

Knowledge and Assertion in Korean

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Abstract: Evidence from life science, cognitive science, and philosophy supports the hypothesis that knowledge is a central norm of the human practice of assertion. However, to date, the experimental evidence supporting this hypothesis is limited to American anglophones. If the hypothesis is correct, then such findings will not be limited to one language or culture. Instead, we should find a strong connection between knowledge and assertability across human languages and cultures. To begin testing this prediction, we conducted three experiments on Koreans in Korean. In each case, the findings replicated prior results observed in Americans and were corroborated by key findings from new replication studies on Americans using materials back-translated from Korean. These findings support the theory that there is a core, cross-culturally robust human practice of assertion and that, according to the rules of this practice, assertions should express knowledge.

Keywords: assertion; knowledge; communication; norms

Introduction

Communication is an adaptive behavioral trait shaped by natural selection (Darwin 1872; Maynard Smith & Harper 2004). A challenge facing any communication system is that the interests of sender and receiver often diverge, leading to dishonest signaling, such as false predator alarm calls. If dishonesty proliferates too much, then the signals will eventually be ignored and the communication channel rendered worthless. Stable and enduring communication systems thus include mechanisms that promote honest signaling.

One mechanism is to attend preferentially to *information constrained* signals, which only signalers with access to certain information will produce (Hurd & Enquist 2005). For example, sparrows need to distinguish conspecifics who are invading their territory from those who occupy neighboring territory. A sparrow accomplishes this based on whether the conspecific imitates the song the sparrow just sang (“song matching”), or sings a different song that the sparrow has sung previously (“repertoire matching”). Repertoire matching is an informationally-constrained signal of neighborhood because it “requires knowledge” of the other bird’s repertoire (Beecher, Campbell, Burt, Hill & Nordby 2000: 22, 25). Another mechanism is *social policing*, which involves testing for honesty and retaliating for dishonesty and has been observed in birds, lizards, wasps, and primates (Rohwer 1977; Moller 1987; Thompson & Moore 1991; Tibbetts & Dale 2004; Tibbetts & Izzo 2010). Retaliation can take the form of physical aggression or a diminished reputation and distrust from other group members, known as “skeptical responding” (Cheney & Seyfarth 1988; Gouzoules, Gouzoules & Miller 1996). Behavioral ecologists describe “receiver

retaliation” as a “behavioral rule” that disincentivizes dishonest conventional signaling, and as a “key factor” making conventional communication systems evolutionarily stable (Bradbury & Vehrencamp 2011: 411).

In humans, assertion is a principal means of communicating information. What prevents humans from dishonestly asserting enough to destabilize the practice? Recent work in cognitive science and philosophy supports a specific answer to that question: the human practice of assertion is at least partially sustained by a socially policed information constraint, namely, *knowledge* (Turri 2016a). This sort of view is often described as proposing a “knowledge norm” or “knowledge rule” for assertion (see Benton 2014 for a review). In what follows, for convenience we will often refer to it as the “knowledge-rule hypothesis.” If the knowledge-rule hypothesis is correct, then the human practice of assertion is sustained by mechanisms similar to those that sustain non-human communication systems: information constraint and social policing. Evidence for a knowledge rule comes from several sources, including observation of conversational patterns, developmental studies showing that from an early age human children link knowledge and assertability, and experimental studies testing adults’ judgments about assertability and knowledge (for a review, see Turri 2017a).

One important limitation of this evidence is that it is limited to North American anglophone populations. But if knowledge is a central norm of the human practice of assertion, as it is in other animal communication systems, then we should find a connection between knowledge and assertability across languages and cultures. This is consistent with finding some cultural differences, such as those related to policing norms in general (e.g. Hamilton, Blumenfeld, Akoh &

Miura 1990), or a general tendency toward more moderate or extreme responses (e.g. Chen, Lee & Stevenson 1995), but there should still be a detectable central tendency to link what should be said to what is known.

This brings us to the motivation for the present research. We sought to test whether the experimental evidence for a knowledge rule, observed in North American anglophones, is robust across human language and culture. English is an Indo-European language. The Proto-Indo-European verb for “know”, **gnō-*, also had a suffixed form that meant “tell”, **gne-ro-*, from which the modern “narrate” derives (Watkins 2011). This verbal association between knowing and telling persisted in some Indo-European languages, including Latin (*noscere* and *narrare*). Thus a stronger cross-cultural test for a knowledge rule would involve a non-Indo-European language. We chose Korean because it is a non-Indo-European language (Mallory & Adams: 84), it is a language isolate (Song 2005: 15), and one of the co-authors is a native speaker.

We conducted three experiments, in each case adapting and translating materials already tested on Americans in order to test Koreans. All experiments involved reading a simple scenario and judging one or more aspects of it. In the first experiment, we tested whether a proposition’s truth-value affects whether Koreans think that it should be asserted (i.e. their “assertability judgments”). In the second experiment, we collected judgments about knowledge and evidence in order to test whether either predicts Koreans’ assertability judgments. In the third experiment, we tested whether describing someone as *knowing* or *being certain of* a true proposition affects Koreans’ assertability judgments. Out of an abundance of caution, in order to ensure that the principal findings of interest were not due to minor changes when adapting stimuli to Korean culture,

we back-translated the Korean materials into English and tested them on American participants. A supplemental file includes all the Korean stimuli used in all experiments reported here. In the main text below, we include back-translations of the Korean stimuli into English, which are identical to the stimuli tested on our new American participants, except for using typical names in American English (all such occurrences are explicitly noted below).

The findings of such studies could potentially support at least two very different conclusions. On the one hand, the Korean findings could differ vastly from what has been observed in Americans. This would support the conclusion that there is no such thing as *the* basic human practice of assertion but, rather, a constellation of human information-sharing practices sustained by different implicit rules. In other words, it would undermine the knowledge-rule hypothesis, although it would be consistent with weaker hypotheses that posit an array of different, culturally local practices, only some of which are sustained by a knowledge rule. On the other hand, the Korean findings could replicate key results observed in Americans. This would support (without proving) the theory that there is a core, cross-culturally robust human practice of assertion and that, according to the rules of this practice, assertions should express knowledge. In other words, it would support the knowledge-rule hypothesis. Consistent with this, there could still be cultural differences in the degree to which assertability is linked to knowledge (see the General Discussion for further discussion). In other words, consistent with there being a basic, cross-culturally robust link, its strength could vary cross-culturally.

Experiment 1

This experiment tests whether a proposition's truth-value affects whether Koreans think that it should be asserted. Prior research has found that a proposition's truth-value affects whether Americans think that it should be asserted (Turri 2013; Turri 2017b). More specifically, if a proposition is false, then Americans judge that it should not be asserted, although in closely matched conditions that differ only in the proposition being true, Americans judge that it should be asserted. The knowledge-rule hypothesis predicts that we will observe a similar effect of truth-value on how Koreans rate assertability. This is because knowledge requires truth, so rendering a proposition false will prevent it from being known.

Method

Participants

One hundred and thirty-seven Korean participants were tested (aged 20-63 years, mean age = 38 years; 73 female). Korean speakers were recruited, tested, and compensated using an online platform provided by DooIt (<<http://www.dooit.co.kr>>), a research firm based in Seoul, South Korea. We used the same recruitment and testing procedures for all experiments reported in this paper. The experiments were coded so that potential recruits could not participate in more than one of the experiments.

Materials and Procedure

Participants were randomly assigned to one of two conditions (false, true) in a between-subjects design. All participants read a simple story, responded to a test statement, and answered a comprehension question. The story was adapted from previous research on assertability judgments by Americans (Turri 2013).

Korean participants considered a simple story about SeYoung, a stamp collector who owns so many stamps that she cannot keep track of them all by memory alone. Accordingly, she maintains a detailed inventory of her stamps, which she knows is imperfect but extremely accurate. One day someone asks SeYoung whether she has a 1956 Melbourne Olympic commemorative stamp in her collection. She consults the inventory and it says that she does have one. At the end of the story, one group of people was told that the inventory was inaccurate (false condition), whereas another group was told that the inventory was accurate (true condition). Here is an English translation of the story participants read (true/false manipulation in brackets):

SeYoung is a postage stamp collector. She has more than a thousand stamps from many countries. As such, she has a hard time keeping track of all her stamps. Therefore, she created a stamp inventory. Although it is not perfect, it is very accurate.¶¹ Today, SeYoung's friend asks her, "SeYoung, do you have a 1956 Melbourne Olympic commemorative stamp?" SeYoung checks her inventory. It says that she has a 1956 Melbourne Olympic commemorative stamp. [The inventory is accurate, as usual, and she does have the stamp. / The inventory is inaccurate, which is unusual, and she does not have the stamp.]

¹ Indicates a paragraph break on the participant's screen.

A supplemental file includes the Korean text participants saw, for all stimuli used in all experiments reported here.

After reading the story, all participants answered the same test question regarding assertability:

Should SeYoung say that she has a 1956 Melbourne Olympic commemorative stamp in her collection? (assertability)

To answer, participants chose one of seven options, arranged vertically, by ticking a radio button:

She definitely should not (= 1)

She should not

She probably should not

It's unclear (= 4)

She probably should

She should

She definitely should (= 7)

Numerical labels indicate the coding scheme; participants did not see them. Participants then advanced to a new screen and answered a comprehension question (response options in brackets, rotated randomly):

SeYoung _____ have a 1956 Melbourne Olympic commemorative stamp in her collection. (does/does not)

The purpose of this question was to ensure that participants understood this critical detail of the case.

Results

One hundred and three Korean participants passed the comprehension question. The following analyses exclude anyone who failed the comprehension question. Preliminary regression analysis revealed no effect of participant sex or age on response to the assertability question ($p_s > .05$). The same is true in all the other experiments reported here; accordingly, we will not discuss these demographic variables any further. The appendix contains tables with descriptive statistics for all dependent measures from all experiments reported here.

An independent samples t-test revealed an extremely large effect of truth-value on Korean assertability ratings, $t(101) = 6.58$, $p < .001$, $d = 1.31$, with mean rating higher in the true condition ($M = 4.74$, $SD = 1.24$) than in the false condition ($M = 2.98$, $SD = 1.46$). (See Figure 1.) One sample t-tests revealed that mean assertability rating was significantly above the neutral midpoint ($= 4$) in the true condition, $t(52) = 4.31$, $p < .001$, but significantly below it in the false condition, $t(49) = -4.93$, $p < .001$). The mean, median, and modal response in the two conditions fell on opposite sides of the midpoint.

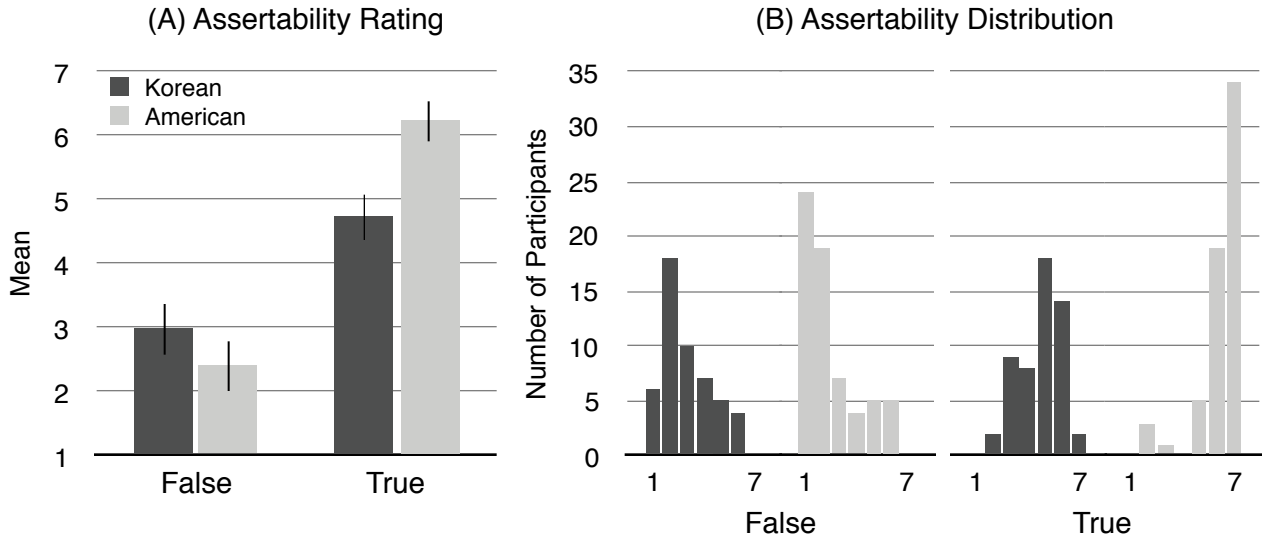


Figure 1. Experiment 1. Panel A: mean assertability rating (whether the speaker should make the assertion) in the two truth-value conditions across two cultures. Error bars represent 95% bootstrapped confidence intervals. Panel B: distribution of responses to the assertion attribution in the two cultures. Scales ran 1 (“definitely should not”) – 7 (“definitely should”).

Back-translation Study

All stimuli were back-translated into English and tested on American participants. Compared to the translations included above, American participants saw the exact same stimuli except that the character was named “Sally.” One hundred and thirty-three Americans (aged 20-73, mean age = 34; 42 female) were recruited, tested, and compensated using an online platform of Amazon Mechanical Turk and Qualtrics. One hundred and twenty-six American participants passed the comprehension question and those who failed were excluded from further analysis. To achieve a direct comparison between American and Korean responses, we conducted a two-way analysis of variance with culture and assignment to truth-value condition as independent variables and as-

sertability rating (i.e. response to the assertability question) as the dependent variable. This analysis revealed main effects of both truth-value, $F(1, 225) = 225.31, p < .001, \eta_p^2 = .500$, and culture, $F(1, 225) = 6.08, p = .014, \eta_p^2 = .026$, as well as an interaction, $F(1, 225) = 30.87, p < .001, \eta_p^2 = .121$. Inspection of the means and distributions (see Figure 1) indicates that the interaction was due to Americans giving more extreme responses in both the true and false conditions, resulting in a larger effect of truth-value on assertability ratings. A follow-up independent samples t-test revealed an extremely large effect of truth-value on American assertability ratings, $t(124) = 14.97, p < .001, d = 2.69$, with mean rating higher in the true condition ($M = 6.23, SD = 1.23$) than in the false condition ($M = 2.41, SD = 1.46$). Like the Koreans, the mean, median, and modal American response in the two conditions fell on opposite sides of the midpoint.

Discussion

Korean participants' judgments about assertability were strongly affected by truth-value. When a proposition was true, the central tendency was to judge that the agent should assert it. But when the proposition was false, the central tendency was to judge that the agent should not assert it. This occurred even though the source of the agent's evidence for the proposition was objectively the same in both cases, namely, imperfect but very accurate. These results replicate findings previously observed for Americans and resemble the results from a new replication study on Americans using materials back-translated from Korean. (For replications of the basic finding using different questioning procedures, see Turri 2013, Turri 2015a, and 2017b.) At the same time, we did observe a significant cultural difference whereby the effect of truth-value was larger for

Americans than for Koreans, which is consistent with previous findings on cultural response styles whereby people from east Asian cultures are more reluctant than Americans to select extreme values on Likert scales (Chen, Lee & Stevenson 1995; see the General Discussion for further discussion). Overall, then, the results support the hypothesis that knowledge is a central norm of the human practice of assertion. Nevertheless, the present study has at least two limitations. First, it tested only a single scenario. It is important to investigate whether the same basic pattern occurs for other scenarios. Second, it assumes that Koreans view truth-value as relevant to knowledge. The next experiment addresses both of these limitations by testing a different scenario and also gathering knowledge judgments.

Experiment 2

This experiment expands upon the principal finding from Experiment 1 — the effect of truth-value on assertability judgments — by using a similar manipulation but also asking participants to rate whether the agent in the story knows the proposition. Prior research has found that knowledge judgments significantly predict assertability judgments and mediate the effect of truth-value for American participants (Turri 2015a; see also Turri 2015b). The knowledge-rule hypothesis predicts that such mediation will occur for Koreans too. The study’s design also allows us to confirm the plausible assumption that Koreans, like Americans, view truth-value as relevant to knowledge, and to test whether the principal finding from Experiment 1 replicates using a cover story pertaining to a completely different subject matter.

Method

Participants

One hundred and sixty-seven new Korean participants were tested (aged 20-64 years, mean age = 36 years; 98 female).

Materials and Procedure

Participants were randomly assigned to one of two conditions (true, false) in a between-subjects design. The manipulation and procedures were similar to those from Experiment 1, with two important exceptions: we used a different cover story and included more dependent measures (adapted from Turri 2015a). Here is the text of the story, which pertained to a corporate human resources manager (true/false manipulation in brackets):

YoungMin works in human resources for a company with over ten thousand employees. He cannot keep track of all their names by memory, so he maintains an inventory of them. He keeps the inventory up to date. The inventory isn't perfect, but it is extremely accurate. ¶ Today someone from the Ministry of Justice asked him, "Do you have an employee working for you named Nguyen Tan Dung?" ¶ YoungMin consults his inventory. It says that he does have an employee by that name. [The inventory is accurate, as usual, and Nguyen Tan Dung works for the company. / The inventory is inaccurate, which is unusual, and Nguyen Tan Dung does not work for the company.]

After reading the story, all participants rated their agreement with an assertability attribution:

1. YoungMin should say that an employee by that name works for the company. (should)

Participants then advanced to a new screen and rated their agreement with two other statements:

2. YoungMin knows that an employee by that name works for the company. (know)
3. YoungMin has good evidence that an employee by that name works for the company. (evidence)

Responses were collected on a standard 7-point Likert scale, 1 (“strongly disagree”) – 7 (“strongly agree”), left-to-right on the participant’s screen. The purpose of the evidence evaluation was to provide additional context for evaluating the potential connection between knowledge and assertability. Participants then went to a new screen and answered a comprehension question:

Nguyen Tan Dung _____ work for the company. (does/does not)

Finally, participants advanced to a final screen and completed an attention check, which we added as a further hedge against observed results being attributable to careless reading or responding:

We are interested to know whether you actually take the time to read and respond carefully. If not, then the data we collect based on your responses may be invalid. In order to demonstrate that you read and respond carefully, please answer “no” to the question, “Do you understand these instructions?” Answering “no” to the question will show us that we can trust your responses. Thank you very much. ¶ Do you understand these instructions? (Options: Yes/No)

Results

Ninety-eight Korean participants passed the comprehension question and attention check. The following analyses exclude anyone who failed either item. An independent samples t-test revealed a large effect of truth-value on assertability ratings, $t(96) = 4.00$, $p < .001$, $d = 0.82$, with mean rating higher in the true condition ($M = 4.88$, $SD = 2.11$) than in the false condition ($M = 3.34$, $SD = 1.67$). (See Figure 2.) One sample t-tests revealed that mean assertability rating was significantly above the neutral midpoint ($= 4$) in the true condition, $t(47) = 2.87$, $p = .006$, but significantly below it in the false condition, $t(49) = -2.79$, $p < .008$. Truth-value also affected knowledge judgments, $t(96) = 5.28$, $p < .001$, $d = 1.08$, with mean response higher in the true condition ($M = 5.38$, $SD = 1.73$) than in the false condition ($M = 3.58$, $SD = 1.63$). Similarly, truth-value also affected evidence evaluations, $t(96) = 2.82$, $p = .006$, $d = 0.58$, with mean response higher in the true condition ($M = 4.63$, $SD = 1.79$) than in the false condition ($M = 3.68$, $SD = 1.52$).

To gain insight into the psychological processes informing assertability ratings, we conducted a multiple linear regression analysis that included assertability rating as outcome and assignment to truth-value condition (coded: 0 = false, 1 = true), knowledge judgments, and evidence evaluations as predictors. (See Figure 2.) The model was significant, but only knowledge judgments significantly predicted assertability rating. (See Table 1.) Given the main effect of truth-value on assertability ratings, reported above, this suggests that knowledge attributions mediated the effect of truth-value. To directly test this, we conducted a bootstrap mediation analysis (Hayes 2013). We used assignment to truth-value condition as the independent variable (coded: 0

= false, 1 = true), assertion rating as the outcome, and knowledge judgment as potential mediator. This analysis showed that knowledge judgments completely mediated the effect of truth-value on assertability ratings, $p < .001$, $Z = 3.31$, $R^2 = .12$: indirect effect = 0.82 [0.32, 1.51], direct effect = 0.71 [-0.08, 1.51]. (See Figure 2.) As a point of comparison, we conducted a similar mediation analysis with evidence evaluations substituted for knowledge judgments. This analysis showed that evidence evaluations partially mediated the effect of truth-value on assertability ratings, but the effect size was smaller, $p = .04$, $Z = 2.02$, $R^2 = .06$: indirect effect = 0.33 [0.06, 0.78], direct effect = 1.25 [0.45, 1.97].

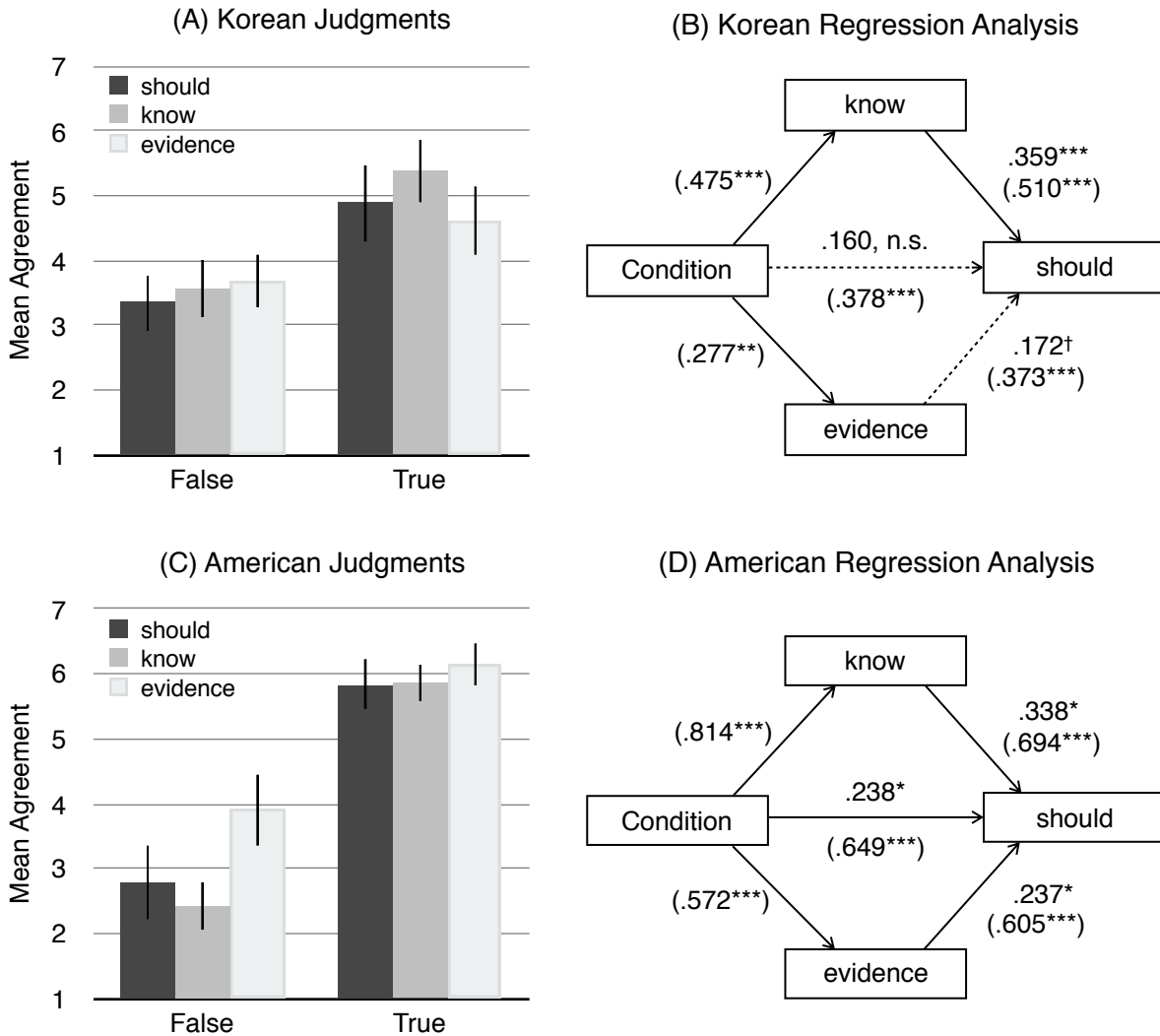


Figure 2. Experiment 2. Panels A and C: mean response to the statements that the agent should assert the proposition (“should”), knows the proposition (“know”), and has good evidence for the proposition (“evidence”) across two cultures. Scales ran 1 (“strongly disagree”) – 7 (“strongly agree”). Error bars represent 95% bootstrapped confidence intervals. Panels B and D: multiple linear regression predicting assertability ratings (“should”) in the two cultures. Parenthetical values represent the strength of a simple regression between the two variables; values outside the parentheses represent the strength of relationships in multiple regression. † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 1. Experiment 2. Multiple linear regression predicting Korean assertability ratings.

Predictor	B	SE (B)	β	t	p
Constant	1.205	0.525		2.30	<.001
Condition	0.649	0.398	0.160	1.63	.106
know	0.386	0.112	0.359	3.44	<.001
evidence	0.205	0.114	0.172	1.80	.075

Note. $F(3, 94) = 13.93$, $p < .001$, $R^2 = .308$. Reference class for Condition: false.

Table 2. Experiment 2. Multiple linear regression predicting American assertability ratings.

Predictor	B	SE (B)	β	t	p
Constant	0.757	0.478		1.58	.116
Condition	1.122	0.552	0.238	2.03	.045
know	0.377	0.147	0.338	2.56	.012
evidence	0.285	0.112	0.237	2.54	.013

Note. $F(3, 101) = 38.40$, $p < .001$, $R^2 = .533$. Reference class for Condition: false.

Back-translation Study

All stimuli were back-translated into English and tested on American participants. Compared to the translations included above, American participants saw the exact same stimuli except for name changes to the characters (“YoungMin” and “Nguyen Tan Dung” became “Michael” and “Natalie Tanner”) and the relevant office (the “Ministry of Justice” became the “Department of Justice”). One hundred and nineteen new Americans (aged 23-69, mean age = 36; 35 female) were tested. One hundred and five American participants passed the comprehension question and attention check. The following analyses exclude anyone who failed either item. To achieve a direct comparison between American and Korean responses, we conducted a two-way multivariate analysis of variance with culture and assignment to truth-value condition as independent vari-

ables and response to the assertability, knowledge, and evidence statements as dependent variables. This analysis revealed main effects of both truth-value, $F(3, 197) = 59.33, p < .001$, Pillai's Trace = .475, and culture, $F(3, 197) = 8.70, p < .001$, Pillai's Trace = .117, and their interaction, $F(3, 197) = 6.31, p < .001$, Pillai's Trace = .088, on the dependent variables. (See Figure 2.) Considering the results for the dependent variables separately, there was a main effect of culture on evidence evaluations, $F(1, 199) = 14.25, p < .001, \eta_p^2 = .067$, but not on knowledge judgments, $F(1, 199) = 2.72, p = .101$, or assertability ratings, $F < 1$. There was a main effect of truth-value condition on evidence evaluations, $F(1, 199) = 47.88, p < .001, \eta_p^2 = .194$, on knowledge judgments, $F(1, 199) = 160.76, p < .001, \eta_p^2 = .447$, and assertability ratings, $F(1, 199) = 77.78, p < .001, \eta_p^2 = .281$. There were also interaction effects on evidence evaluations, $F(1, 199) = 7.95, p = .005, \eta_p^2 = .038$, on knowledge judgments, $F(1, 199) = 15.80, p < .001, \eta_p^2 = .074$, and assertability ratings, $F(1, 199) = 8.54, p = .004, \eta_p^2 = .041$. Again the interactions were due to Americans tending to give more extreme responses, resulting in larger effects of truth-value.

We conducted a multiple linear regression analysis on American assertability ratings in the same way we did for Koreans. The model was significant, but this time all three predictors (knowledge judgments, evidence evaluations, and assignment to truth-value condition) made unique statistically significant contributions. (See Table 2.) We then conducted the same two mediation analyses that we conducted for the Koreans. In the American sample, knowledge judgments partially mediated the effect of truth-value on assertability ratings, $p < .001, Z = 3.93, R^2 = .40$: indirect effect = 1.89 [0.84, 3.21], direct effect = 1.17 [0.05, 2.29]. (See Figure 2.) Evidence evaluations also partially mediated the effect of truth-value on assertability ratings, but the effect

size was smaller, $p < .001$, $Z = 3.51$, $R^2 = .28$: indirect effect = 0.94 [0.46, 1.57], direct effect = 2.12 [1.32, 2.91].

Discussion

Korean participants' judgments about assertability were again strongly affected by truth-value, replicating the principal finding of Experiment 1 and showing that it extends to other scenarios. Importantly, knowledge judgments mediated the effect of truth-value on assertability judgments, which supports the knowledge-rule hypothesis. We also found that Koreans' knowledge judgments and evaluations of evidence are sensitive to truth-value. All of these results replicate findings previously observed in studies on Americans (e.g. Starmans & Friedman 2012; Turri 2015a; see the General Discussion for additional references) and resemble the results from a new replication study on Americans using back-translated materials. As in Experiment 1, we observed a significant cultural difference whereby truth-value had a larger effect on Americans' judgments than on Koreans', for all three judgments studied here (i.e. regarding evidence, knowledge, and assertability). Despite this potentially interesting difference, the central tendency in both cultures was consistent in critical respects.

Experiment 3

This experiment tests whether describing someone as *knowing* or *being certain of* a true proposition affects Koreans' assertability judgments. Prior studies on American participants found that

they viewed knowing as a stronger sign of assertability than certainty is (Turri 2016b; Turri, Friedman & Keefner 2017). The knowledge-rule hypothesis predicts that a similar pattern will occur for Korean participants.

Method

Participants

One hundred and sixty-two new Korean participants were tested (aged 21-69 years, mean age = 39 years; 85 female).

Materials and Procedure

Participants were randomly assigned to one of two conditions (certainty, knowledge) in a between-subjects design. Participants read a simple scenario and recorded several judgments about it (adapted from Turri, Friedman & Keefner 2017). In the scenario, a government agency recently tested the spring water from a mountain and declared it unsafe for drinking. But, actually, the test was inaccurate and the water is perfectly safe to drink. While she is out hiking on the trail, a woman, YoungHee, examines the water. The conditions differed in whether she is described as *knowing* or *being certain* that the water is safe to drink. Here is the text of the scenario:

The local spring water located in a small mountain nearby the town was recently tested and declared unsafe for drinking. However, although it is difficult to tell, the Ministry of Environment botched the test and, as a matter of fact, the water is perfectly safe for drinking. ¶ On a hot summer day, YoungHee decides

to hike the trail in the mountain. She briefly examines the water, and now she [knows/is certain] that the water is safe for drinking.

Participants then answered a question about assertability:

Should YoungHee say to the other hikers that the water is safe for drinking?

Responses were collected using the same seven options used in Experiment 1. Participants then advanced to a new screen and rated their agreement with two statements:

YoungHee knows that the water is safe for drinking.

YoungHee is certain that the water is safe for drinking.

Responses to these two statements were collected on the same 7-point Likert scales as used in Experiment 2 (i.e. 1 “strongly disagree” – 7 “strongly agree”). The purpose of these items was to check whether participants’ own evaluations of knowledge or certainty contributed to their assertability ratings, over and above any effect associated with assignment to condition (i.e. with their *being told* that the agent “knows” or “is certain”). Participants then advanced and, on separate screens, answered a comprehension question regarding a key detail of the case,

In fact, the water is _____. (safe/unsafe)

and the same comprehension check used in Experiment 2.

Results

Eighty-one Korean participants passed the comprehension question and attention check. The following analyses exclude anyone who failed either item. An independent samples t-test revealed a medium effect of mental state (certainty versus knowledge) on assertability ratings, $t(79) = -2.39$,

$p < .019$, $d = 0.54$, with mean rating lower in the certainty condition ($M = 3.88$, $SD = 1.45$) than in the knowledge condition ($M = 4.59$, $SD = 1.22$). (See Figure 3.) One sample t-tests revealed that mean assertability rating was significantly above the neutral midpoint ($= 4$) in the knowledge condition, $t(48) = 3.39$, $p = .001$, but no different from the midpoint in the certainty condition, $t(31) = -0.49$, $p = .630$.

To gain insight into the psychological processes informing assertability ratings, we conducted a multiple linear regression analysis that included assertability rating as outcome and assignment to mental-state condition (coded: 0 = certainty, 1 = knowledge), knowledge judgments, and certainty judgments as predictors. The model was significant, and knowledge judgments and assignment to condition significantly predicted assertability rating. (See Table 3.) Certainty attributions did not have independent predictive value.

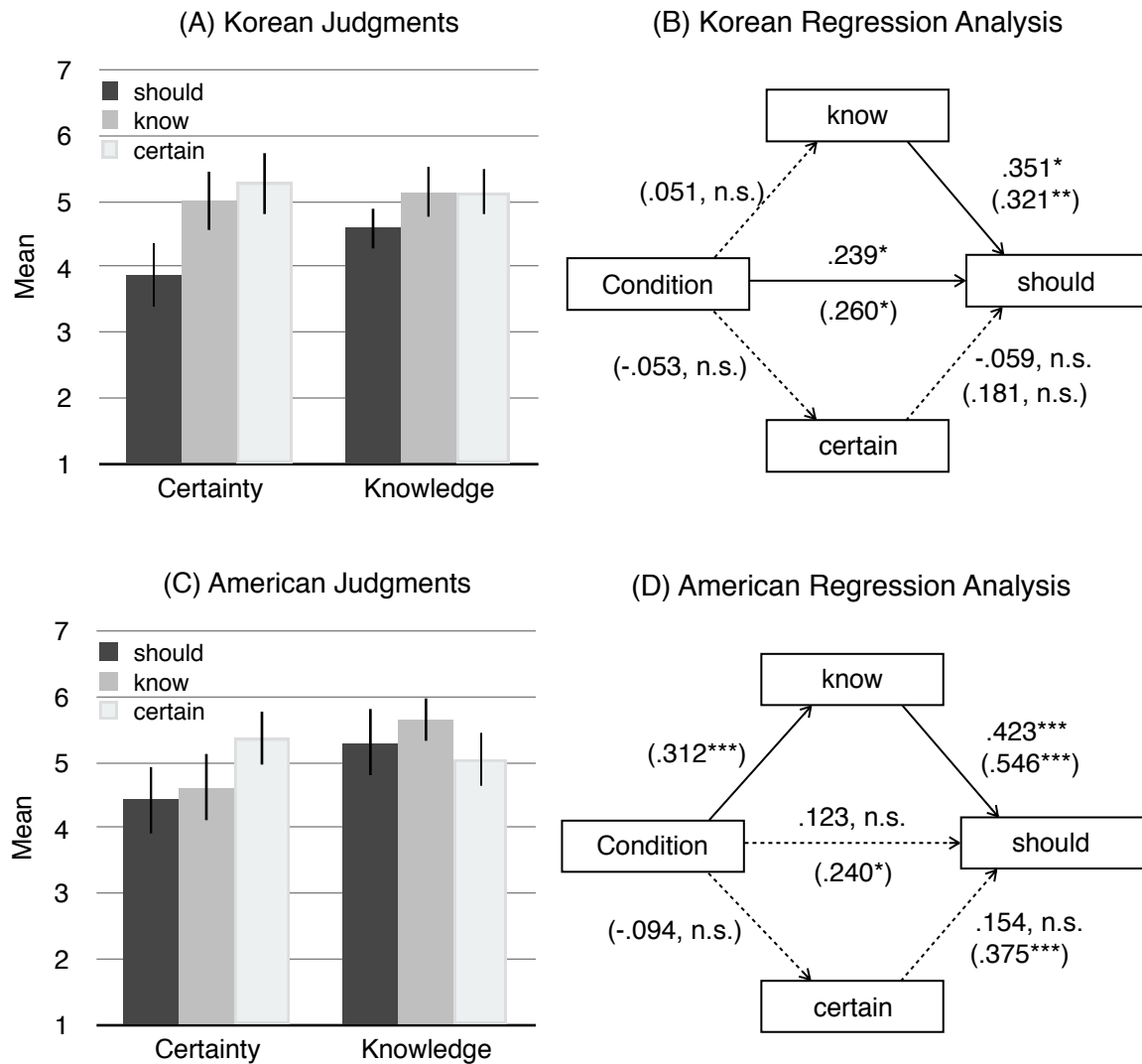


Figure 3. Experiment 3. Panels A and C: mean response to the statements that the agent should assert the proposition (“should”), knows the proposition (“know”), and is certain of the proposition (“certain”). Scales ran 1–7. Error bars represent 95% bootstrapped confidence intervals. Panels B and D: multiple linear regression predicting assertability ratings (“should”). Parenthetical values represent the strength of a simple regression between the two variables; values outside the parentheses represent the strength of relationships in multiple regression. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3. Experiment 3. Multiple linear regression predicting Korean assertability ratings.

Predictor	B	SE (B)	β	t	p
Constant	1.807	0.776		2.33	.022
Condition	0.659	0.290	0.239	2.27	.026
know	0.348	0.149	0.351	2.33	.022
certain	-0.062	0.160	-0.059	-0.39	.698

Note. $F(3, 77) = 5.05$, $p = .003$, $R^2 = .164$. Reference class for Condition: certainty.

Table 4. Experiment 3. Multiple linear regression predicting American assertability ratings.

Predictor	B	SE (B)	β	t	p
Constant	0.944	0.685		1.38	.171
Condition	0.455	0.112	0.423	4.04	<.001
know	0.451	0.323	0.123	1.40	.165
certain	0.175	0.113	0.154	1.55	.125

Note. $F(3, 110) = 17.11$, $p < .001$, $R^2 = .318$. Reference class for Condition: certainty.

Back-translation Study

All stimuli were back-translated into English and tested on American participants. Compared to the translations included above, American participants saw the exact same stimuli except that the character was named “Heather” and the relevant office was “the health department.” One hundred and twenty new Americans (aged 20-78, mean age = 37; 53 female) were tested. One hundred and fourteen American participants passed the comprehension question and attention check. The following analyses exclude anyone who failed either item. To achieve a direct comparison between American and Korean responses, we conducted a two-way multivariate analysis of variance with culture and assignment to mental-state condition (certainty, knowledge) as independent

variables and response to the assertability, knowledge, and certainty statements as dependent variables. This analysis revealed main effects of mental state, $F(3, 189) = 9.04$, $p < .001$, Pillai's Trace = .125, and culture, $F(3, 189) = 2.79$, $p = .042$, Pillai's Trace = .042, and their interaction, $F(3, 189) = 3.07$, $p = .029$, Pillai's Trace = .046, on the dependent variables. (See Figure 3.) Considering the results for the dependent variables separately, there was a main effect of culture on assertability ratings, $F(1, 191) = 7.13$, $p = .008$, $\eta_p^2 = .036$, but not on knowledge attributions or certainty attributions, $F_s < 1$. There was a main effect of mental-state condition on assertability ratings, $F(1, 191) = 11.26$, $p < .001$, $\eta_p^2 = .056$, and on knowledge attributions, $F(1, 191) = 7.14$, $p = .008$, $\eta_p^2 = .036$, but not on certainty attributions, $F(1, 191) = 1.02$, $p = .314$. There was an interaction effect on knowledge attributions, $F(1, 191) = 4.16$, $p = .043$, $\eta_p^2 = .021$, but not on assertability ratings or certainty attributions, $F_s < 1$. Similar to the Koreans, one sample t-tests on American assertability ratings revealed that mean response was significantly above the neutral midpoint (= 4) in the knowledge condition ($M = 5.31$, $SD = 1.64$), $t(57) = 6.10$, $p < .001$, but no different from the midpoint in the certainty condition ($M = 4.43$, $SD = 1.95$), $t(55) = 1.64$, $p = .106$.

We conducted a multiple linear regression analysis on American assertability ratings in the same way we did for Koreans. The model was significant, but this time only knowledge attributions made unique statistically significant contributions. (See Table 4.) Like the Korean model, certainty attributions did not have independent predictive value. Unlike the Korean model, assignment to mental-state condition did not have independent predictive value either.

Discussion

Korean participants' judgments about assertability were significantly affected by the difference between being told that an agent "knows" or "is certain" of a true proposition. More specifically, when the agent was described as knowing, participants were more likely to judge that the agent should assert the proposition. In this same context, participants' judgments about whether the agent knew significantly predicted their judgments about assertability, but their judgments about whether the agent was certain did not. These results replicate findings previously observed in studies on Americans and resemble the results from a new replication study on Americans using back-translated materials. These findings further support the knowledge-rule hypothesis.

General Discussion

This paper tested the hypothesis that knowledge is a central norm of the human practice of assertion ("the knowledge-rule hypothesis"). Prior research on American anglophones supports the hypothesis. But the hypothesis predicts that the link between knowledge and assertability (i.e. whether someone should make an assertion) is robust across human cultures and languages. To test this prediction, we conducted three experiments on Korean speakers. In each case, the results supported the hypothesis.

We made three principal findings. First, we found that a proposition's truth-value affects

Koreans' assertability judgments (Experiments 1 and 2). More specifically, the central tendency was to judge that a false proposition should not be asserted, whereas a true proposition should be asserted, even though the source of the speaker's information was objectively the same in both cases. Second, we found that Koreans' own judgments about whether the speaker knows the proposition significantly predicted their assertability judgments and, indeed, completely mediated the effect of truth-value on assertability judgments; by contrast, when controlling for the influence of knowledge judgments, Koreans' evaluation of the speaker's evidence for the proposition did not predict their assertability judgments (Experiment 2). Third, we found that describing an agent as "knowing" or being "certain" of a true proposition affected Koreans' assertability judgments. More specifically, we found that when an agent is described as "knowing" the proposition, Koreans were significantly more likely to judge that the person should make the assertion (Experiment 3). Moreover, in this same context, Koreans' own judgments about whether the agent knows significantly predicted their assertability judgments, whereas their judgments about whether the agent is certain did not.

These findings replicate results previously observed in Americans (see the introduction to each experiment for references) and were further corroborated by three new replication studies on Americans using back-translated materials. Overall, these findings provide convergent evidence of a strong link between knowledge and assertability in Korean language and culture, and consequently they support the knowledge-rule hypothesis. More specifically, they support the conclusion that there is a core, species-typical human information-sharing practice of assertion, and that knowledge is a central norm of this practice.

Despite supporting the knowledge-rule hypothesis, the present research has limitations and does not prove that the hypothesis is true. First and foremost, the knowledge-rule hypothesis's predictions are not limited to Koreans and Americans. We chose Korean because it provides a very strong initial test of the hypothesis (see the Introduction for discussion), but it is relevant to test for similar patterns in other languages too. Second, although we tested several very different scenarios and consistently observed results that support the knowledge-rule hypothesis, it could be informative to test even more scenarios. Perhaps the connection between knowledge and assertability can be weakened in different ways in different cultures. Third, we compared the effect of knowledge judgments on assertability judgments to the effects of judgments about evidence and certainty, and we found that knowledge judgments were the strongest predictor of assertability judgments. These comparisons provide useful context for evaluating the connection between knowledge and assertability. But it could be informative to conduct comparisons with other judgments too. In all these ways, and others too, further research is needed to continue advancing our understanding of the underlying issues.

In the context of finding importantly similar central tendencies in assertability judgments by Koreans and Americans, we also observed some differences. In particular, Americans were typically more likely to record extreme responses when asked to rate assertability, knowledge, and quality of evidence. Accordingly, even though truth-value had a large effect on these judgments for Koreans, it tended to have an even larger effect for Americans. For example, in Experiment 1, the effect size of truth-value on Korean assertability ratings ($d = 1.31$) was very large by conventional standards (Ellis 2010), yet it was over twice as large for Americans ($d = 2.69$). This could

be due to cultural differences in the degree to which assertability is linked to knowledge. For example, there could be some vagueness or flexibility in the basic rule linking assertability to knowledge, which could be addressed differently across cultures. Consistent with that, the cultural differences we observed could be partly due to purely linguistic differences in culturally reinforced tendencies toward understatement or overstatement (Chen, Lee & Stevenson 1995), or it could reflect underlying psychological differences in salient reference classes relevant to social evaluations (Heine, Lehman, Peng & Greenholtz 2002), willingness to assign credit or blame (Hamilton, Blumenfeld, Akoh & Miura 1990), or willingness to tolerate potentially conflicting information (Hamamura, Heine & Paulhus 2008), among other possibilities, such as differences in handling anxiety or uncertainty (Gudykunst 1995; Smith 2016). The present research was not designed to evaluate these possibilities — or, it is worth noting, analogous questions pertaining to the link between assertability and knowledge across the human lifespan — but we welcome future work that does. For present purposes, we emphasize that the knowledge-rule hypothesis does not predict an absence of cultural differences in information-sharing practices. Instead it predicts a detectable central tendency to link judgments about what should be said to what is known across human language and cultures, which is supported by the present findings.

Prior research in cross-cultural epistemology has found similarities between the folk epistemologies of Americans and Koreans (Kim & Yuan, ms.). For instance, Americans and Koreans are more likely to attribute knowledge based on perception than on probabilistic inference (Friedman & Turri 2015; Kim & Yuan, ms), are less likely to attribute knowledge when certain forms of luck affect an agent's evidence (Starmans & Friedman 2012; Kim & Yuan, ms.), and are

more likely to attribute knowledge of harmful outcomes than beneficial ones (Beebe & Buckwalter 2010; Kim & Yuan, ms.). The present research extends the list of similarities between American and Korean folk epistemologies, in two ways. First, we found that when a proposition is false rather than true, it significantly lowers the rate of knowledge attribution among Koreans, even when all other objective features of the situation are held constant (Experiments 1 and 2). This same pattern has been repeatedly observed in Americans (e.g. Starman & Friedman 2012; Buckwalter 2014). Second, we found that when a proposition is false rather than true, it significantly lowers Koreans' evaluation of the evidence supporting it, even when all other objective features of the situation are similar (Experiment 2). This same pattern has been repeatedly observed in Americans (e.g. Turri 2015a; Turri 2015b). The present findings thus deepen our appreciation for the cross-cultural stability of core folk epistemological judgments pertaining to knowledge, truth, and evidence. As a result, the findings lend further support to the hypothesis that humans worldwide share a suite of species-typical folk epistemological concepts (Machery, Stich, Rose, et al. 2015; Turri 2015c; Kim & Yuan ms; Machery, Stich & Rose 2017; Rose, Machery, Stich, et al. in press.).

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Appendix

Table A1. Descriptive statistics for assertability ratings in Experiment 1.

Condition	Korean					American				
	N	M	Md	Mo	SD	N	M	Md	Mo	SD
False	53	4.74	5	5	1.24	62	6.23	7	7	1.23
True	50	2.98	3	2	1.46	64	2.41	2	1	1.60

Table A2. Descriptive statistics for all dependent measures in Experiment 2.

Condition	Korean					American				
	N	M	Md	Mo	SD	N	M	Md	Mo	SD
False	50					50				
should		3.34	4	4	1.67		2.78	2	1	2.07
know		3.58	4	3	1.63		2.42	2	2	1.36
evidence		3.68	4	4	1.52		3.90	4	6	1.98
True	48					55				
should		4.88	5	7	2.11		5.84	6	7	1.53
know		5.38	6	7	1.73		5.85	6	6	1.11
evidence		4.63	5	4	1.79		6.16	7	7	1.21

Table A3. Descriptive statistics for all dependent measures in Experiment 3.

Condition	Korean					American				
	N	M	Md	Mo	SD	N	M	Md	Mo	SD
Certainty	32					56				
should		3.88	4	3	1.45		4.43	5	3	1.95
know		5	5	5	1.32		4.61	5	6	1.94
certain		5.28	5	5	1.35		5.36	6	6	1.59
Knowledge	49					58				
should		4.59	5	5	1.22		5.31	5.5	7	1.64
know		5.14	5	4	1.41		5.67	6	6	1.28
certain		5.14	5	4	1.24		5.05	5.50	6	1.66

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Supplemental File

This file contains all the stimuli, in Korean, used in the three experiments

Experiment 1

세영은 우표수집가입니다. 그녀는 세계 많은 나라에서 발행한 천 장도 넘는 많은 우표를 가지고 있습니다. 그녀는 모든 우표를 기억하는데 어려움을 느낍니다. 그래서 그녀는 우표 목록을 작성했습니다. 비록 목록이 완벽하지는 않지만, 매우 정확합니다.

오늘 세영의 친구는 그녀에게 물었습니다. “세영아, 년 1956년 멜버른 올림픽 기념 우표를 가지고 있니?”

세영은 우표 목록을 보았습니다. 우표 목록은 그녀가 1956년 멜버른 올림픽 기념 우표를 가지고 있다고 합니다. [여느 때와 같게 그녀의 목록은 정확했고 그녀는 우표를 가지고 있었습니다. / 여느 때와는 다르게 그녀의 기록은 달랐고 그녀는 실제로 우표를 가지고 있지 않았습니다.]

질문: 세영은 1956년 멜버른 올림픽 기념 우표를 가지고 있다고 말해야 할까요?

- 절대로 말하면 안 된다. (1)
- 말하면 안 된다.
- 말하면 안 될 거 같다.
- 잘 모르겠다.
- 말해도 될 거 같다.
- 말해도 된다.
- 반드시 말해야 한다. (7)

세영은 1956년 멜버른 올림픽 기념 우표를 가지고 _____.

- 있었다.
- 있지 않았다

Experiment 2

영민은 만 명이 넘는 직원이 있는 회사의 인사부에서 일합니다. 그는 모든 직원의 이름을 외울 수 없어서 목록을 작성해서 사용합니다. 그는 목록을 항상 수정 보완합니다. 목록은 완벽하지 않아도, 상당히 정확합니다.

오늘 법무부에서 사람이 찾아와 영민에게 물었습니다. “응유엔 떤 둥이란 직원이 일하고 있습니까?”

영민은 목록을 보았습니다. 목록에는 응유엔 떤 둥이란 사람이 일하고 있는 것으로 나옵니다. [여느 때와 같게 그의 목록은 정확했고 응유엔 떤 둥은 회사에서 일하고 있었습니다. / 여느 때와는 다르게 그의 기록은 달랐고 응유엔 떤 둥은 회사에서 일하고 있지 않았습니다.]

- 영민은 그 직원이 회사에서 근무하고 있음을 말해야 합니다.
- 영민은 그 직원이 회사에서 근무하고 있음을 압니다.
- 영민은 그 직원이 회사에서 근무하고 있다는 신뢰할 수 있는 증빙을 가지고 있습니다.

응유엔 떤 둥은 회사에서 일하고 _____.

- 있습니다.
- 있지 않습니다

귀하가 시간을 내서 본 설문을 읽고 주의 깊게 대답했는지 알기를 원합니다. 만약 그렇지 않다면, 우리가 받은 대답은 의미가 없을 수 있습니다. 귀하가 여러 문제를 읽고 조심스럽게 대답했는지 알기 위해 밑에 “이 지시를 이해하셨나요?”에 “아니요”를 선택해 주세요. “아니요”로 대답하셨을 경우 귀하의 대답을 신뢰할 수 있음을 알 수 있습니다. 감사합니다.

이 지시를 이해하셨나요? [네/아니요]

Experiment 3

동네 작은 산에 있는 약수를 조사한 결과, 물은 마시기에 적합하지 않다고 공표되었습니다. 하지만, 비록 알기는 힘들어도, 환경부에서 실험 중 실수를 했고, 실제로 물은 마시기에 적합했습니다.

더운 여름날에 영희는 동네 작은 산으로 가기로 정했습니다. 그녀는 약수를 보았고, 마실 수 있는 물[인줄/로] [알았습니다/확실했습니다].

- 문제: 영희는 다른 등산객들에게 물을 마셔도 된다고 해야 합니까?
 - 절대로 말하면 안 된다. (1)
 - 말하면 안 된다.
 - 말하면 안 될 거 같다.
 - 잘 모르겠다.
 - 말해도 될 거 같다.
 - 말해도 된다.
 - 반드시 말해야 한다. (7)
- 문제: 영희는 물을 마셔도 안전하다고 알고 있습니다.
- 문제: 영희는 물을 마셔도 안전하다고 확신하고 있습니다.

사실 약수는 안전_____. [합니다/하지 않습니다]

귀하가 시간을 내서 본 설문을 읽고 주의 깊게 대답했는지 알기를 원합니다. 만약 그렇지 않다면, 우리가 받은 대답은 의미가 없을 수 있습니다. 귀하가 여러 문제를 읽고 조심스럽게 대답했는지 알기 위해 밑에 “이 지시를 이해하셨나요?”에 “아니요”를 선택해 주세요. “아니요”로 대답하셨을 경우 귀하의 대답을 신뢰할 수 있음을 알 수 있습니다. 감사합니다.

이 지시를 이해하셨나요? [네/아니요]