

Inducing Feelings of Ignorance Makes People More Receptive to Expert (economist) Opinion

by

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Author's Declaration

This thesis consists of materials all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Statement of Contributions

I contributed to the study design in collaboration with Dr. Jonathan Fugelsang, Dr. Derek Koehler, Dr. Michał Białek, and Martin Harry Turpin. Additionally, I performed the testing, data collect, and data analysis for all five studies. Initial drafts of the thesis were composed primarily by myself, Dr. Jonathan Fugelsang and Dr. Derek Koehler. The remaining authors contributed to the manuscript from which this thesis is based.

Abstract

While they usually should, people do not revise their beliefs more to expert (economist) opinion than to lay opinion. The present research sought to better understand the factors that make it more likely for an individual to change their mind when faced with the opinions of expert economists versus the general public. Here, across five studies ($N = 2,650$), I examined the role that overestimation of one's knowledge plays in this behavior. I replicated the finding that people fail to privilege the opinion of experts over the public on two different (Study 1) and five different (Study 5) economic issues. I then found that undermining an illusion of both topic relevant (Studies 2 - 4) and irrelevant knowledge (Studies 3 & 4) can lead to greater belief revision in response to expert rather than lay opinion. I suggest one reason that people fail to revise their beliefs more to experts is because people tend to think they know more than they really do.

Acknowledgements

I would like to thank the University of Waterloo for providing me with the opportunity to study at Canada's most innovative university and for providing a climate conducive to the advancement of knowledge.

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Finally, I would like to thank my parents. I don't know how much more can be said other than I could not have done this without you.

Dedication

This thesis is dedicated to the entirety of the staff at Royal Victoria Hospital who one year ago today brought my mother back to life two times in one week. I will never contribute to the world something greater than what you have for me.

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Introduction

“The whole problem of the world is that fools and fanatics are always so certain of themselves, but wiser people so full of doubts” - Commonly attributed to Bertrand Russell

Are wiser people more doubtful, or does experiencing doubt make one wiser? This is an old debate, and thinkers as far back as ancient Greece have weighed in on this fundamental question. In the opinion of arguably the wisest man in Greece, Socrates, the feature which makes one wise is recognizing the limits of one’s knowledge: *“I am wiser than this man, for neither of us appears to know anything great and good; but he fancies he knows something, although he knows nothing; whereas I do not know anything, so I do not fancy I do.”* (Apology, 21d). The key feature of wisdom in the opinion of one great ancient thinker is to recognize what one knows, does not know, and adapt behavior to be in line with these limitations. Experts in a topic one is not experienced in may provide a useful measuring stick against which one can compare their understanding of a topic. Indeed, the degree to which a person is willing to defer to the opinion of experts demonstrates the wisdom that comes with understanding the limits of one’s knowledge. Nevertheless, people often disregard the opinion of experts in favor of their own unlearned intuition, or the opinion of people similarly unknowledgeable to themselves. That is, people should defer more to experts than to lay opinion but, puzzlingly, they don’t (Johnston & Ballard, 2016). What underlies this behavior, and more pressingly, how can we help people weight the opinion of those with demonstrated expertise more heavily when making decisions?

The highly specialized world of today should dictate that decisions of epistemic authority, choosing when to think for oneself versus deferring to experts, would usually conclude with deferring to the proficient (Pierson, 1994). This notion should be especially true when presented with information that one lacks the necessary informational background in (Keil,

2010). People tend to behave, however, in a manner that suggests that experts possess an authority on decisions (i.e., *how* to do things), but not necessarily on beliefs and values (i.e., *which* things to do) (Zagzebski, 2012). For example, people might defer to experts on how to efficiently trade with a foreign country, but not on whether that country should or should not be traded with. In the latter case people tend to be at most, as equally influenced by opinions of professional economists than by the same opinions of the general public (Johnston & Ballard, 2016). That is, people appear to find the views of their peers just as convincing as those of experts when considering how to adjust their beliefs in response to new information.

Why aren't experts more influential than the average citizen when it comes to personal belief adjustment? One idea is that strongly held beliefs carry feelings of righteousness (Haidt, 2012) so that not only do people exaggerate the degree to which they have knowledge about a topic, they may also believe that they maintain a uniquely privileged moral status by holding these beliefs. Any epistemic compromise that may come from deferring to expertise may also involve an undermining of their moral position. This causes them to be even less likely to seek disconfirming evidence (Haidt, 2012) even beyond the contribution of the well-evidenced cognitive bias against disconfirmation (Nickerson, 1998; Stanovich, West & Toplak, 2013). In the realm of economics, there has been substantial evidence gathered that suggests that much of our economic decision making is actually made along dimensions of morality (Baron, 2018; Bhattacharjee, Dana & Baron, 2017; Browne & Milgram, 2008; Taylor, 2014). This creates a particular situation where there are both cognitive-epistemic as well as moral reasons a person may fail to listen to experts on a particular subject. Given that this intense feeling of being right underlies the failure to voluntarily seek out information contrary to one's personal beliefs, it is of no surprise that this also fundamentally alters the way people deal with conflicting information

when they cannot avoid it. People tend to be motivated skeptics (Kunda, 1990), actively searching for and proposing reasons why evidence against their viewpoints may be flawed. This is especially true if the experts are perceived to hold ideas that violate their core values (Kahan, Jenkins-Smith & Braman, 2011). People may also value protecting their cultural identity (Kahan, 2015), and wanting to fit in with their associates so much so that they would grant their peers (ordinary members of the general population) more influence than professionals.

Although there is a clear tendency for people to engage in motivated skepticism, this does not appear to be immutable, as research suggests that there are conditions under which we may overcome these tendencies and behave more objectively (Bolsen, Druckman & Cook, 2014; Kunda, 1990). Indeed, it is more likely that motivated skepticism can explain the lack of influence experts have only when they are espousing views that clash with values that we hold sacred (see Tetlock, 2003; Tetlock, Kristel, Elson, Green & Lerner, 2000). This was further supported in Johnston and Ballard (2016), as “hot-button” politicized economic issues led to greater rejection of expert opinion than did less-politicized issues. However, even in the comparatively mundane topics from a moral perspective, participants nevertheless failed to give privilege to the opinion of experts. So, a total rejection of experts cannot solely be explained by our tendency to be defensively engaged thinkers.

Another potential reason to underappreciate expert opinions is that people overestimate their knowledge (Dunning, Johnson, Ehrlinger & Kruger, 2003; Kruger & Dunning, 1999; Moore & Healy, 2008;). They tend to believe they understand the world around them to a far greater extent than they truly do (Fernbach, Rogers, Fox & Sloman, 2013; Fernbach, Sloman, St. Louis & Shube, 2013; Keil, 2003; Rozenblit & Keil, 2002) and therefore have little reason to consider others as more of an expert on a particular topic than they are. This overestimation of

knowledge applies to both everyday objects like the mechanics underpinning the function of toilets and toasters, and complex social policies like immigration and trade. This effect of overestimating the extent to which we understand (and are capable of explaining in detail) complicated phenomena has been called the “Illusion of Explanatory Depth” (IoED: Rozenblit & Keil, 2002). When asked to explain the mechanics of a process in detail, people are confronted with the actual limitations of their expertise through their failure to give a cohesive and complete description, this leads to a recalibration of their perceived knowledge through the vanishing of the IoED (Fernbach et al., 2012; Keil, 2003). This can have downstream effects such as reducing political extremism (Fernbach et al., 2013) or, speculatively, increasing the tendency to privilege expert consensus when given an opportunity to change our opinion on a matter of economic policy.

In this research I tested whether overconfidence can explain how people revise their beliefs given expert and laymen consensus. I hypothesized that inducing a feeling of ignorance might be an efficient method for getting people to rely on more valid sources of information (i.e., from experts) over less valid ones (i.e., from the public). In particular, if people believe they already understand something to a much greater extent than they really do, they may not appreciate the vast difference in expertise between laypeople and experts. Thus, it is possible, and I suggest likely, that overconfident participants found the utility of expert opinion to be equivalent to that of members of the public. I propose that lowering confidence in perceived understanding by exposing an illusion of explanatory depth would increase the perceived utility of experts by highlighting the differences between the potential knowledge gap of themselves versus a group of experts. I would then expect this to lead to greater belief revision in response to expert, rather than lay opinion

I devised five studies to test the claim that exposing an illusion of knowledge will increase the influence of experts. The first study replicated the main finding of Johnston and Ballard (2016), that people fail to adjust their beliefs more to expert rather than lay consensus. The second study introduced the IoED paradigm that led to greater belief revision in response to experts versus lay opinion. The third study replicated the results of the previous and provided evidence for the claim that undermining an illusion of even topic-irrelevant knowledge can lead to more belief revision in response to expert rather than lay opinion. The fourth study replicated this finding across five different economic issues. The fifth study, also using the expanded set of issues, included a control condition that again replicated the main finding that people do not revise more to experts than to lay people. Compiling Studies 4 and 5 together I find that belief revision in response to expert versus public consensus is more than twice as strong when participants had an illusion of knowledge exposed compared to when they did not.

Study 1: Replication of Johnston and Ballard (2016)

I first attempted to replicate the original finding of Johnston and Ballard (2016) that people fail to revise beliefs to be more in line with expert opinion, instead preferring the opinions of lay people. However, I made an important design change from the original work as I implemented a pre-post design to test whether the findings are consistent across a within-subjects manipulation. Further, I compiled what was originally tested by Johnston and Ballard (2016) across two studies into one.

Method

Participants

I recruited 204 participants via Mechanical Turk who were required to be United States citizens above the age of 18 and have a HIT approval rating of at least 90%. No other recruitment restrictions were applied. All studies reported in this paper followed this restriction criteria. Participants were mostly white (79%), male (60%), had obtained at least some level of post-secondary education (83%), and were between the ages of 18 to 69 ($M = 33.12$, $SD = 9.54$).

Procedure

The materials, data, and analyses' syntax can all be found on the Open Science Framework here: <https://osf.io/2pzbe/>. Participants were asked twice for their agreement on two different economic statements selected from Johnston and Ballard (2016): a “gold standard” statement and a “trade with China” statement. As suggested by the original authors, the key distinction between these two statements is the prior beliefs held by participants. Johnston and Ballard (2016), found that most of their sample had an opinion regarding the benefit of trading with China on the US economy, but few had prior opinions on whether the US should or should not be on a gold standard.

For the first agreement rating, participants were presented the statement plainly (e.g., “Trade with China makes most Americans better off because, among other advantages, they can buy goods that are made or assembled more cheaply in China”) and asked to rate their agreement on a 1 (strongly disagree) to 5 (strongly agree) scale with 3 representing uncertainty. They were then asked to re-rate their agreement with the statement, however, present during this second judgment was “consensus information.” This information was the responses to the same statement participants were judging but said to have been made by members with varying political preferences of their randomly assigned source (Professional Economists vs. General Public). After making this post-consensus judgment, two “trust in economists” questions were answered along with demographic questions.

The economic statements and the levels of consensus used by Johnston and Ballard (2016) (and subsequently, by me) were taken from the Initiative on Global Markets’ (IGM) panel of economists, consensus on each issue represents the opinions of actual economists and the diversity of opinions for each issue is unique (see Supplementary Materials).

Results

To test whether participants’ beliefs were revised in accordance with consensus information and whether the source of the information mattered, I tested the difference between pre- and post-consensus beliefs.¹ For the trade with China statement, I found a main effect of consensus such that there was a significant increase in agreement with the statement (consistent with consensus information) after having been provided consensus information, $F(1, 202) = 15.74$, $MSE = 0.13$, $p < .001$, $np^2 = .072$ (see Figure 1). However, there was no interaction

¹ All statistical tests in this paper were conducted as two tailed tests at the $\alpha = .05$ significance level.

between source of the consensus and time, $F(1, 202) = 0.85$, $MSE = 0.13$, $p = .358$, $np^2 = .004$.

Thus, people revised their beliefs after being exposed to consensus information in general but failed to revise more to expert than public opinion.

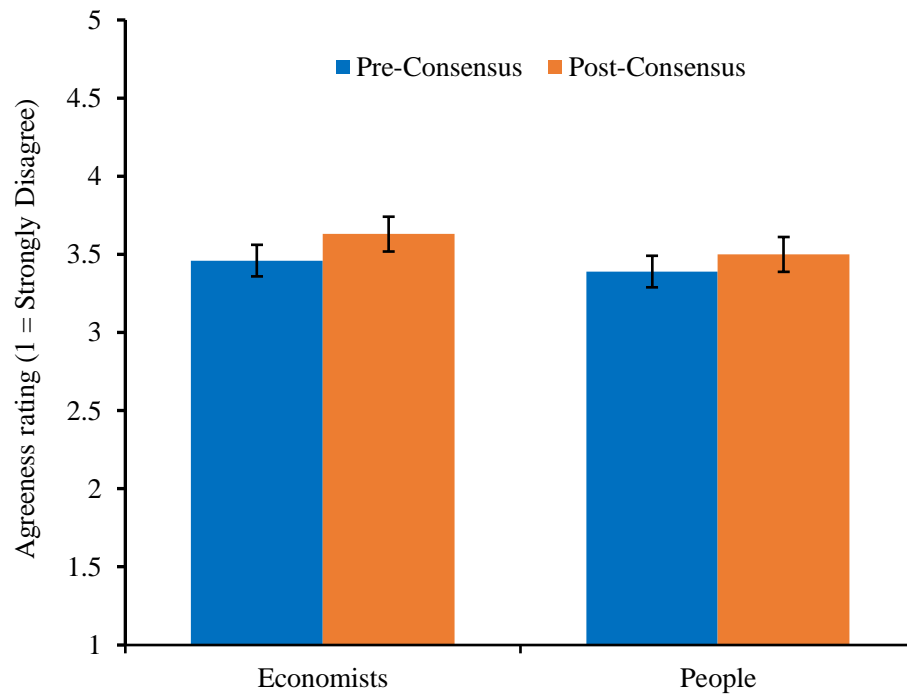


Figure 1. Agreement ratings with the trade with China statement ($n = 204$) before and after receiving consensus information. Error bars are +/- 1 SE.

A similar pattern of results was found for the gold standard statement. There was a main effect of consensus information, which indicated that people displayed significantly more disagreement in their post-consensus beliefs compared to their pre-consensus beliefs, $F(1, 202) = 4.92$, $MSE = 4.92$, $p < .001$, $np^2 = .061$ (see Figure 2). However, no interaction between source of the consensus and time was found, $F(1, 202) = 2.53$, $MSE = 0.84$, $p = .135$, $np^2 = .011$. Again, I found that while people did revise their beliefs in accordance with consensus information, the

source of the consensus (expert economists vs lay people) appeared to play no role in their belief revision, successfully replicating the results of Johnston and Ballard (2016).

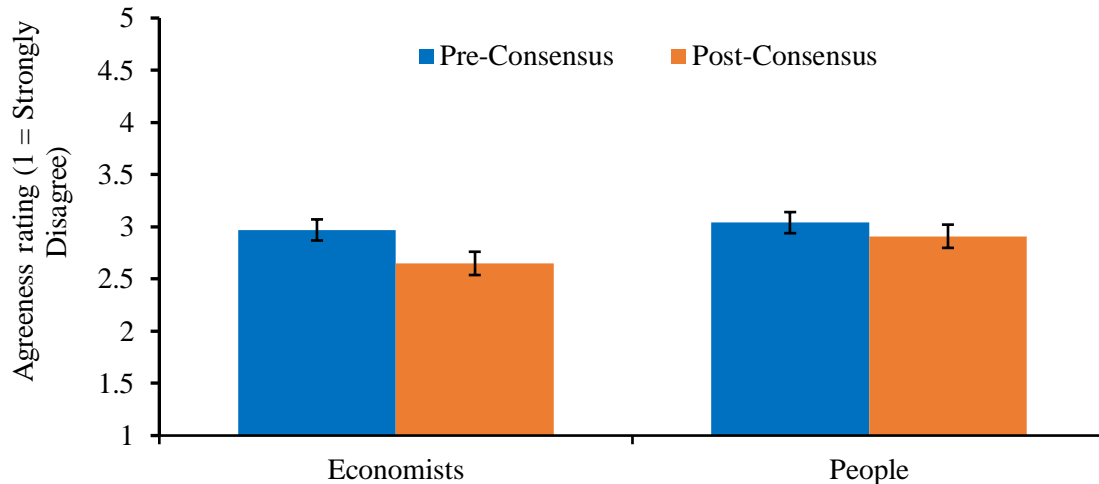


Figure 2. Agreement ratings with the Gold Standard ($n = 204$) statement before and after receiving consensus information. Error bars are ± 1 SE.

Discussion

My first study replicated the finding of Johnston and Ballard (2016), that people fail to revise their beliefs more to expert than lay opinion. I then turned to answer the question of *why* — why do people behaviorally fail to privilege the opinion of experts over the public? One possible reason is that people overestimate how much they know and therefore under value the opinions of experts. In other words, they are not revising as much to experts as they would if they were less confident in how much they know.

My data suggest that people understand the value of experts in an abstract sense (as a large majority of the participants reported trusting the opinions of professional economists when making their own economic decisions), however, this was not reflected in behavior where they would be expected to give expert opinion greater weight than the opinion of non-experts. Here,

people may be implicitly failing to disqualify themselves as experts. They may be aware of the value that experts provide but may feel the expertise required to provide this value is not discrepant enough between themselves and an expert. That is to say, on these economic issues people implicitly consider *themselves* to be experts. Thus, participants could understand that an expert is an expert, but in this case may not believe that the expert holds any specialized knowledge above what they themselves have access to. If this is true, then making the difference between the topical knowledge of an ordinary individual versus an expert salient to the participant should increase belief revision in response to expert opinion. I conducted a second study to test this prediction.

Study 2

People tend to fail to correctly assess how much they really know about how the world works. Often, we think we can explain even ordinary phenomenon (e.g., how recycling works) in more detail than we really can. When asked to mechanistically explain how something works in full detail, however, we become aware of our apparent lack of knowledge, and often experience humility at our once overconfident assessment of our knowledge (Rozenblit & Keil, 2002). Importantly, recognition of our lack of knowledge happens without being provided any external feedback on the explanations provided. That is, without being told we don't know as much as we think we do, we realize it entirely by ourselves. Known as the illusion of explanatory depth, this paradigm reveals the misbeliefs that many of us have regarding our knowledge of a topic.

It is this paradigm that was implemented in Study 2 as an attempt to make participants more aware of the discrepancy of knowledge between themselves and an expert in economics.

Method

Participants

Three hundred and ninety-nine participants were recruited via Mechanical Turk and were mostly white (77%), male (56%), had obtained at least some level of post-secondary education (86%), and were between the ages of 18 to 68 ($M = 35.36$, $SD = 10.51$). In addition to the recruitment restrictions outlined in Study 1, potential recruits were also barred if they had participated in the previous study. Furthermore, we limited participation to unique IP addresses such that only one participant per IP address could complete the study.

Procedure

Study 2 followed a procedure nearly identical to the first, with a few key changes. In this study, participants only responded to the trade with China statement. Additionally, prior to completing the procedure implemented in the first study, participants completed an illusion of explanatory depth (IoED) exercise analogous to Rozenblit and Keil, (2002). Here, participants were first asked to rate how well they understood the impact that trading with China has on the US economy. This rating was made on a 1 (little understanding) to 7 (thorough understanding) scale that participants were provided detailed instructions on how to use. Next, they were asked to explain in as much detail as possible how trading with China impacts the US economy. After completing the explanation, they reported their self-understanding once again. Following this, the remaining procedure of the study was identical to the first study. One final difference was that half of my participants were also asked to make the agreement judgment (referred to as “Pre-writing”) prior to completing the IoED paradigm. That is, half of my participants would make three agreement judgments. Following the procedure used by Fernbach et al., (2013), this additional judgment was implemented so that I would be able to determine whether or not participants who provided a Pre-writing judgment anchored themselves to this initial judgment, failing to change their response to it even if they had reported feeling far less knowledgeable in the topic of interest.

Results

As the manipulation was intended to decrease participants’ confidence in their previously held economic beliefs (see Fernbach et al., 2013), I expected those who agreed with the economic statement to now agree less, and those who disagreed to agree more with the trade with China statement. To this end I created a polarity index that was expressed as the absolute

distance of one's opinion from the "uncertain" response for the Pre-writing and Pre-Consensus judgments ($n = 198$).² Inconsistent with my prediction, there was no significant decrease in polarity after being asked to generate a mechanistic explanation, $t(197) = 1.12$, $SE = 0.05$, $p = .132$, $d = 0.08$ [-0.06, 0.22].

Next, I tested the effect that exposing the illusion of explanatory depth to participants had on belief revision in response to consensus information. I found a main effect of consensus, such that people revised their beliefs in response to receiving consensus information, $F(1, 396) = 59.82$, $p < .001$, $np2 = .131$.³ I also found an interaction between the source of the consensus information and time, $F(1, 396) = 14.12$, $p < .001$, $np2 = .034$. Post-hoc analyses revealed that people revised their beliefs to both the public consensus ($n = 208$), $F(1, 206) = 9.68$, $p = .002$, $np2 = .045$, and economist consensus ($n = 191$), $F(1, 190) = 54.65$, $p < .001$, $np2 = .223$, but to a far greater magnitude when the information came from professional economists.

² Note the $n = 198$ represents only half of the total sample size because only half of the sample made a Pre-writing judgment.

³ The reported analyses collapses across the pre- and no pre-writing judgment conditions. These reported effects remain significant if tested within each of these conditions.

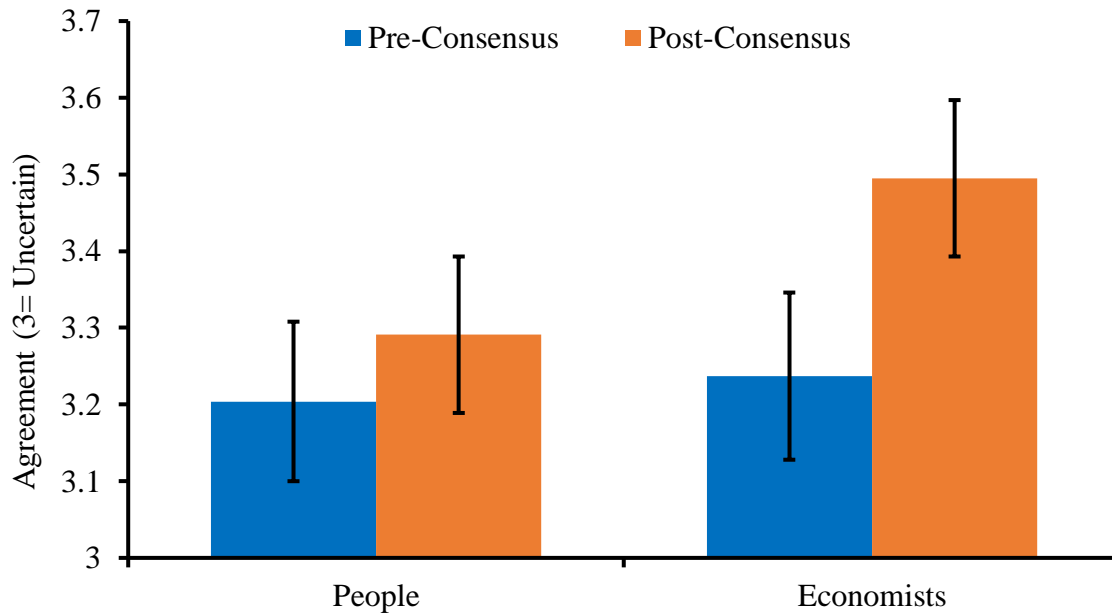


Figure 3. Agreement with the economic issue across Pre-and Post-consensus judgments of the Public ($n = 208$) and Economists ($n = 191$) conditions. Assessed on a 1 (Strongly Disagree) to 5 (Strongly Agree) scale where 3 represents uncertainty. Error bars are ± 1 SE.

Discussion

In Study 2, I found that after being asked to explain the mechanisms of the economic issue they were to give an opinion on, people became far more influenced by the opinions of economists. While the participants still adjusted their beliefs to both sources, they did so to a far greater extent when presented with economist opinion compared to lay opinion. I also found that generating an explanation for how something works led to a reduction in position extremism for those who previously agreed with the issue (60% of the sample).

I generated two competing explanations for why exposing an illusion of knowledge led to an increase in receptivity to expert opinion. The first hypothesis suggests that exposure made the participants aware of how little they knew about the particular economic issue, that being foreign trade. As such, they were more willing to revise their beliefs to be in line with experts who likely

possessed topic-relevant knowledge. The second hypothesis suggests that exposure induced a general feeling of ignorance in the participants, and in turn, made them less convinced of their general expertise in any topic. Thus, they would be more influenced by the opinions of experts as opposed to opinions of their peers. If the second explanation is true (an induction of ignorance), failing to explain *any* issue would produce a similar willingness to revise one's beliefs. If the first explanation is true (lack of topic-relevant knowledge), however, I should observe no belief revision after failing to explain an irrelevant issue (e.g., how modern recycling works). The next study aimed to replicate the findings of this study while testing the two competing explanations.

Study 3

This study attempted to replicate the previous study's findings and to further test whether the content of the to-be-explained material in the IoED paradigm mattered. This aims to answer the question: Is it necessary to make a participant experience a feeling of ignorance on a specific topic (in this case an economics topic)? Or is failing to explain a complicated procedure on any topic enough for participants to begin to privilege the opinion of experts? To do so, I added an explanation condition where participants would judge their understanding of and explain the recycling process in a modern American city rather than the impact that trading with China has on the US economy. The issue of recycling was selected as I believed it is a topic that would be familiar enough to the subjects to appear superficially simple and lend itself to an overestimation of knowledge while being relatively complex in nature.⁴

Method

Participants

I recruited 401 participants via Mechanical Turk with same restrictions previously used in Study 2. Participants could not have completed either Study 1 or 2 to enter this study. Respondents were mostly white (77%), male (55%), had obtained at least some level of post-secondary education (88%), and were between the ages of 18 to 77 ($M = 35.96$, $SD = 11.31$).

Procedure.

This study's procedure was nearly identical to that of Study 2's with two changes. First, an unrelated content writing condition was included. This version of the paradigm had

⁴ The issue was also selected as it was thought to be relatively unrelated to the expertise of economists. However, as an anonymous reviewer pointed out, this assumption is likely not fair to make and it is certainly possible that expert economists hold knowledgeable viewpoints on this issue.

participants report their understanding of and provide an explanation as to how the recycling process in a modern US city works. Half of the participants would complete this unrelated content writing condition while the other half would complete the experimental content writing condition previously used. Second, all participants (rather than half, as in Study 2) would provide a pre-writing judgment, that is, an agreement judgment to the economic statement prior to completing the IoED paradigm. This granted greater power to detect any difference between prior and post manipulation beliefs with little risk as there was no difference in belief revision to experts versus lay people dependent on whether they provided this judgment or not. The rest of the study remained identical to Study 2.

Results

I first tested whether each explanation task reduced position extremity. To do so I once again created “polarity” indexes to measure the average degree of distance from uncertainty in Pre-writing and Pre-Consensus judgments. Consistent with my prediction, I found a significant reduction in polarity after completing the IoED paradigm, $F(1, 398) = 6.33$, $MSE = 0.62$, $p = .012$, $\eta^2 = .016$. Further, the interaction between writing about a related versus unrelated topic was not significant, $F(1, 398) < 1$, indicating that both writing conditions had a similar effect on reducing position extremism. Thus, I conclude that both explanation conditions were sufficient in exposing an illusion of knowledge.

I then tested whether people revised their beliefs differentially, dependent on both the source of the consensus information and what topic they explained and reported understanding on. That is, I examined if people gave additional weight to the opinion of experts when put through the IoED paradigm as in Study 2, and whether this paradigm was required to be topic-relevant or not.

The three-way Time by Explanation condition by Consensus condition interaction was not significant, $F(1, 397) < 1$ (see Figure 4), indicating that the pattern of belief revision to the source of the information was not significantly different across explanations. In other words, whether participants rated their understanding of and explained how trading with China impacts the US economy or how recycling in a modern American city works, their subsequent belief revision to both the public and experts was nearly identical. As such, these explanation conditions were collapsed across to provide a higher-powered analysis of whether participants revised their beliefs more to experts than to laypeople.

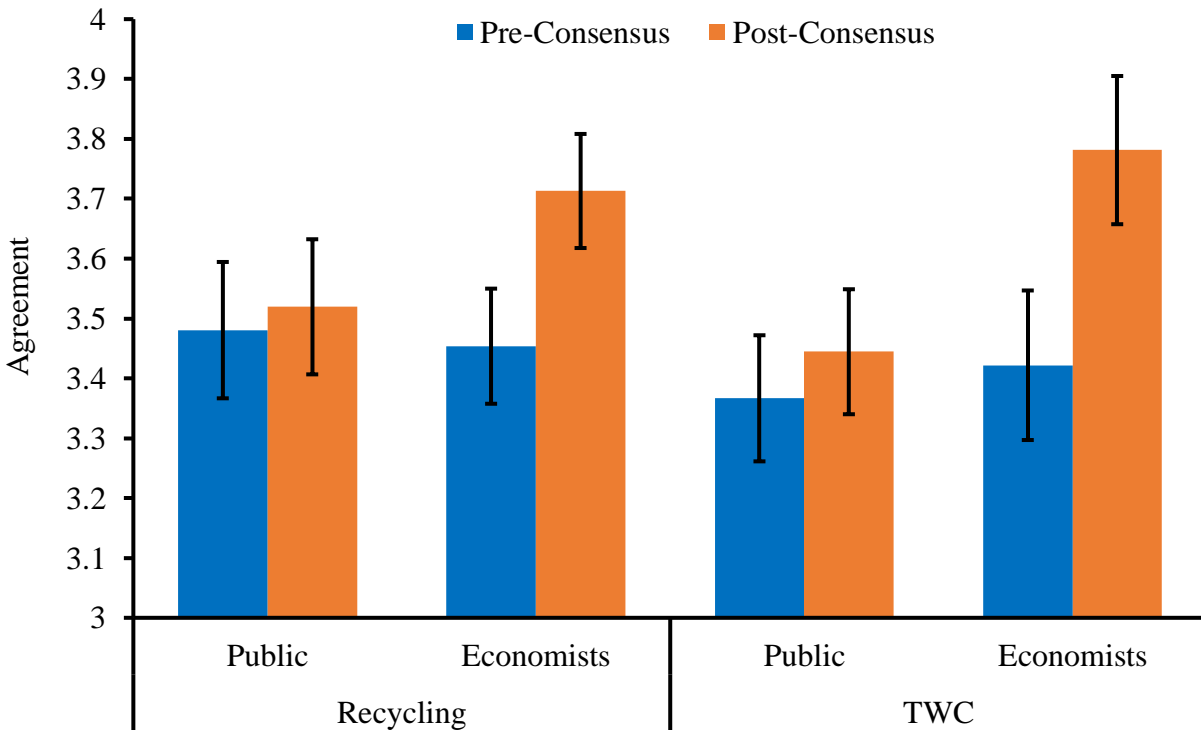


Figure 4. Agreement with the economic issue of Pre-and Post-consensus judgments of the Recycling-Public ($n = 92$), Recycling Economists ($n = 129$), TWC Public ($n = 105$), and TWC Economists ($n = 75$) conditions. Assessed on a 1 (Strongly Disagree) to 5 (Strongly Agree) scale where 3 represents uncertainty. Error bars are +/- 1 SE.

Consistent with Study 2, I found a significant Time by Source of consensus interaction, such that people revised their beliefs more to expert ($n = 204$), rather than public opinion ($n = 197$), $F(1, 397) = 12.96$, $MSE = 1.98$, $p < .001$, $np^2 = .031$ (see Figure 5). Unpacking this interaction revealed that the participants significantly revised their beliefs to experts (in a manner consistent with the consensus information), $t(203) = 6.97$, $SE = 0.04$, $p < .001$, $d = 0.98$ [0.69, 1.27], while they did not significantly revise their beliefs to laypeople, $t(196) = 1.65$, $SE = 0.04$, $p = .102$, $d = .11$ [-0.02, .26]. Once again, after having an illusion of knowledge exposed, participants revised their beliefs of an economic issue to a far greater extent when presented with the opinions of professional economists than the (same) opinions of the general public.

I then examined whether exposing an illusion of knowledge affected the extent to which participants weighed expert opinion in belief adjustment. To do this I assessed the difference between the subjects' pre-writing and post-consensus agreement judgments to determine whether people's beliefs at the end of the study were different than they were at the beginning. I found a significant Time by Source of consensus interaction, $F(1, 399) = 8.76$, $MSE = 1.91$, $p = .003$, $np^2 = .021$. Post-hoc analyses revealed that those who received the opinions of experts significantly changed their beliefs across time, $t(203) = 4.87$, $SE = 0.05$, $p < .001$, $d = 0.68$ [0.40, 0.96], while those who were provided the opinions of the general public did not, $t(196) = 0.53$, $SE = 0.05$, $p = .597$, $d = .04$ [-0.10, .18]. This suggests that exposing an illusion of explanatory depth increases the degree to which people weigh expert opinion in changing their minds about a topic.

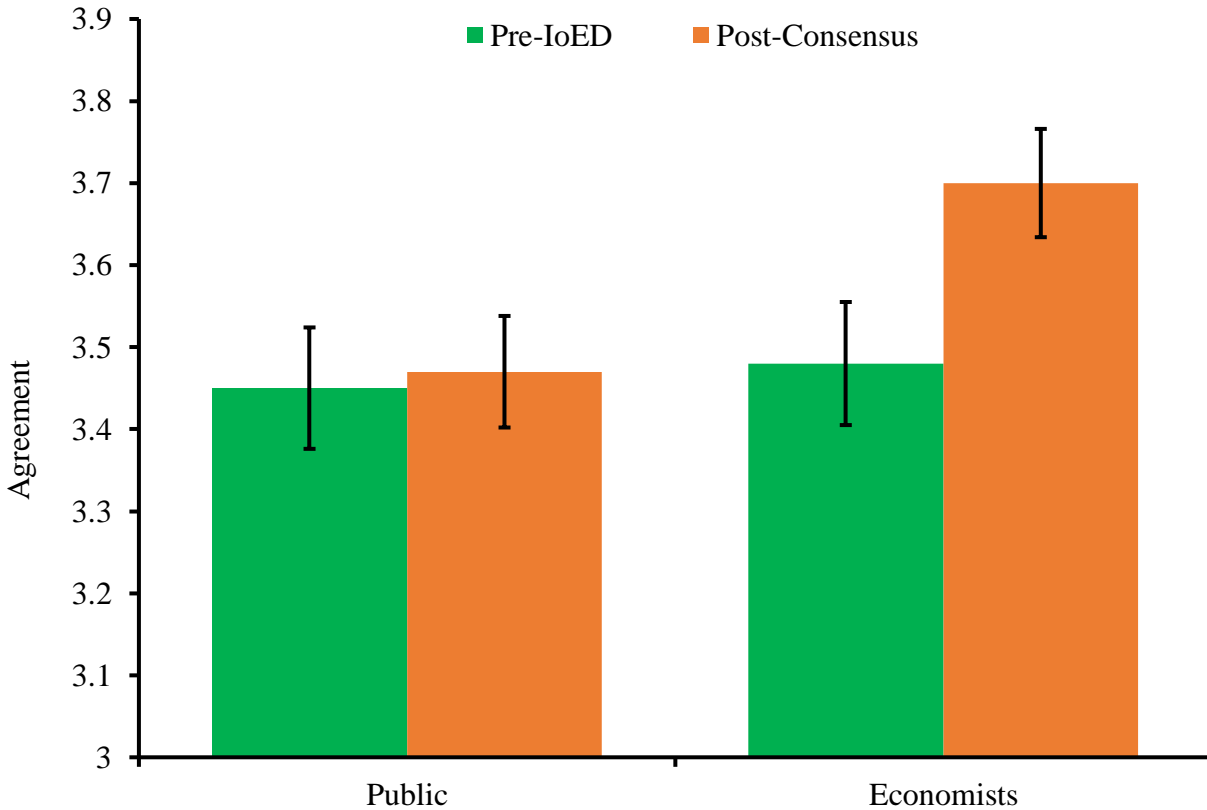


Figure 5. Pre-IoED and Post-Consensus judgments split by consensus conditions, Experts ($n = 204$) vs. Public ($n = 197$). Error bars are ± 1 SE.

Discussion

This study attempted to replicate the finding of the Study 2 that after attempting to explain an economic issue mechanistically, people revise their opinion of that economic issue more when they receive consensus information from economists (experts) than when they receive consensus of the general public. I also tested whether this finding is explanation relevant, that is, whether a person must attempt to explain how that specific issue works or if attempting to explain any process would produce the effect of privileging expert opinion. I found that after attempting to explain how something works, participants revised their beliefs significantly more to the opinions of experts than opinions of the public. This was found regardless of whether the

mechanistic explanation was about the exact issue (US trading with China) or something not related (recycling in a US city). I also found that when given the opinions of experts, people had significantly different beliefs at the end of the study than they held at the beginning, but this was not the case when public opinion was given instead. Here, after exposure to the IoED people were far more likely to change their minds when presented with expert opinion than the opinion of the public. I also found that position extremity was decreased after explaining how something works, regardless of the topic of that explanation, consistent with the findings of Fernbach et al., (2013).

This provides further evidence for the explanation that while people recognize differences between themselves and experts on an issue, they may not be aware of the discrepancy in knowledge between themselves and an expert on the topic. When made aware of their lack of topic-relevant knowledge people become far more heavily influenced by experts than the general public. However, it is also the case when people are made aware of their lack of topic-irrelevant knowledge. I suggest that exposing a lack of knowledge has a more general effect that shifts the mental model of what knowledge an expert possesses relative to ourselves and leads people to revise their beliefs more in response to expert opinion than the opinion of lay people. I refer to this as an *induction of ignorance*. This may suggest that people maintain a feeling that they are generally more knowledgeable than they truly are on all topics, which the exposure to the IoED paradigm undermines by making their ignorance directly salient to them.

A shortcoming of the past two studies employing the IoED manipulation is a lack of a true control group to make comparisons between. Thus, I am not able to claim solely based on the results of either study that exposing ignorance led to more belief revision than the group who was not exposed. To address this limitation, however, I conducted a cross-study analysis to test

whether there was significantly more adjustment to experts than laypeople in the second and third studies compared to the first, treating the first study as a control condition. I found a significant Time by Consensus Condition by Study interaction, $F(2, 997) = 4.99$, $MSE = 0.77$, $p = .007$, $np^2 = .010$. Further probing of this interaction revealed that Studies 2 and 3 each featured significantly more belief revision to experts than to laypeople in comparison to Study 1, and were not significantly different from each other.⁵ However, as this test is an internal meta-analysis of non-pre-registered studies, one should be cautious of interpreting the main finding of this paper from this analysis alone (see Vosgerau, Simonsohn, Nelson & Simmons, 2018). As a result, the next studies conducted introduced control conditions.

Another valid criticism of the research so far is the lack of variability in economic issue stimuli. That is, thus far I have only shown on one specific issue that inducing a feeling of ignorance leads to greater belief revision to expert versus public opinion. I am unable to rule out the claim that it is something idiosyncratic to this specific issue. To make a broader claim about belief revision to economists versus the public I need to demonstrate the effect across multiple economic issues. In addition to a control condition, the next two studies attempt to address this problem of stimulus sampling (Wells & Windschitl, 1999).

⁵ The three-way interaction was further probed using multiple comparisons. Comparing Study 1 and Study 2, I found a significant Time by Condition by Study interaction, $F(1, 598) = 8.78$, $MSE = 1.37$, $p = .003$. Comparing Study 1 and Study 3, I found a significant Time by Condition by Study interaction, $F(1, 601) = 8.15$, $MSE = 1.18$, $p = .004$. Comparing Study 2 and Study 3, I did not observe a significant Time by Condition by Study interaction, $F(1, 795) = 0.07$, $MSE = 0.01$, $p = .799$. Together, these indicate that the pattern of belief revision to expert opinion found in Studies 2 and 3, while not significantly different from each other, were both individually different from Study 1. Thus, the effect in question appears robust when compared to a pseudo-control condition.

Study 4

Studies 4 and 5 were both preregistered via the OSF. The preregistrations can be found on the OSF along with the materials and data.

To address the concern of stimulus sampling, this study attempted to replicate Study 3's findings across five economic issues. The issues selected were the five issues used in the original work by Johnston and Ballard (2016). Further, as it is possible to suggest that the "unrelated" explanation condition in the previous study (how recycling works in the US city) is not unrelated enough, that is, it is an issue that a professional economist could have a knowledgeable opinion on, I changed the topic to be explained. The new unrelated condition would feature a topic used in early IoED research: how a helicopter takes flight (Keil, 2003). Also, in an attempt to address the issue of no true-control in the last two studies, I included a condition I hypothesized would work as a control: explaining *why* you hold the belief you do about the issue, rather than *how* it works. This method is based off the condition implemented by Fernbach et al., (2013) that used it to demonstrate that explaining *how* rather than *why* leads to a decrease in political extremism. If I find that economic extremism is reduced by *how* (as demonstrated in the past two studies) but not *why* then this could represent a valid control condition. If explaining *why* also reduces position extremism then it is very unlikely it would produce a belief revision effect discrepant from the *how* conditions. In sum, participants would be explaining either how their one economic issue works, why they hold the opinion they do of that economic issue, or how a helicopter takes flight.

Method

Participants

I recruited 1000 participants via Mechanical Turk for this study. Participants could not have completed either Study 1 or 2 or 3 to enter this study. In addition to the recruitment restrictions applied for Studies 2 and 3, I also blocked responding from suspicious geolocations associated with bot farms via the Turk Prime feature (Litman, Robinson & Abberbock, 2017). Respondents were mostly white (70%), of evenly mixed gender (49% male), had obtained at least some level of post-secondary education (71%), and were between the ages of 18 to 77 ($M = 36.92$, $SD = 11.86$). Prior to analysis I excluded 12 participants for either failing to write anything and/or failing to respond to any of the three agreement judgments. This left 284 participants in the related how condition, 376 participants in the unrelated how condition, and 329 related why condition.

Procedure

This study's procedure was nearly identical to Study 3 except the number of possible issues participants could provide their opinion about was increased as was the number of writing conditions. Participants were randomly assigned to one of three writing conditions that asked them to rate their understanding of that issue, and then provide a requested explanation, followed by another understanding rating. They would either write about (and rate their understanding of) *how* their economic issue worked (e.g., how trading with China impacts the US economy), *why* they held the position on the economic issue that they did (e.g., why they agree that trading with China makes most Americans better off), or *how* an unrelated issue works (e.g., how a helicopter takes flight). Further, participants would be randomly assigned to give their response to only one of the five potential economic issues. These issues would be collapsed across for purposes of

analyses. All participants would make an agreement judgment to the issue three times. Once before writing (pre-writing judgment), once after writing (pre-consensus judgment) and once after receiving consensus opinion on the issue (post-consensus judgment). As the opinions of each economic issue were provided by professional economists, the diversity and levels of agreement (and disagreement) for each issue is unique. Thus, I am testing both whether the effect holds when the economic issue varies, and whether it holds across differing levels of consensus. Further, on two out of the five issues most economists disagreed with the statement (the other three they mostly agreed with), allowing us to not only have varying levels of consensus, but different directions of consensus, too. Each issue and its respective consensus can be found in the materials posted to OSF.

Results

Confirmatory analyses

I first tested whether explaining *how* but not *why* reduced position extremity. As the manipulation check, I predicted that consistent with prior findings, explaining how something works would reduce polarity from the pre-writing to the pre-consensus judgment. However, while there was a main effect of writing, $F(1, 986) = 7.06$, $MSE = 0.12$, $p = .008$, $np2 = .007$, there was no interaction $F(2, 986) = 0.91$, $MSE = 0.12$, $p = .404$, $np2 = .002$. This suggests that position extremity was reduced across all writing conditions by a similar amount, contrary to my prediction. As a result, one should not expect there to be a difference in belief revision based on these writing conditions.

After writing, regardless of what was written, participants revised significantly more to expert opinion than to lay opinion, $F(1, 983) = 12.48$, $MSE = 0.30$, $p < .001$, $np2 = .013$ (see Figure 6), but there was no difference in belief revision in response to expert opinion across

written conditions, $F(2, 983) = 0.13$, $MSE = 0.30$, $p = .877$, $np2 < .001$. That is, after writing, regardless of what was written, participants revised more to expert compared to lay consensus. In support of the prediction generated by the manipulation check, writing *why* failed to produce an effect different from the other two writing conditions (related how and unrelated how).

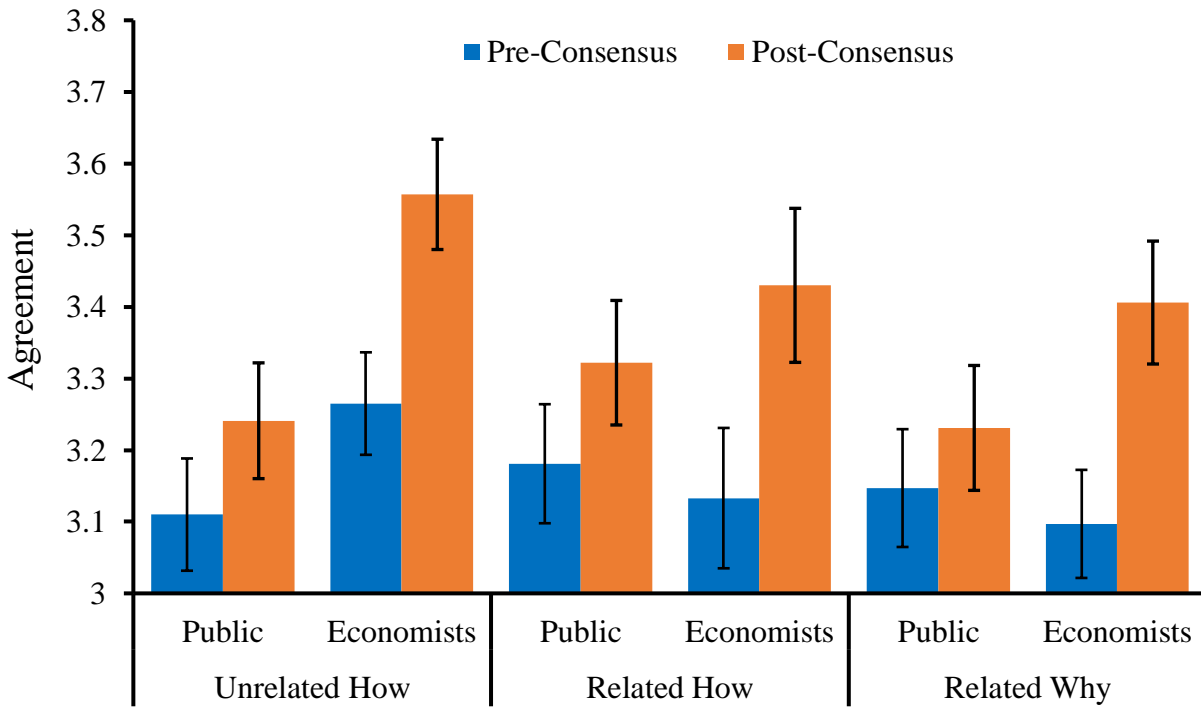


Figure 6. Agreement with the economic issue of Pre- and Post-consensus judgments across the three writing and two consensus conditions. Assessed on a 1 (Strongly Disagree) to 5 (Strongly Agree) scale where 3 represents uncertainty. Error bars are +/- 1 SE.

The analysis of what I term belief adjustment, the difference between the pre-writing and post-consensus judgments, revealed a similar pattern. No differences across writing conditions on belief adjustment was found, $F(2, 983) = 0.16$, $MSE = 0.42$, $p = .852$, $np2 < .001$. However a Time by Consensus interaction revealed that regardless of what was written, writing led to

greater belief adjustment when provided with expert versus lay opinion, $F(1, 983) = 6.54$, $MSE = 0.42$, $p = .011$, $np^2 = .007$. That is, relative to the first agreement judgment they made, the last agreement judgment was in greater line with the consensus opinion when that opinion was said to be held by experts compared to the public.

Discussion

Across five different economic issues each with a unique level of consensus I replicated the finding that explaining leads to greater belief revision and belief adjustment in response to expert economist versus public opinion. Further, I provide additional evidence that what is explained is irrelevant as even explaining how a helicopter works led to the downstream effect of increased belief revision. Importantly, while two of the three questions I attempted to answer were resolved, one was left entirely unanswered. As the originally planned written control condition failed to produce results discrepant from the experimental conditions on the manipulation check it is unlikely that the *why* condition was a true control condition. In retrospect, when queried for reasons why someone holds a position on an economic issue, they may start attempting to explain how it works. In complex and technical economic issues like the ones presented to participants here, it may be the case that a consideration of “why” will tend to reduce to an explanation of “how”. For instance, it would be difficult to find an explanation to the question “why do you believe a ship floats on the water” without necessarily appealing to its underlying mechanisms. As a result, this may be why the written *why* condition reduced position extremity – because participants were writing about how it works in their natural explanation of why they believed what they believe. To explore this possibility I had two independent, hypothesis-blind coders read each participant’s explanation and categorized them as an attempt to: explain how something works, why someone believed in something, reported stating “I don’t

know” or wrote nonsense. The results of the coding analysis revealed that the distribution of responses between the *how* and *why* writing conditions were nearly identical. That is, for one coder, 38% of participants in the related *how* condition explained “why” they believed what they believed, and 48% of them explained “how” it worked. This is compared to the 42% who wrote “why” they believed it and 43% who wrote “how” it worked in the related *why* condition.⁶ This is direct evidence that participants found it difficult to specifically write about how something worked or why they believed it. Thus, in addition to the main effect of extremism reduction, the results of independent coders suggest that the substance of what was being written about in both writing conditions was essentially the same thing. Therefore, I treat the *why* condition in this study as a further experimental condition.

As a result, my control condition question remained unanswered. I decided to run one more study focusing on a pure control condition that I intended to collapse with the current study to test whether the effect of the manipulation across five issues was different from revision in a control condition.

⁶ For the other coder while the percentage results are slightly different, the distribution again remains identical across the related *how* and related *why* conditions. For example, the other coder’s numbers were 51% explaining why and 37% explaining how in the related *how* condition and 51% explaining why and 36% explaining how in the related *why* condition. The ratings of the two coders were moderately reliable $k = .42$.

Study 5

This study attempted to test the main writing condition (explaining how the issue works) and a pure writing control task (copying text from a picture). Further, the data collected from this study would be compiled with the data from Study 4 in order to provide the best estimate as to whether the writing manipulation led to greater belief revision in response to expert opinion than the control condition.

Method

Participants.

I recruited 653 participants via Mechanical Turk for this study. In addition to the recruitment restrictions implemented in Study 4, potential participants could not have previously completed any of Studies 1 – 4. Respondents were mostly white (75%), an even mix of gender (51% men), had obtained at least some level of post-secondary education (67%), and were between the ages of 18 to 75 ($M = 36.33$, $SD = 11.06$). Prior to analysis I removed all participants who wrote absolutely nothing (1% of the sample). This left 246 participants in the experimental condition and 403 participants in the control condition.

Procedure.

This study's procedure was nearly identical to Study 4, except participants would be assigned to one of only two writing conditions. In the explanation how condition, like the previous study, participants would explain how their economic issue worked. In the control condition, participants would copy the text from a descriptive passage that was in image form (to prevent copy and pasting). The length of the descriptive passage was approximately equivalent to the amount of writing entered for an average written explanation in the previous studies. The rest of the study remained the same as Study 4.

Results

Confirmatory analyses

I first tested whether explaining how an economic issue worked compared to copying a descriptive passage of text led to a reduction in extremism on the economic issue. Similar to the previous studies, I predicted that explaining how something works would reduce polarity from the pre-writing to the pre-consensus judgment. In contrast, I expected the control condition to have no effect on position extremism between these two judgments. Analyses revealed that there was no difference between the writing conditions on polarity reduction, $F(1, 647) = 1.51$, $MSE = 0.09$, $p = .219$, $np2 = .002$. Importantly, however, there was no main effect of Time either, $F(1, 647) = 0.43$, $MSE = 0.09$, $p = .513$, $np2 = .001$, suggesting that position extremism was not reduced in either the control or experimental condition. While I expected the control condition to fail to reduce position extremism (as it did), I did not predict the explanation condition to do as well. Further, as there were no observed differences in the manipulation check, based on my model, I would likely not see a difference in this study between explaining how something works and copying text from a text box, although I had originally predicted that I would.

I then tested whether participants in the control condition revised their beliefs more to expert versus lay opinion and whether this difference was distinguishable from the explanation condition. I hypothesized that the control condition would replicate the findings of Johnston and Ballard (2016) and of my previous Study 1 and demonstrate no difference between revisions to opinion. The Time by Consensus by Writing condition interaction was not significant, $F(1, 645) = 0.08$, $MSE = 0.30$, $p = .774$, $np2 = .000$. This suggests that, as indicated by the manipulation check results, those in the explanation condition did not revise significantly more to experts

versus the public compared to those in the control condition. Overall, there was an effect of greater revision to experts than to the public, $F(1, 645) = 5.45$, $MSE = 0.30$, $p = .020$, $np2 = .008$.

For the change in agreement from the pre-writing to the post-consensus judgment, a similar pattern of results emerged. The Time by Writing by Consensus interaction was not significant, $F(1, 645) = 0.01$, $MSE = 0.70$, $p = .941$, $np2 = .000$, but there was a Time by Consensus interaction, $F(1, 645) = 10.47$, $MSE = 0.37$, $p = .001$, $np2 = .016$, suggesting that there was greater belief adjustment when participants saw economic consensus as opposed to public consensus.

Pre-registered Internal Meta-Analysis

Next, as stated in the pre-registration, I collapsed across Studies 4 and 5 to provide a better picture of the effects across all five issues. This analysis involved collapsing the explanation conditions together, creating one condition with 1,250 subjects. Note that this is significantly larger than the sole control condition featuring only 400 subjects. I first tested the whether the explanation conditions reduced polarity to a greater extent than did the control condition. This interaction was not statistically significant, $F(1, 1652) = 3.56$, $MSE = .11$, $p = .059$.⁷ The control condition did not significantly reduce position extremity from the pre-writing judgment to the pre-consensus judgment, $t(403) = -.97$, $SE = .02$, $p = .331$, $d = -.03$ [-.13, .06]. In contrast, the experimental condition did significantly reduce position extremity between the pre-writing and pre-consensus judgments, $t(1249) = 2.74$, $SE = .02$, $p = .003$, $d = .08$ [.02, .14]. Thus, the analyses collapsed across five different economic issues, each with a unique level of

⁷ When comparing the raw data of all of the studies that possess polarity data (studies 2 – 5) a stronger effect emerges, $F(1, 2452) = 5.19$, $MSE = .17$, $p < .001$, $np2 = .012$, though again I caution that this test be only considered part of the evidence for our account as it is an internal meta-analysis that includes some non-pre-registered studies.

consensus, demonstrates that exposing an illusion of knowledge reduces position extremism on an economic issue.

I then assessed whether there was a difference between belief revision in response to expert versus public opinion. Overall, there was a significant Time by Consensus interaction, $F(1, 1650) = 9.38, MSE = .32, p = .002, np2 = .006$, which suggests that people do revise more to professional economists than to the lay public on economic issues. However, the Time by Consensus by writing interaction was not significant, $F(1, 1650) = .41, MSE = .32, p = .522$.⁸ This suggests that there was no difference between the control condition and the explanation conditions. For exploratory reasons, I decided to unpack the three-way interaction. This interaction was not significant for the control condition $F(1, 402) = 1.75, MSE = .35, p = .109, np2 = .006$, but the interaction within the experimental condition was clear, $F(1, 1248) = 15.95, MSE = .30, p < .001, np2 = .013$.⁹ I do not believe that I had sufficient power to detect the three-way interaction (or the position extremism three-way interaction) and that displaying the interactions within each writing conditions makes the difference in effect between these conditions clear. Importantly, the effect size of the experimental condition is more than two times larger than it is for the control. Overall, it appears that inducing a feeling of ignorance leads people to revise their beliefs more to expert than to public opinion compared to when a feeling of ignorance is not induced.

⁸ When comparing the raw data of Studies 2 – 5, a significant three-way interaction emerges, $F(1, 2857) = 10.01, MSE = .263, p < .001, np2 = .012$, revealing that after inducing a feeling of ignorance, people revised more to the opinion of experts versus the public compared to when a feeling of ignorance was not induced. I stress the same caution on interpretation as in the previous footnote.

⁹ While I am aware that some may consider this unpacking statistically inappropriate, I believe not reporting it would be inappropriate as I have the power to detect each two-way interaction, but lack the necessary sample to detect the three-way interaction.

Assessing belief adjustment from the pre-writing to the post-consensus judgments, the Time by Writing by Consensus interaction was not significant, $F(1, 1650) = 0.23$, $MSE = 0.40$, $p = .633$, $np2 = .000$. Unpacking this interaction with the same considerations as above, both the control, $F(1, 402) = 6.61$, $MSE = 0.37$, $p = .011$, $np2 = .016$, and the experimental writing conditions, $F(1, 1248) = 20.40$, $MSE = 0.41$, $p = .001$, $np2 = .009$, demonstrate an effect of agreement change. This suggests prior to writing to after seeing consensus both conditions revised agreement more to economist opinion compared to public opinion.

General Discussion

My research focused on how people revise their beliefs in response to the opinions of experts (professional economists) compared to the general public. Study 1 replicated the finding that people adjust their beliefs in response to consensus information but do not adjust more to economists' opinion than lay opinion. Study 2 showed that when exposing an illusion of explanatory depth, people became less confident in their beliefs and consequently, revised their beliefs far more in response to learning the opinion of experts. Study 3 found that exposing the illusion of explanatory depth is not topic-bound and that it may have a more general effect of reducing overconfidence by inducing a feeling of ignorance. Study 4 demonstrated the effect of the manipulation across five different economic issues each with its own unique level of consensus and provided further evidence that it is a general feeling of ignorance (rather than awareness of a lack of topic-relevant knowledge) that creates the revision effect. Finally, Study 5 featured a control condition that also replicated the main finding of Johnston & Ballard (2016) and Study 1. When collapsing across Studies 4 and 5, the effect of exposing an illusion of knowledge on belief revision in response to expert versus public opinion was more than two times stronger than when no illusion is exposed.

When making the decision to make up our own minds or defer to experts, why do we fail to privilege the opinions of experts over those of the general public? In the realm of economics, two factors account for this: moral dilemmas tied to the specific issue and cognitive-epistemic reasons. In the present research I held the moral aspect constant and directly assessed whether I could improve belief revision in response to experts from the angle of cognitive change. I drew from research on overconfidence (see Moore & Healy, 2008), a seemingly ubiquitous phenomenon. I reasoned that people may be overestimating their own knowledge and therefore

fail to recognize the knowledge gap that typically exists between themselves and an expert. Such behavior would explain why people consistently fail to be persuaded more by economists than laypeople on economic issues as found by Johnston and Ballard (2016), and further by Coppock (2018).

I reasoned that exposing this overconfidence for what it is, an illusion of knowledge, could make salient the knowledge gap and lead to greater belief revision in response to experts. My findings are consistent with past literature that exposing the illusion of explanatory depth leads to downstream psychological effects such as reducing political extremism (Fernbach et al., 2013), as I too found that extremism (assessed as polarity in my research) was reduced after a mechanistic explanation was provided by participants. I also contribute further to the literature by demonstrating that undermining the illusion increases receptivity to expert opinion.

Limitations and Future Research

A shortcoming of my research is the lack of a true control condition within one single well-powered study. While I do have both a non-preregistered and a pre-registered internal meta-analysis that both reveal the same finding: belief revision to experts is stronger when an illusion of knowledge has been undermined, I do lack the absolute clarity of a definitive one-study test. Further, the results of the final study might suggest that people are already revising slightly more to experts, contrary to the first study and the work of Johnston and Ballard (2016) and Coppock (2018). However, I believe the collective weight of evidence accumulated makes a strong case for the interpretation that having an illusion of knowledge punctured leads to greater revision to experts versus the public.

Another limitation of my research is its generalizability to other fields. The present research was situated in the field of economics and it is not clear whether these effects manifest

due to the peculiarities of the field of economics, or if these results would generalize to experts in other fields such as medicine or law. Future research could look to test the generalizability of both the original finding and whether exposing ignorance would produce a similar pattern of results. Furthermore, future research should look to extend my results in non-Mechanical Turk samples and non-WEIRD populations.

Future research may also look to answer the question of whether exposing an illusion of knowledge, at least by this manipulation, is necessary to create this effect. If it is true that exposing an illusion of knowledge is not necessarily topic bound and it is a general feeling of ignorance that is being induced, then surely there are other methods that may produce similar results. If researchers are wishing to strive toward a solution that is perhaps more practical to implement in an applied setting, then this line of research may be a fruitful endeavor.

If wisdom comes with recognizing the limits of one's knowledge, and the privileging of expert opinion indicates that one does recognize these limits, then the results of these studies indicate that experiencing doubt can indeed make us wiser. The realization that we know much less than we thought seems to trigger a change in behavior which causes individuals to more heavily weight the opinion of experts over that of lay people. It seems that without this experience of self-doubt many of us too often resemble the self-certain "fools and fanatics" lamented by the late Bertrand Russell.

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