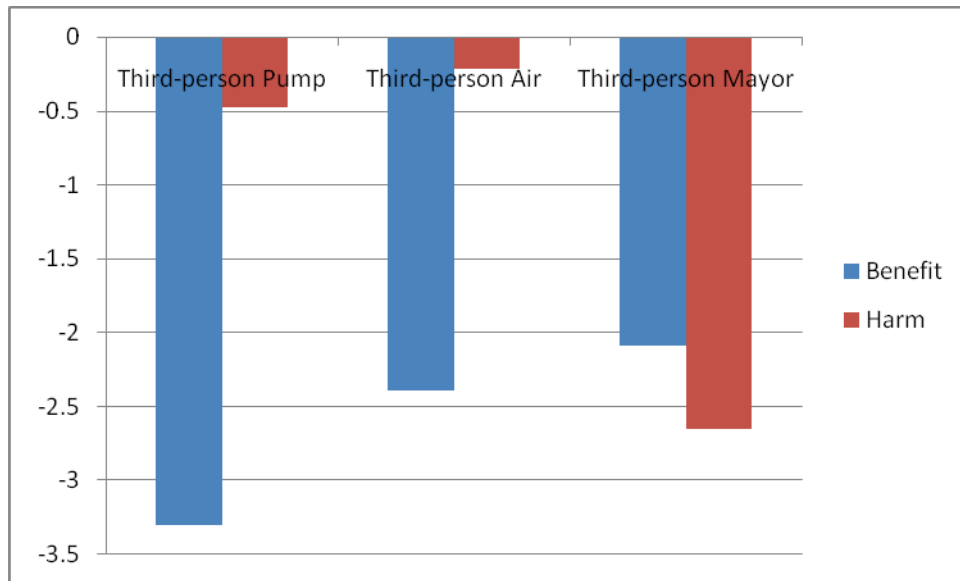


Figure 7: Mean of Chinese participants' weighted knowledge ascriptions about third-person cases for GESEE

This result suggests that the failure of replication of the third-person mayor case is due to case-specific reasons; namely that the Chinese have some specific ideas about mayors and secretaries which interfered with their GESEE intuition. Once this consideration is taken into account, GESEE emerged across all the different types of cases presented to the Chinese participants and there was a significant difference in the level of knowledge attribution for the harm and benefit conditions.¹³

3. Discussion

Both Korean and Chinese populations were found to exhibit GESEE. The results for both populations showed a striking asymmetry of knowledge attribution between harm and

¹³ Though the GESEE pattern didn't emerge both in our first and our second study of the third-person mayor case, participants' responses to the case differed quite dramatically in the two studies. The weighted knowledge scores (both in the benefit and harm condition) in the first study were positive, meaning that the Gettier intuition didn't hold, while those scores became negative in the second study, meaning that the Gettier intuition held. We think that the difference might be attributed to our different ways of framing the questions after participants read the vignette (see the appendix).

benefit conditions. Though this effect was not obtained in the third-person mayor case among our Chinese participants, Chinese participants indeed demonstrated GESEE in the other third-person cases. This outcome indicates that the Chinese result in the third-person mayor case was due to case-specific reasons (e.g., specific ideas that Chinese people have about mayors, or the relation between mayors and their secretaries), rather than reflecting anything more fundamental about their tendency to show the third-person GESEE.

3. General Discussion

Our studies examined three effects in three groups outside the US (South Korea, Taiwan and China). Each effect was tested in two populations, and we found that they all emerged in both the populations. Our perceptual vs probabilistic evidence effect study found that Korean and Taiwanese participants, like Friedman and Turri's (2014) American participants, were more likely to attribute knowledge to beliefs based on perceptual evidence than on those based on probabilistic evidence. Consistent with one main effect reported in Starmans and Friedman (2012), our GAAEE study showed that Chinese and Korean participants were more likely to attribute knowledge to true beliefs based on authentic evidence than true beliefs based on apparent evidence even in Gettierized situations. Our GESEE study found that Chinese and Korean participants, resembling Buckwalter's (2013) American participants, demonstrated a striking asymmetry of knowledge attribution when an agent was harming rather than benefiting others. In sum, each of the effects we studied showed up in both cultural groups we tested.

The direct finding of our study is that people in Taiwan, Mainland China, South Korea, and the US exhibit the same pattern of knowledge attribution concerning the three effects we tested for. Based on this finding, we conjecture that patterns of intuitive knowledge attribution (not restricted to those effects we surveyed) are likely to be highly universal across various cultures (not restricted to those cultures we have surveyed). We believe that this is a reasonable conjecture based on the following considerations: First, we see nothing special about the three effects we tested which would make these, but not other effects, universal. Second, we see no reason to believe that such universality is restricted to the populations surveyed.

In supporting the notion that epistemic intuitions are highly universal across cultures, we are by no means suggesting that patterns of knowledge attribution are consistent without exception. Indeed, there may be future studies that find such differences. Our claim is rather

that epistemic intuitions are likely to be highly universal—much more universal than previously thought after WNS’s report.

We would like to leverage our finding to advocate for a pivot in how epistemology should approach the subject of universality moving forward. The discussion to date about cross-cultural universality has almost entirely focused on the supposed lack thereof. Sparked largely by WNS's report of cross-cultural differences, the dominant question was, “What are the philosophical implications of cross-cultural differences in epistemic intuitions?” By focusing on such questions, interlocutors presupposed the existence of cross-cultural differences. However, the total body of evidence to date on cross-cultural intuitions does not provide support for the claim that there are such differences. Not only have numerous studies failed to replicate reported differences, but our findings, in conjunction with Machery et al. (2015), now give reason to believe in the positive hypothesis for universality.

Instead of contemplating the implications of unfounded cross-cultural *differences*, a more constructive philosophical discourse would explore the implications of significant cross-cultural *universality* of epistemic intuitions. This shift in philosophical focus would open up a cluster of important questions for epistemology about, e.g., (1) how far or how deep the universality runs; (2) what best explains the robust universality; and most importantly, (3) given the high degree of universality, what role intuitions should play in epistemology.

We will leave question (1) for future empirical studies. In what follows, we proceed to making some preliminary moves addressing questions (2) and (3). This discussion is intended as a demonstrative tool highlighting the significance and potential fruitfulness of inquiring into such questions, rather than as an argument for specific answers to those questions.

When it comes to explaining the high level of universality of knowledge attribution, two fairly straightforward accounts seem both plausible *prima facie*: the pragmatist and nativist explanations.¹⁴ According to pragmatism as Craig puts it (cf. Craig 1990):

we take some *prima facie* plausible hypothesis about what the concept of knowledge does for us, what its role in our life might be, and then ask what a concept having that role would be like, what conditions would govern its application. . . [T]ry to work out how a concept custom-designed for that role would look, and then see to what extent it matches our everyday practice with the concept of knowledge as actually found. (Craig 1990: 2–3)

¹⁴ Though this discussion focuses on pragmatism and non-pragmatic nativism as potential explanations for epistemic universality, we do not assume that the two accounts are the only possible explanations.

If the custom-designed concept of knowledge largely shares the contour of our ordinary concept of knowledge, this would support the hypothesis that we acquire the concept of knowledge because it is conducive to beneficial ends like truth-preservation in a community, identifying trustworthy informants, the coordination between agents through effective mind-reading, and so forth.¹⁵ If we are to add a further plausible assumption that the ends the concept of knowledge serves converge across cultures, we can expect the convergence of knowledge attributions across cultures (cf. Hannon 2015). Through trial-and-error, useful applications of the concept are selected out, and the meaning of “knowledge” is solidified, stabilized, and constrained by constant social practice. And through rewards-and-sanctions for new language learners (e.g., children), the patterns are spread and passed on. In this way, we might say that the pragmatic ends carve out the concept of knowledge at the societal level. Let us refer to this account as *social pragmatism*.

In another variant of pragmatism, which we call *innate pragmatism*, the ends that “knowledge” serves operate at the genetic level by means of evolution. In light of adaptationist theories of evolution, if the concept of knowledge is so pragmatically essential to the survival and flourishing of human communities, there would have been strong evolutionary pressure in favor of human beings acquiring genetic endowment of this concept. If we assume that such an adaptive evolutionary process has indeed taken place, and that human beings acquired genes expressed as the mental capacity of knowledge attribution and that those genes were preserved through nature selection because they enhanced fitness, then the concept of knowledge would be not only universal but also innate to human minds. In this way, the process of trial-and-error as well as rewards-and-sanctions need not take place for every new generation, since the core concept of knowledge has been planted in human minds as a matter of our genetic make-up, which dictates (at least to a great extent) how we understand the concept and when we would attribute/deny knowledge in a given case.¹⁶

Alternatively, there are nativist accounts which claim the innateness of knowledge without making reference to any pragmatic function of the concept. One such account relies on *anti-adaptationist* theories of evolution (cf. Gould and Lewontin 1979), according to

¹⁵ Craig (1990) offers a systematical elaboration and defense for the pragmatic understanding of the concept of knowledge. And he singled out certifying reliable informants as the purpose of the concept of knowledge. Though we see great merit of the pragmatic approach to analyzing the concept of knowledge, we share many critics’ skepticism that the concept of knowledge serves any unique purpose (c.f., for example, Rysiew 2012 and Beebe 2012).

¹⁶ This particular claim about our concept of knowledge fits into a broader picture of nativism expounded by Alan Leslie (1999), which holds that certain concepts in theory of mind (usually including belief, pretense and desire, etc.) are innate.

which human beings might acquire traits not selected for any specific advantage. Within this framework, that knowledge is hardwired into our minds (maybe due to, e.g., genetic drift) calls for no further explanation in terms of pragmatic functions. We will refer to this account as *non-pragmatic nativism*.

Either pragmatism or nativism, if true, can explain the robust universality of epistemic intuitions. Though these theories are distinct from each other, they interact in ways indicated below.

	Nativism	Non-Nativism
Pragmatism	Innate Pragmatism	Social Pragmatism
Non-Pragmatism	Non-Pragmatic Nativism	Other explanation for universality is needed

Recently, the innateness of the concept of knowledge has obtained some empirical support: Both young children and other primates demonstrate a certain basic concept of knowledge, a prototype of which involves immediate, accurate representation of reality, employed to make predictions about others' behavior (cf. Hogrefe et al. 1986; Wellman and Liu 2004; Onishi and Baillargeon 2005; Marticorena et al. 2011). These findings are compatible with innate pragmatism as well as non-pragmatic nativism. Importantly, however, they do not yet completely rule out social pragmatism, since theorists have argued that the innate concept of knowledge shared by babies and non-human primates would be too primitive to adequately explain the universality of knowledge attribution in highly sophisticated scenarios (e.g., Stich 2013).

We believe further empirical studies, especially in primatology and developmental psychology, are needed before we can confidently come down on one side between these competing accounts. We need to better understand the relatively basic concept of knowledge which adults share with babies and other primates, and also whether/how this concept eventually develops into the richer concept of knowledge possessed by adult humans. Answers provided by such studies would affect the explanatory power of each of the accounts. For example, if it turns out that the innate, basic core concept of knowledge is limited to immediate, accurate presentations of reality, a nativist account may have a hard time explaining the universality of GESEE, or the impact of any other pragmatic factors – if they also turn out to be universal (cf. Part II, Sec. 3) - as immediate accurate representations of reality are not sensitive to such factors. In this case, it is possible that a degree of social

pragmatism may need to be layered on to nativism for a complete explanation of universality. Until such necessary empirical results are collected, we are not yet in a place to make judgements about the right explanation for universality.

Nevertheless, the stakes are high concerning the right explanation for universality. The answer to the question about the evidential role of epistemic intuitions hinges, at least partly, on which explanation of universality is correct. If the concept of knowledge is acquired simply as a sort of a brute fact (as suggested by non-pragmatic nativism), we might wonder what is the point in examining our epistemic intuitions. Certainly, we could feasibly carry out a descriptive study of our concept of knowledge, which would be valuable as a piece of empirical scientific knowledge. However, if we are instead to think (as many epistemologists do) that the concept of knowledge should serve as a foundational building block for our normative epistemological theories, which are called upon to elaborate the proper norms of inquiry, belief-formation, assertion, etc., then there is no reason to take intuitions that were products of a non-adaptive (and in a crucial sense, *blind*) procedure as a plausible starting point for epistemological inquiry. In other words, if non-pragmatic nativism is true, it might be thought that our epistemic intuitions would hardly be relevant to normative epistemology.

In contrast, if pragmatism is true, it seems reasonable to grant at least *pro tanto* considerations for our epistemic intuitions in epistemology. According to pragmatic accounts of “knowledge” (both innate or social pragmatism), the concept of knowledge facilitates some beneficial end(s) for a society, such as truth-acquisition, preservation and circulation as well as coordination through effective mind-reading. If we still regard those ends as desirable, it would be advisable to consult our epistemic intuitions for normative purposes. This would be true, especially in light of J.L. Austin’s comment:

Our common stock of words embodies all the distinctions men have found worth drawing, and the connexions they have found worth marking, in the lifetimes of many generations: these surely are likely to be more numerous, more sound, since they have stood up to the long test of the survival of the fittest, and more subtle, at least in all ordinary and reasonably practical matters, than any that you or I are likely to think up in our arm-chairs of an afternoon -- the most favoured alternative method (Austin 1956).

Thus, supposing that the lay concept of knowledge brings forth such beneficial ends, there is at least *pro tanto* reason to consult it in normative epistemology, whose task it becomes to further systematize and optimize (by adding, detracting, or refining) epistemic norms that have been implicitly embedded in the lay concept of knowledge and in our practices of employing it in all sorts of contexts. This doesn’t mean that we simply defer to

our *de facto* concept of knowledge in our effort to build normative epistemology. Our linguistic practice might have assigned multiple tasks to a single unified concept of knowledge, for example, that it not only guides our effort to discover “pure” theoretical truths and facts but also allows us to set a low bar for “know” when harm is an issue in order to better ground our moral criticism of the wrong-doers (as GESEE seems to suggest).¹⁷ However, there is no guarantee that those tasks are always mutually conducive or even compatible. What normative epistemology can do is explore whether such tension exists, and how it would affect our epistemic practice in various dimensions, and whether and how we might have to make hard choices about prioritizing certain epistemic intuitions and even discarding some of them. By engaging in a search for reflective equilibrium, we are expected to arrive at a refined concept of knowledge along with elaborative, explicit norms for epistemological practice built around it. Thus, if pragmatism about our concept of knowledge is true, it would support assigning some – though surely a qualified and limited – evidential role to epistemic intuitions. In this way, the question of whether intuitions should play a role in normative epistemology bears on which explanation of epistemic universality is correct.

Having presented a sketch of what the coming discourse might look like after we shift our focus to epistemic universality, we would like to conclude our paper with an invitation for thinkers from wide-ranging academic circles (from primatology, psychology, experimental philosophy and traditional philosophy) to take up exploring epistemic universality – its depth, breadth, and implications. We hope that in the future, this universality-based discussion will blossom and go beyond the thinking inspired by the differences-based debate. Unlike the latter, the former has the important merit of being backed by the body of empirical evidence.

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¹⁷ Though the third-person GESEE helps to mitigate the worry that the asymmetry of knowledge attribution in harm and benefit conditions is directly driven by the desire to blame the wrong-doer, it doesn’t rule out that the asymmetry is caused by the general, communal need to hold the wrong-doers responsible. It might be due to the pressure of consistence that since we want to attribute knowledge to the wrong-doer in order to hold him responsible, we’d better also attribute knowledge to the observer who enjoys a similar level of evidence.

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Appendix

All studies included a question asking participants to rate their confidence in the answer given on a scale from 1 to 7, with 7 being the most confident. Additionally, all studies included a demographic questionnaire that asked for the participant’s age and gender. The

cases used in Korea, Taiwan and China were translated back to English and are written below. All cases (except the set of Chinese third-person cases for GESEE) are presented in groups, with an original case, a Korean case and a Chinese case in each group. The places in which the latter two differ from the original cases are italicized.

Appendix A. Perceptual vs probabilistic evidence effect

The lottery cases

1. The original lottery case in Friedman and Turri (2014)

Abigail is out shopping with her son. In a store, they see a man with a super lotto ticket. Abigail's son says, "I bet that ticket's not a loser. It might win the jackpot!" Abigail answers, "It is a losing ticket." And Abigail is exactly right: The ticket is a loser.

2. The Korean lottery case

Abigail is out shopping with her son. In a store, they see a man with a super lotto ticket. Abigail's son says, "I bet that ticket's not a loser. It might win the jackpot!" Abigail answers, "It is a losing ticket." And Abigail is right: The ticket is a loser.

3. The Taiwanese lottery case

Liu Ning is out shopping with her son. In a store, they see a man with a super lotto ticket. *Liu Ning*'s son says, "I bet that ticket's not a loser. It might win the jackpot!" *Liu Ning* answers, "It is a losing ticket." And *Liu Ning* is right: The ticket is a loser.

The zoo cases

4. The original zoo case

Abigail is visiting the zoo with her son. In a pen, they see a black-and-white striped animal. Abigail's son says, "I bet that's not a real zebra. It might be a painted mule!" Abigail answers, "It is a real zebra." And Abigail is exactly right: The animal is a zebra.

5. The Korean zoo case

Abigail is visiting the zoo with her son. In a pen, they see a *striped* animal. Abigail's son says, "I bet that's not a real zebra. It might be a painted mule!" Abigail answers, "It is a real zebra." And Abigail is right: The animal is a zebra.

6. The Taiwanese zoo case

Liu Ning is visiting the zoo with her son. In a pen, they see a black-and-white striped animal. *Liu Ning*'s son says, "I bet that's not a real zebra. It might be a painted mule!" *Liu Ning* answers, "It is a real zebra." And *Liu Ning* is exactly right: The animal is a zebra.

The farm cases:

7. The original farm case

Abigail is driving past a farm with her son. In a field, they see a black-and-white striped animal. Abigail's son says, "I bet that's not a real zebra. It might be a painted mule!" Abigail answers, "It is a real zebra." And Abigail is exactly right: The animal is a zebra.

8. The Korean farm case

Abigail is driving past a farm with her son. In a field, they see a striped animal. Abigail's son says, "I bet that's not a real zebra. It might be a painted mule!" Abigail answers, "It is a real zebra." And Abigail is right: The animal is a zebra.

9. The Taiwanese farm case

Liu Ning is driving past a farm with her son. In a field, they see a black-and-white striped animal. *Liu Ning*'s son says, "I bet that's not a real zebra. It might be a painted mule!" *Liu Ning* answers, "It is a real zebra." And *Liu Ning* is exactly right: The animal is a zebra.

All cases were followed with the following set of questions, always in the same order. No changes were made to the questions asked after the case, except switching "Abigail" to "Liu Ning" in all the Chinese cases.

- (1) The animal/ticket is a _____. [zebra/mule]/[loser/winner]
- (2) Abigail and her son were _____. [visiting the zoo/driving past a farm/out shopping]
- (3) Abigail _____ that the animal/ticket is a zebra/loser. [knows/only believes]
- (4) How confident are you in the answer you just gave? [1: not at all confident—10: completely confident]
- (5) What did Abigail and her son see? [A black-and-white striped animal/A man with a super lotto ticket]
- (6) Abigail is _____ in thinking that the animal/ticket is a zebra/loser [justified/unjustified]
- (7) How confident are you in the answer you just gave? [1: not at all confident—10: completely confident]
- (8) Was there at least some chance, no matter how small, that the animal/ticket was a mule/winner?

Appendix B. GAAEE

The yogurt authentic-evidence cases:

1. The original yogurt authentic-evidence case in Starmans and Friedman (2012)

Julie buys a container of yogurt at the local deli. Although, Julie is not aware of it, the yogurt

in the container is exceptionally sweet—a mixup at the factory caused the yogurt to get a triple dose of sweetener. Julie comes home, puts it her fridge, and then goes into her bedroom. Julie’s neighbor Sam has been spying on her. While she is in her bedroom, he picks the lock to her apartment, and enters. He takes the yogurt container from the fridge, and replaces it with a sealed container of yogurt from his own fridge.

Then he goes back into his own apartment with Julie’s yogurt container. Julie has only been in the bedroom for a few minutes, and did not hear anything.

At the end of the story:

(1) Is there a container of yogurt in Julie’s fridge? [Yes/No]

(2) Julie _____ that there is yogurt in her fridge. [Really knows/Only believes]

2. The Korean yogurt authentic-evidence case

Julie buys a yogurt at the local store. Although, Julie is not aware of it, the yogurt in the container is exceptionally sweet—a mixup in the factory’s production process caused the yogurt to get a triple dose of sweetener. Julie returns home, puts it her fridge, and then goes into her room. Julie’s neighbor Sam has been spying on her. While she is in her room, he picks the lock to her front door, and enters. He takes the yogurt container from the fridge, and replaces it with a new container of yogurt from his own fridge. Then he goes back into his own apartment with Julie’s yogurt container. Julie has only been in the bedroom for a few minutes, and did not hear anything.

At the end of the story:

(1) Is there a yogurt in Julie’s fridge? [Yes/No]

(2) Julie _____ that there is a container of yogurt in her fridge. [Really knows/Only believes]

3. The Chinese yogurt authentic-evidence case

Lili buys a container of yogurt at the local deli. Although, *Lili* is not aware of it, the yogurt in the container is exceptionally sweet—a mixup at the factory caused the yogurt to get a triple dose of sweetener. *Lili* comes home, puts it in her fridge *in the kitchen*, and then goes into her bedroom. *Liu Fang*, who lives in the same apartment but different rooms with *Lili*, enters the kitchen while *Lili* is in her bedroom. She takes the yogurt container from the fridge, and replaces it with a sealed container of yogurt which she herself just bought. Then she goes back into her own room with *Lili*’s yogurt container. *Lili* has only been in her bedroom for a few minutes, and did not hear anything.

At the end of the story:

(1) Is there a container of yogurt in *Lili*’s fridge? [Yes/No]

(2) *Lili* _____ that there is yogurt in her fridge. [Really knows/Only believes]

The yogurt apparent-evidence cases:

4. The original yogurt apparent-evidence case

Julie buys a container of yogurt at the local deli. Although, Julie is not aware of it, there is no yogurt in the container—a mixup at the factory caused the container to be filled with sour cream instead. Julie comes home, puts it her fridge, and then goes into her bedroom. Julie’s neighbor Sam has been spying on her. While she is in her bedroom, he picks the lock to her apartment, and enters. He takes the yogurt container from the fridge, and replaces it with a sealed container of yogurt from his own fridge. Then he goes back into his own apartment with Julie’s yogurt container. Julie has only been in the bedroom for a few minutes, and did not hear anything.

At the end of the story:

(1) Is there a container of yogurt in Julie’s fridge? [Yes/No]

(2) Julie _____ that there is a container of yogurt in her fridge. [Really knows/Only believes]

5. The Korean yogurt apparent-evidence case

Julie buys a [*deleted: a container*] yogurt at the local deli. Although, Julie is not aware of it, there is no yogurt in the container—a mixup in the factory’s production process caused the container to be filled with milk instead. Julie comes home, puts it her fridge, and then goes into her [*deleted: bed*] room. Julie’s neighbor Sam has been spying on her. While she is in her room, he picks the lock to her *front door*, and enters. He takes the yogurt container from the fridge, and replaces it with a new yogurt from his own fridge. Then he goes back into his own apartment with Julie’s yogurt container. Julie has only been in the bedroom for a few minutes, and did not hear anything.

At the end of the story:

(1) Is there a [*deleted: a container of*] yogurt in Julie’s fridge? [Yes/No]

(2) Julie _____ that there is [*deleted: a container of*] yogurt in her fridge. [Really knows/Only believes]

6. The Chinese yogurt apparent-evidence case

Lili buys a container of yogurt at the local deli. Although, *Lili* is not aware of it, there is no yogurt in the container—a mixup at the factory caused the container to be filled with *milk* instead. *Lili* comes home, puts it her fridge *in the kitchen*, and then goes into her bedroom. *Liu Fang*, who lives in the same apartment but different rooms with *Lili*, enters the kitchen

while *Lili* is in her bedroom. She takes the yogurt container from the fridge, and replaces it with a sealed container of yogurt *which she herself just bought*. Then she goes back into her own room with *Lili's* yogurt container. *Lili* has only been in the bedroom for a few minutes, and did not hear anything.

At the end of the story:

1. Is there a container of yogurt in *Lili's* fridge? [Yes/No]
2. *Lili* _____ that there is a container of yogurt in her fridge. [Really knows/Only believes]

The coin authentic-evidence cases

7. The original coin authentic-evidence case (Starmans and Friedman 2012)

Corey has been collecting coins in his piggy bank for years. One day he is about to put a quarter in his piggy bank, and notices that it looks pretty old. Though he's never paid attention to dates before, he reads the date and sees that it's from 1936. However, he doesn't realize that 1936 is the year his grandmother was born. There is already a quarter dated 1936 buried deep in his piggy bank, but Corey isn't aware of this. He deposits the quarter and goes to take a nap. Corey's roommate Scott comes home, and needs some change for the bus. He shakes the piggy bank and the quarter Corey just put in falls out. Scott takes it and leaves. Corey wakes up after a 10 minute nap, and doesn't realize that Scott was there.

At the end of the story:

1. Is there a coin from 1936 in Corey's piggy bank? [Yes/ No]
2. Corey _____ that there is a coin from 1936 in his piggy bank. [Really knows/Only believes]

8. The Korean coin authentic-evidence case

Joo-Young has been collecting coins in his piggy bank for the past few years. One day he is about to put a *100-won* (Korean currency) coin in his piggy bank, and notices that it looks very old. Though he's never paid attention to dates before, he reads the date and sees that it's from *1971*. However, he doesn't realize that 1971 is the year his *mother* was born. There is already a 100-won coin dated 1971 buried deep in his piggy bank, but *Joo-Young* isn't aware of this. He deposits the quarter and goes to take a nap. *Joo-Young's* roommate *Seong-Hoon* needs some change for the bus. He shakes the piggy bank and the quarter *Joo-Young* just put in falls out. *Seong-Hoon* takes it and leaves. *Joo-Young* wakes up after a 10 minute nap, and doesn't realize that *Seong-Hoon* was there.

At the end of the story:

1. Is there a coin from 1971 in *Joo-Young*'s piggy bank? [Yes/ No]

2. *Joo-Young* _____ that there is a coin from 1971 in his piggy bank. [Really knows/Only believes]

9. The Chinese coin authentic-evidence case

Liu Xin has been collecting coins in his piggy bank for years. One day he is about to put a quarter in his piggy bank, and notices that it looks pretty old. Though he's never paid attention to dates before, he reads the date and sees that it's from 1986, *the year in which he was born*. After carefully examining the coin, he deposits the quarter and goes to take a nap. Indeed there is already a quarter dated 1986 buried deep in his piggy bank, but *Liu Xin* isn't aware of this. *Li Ming*, *Liu Xin*'s roommate comes home, and needs some change for the bus. He shakes the piggy bank and the quarter *Liu Xin* just put in falls out. *Li Ming* takes it and leaves. *Liu Xin* wakes up after a 10 minute nap, and doesn't realize that *Li Ming* was there.

At the end of the story:

1. Is there a coin from 1986 in *Liu Xin*'s piggy bank? [Yes/ No]

2. *Liu Xin* _____ that there is a coin from 1986 in his piggy bank. [Really knows/Only believes]

The coin apparent-evidence cases:

10. The original coin apparent-evidence case

Corey has been collecting coins in his piggy bank for years. One day he is about to put a quarter in his piggy bank, and notices that it looks pretty old. Though he's never paid attention to dates before, he reads the date and sees that it's from 1936. However, he doesn't realize that the date has partially rubbed off and it is really from 1938. There is already a quarter dated 1936 buried deep in his piggy bank, but Corey isn't aware of this. He deposits the quarter and goes to take a nap. Corey's roommate Scott comes home, and needs some change for the bus. He shakes the piggy bank and the quarter Corey just put in falls out. Scott takes it and leaves. Corey wakes up after a 10-minute nap, and doesn't realize that Scott was there.

At the end of the story:

1. Is there a coin from 1936 in Corey's piggy bank? [Yes/ No]

2. Corey _____ that there is a coin from 1936 in his piggy bank. [Really knows/Only believes]

11. The Korean coin apparent-evidence case

Joo-Young has been collecting coins in his piggy bank for years. One day he is about to put a

100-won (Korean currency) coin in his piggy bank, and notices that it looks very old. Though he's never paid attention to dates before, he reads the date and sees that it's from 1970. However, he doesn't realize that the date has partially rubbed off and it is really from 1972. There is already a 100-won coin dated 1970 buried deep in his piggy bank, but Joo-Young isn't aware of this. He deposits the quarter and goes to take a nap. Joo-Young's roommate *Seong-Hoon* comes home, and needs some change for the bus. He shakes the piggy bank and the quarter Joo-Young just put in falls out. *Seong-Hoon* takes it and leaves. Joo-Young wakes up after a 10-minute nap, and doesn't realize that *Seong-Hoon* was there.

At the end of the story:

1. Is there a coin from 1970 in *Joo-Young's* piggy bank? [Yes/ No]

2. *Joo-Young* _____ that there is a coin from 1970 in his piggy bank. [Really knows/Only believes]

12. The Chinese coin apparent-evidence case

Liu Xin has been collecting coins in his piggy bank for years. One day he is about to put a quarter in his piggy bank, and notices that it looks pretty old. Though he's never paid attention to dates before, he reads the date and sees that it's from 1986. However, he doesn't realize that the date has partially rubbed off and it is really from 1988. There is already a quarter dated 1986 buried deep in his piggy bank, but *Liu Xin* isn't aware of this. He deposits the quarter and goes to take a nap. *Liu Xin's* roommate *Li Ming* comes home, and needs some change for the bus. He shakes the piggy bank and the quarter *Liu Xin* just put in falls out. *Li Ming* takes it and leaves. *Liu Xin* wakes up after a 10-minute nap, and doesn't realize that *Li Ming* was there.

At the end of the story:

1. Is there a coin from 1986 in *Liu Xin's* piggy bank? [Yes/ No]

2. *Liu Xin* _____ that there is a coin from 1986 in his piggy bank. [Really knows/Only believes]

Appendix C. GESEE

The pump cases

1. The original pump case (Buckwalter 2014)

Sam's job is to pump water into the cistern, which then supplies the water to the farms owned by several families in the community. One day, as Sam operates the pump, he hears a broadcast on the radio. The radio report says that local officials suspect a new chemical from a nearby factory, chemical X, may have found its way into the local reservoir, and that there

is a chance it will be very [beneficial/poisonous] to all the local townspeople's crops. Sam thinks to himself, "I don't care about their crops; I just want to earn my pay," and continues pumping the water. Sure enough, the crops started [thriving/dying]. It turned out that the local officials were completely wrong about the chemical in the water. After analyzing the water, they found no trace of chemical X. Scientific reports later confirmed that the crops were all [thriving/dying] because of a fungus that had been secretly growing inside Sam's pump.

At the end of the story:

Do you agree disagree with the statement, "Sam knew that by pumping the water, the townspeople's crops would [thrive/die]."

2. The Korean pump case

No changes from original case.

3. The Chinese pump case

No changes from original case.

The mayor cases:

4. The original mayor case

The mayor of a small town is trying to decide whether or not to sign a new contract with a local corporation. The math is all very complex, but all his economic strategists think that there's a relatively good chance that one outcome is that it will [create/cut] jobs for workers in the community. The mayor says, "all I really care about is campaign contributions, not people's jobs, and I am sure to get millions from the corporation if I agree." So, he decides to sign their contract. The corporation, however, didn't take any chances. They secretly switched the contract with a totally different one right before the mayor signed it. By changing all the fine print, in some cases the opposite of what the mayor thought he was signing, the corporation could be sure it got what it wanted. Sure enough, shortly after the mayor signed the contract, a number of members of the community [got/lost] jobs, and the mayor received a huge donation to his reelection campaign.

At the end of the story:

Do you agree or disagree with the statement, "The mayor knew that by signing the contract he would [create/cut jobs]"?

5. The Korean mayor Case

No changes from original case.

6. The Chinese mayor Case

No changes from original case.

Third-person cases:

7. The original third-person mayor case

The mayor of a small town is trying to decide whether or not to sign a new contract with a local corporation. The contract is very complex, but all his economic strategists think that there's a relatively good chance that one outcome is that it will [create/cut] jobs for workers in the community. The mayor says, "all I really care about is campaign contributions, not people's jobs, and I am sure to get millions from the corporation if I agree." James the office secretary overheard everything, and is appalled by what the mayor said. Nonetheless, the mayor decides to sign the contract. The corporation, however, didn't take any chances. They secretly switched the contract with a totally different one right before the mayor signed it. By changing all the fine print, in some cases the opposite of what the mayor thought he was signing, the corporation could be sure it got what it wanted. Sure enough, shortly after the mayor signed the contract, a number of members of the community [got/lost] jobs, and the mayor received a huge donation to his reelection campaign.

After the story:

Do you agree or disagree with the statement, "James the office secretary knew that members of the local community would [get/lose] jobs"?

8. The Korean third-person mayor case

No changes from original case.

9. The Chinese third-person mayor case

No changes from original case.

The Chinese Third-person cases:

10. The Chinese third-person pump case

Wen Bin's job is to pump water into the cistern, which then supplies the water to the farms owned by several families in the community. One day, as Wen Bin operates the pump, he hears a broadcast on the radio. The radio report says that a new chemical from a nearby factory, chemical X, has found its way into the local reservoir, and that it will be very [beneficial/poisonous] to all the local townspeople's crops. Wen Bin continues pumping the water while chatting with his girlfriend, "I don't care about their crops; I just want to earn my pay." Wen Bin's friend, Li Ming, overheard everything, and is appalled by what Wen Bin said. Sure enough, the crops started [thriving/dying]. It turned out that the radio broadcast got it

wrong about the chemical in the water. After analyzing the water, scientists found no trace of chemical X at all. And later scientific reports further confirmed that the crops were all [thriving/dying] due to a totally different cause, i.e., a fungus that had been secretly growing inside the pump.

Do you agree or disagree with the statement, “Li Ming, Wen Bin’s friend, knew that the townspeople’s crops would [thrive/die], as he heard the broadcast and Wen Bin’s words”?

11. The Chinese third-person air case

The vice-president of a company went to the chairman of the board and said, “we are thinking of starting a new program. Based on careful and convincing analysis offered by our financial and tech experts, it will help us increase profits, but it will also [improve/harm] air quality of the city.” The chairman of the board answered, “I don’t care at all about the air quality. I just want to make as much profit as I can. Let’s start the new program.” Thus, they decided to start the new program. The secretary of the chairman, Li Ming, overheard everything, and is appalled by what the chairman said. Sure enough, shortly after the company started the new program, the air quality was [improved/harmed]. It turned out that the experts in the company got it wrong about the environmental effects of the new program. The new program actually has no effect at all to the air. The fact that the air quality had been [improved/harmed] was due to a totally different cause, i.e., a new waste disposal plant that had started to operate.

Do you agree or disagree with the statement, “Li Ming, the secretary of the chairman, knew that the air quality would be [improved/harmed], as he heard the conversation between the vice-president and the chairman”?

12. The third-person mayor case

The mayor of a small town is trying to decide whether or not to sign a new contract with a local corporation. The contract is very complex, but all his economic strategists think that there’s a relatively good chance that one outcome is that it will [create/cut] jobs for workers in the community. The mayor says, “all I really care about is campaign contributions, not people’s jobs, and I am sure to get millions from the corporation if I agree.” *Li Ming*, the office secretary overheard everything, and is appalled by what the mayor said. Nonetheless, the mayor decides to sign the contract. The corporation, however, didn’t take any chances. They secretly switched the contract with a totally different one right before the mayor signed it. By changing all the fine print, in some cases the opposite of what the mayor thought he was signing, the corporation could be sure it got what it wanted. Sure enough, shortly after the mayor signed the contract, a number of members of the community [got/lost] jobs, and

the mayor received a huge donation to his reelection campaign.

After the story:

Do you agree or disagree with the statement, “*Li Ming*, the office secretary knew that members of the local community would [get/lose] jobs, *as he heard the conversation between the mayor and his economic strategists*”?