You Understand, So I Understand:

How A "Community of Knowledge" Shapes Trust in Expert Evidence

by

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ABSTRACT

This experiment uses the Community of Knowledge framework to better understand how jurors interpret new information (Sloman & Rabb, 2016). Participants learned of an ostensibly new scientific finding that was claimed to either be well-understood or not understood by experts. Despite including no additional information, expert understanding led participants to believe that they personally understood the phenomenon, with expert understanding acting as a cue for trustworthiness and believability. This effect was particularly pronounced with low-quality sources. These results are discussed in the context of how information is used by jurors in court, and the implications of the “Community of Knowledge” effect being used by expert witnesses.

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INTRODUCTION

Sloman and Rabb (2016) proposed the existence of an effect, called the "community of knowledge" effect, or CK effect. The effect occurs when a person is told that another person understands how something works, and results in the person receiving this information to think that they also understand how it works without actually receiving an explanation. This newly-identified effect, in isolation, is a simple social-cognitive psychology theory that explains how people rely on one another for information. However, when put into the legal context, the CK effect is an example of how unrelated information can influence decision-making in high-stakes legal cases. To explore the CK effect, a review of related literature will be discussed. Then, literature highlighting the consequences of such effects in legal decision-making will be reviewed. Lastly, an experiment further exploring the CK effect will be presented, including a discussion of the findings and future directions for other social and legal psychology researchers to consider.

Community of Knowledge

In the study by Sloman and Rabb, a series of within-group studies were conducted in which researchers presented participants with news briefs describing novel scientific findings and measured participants' perceptions of understanding and ability to explain how the novel scientific finding worked following each news brief. The news briefs varied in the type of novel scientific finding that was discovered (e.g. triangular lightning, glowing rocks, humming stalactites), difficulty in understanding how the phenomenon worked (using statements of the scientific finding being easy or difficult to understand), whether the discovering scientists understood and could explain how it worked (using statements of whether experts understood how the scientific finding worked), and accessibility of the information (e.g. information that was classified by the FBI or publicly available in a journal).

Results demonstrated that participants were significantly more likely to perceive themselves as understanding how the novel scientific finding worked when they were told that discovering scientists understood and could explain how the scientific phenomenon worked. These results were stable across the different types of novel scientific findings and were moderated by the perceived accessibility of the novel scientific information – participants did not perceive themselves as able to understand how the novel scientific finding worked if they were told that such information was classified by the FBI (Sloman & Rabb, 2016).

This effect, which they coined the "Community of Knowledge" effect, or CK effect, described the perception of understanding novel information to an extent where one could explain how it works, without having enough factual information to reasonably do so. In the original study, the effect persisted across multiple news briefs within participants. At first glance, this effect resembles that of the "illusion of explanatory depth," as originally posited by Rozenblit and Keil (2002). The illusion of explanatory depth happens when participants are asked to explain a topic or idea they perceive themselves as knowledgeable on through an explanation task. After completing the explanation task, participants realize they are unable to explain their chosen topic as well as they originally thought. This results in high scores of perceived ability to understand prior to the explanation task, and low scores of perceived ability to understand after the explanation task. The CK effect uses the same dependent variables and has similar outcomes as those in illusion of explanatory depth research.

Despite these similarities, Sloman and Rabb (2016) did not address the potential for the effect to be susceptible to adjustment the way the illusion of explanatory depth is, suggesting the effect is more so a static bias than a perceptual cue. If this is the case, then other researchers should take interest in this finding, as it has implications for other contexts. If a person only needs another person to state that they understand and can explain something to feel that they also understand and can explain the same scientific information, people's decision-making may be influenced this effect rather than by critical facts about the scientific information, such as whether the scientific information applied the scientific method and other possible explanations were ruled out.

Before it described a social-cognitive effect, the "community of knowledge" referred to the philosophical idea that the meaning of words and concepts are developed within a community (Welbourne, 1981). In a review of John Locke's theory on communication and meaning, Welbourne proposes the existence of ideas within a social framework dependent upon trustworthiness and believability. According to Putnam (1975), in order for an idea to gain meaning within a community, it must draw on its very essence or core idea (Medin & Ortony, 1989), and one's outside knowledge of the idea (Wilson, 2002). Thus, Welbourne's theory is a synthesis of these concepts.

Empirical evidence of this concept dates back as early as 1987, when participating couples completed a task in which they gave instructions on how to complete everyday tasks, such as changing the oil on a vehicle (Wegner, 1987). In doing so, the partner who perceived themselves as less knowledgeable about the task relied on their partner to give instructions. For example, when asked to explain how to change a car's oil, the female partner relied on the male partner to give instruction, as the female partner perceived the male partner as more knowledgeable about the given task (Wegner, 1987). Further, participant groups tasked with recalling words or other information were observed relying upon other participants in the group to recall the information that they themselves could not remember (Wegner, 1995). A limitation to these findings is that participants' dependence upon their peers could be interpreted as social loafing, however if participants exerted the same effort into the memory recall as their peers, this point would be moot.

Support for the community of knowledge was demonstrated not only in memory recall tasks, but also in explanatory tasks, such as that used by Fernbach and colleagues (Fernbach, Rogers, Fox, & Sloman, 2013). Participants answered questions about their tendencies toward political extremism and understanding of various social policies, then wrote a detailed explanation of a social policy that they reported being knowledgeable about. After doing so, participants again rated political extremism and understanding. Results demonstrated that participants' ratings of understanding lowered, as they realized that they could not fully explain the social policy that they had personally endorsed their understanding of. Additionally, results demonstrated lower rates of political extremism after the explanation exercise, highlighting the potential consequences of such tasks on personal attitudes.

Although there is evidence supporting the existence of a community of knowledge, there are competing theories that could potentially explain findings in Community of Knowledge research. For example, there is research supporting the idea that people develop their own self-concept based on information from others. Goldstein & Cialdini (2007) primed participants to identify with an actor, during which time they observed the actor's behavior during the study. After completing this task, participants then answered questions about their own attributes and self-concept. Results demonstrated that participants incorporated attributes of the actor into their own self-concept when they were primed to identify with the actor.

These results are similar to those found by Sloman and Rabb (2016) in that they both demonstrate situations in which people incorporate another person's traits or knowledge into their own traits or knowledge. Goldstein and Cialdini (2007) argue that this occurs because people infer their own attributes by observing other people with whom they have a merged identity, such as friends or family with whom they have things in common. Applying this theory to the CK study, participants' increased perceptions of understanding and ability to explain would be the result of identifying with the researchers that discovered the novel scientific finding, the university they study at, or even the publishing source of the finding, and then adopting the knowledge into one's own attributes or self-concept.

Considering existing literature and findings by Sloman and Rabb (2016) together, two research questions emerge: is the CK effect a reliable effect, and is it susceptible to peripheral cues the same way other decision-making processes are?

The Elaboration Likelihood Model

The elaboration likelihood model as originally posited by Petty and Cacioppo (cited in Petty & Brinol, 2012) is a split-pathway framework within which people make decisions and change attitudes. The model is created on the foundation that people effectively make decisions or change their attitude based on their motivation and ability to do so.

One pathway within which the ELM operates is the central pathway. When a person is highly interested in a topic, they are motivated to be informed on it and more likely to pay attention to factual information, or central cues, which would help them make an informed decision on the topic. Additionally, when someone is able to make an effective decision because they are well-rested, focused, and can understand the information, they are more likely to use central cues, as they are relevant to their decision.

The second pathway within which the ELM operates, the peripheral pathway, states that when someone is not motivated to make an informed decision on a topic, or there are circumstances making them less able to make an informed decision, they rely on peripheral cues to make decisions. Peripheral cues include information that is irrelevant to the decision being made. For example, when deciding on which realtor to use in selling a house, peripheral cues would include details like the amount of smiling the realtor did or the color of their blouse, as opposed to the number of homes they have sold and their reputation around town.

Early studies on the elaboration likelihood model demonstrated the use of cues that are peripheral, or aside from the primary information needed, in decision making. One study explored the use of information quality as a cue and found that attitudes regarding an argument topic were stronger and more-supported in study conditions that were high-thinking versus low-thinking (Petty et al., 1981 as cited in Petty & Brinol, 2012). Further, information on the source quality (whether the argument was made by an educational publication from a university compared to a local high school student's essay) mattered less in high-thinking conditions.

Similar studies in legal settings suggest similar uses of peripheral cues in legal decision making. For example, one study aimed to explore whether testimony delivery (in person or through closed-caption television) influenced jurors' ability to make an informed decision regarding the case (Orcutt et al., 2001). Results indicated that regardless of the testimony delivery type, jurors were less likely to convict the defendant when they detected deception in the child's testimony. In this study, testimony delivery type was used as a peripheral cue while child detection was used as a central cue. Testimony delivery did not influence rational legal decision-making, suggesting that testimony delivery type does not act as a peripheral cue the same way source quality did in previous studies.

Another study explored evidence testimony type and its influence on jury decision making (McQuiston-Surrett & Saks, 2009). These researchers found that jurors were more likely to believe a piece of forensic evidence came from the defendant when it was presented using different styles of forensic science testimony. Some styles of forensic science testimony included providing jurors with a statement that the evidence is a match or a statement that the evidence is “similar in all microscopic characteristics.” earchers also found that jurors who believed the forensic evidence came from the defendant were more likely to view the evidence as incriminating. In this study, the type of forensic science testimony (different ways of delivering the same evidence) was the peripheral cue, as it led to differences in belief of where the evidence came from, and how incriminating the evidence was.

Legal Context

If the CK effect is in fact a static bias, as the research suggests thus far, there are implications depending on the context within which the effect is found. In criminal court trials, jury members and judges are present to make legal decisions regarding the case and the defendant (U.S. Const. Amend. VI). In making these decisions, jury members and judges rely on testimony evidence to make informed decisions about a criminal court case. Testimony evidence can come from a variety of people, including victims, witnesses, and experts in relevant fields.

Expert witnesses, as defined by the Federal Rules of Evidence (2000), is a person who serves as a witness in a case that is qualified as an expert through their education, experience, training, skill, or knowledge in a topic that is scientific or otherwise in nature. If the expert’s specialized knowledge will help the jury and judge understand the case or determine facts, they are permitted to testify - assuming their testimony is based on a sufficient amount of data or facts and is the product or application of sound principles and methods (Federal Rules of Evidence, 2000).

When expert witnesses are permitted to testify, they are only permitted to provide opinions that can help determine facts – they cannot provide actual answers to legal questions, such as whether the defendant was insane at the time of the offense or if the defendant should be found guilty of the crime. Because of their specialized nature and unique roles within a court case, expert witnesses have the responsibility of presenting information that is novel to jurors, complicated in nature, or specific to their own expertise. This makes juror understanding and interpretation of the evidence difficult, to the point where some jurors or judges, also known as fact finders, are unable to understand the testimony evidence.

Fact Finders

Judges and jury members act as fact finders in criminal court cases, where they make decisions of guilt based on the facts of the case (U.S. Const. Amend. VI). Facts of the case are presented by those representing either the prosecution or the defense in a case, as well as the witnesses testifying in the case. Fact finders are trusted to determine facts effectively with the information they are presented; however, evidence suggests that effective decision-making as a jury member, and as a judge, is harder than one would hope.

A judge's role in a case is to determine evidence admissibility if it is challenged by one of the sides, either the prosecution or the defense, of the case (Federal Rules of Evidence, 2000). If the evidence of a case is deemed relevant and trustworthy, the evidence is presented during trial, where both judge and juror determine the facts of the case. Two hallmark cases resulted in case law providing guidance for judges to determine evidence admissibility. One case, *Frye v. United States* (1923), set the earliest precedent for evidence admissibility. The courts ruled that scientific evidence must be “generally accepted” within its scientific community to be admitted into a trial. The case law provided structure for judges to ensure unreliable or poor scientific testimony was rejected from court cases. Shortcomings of the “Frye test” included its inability to allow new, but reliable, scientific evidence or methods into court (Billings, 2001).

The *Federal Rules of Evidence*, originally written in 1975, later recommended new guidelines for evidence admissibility in federal courts, setting forth more specific standards that would further limit the amount of bad scientific evidence being permitted into court and modeling effective evidence admissibility guidelines for other jurisdictions (Billings, 2001). Although these guidelines were strong and theory-based, they were not binding for judges and jurisdictions outside of the federal level, such as city and state courts.

The second case to determine evidence admissibility guidelines for judges was *Daubert v. Merrill Dow Pharmaceuticals, Inc.* (1993). The case decision affirmed the guidelines originally published in the *Federal Rules of Evidence* (2000) and instructed judges on how to act as a “gatekeeper” of evidence for the courtroom to attempt to protect jurors from being exposed to poor science. The decision outlined four criteria for judges to consider when evaluating scientific evidence admissibility: the scientific method or fact needs to be 1) tested, reliable, and valid, 2) accepted by the scientific community in which it is used, 3) subjected to a peer-review process, and 4) have an error rate that is within an acceptable range.

Under the most recent precedent for determining evidence admissibility, judges have clearer guidelines on what should be admitted, protecting other fact finders from being exposed to information that would unfairly influence their decisions. However, according to Kovera and McAuliff (2000), the precedent is not effective in protecting jurors from flawed science on its own. A study was conducted to determine judges' ability to make evidence admissibility decisions using admissibility standards, particularly when flawed science was present, and when the judge had some type of formal scientific training (e.g. taken a graduate-level science course, completed a Continuing Education course on scientific methods). Researchers found that only 17% of judges allowed scientifically valid testimony into trial that judges with formal scientific training had higher admissibility ratings for the scientifically valid testimony, and judges with no formal scientific training had higher admissibility ratings for the scientifically flawed testimony.

Given that judges continue to have difficulty with effective decision making after receiving clear guidelines on how to do so, there is evidence of other factors influencing decision-making. As mentioned previously, peripheral cues are an example of other factors that may lead to less effective decision making when people, in this case fact finders, are unable or unmotivated to use effective decision-making techniques.

Expert Testimony and Juror Bias

Despite efforts by expert witnesses to maintain the objectivity of their testimony, juror and judge bias cause undue influences on decisions made using expert testimony evidence. In civil court cases, it is evident that expert race and gender influence the persuasiveness of the expert's testimony (Memon & Shuman, 1998). After reviewing the summary, audiotapes, and slide presentations of a case, jurors were most persuaded by black female experts' testimony. Although this particular study's results are not consistent with similar study results on the influence of witness gender and race on persuasion, it demonstrates the potential for jurors to be influenced by information irrelevant to the expert's credibility. Additionally, eye contact behavior can influence juror perceptions of expert credibility (Neal & Brodsky, 2008). Participants watched a video portraying an expert reading a trial expert, the videos differing by expert gender and amount of eye contact used by the expert (low, medium, high). Jurors indicated that experts with high eye contact, irrespective of gender, was perceived as more credible.

Evidence suggests that even different types of testimony evidence – such as testimony on particular psychological theories – elicit stereotype biases that influence juror decisions. Schuller and Vidmar (1992) demonstrated that battered woman syndrome evidence reminds jurors of the stereotyped "battered woman," leading to juror decisions based off of the stereotyped concept of a battered woman as opposed to the defendant's unique case and facts provided in the testimony.

Different testimony styles – such as the way in which an expert ties research back into the trial case – can influence the way jurors make a decision on the case. Juror participants received group probability data from an expert witness's testimony in a rape case, with the testimony varying in whether it connected the group probability data back to the trial case (Brekke & Borgida, 1988). Participants used the group probability data from the testimony most when the expert connected the group probability data back to the trial case, particularly when this was done earlier in the testimony as opposed to later.

The effects of some types of evidence have not been clearly supported by research, as their effect on fact finder decisions appear unclear. Neuroevidence, for example, was originally thought to have an unusually persuasive power over jury members when used in expert testimony (McCabe & Castel, 2008). Researchers presented participants with brain images and the trial content in a script, then measured expert witness credibility. Results indicated that the presence of brain images resulted in an increase in expert witness credibility. Later studies demonstrated the general lack of such an effect in both replication and original study designs (Schweitzer, Baker, & Risko (2013).

Testimony complexity can serve as a central cue in jury decision making, as it changes the ability of jurors to make effective decisions. After viewing a trial video including scientific evidence presented by experts, participants reported being more persuaded by an expert's professional credentials, such as degree and certifications, when the expert's testimony was complex (Cooper et al., 1996). Another study resulted in an interaction between expert gender and testimony complexity was found when participants evaluated a civil case involving an antitrust price-fixing agreement (Schuller, Terry, & McKimmie, 2005). Mock jurors found the male expert to be more persuasive when the expert's testimony was complex, and the female expert more persuasive when the expert's testimony was simple.

Although expert witnesses are not at fault for the biases of others, it is critical that experts understand biases so that they can be accounted for in one's testimony. When experts neglect to incorporate bias research into their testimony evidence, they risk misinterpretation of their novel, complex testimony – which can lead to ineffective, permanent decisions.

Current Study

To answer the questions posed herein, an online survey was created to measure the effects of expert understanding and source quality on perceptions of understanding, ability to explain, trust, and believability of a novel scientific finding. The study hypotheses included the following: 1) participants' perceived understanding and ability to explain a novel scientific finding will increase when an expert claims to understand and have the ability to explain how a novel scientific finding works, 2) participants' perceptions of source trustworthiness and believability will increase when the novel scientific finding is published in an academic journal compared to a local newspaper, and 3) the CK effect will be stronger when the novel scientific finding is published in an academic journal compared to a local newspaper.

The scenario in which experts report understanding how the phenomenon works should elicit an increase in participants' perceived understanding and ability to explain the phenomenon compared to the scenario in which experts report not understanding how the phenomenon works, despite participants not having any additional information as to how the phenomenon actually works - supporting the presence of the CK effect.

The source quality, a local newspaper compared to an academic journal, is expected to influence the CK effect for several reasons. In the Sloman and Rabb study, it was determined that the CK effect was stronger when participants were told that the concept was easier to understand, compared to when participants were told that it was difficult to understand. This supports the idea that the CK effect, and related decisions made by participants, utilize the ELM framework, as the effect was weaker when participants were less able to understand the information. Given the CK effect's susceptibility to cues, it would be expected that the comparing a vetted, scientifically supported publication to a non-scientific, entertainment publication would act as a peripheral cue, further influencing decision making when the CK effect is present. If participants use the source quality as a peripheral cue to make decisions regarding the scientific finding, then participants would have higher ratings on various dependent measures when the source is an academic journal compared to the local newspaper, as it provides peripheral information on whether the source should be believed and trusted.

CHAPTER 2

METHOD

Design

Study participants were presented with a set of brief newspaper-style briefs describing a novel, fictitious scientific finding. The news briefs varied in three ways: the expert's reported understanding of the novel scientific finding, the brief's publishing source quality, and the type of scientific finding. This resulted in a 2 (Phenomenon: melting rocks, humming stalactites) x 2 (Understanding: no, yes) x 2 (Publishing source: local newspaper, academic journal) partial mixed factors design. After reading each brief, participants answered a set of items about their understanding of, belief in, and perceptions of the scientific finding. Lastly, participants answered demographic questions.

Participants

Participants were collected using Amazon Mechanical Turk crowdsourcing software. A total of N = 300 participants were included in the original sample. Nine participants were removed from the original sample because they completed the survey in less than 90 seconds, resulting in a final sample of N = 291 participants. A power analysis on the highest effect anticipated, a mixed methods two-way interaction, determined a minimum sample size of N = 150 needed to detect an effect size comparable to those detected in analyses by Sloman and Rabb (2016) (an effect size of $\eta^2 = 0.05$ or higher), with a sufficient amount of statistical power (0.80 or better) (Cohen, 1988). Based on this calculation, the final sample size exceeded the minimum sample size needed.

The sample consisted of 44.7% female participants, with an average age of 34.71 years old. About 36.4% of the participants had a four-year college degree, and the racial demographic of the group consisted of 71.5% Caucasian/White, 9.6% Asian/Pacific Islander, 8.2% African American, 7.2% Hispanic/Latino, 0.3% Middle East/North African, and 3.1% identified as “other.”

In addition to traditional Amazon M-Turk features, add-on TurkPrime software was used to reach a more representative sample (Litman, Robinson, & Abberbock, 2017). This is accomplished using several features exclusive to TurkPrime, including more specific participation criteria, excluding participants who have participated in previous surveys, and administering the survey to smaller groups of participants over a longer amount of time, allowing a wider variety of M-Turk workers to complete the same survey.

Materials

To create the study, a series of newspaper-style briefs were written. Each news brief described a novel, fictitious scientific finding that was being researched by experts at a public university. Half of the news briefs contained a fictitious scientific finding directly adapted from Sloman and Rabb’s experimental materials (2016). In order to replicate and extend their findings, a new scientific finding was created in the same style and included in the present survey.

The first manipulation, the fictitious scientific finding, was included to primarily test replication of findings from Sloman and Rabb (2016). Fake scientific phenomena were used in both studies, including the concepts of "humming stalactites" and "melting rocks." Fake phenomena were used versus real scientific findings to ensure that participants did not have any pre-existing knowledge or understanding of the novel information presented. The scenario adapted from the Sloman and Rabb study described stalactites that hum, while the scenario created for this specific study, styled after that by Sloman and Rabb, described rocks that turn into a liquid state (melted) when wet. In both conditions, this phenomenon variable was represented by two sentences describing the discovery of the phenomenon. The entire news brief, and the alternative version of this manipulation, is included in Appendix A. An example:

> A June 26, 2015, study in the local newspaper Billings Herald reported the discovery of a cave formation that scientists have thoroughly explained. The authors of the study, Danica and Frith, gave a description of the unusual formation: The otherwise ordinary stalactites generate a continuous humming sound without being touched.

The second manipulation, expert understanding, varied whether or not the scientists in each scenario understood how the phenomenon worked. Half of the scenarios stated the scientists who discovered the phenomenon fully understood and could explain how it works. For example, one version of the manipulation stated: "The authors fully understand how they work and went on to provide a complete explanation of the underlying process." The other scenario stated the scientists who discovered the phenomenon did not understand, and could not explain, how it works. To ensure a successful replication, the language for this manipulation was directly adapted from examples of the briefs used by Sloman and Rabb (2016).

The last manipulation in the study, publishing source quality, was included to measure the extent to which the CK effect would be influenced by the peripheral cue of source quality. The first level, low-quality source, was represented by a local newspaper, while the high-quality source was represented by an academic journal that published the novel scientific finding. The manipulation was included in the scenario using one sentence, which stated the type of publication source that reported the newly discovered phenomenon, for example: “A June 26, 2015, study in the local newspaper Billings Herald reported the discovery of a cave formation that scientists have thoroughly explained.”

Next, a small survey was constructed for participants to complete after viewing each news brief to measure all dependent measures in the study. A demographics questionnaire was created for the end of the survey, where participants would provide basic information about themselves. Participants were presented with a series of questions after reading each news brief. Each series of questions included measures adapted from the Sloman and Rabb (2016) study, including questions of participants’ perceived understanding of the phenomenon, perceived ability to explain how the phenomenon works, and if participants believed they received an actual explanation of how the scientific phenomenon worked. We also asked participants to indicate the extent to which they trusted the publication source and their perceived believability of the phenomenon.

Questions regarding participants' opinions of scientific information were included at the end of the survey to measure individual differences in attitudes about science. Two of the questions targeted participants' beliefs on scientific endeavors and scientists' responsibility to innovate and discover, for example: "In your own personal opinion, how important is it for 'scientists' to…discover new things?" The other two questions targeted a participants' beliefs on how knowledgeable or intelligent scientists should be regarding what they discover or study, for example: "In your own personal opinion, how important is it for 'scientists' to…understand why something happens?" The questions were based on a 7-point Likert type scale. Questions regarding a participant's age, level of education, sex, political orientation, ethnicity, and state of residency were included at the end of the survey. All dependent measures presented to participants can be viewed in Appendix B.

Procedure

Participants were recruited through Amazon M-Turk, and were asked to participate in a survey for monetary compensation, a total of $0.60 for an estimated 5-10 minutes of their time. Participants were then directed to an online survey created using Qualtrics software. After reviewing an informed consent describing participants' voluntary participation and minimal anticipated risks as a result, participants were then presented with the first block of the survey, including one of eight randomized news briefs. Participants read the news brief, then answered the set of questions for that specific news brief.

After completing the first block of the survey, participants were then presented with the "opposite" news brief of the first one viewed in the second block of the survey.

The opposite news brief is another one of the eight news briefs created, however all of the manipulations for the second news brief are the opposite of the first. For example, if the participant first read a news brief published in a local newspaper describing humming stalactites that experts understood and could explain, the second news brief viewed would be published in an academic journal describing melting rocks that experts did not understand and could not explain. Participants then completed the same set of dependent measures for the second news brief, resulting in each participant providing ratings for two of the eight possible scenarios. Following the second block of the study, participants answered scientific and demographic questions, and they received a code for monetary compensation for their participation.

CHAPTER 3

RESULTS

Descriptive Analysis

For each dependent measure – both in the first and second blocks – descriptive statistics were calculated to explore the distribution of each measure. Most measures fell within the acceptable range of skewness and kurtosis (between -2.00 and +2.00), with the exception of a few variables.

Participants' ratings of perceived understanding after reading the rock condition $M = 1.62$ $SD = 1.01$ was marginally kurtotic, with a kurtosis statistic of 1.98 $SE = 0.40$. Participants' ratings of perceived ability to explain the phenomenon after reading the rock condition $M = 1.62$ $SD = 1.07$ was marginally positively skewed, with a statistic of 1.93 $SE = 0.20$ and excessively kurtotic, with a statistic of 3.09 $SE = 0.40$. Lastly, participants' ratings of having received an actual explanation after reading the rock condition $M = 0.49$ $SD = 0.50$ was excessively kurtotic, with a statistic of -2.03 $SE = 0.40$.

Participants' ratings of perceived understanding after reading the stalactites condition, $M = 1.57$ $SD = 0.96$, was marginally kurtotic with a statistic of 1.89 $SE = 0.40$. Participants' ratings of perceived ability to explain how the phenomenon works after reading the stalactite condition, $M = 1.48$ $SD = 0.92$, was excessively positively skewed with a statistic of 2.02 $SE = 0.20$ and excessively kurtotic with a statistic of 3.44 $SE = 0.40$. Lastly, participants' ratings of having received an actual explanation, $M = 0.50$ $SD = 0.50$, was excessively kurtotic with a statistic of -2.03 $SE = 0.40$.

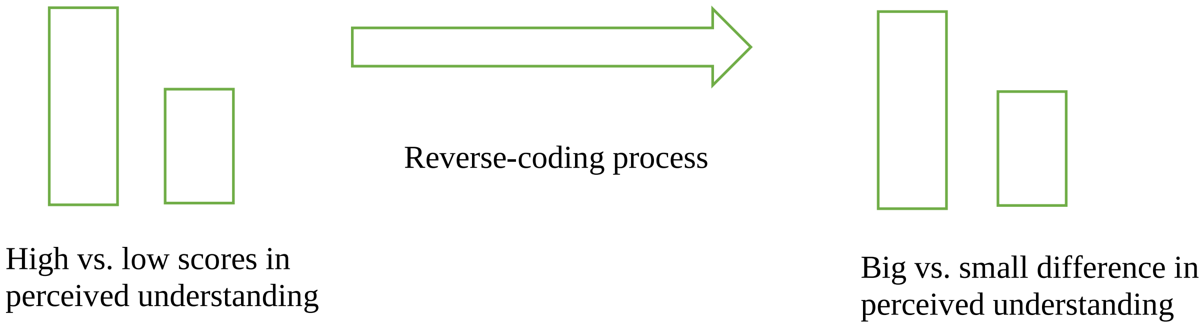
*Table 1: Descriptive Statistics of Dependent Measures**

DV	*M*	*SD*
Rock Scenario		
Perceived understanding	1.62	1.01
Perceived ability to explain	1.62	1.07
Believability	2.30	1.17
Trustworthiness	2.61	1.20
Received explanation	0.49	0.50
Stalactites Scenario		
Perceived understanding	1.57	0.96
Perceived ability to explain	1.48	0.92
Believability	2.83	1.06
Trustworthiness	3.01	1.02
Received Explanation	0.50	0.50

*measures ranged from 1-7 on a Likert scale

To prepare for analysis, the data was collapsed across the phenomenon variable (as it was included for replication purposes and not for the primary hypotheses) and responses for the second block were reverse-coded. The hypothesized effects for the second block were always the opposite of the first block, making data analysis simpler by using reverse-coding. After reverse-coding the dependent measures in the second block, the meaning of each dependent measure is different. Before, higher scores on the dependent measures (e.g. to what extent do you understand how this phenomenon works?) represented higher scores of understanding. After reverse-coding the second block, higher scores on the dependent measures represented a bigger difference in a participant's scores of understanding between the first and second block.

Figure 1: Interpretation of Results After Reverse-Coding



Expert Understanding

An ANOVA test was performed to measure the effect of expert understanding on perceived understanding of the phenomenon. Results indicated that there was a bigger difference in perceived understanding scores that corresponded with the change in manipulations, from when the expert understood the phenomenon (M = 3.11 SE = .05) to when the expert did not understand the phenomenon (M = 2.70 SE = .05) $F(1, 287) = 40.64$ $p < .001$ $\eta^2 = .12$. In other words, this finding demonstrated a successful replication of the CK effect.

Table 2: Main Effects of Expert Understanding on Participants' Perceptions of Novel Information

DV	*F(df)*	*p*	η^2
Perceived understanding	40.64(1)	> .001	.12
Perceived ability to explain	30.98(1)	> .001	.10
Believability	27.40(1)	> .001	.09
Trustworthiness	23.76(1)	> .001	.10

Further testing revealed that participants' scores of perceived ability to explain how the phenomenon worked were significantly higher when they were told experts understood and could explain how it works (M = 3.09 SE = 0.05) compared to when they were told experts did not understand and could not explain how it works (M = 2.72 SE = .05), $F(1, 287) = 30.98$ $p < .001$ $\eta^2 = .10$. Testing also revealed significantly bigger differences in scores of participants' belief that the phenomenon they read about actually took place when experts understood the novel scientific finding (M = 3.13 SE = .06) than when experts did not understand (M = 2.73 SE = .05) $F(1, 288) = 27.48$ $p < .001$ $\eta^2 = .09$. This demonstrates the influence of someone else's reported understanding on participants' personal belief that the scientific finding actually took place.

An alternative explanation to this result is that participants misinterpreted the description of the phenomenon as an actual explanation of how the novel scientific finding worked in the news brief. To measure this, the effect of expert understanding was measured on the variable of perceptions of having received an actual explanation. Results indicated a significant difference in scores of perceptions of receiving an explanation, in that there was a smaller difference in scores of having received an explanation when experts did not understand the novel scientific finding (M = 2.54 SE = .06) than when experts understood the novel scientific finding (M = 3.21 SE = .06) $F(1, 288) = 66.04$ $p < .001$ $\eta^2 = .19$. If participants misinterpreted the scientific finding's description as an explanation, then there would be no difference in perceptions of receiving an actual explanation between conditions. Therefore, participants reported higher rates of understanding, ability to explain, and belief that they received an explanation of how the novel scientific finding worked when they were told experts understood how it worked, even though no actual explanation was provided.

Source Quality

A one-way ANOVA was performed to measure the source quality manipulation and any main effects on the primary dependent variables.

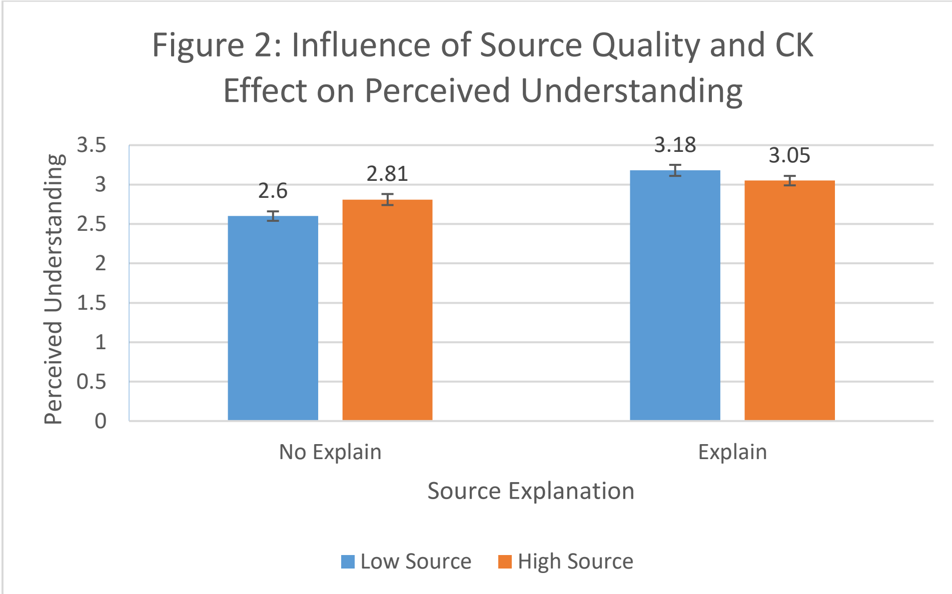
The ANOVA test results indicated there were no main effects of source quality on perceived understanding ($p = .56$), perceived ability to explain ($p = .78$), or believability of the novel scientific finding ($p = .46$). This finding suggests that either the manipulation was not strong enough to elicit differences of trust in the source, or the presence of expert understanding acts as a proxy for the source quality, rather than the actual source. To test this, a test on the manipulation check variable revealed there was no significant difference in perceived trustworthiness depending on the source quality $F(1, 289) = 1.19$ $p = .28$ $\eta^2 = .004$, suggesting that the manipulations were indeed not strong enough to elicit differences in trust when comparing a local news article to an academic journal.

Table 3: Main Effects of Source Quality on Participants' Perceptions of Novel Information

DV	*F(df)*	*p*	η^2
Perceived understanding	0.33(1)	.56	.001
Perceived ability to explain	0.08(1)	.78	> .001
Believability	0.55(1)	.46	.002
Trustworthiness	1.00(1)	.32	.003

Expert Understanding vs. Source Quality

A two-way ANOVA test revealed an interaction between expert understanding and publication source quality on perceived understanding $F(1, 287) = 6.85$ $p = .009$ $\eta^2 = .02$. Publication source quality appeared to moderate the effect of expert understanding on participant perceived understanding. When the publishing source quality is low, the CK effect is significant, with lower scores of perceived understanding when experts didn't understand the scientific finding (M = 2.60 SE = .06) and higher scores of perceived understanding when experts understood the scientific finding (M = 3.18 SE = .07) $F(1, 143) = 33.32$ $p < .001$ $\eta^2 = .19$. When the publishing source quality is high, the CK effect is in the same direction, but weaker, with lower scores of perceived understanding when experts did not understand the scientific finding (M = 2.81 SE = .06) and higher scores of perceived understanding when experts understood the scientific finding (M = 3.05 SE = .06), $F(1, 144) = 8.94$ $p = .003$ $\eta^2 = .06$.



There was no interaction between publishing source quality and expert understanding on perceived ability to explain (p = .16) or perceived believability (p = .16). There was a marginal two-way interaction between source quality and expert understanding on trustworthiness $F(1, 287) = 3.00$ $p = .08$ $\eta^2 = .01$. There was a simple effect of expert understanding on perceived understanding when the source quality is low $F(1, 143) = 29.92$ $p < .001$ $\eta^2 = .17$, in that differences in scores of perceived trustworthiness were lower when the experts did not understand the scientific finding (M = 2.70 SE = .07) than when experts understood the scientific finding (M = 3.23 SE = .07). There was also a weaker simple effect of expert understanding on perceived trustworthiness when the source quality is high $F(1, 144) = 6.95$ $p = .01$ $\eta^2 = .05$, such that differences in scores of perceived trustworthiness were lower when experts did not understand the scientific finding (*M* = 2.90 *SD* = .08) than when the experts understood the scientific finding (*M* = 3.18 *SD* = .08).

Phenomenon

An ANOVA test was performed to measure the effects of the phenomenon variable on perceptions of understanding, ability to explain, trustworthiness, and believability. The phenomenon variable was not included as a primary independent variable because it was included only to ensure replicability of the CK effect using new stimuli.

There was a significant main effect of phenomenon on perceived ability to explain, in that the differences of scores in perceptions of ability to explain decreased from the melting rock phenomenon (M = 2.98 SE = .05) to the humming stalactites phenomenon (M = 2.84 SE = .05), $F(1, 283) = 4.60$ $p = .03$ $\eta^2 = .02$. There was also a significant main effect on perceived trustworthiness which increased from the melting rocks condition (M = 2.86 SE = 05) to the humming stalactites condition (M = 3.15 SE = .05), $F(1, 283) = 17.22$ $p < .001$ $\eta^2 = .06$. Lastly, there was a significant main effect on believability, in that differences of scores in perceived believability that the phenomenon actually happened increased from the melting rock condition (M = 2.73 SE = .05) to the humming stalactite condition (M = 3.14 SE = .05), $F(1, 283) = 30.91$ $p < .001$ $\eta^2 = .10$.

A significant two-way interaction emerged between phenomenon and expert understanding on perceptions of understanding $F(1, 283) = 4.19$ $p = .042$ $\eta^2 = .015$. When participants viewed the melting rock condition, differences of scores in perceptions of understanding increased from when they were told the expert did not understand (M = 2.68 SE = 0.06) to when they were told the expert understood (M = 3.22 SE = .07) $F(1, 144) = 30.03$ $p = .001$ $\eta^2 = .17$. When participants viewed the humming stalactite condition, there was a smaller, less significant difference between conditions when the expert did not understand (M = 2.72 SE = .06) and the expert understood (M = 3.01 SE = .06) $F(1, 143) = 11.60$ $p < .001$ $\eta^2 = .08$. There were no significant interactions between phenomenon type and expert understanding or source quality on perceived ability to understand ($p = .65$), source trustworthiness ($p = .19$), or believability ($p = .43$).

CHAPTER 4

DISCUSSION

Factfinders, such as judges and jurors, are responsible for making informed legal decisions regarding a case (U.S. Const. Amend. VI). When expert testimony is easy to understand, and when conditions are favorable to jurors and their ability to process information, they are effective in detecting truthful, objective information (Cooper et al., 1996; cited in Petty & Brinol, 2012). When expert testimony is difficult to understand, when conditions make it difficult for jurors to reason, and when peripheral information is present, it is difficult for jurors to make informed decisions without being persuaded by extralegal information (e.g. Cooper, Bennett, & Sukel, 1996; Memon & Shuman, 1998; Neal & Brodsky, 2008).

The current study measured participants' perceptions of novel, fictitious scientific findings and demonstrated that participants had higher ratings of perceived understanding, ability to explain, trustworthiness, and believability of the novel scientific finding when experts reported they understood and could explain the phenomenon, supporting Hypotheses 1 and 2, and providing evidence for the CK effect. It appears that the CK effect includes not only higher rates of perceived understanding, but higher rates of perceived ability to explain novel information, trust in the source, and belief that the phenomenon actually happened. Hypothesis 3 was also supported, however not in the predicted direction: results indicated a two-way interaction between expert's reported understanding of the novel scientific finding and the article's publishing source quality, in that a low source quality (a local newspaper) resulted in a stronger CK effect than when the article's publishing source quality was high (an academic journal). The third hypothesis predicted that the CK effect would be stronger when the novel scientific finding was published in an academic journal, however results indicated the opposite. This finding suggests the existence of the CK effect and its foundation in the ELM theory, however it is unclear whether source quality acts as a peripheral cue to source trustworthiness. There is potential for alternative explanations to the findings.

Perceptions of understanding the novel scientific finding may be present overall, and under some conditions higher, because of participants' "impression management," or desire to appear smart. If this were the case, participants would score higher on measures of understanding or ability to explain when they are told an expert understands and can explain it because they want to appear smart, rather than because it reflects their true perceptions. When a participant is told that an expert does not understand how something works and can't explain it, they would be less likely to engage in impression management because even an expert does not understand how it works – so their lack of understanding will not make them appear less smart.

Another potential explanation for the findings is that publishing source quality acts as evidence for a community that participants relate to, rather than a peripheral cue. According to the community of knowledge and illusion of explanatory depth theories, participants need to perceive a shared identity or community with the source of information to have higher perceptions of understanding. If participants perceived themselves as sharing the community for which the local newspaper served, rather than evaluating its quality, this would result in similar increases in perceived understanding compared to the academic journal.

Criticisms to the study range from applicability to the legal setting and the potential for alternative explanations. Because this study did not use a legal scenario or trial-based information, it is unclear if the CK effect would apply to expert testimony. It is still possible, given that research has demonstrated the existence of social psychology theories and effects, such as the elaboration likelihood model or various biases, in legal contexts, however the answer to this question remains unclear. The current study also used an M-Turk worker sample, which has received criticism in recent research.

Despite recent concerns about the effectiveness or quality of data that Amazon M-Turk workers produce, research continues to demonstrate that the benefits of using M-Turk worker data outweigh the weaknesses. Benefits include the cost effectiveness and sample diversity, while weaknesses include self-selected participants and falsified data by dishonest participants (Sheehan, 2017). In a review of M-Turk software and resulting data, critics were reminded that self-selected participants and falsified data by participants are inherent risks in online data, and therefore should not be used to discredit the continued use of M-Turk worker data (Sheehan, 2017). This is especially the case considering M-Turk data exceeds the diversity of data collected from university student samples, as demonstrated by Sheehan (2017). Similarly, research has demonstrated that Amazon M-Turk data differs only slightly from university-based or other online samples in quality, and maintains a level of diversity that some of the other samples do not meet when compared to M-Turk workers (Bartneck et al., 2015).

Another criticism is that in both the current study and that by Sloman and Rabb (2016) and other potentially explanatory theories, including impression management and the illusion of explanatory depth, were not considered when creating dependent measures. Thus, it is possible that the CK effect is not an effect in itself, but rather evidence for the illusion of explanatory depth before participants have an opportunity to explain their understanding, and then confirm that they do not understand as much as they originally thought. Similarly, the CK effect could be the product of impression management and would decrease after participants have the opportunity to express their intelligence and ability to understand scientific information before being exposed to novel information.

To address criticisms and further research on the CK effect, future directions could include applying a similar study design to a legal setting to measure its applicability to a different context, and to replicate the present study including measures on impression management. Future study designs would utilize a trial-scenario, a deliberation task with a random community sample, and present participants with a self-affirmation task prior to reading the first news brief, eliminating the need for impression management to occur and ruling out potential effects from participants' desire to appear smart. To measure the amount of overlap between the CK effect and the illusion of explanatory depth, future study designs would ask participants to explain how the novel scientific finding works by either explaining it to a research assistant or writing it down. Research on the illusion of explanatory depth used similar tasks to correct inflated ratings of understanding. Such studies could reveal whether the CK effect is an extension of the illusion of explanatory depth, or if it is a unique effect resistant to corrections.

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APPENDIX A

[ALL POSSIBLE CONDITIONS FOR STUDY]

A June 26, 2015, study in the local newspaper Billings Herald reported the discovery of a cave formation that scientists have not yet explained. The authors of the study, Danica and Frith, gave a description of the unusual formation: The otherwise ordinary stalactites generate a continuous humming sound without being touched. The authors do not yet understand how they work and provided no explanation of the underlying process. The study described how the stalactites were discovered and discussed further directions of research to be conducted at the University of Pittsburgh.

A November 13, 2016, study in the journal Science reported the discovery of a naturally occurring stone that scientists have thoroughly explained. The authors of the study, Stevens and Melora, gave a description of the strange rock: The seemingly common desert stone turns into a liquid state when it comes into contact with water. The authors fully understand how it works and went on to provide a complete explanation of the underlying process. The study described how the stone was discovered and discussed further directions of research to be conducted at Texas A&M University.

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APPENDIX B

[DEPENDENT MEASURES PRESENTED AFTER NEWS BRIEF]

Please answer the following questions, thinking about the scenario you just read.

	Not well at all (1)	Slightly well (2)	Somewhat well (3)	Very well (4)	Extremely well (5)
How well do I understand how this phenomenon works? (1)	○	○	○	○	○
How well could I explain how this phenomenon works? (2)	○	○	○	○	○
How well do I trust the source that published the research? (3)	○	○	○	○	○
How well do I believe that this phenomenon exists? (4)	○	○	○	○	○
How well could any person understand how this phenomenon works? (5)	○	○	○	○	○

Did you receive an explanation on how these stalactites are able to produce a humming sound?

	No explanation at all (1)	(2)	(3)	(4)	A complete, thorough explanation (5)
Did you receive an explanation? (1)	○	○	○	○	○