Evidence for a Community of Knowledge Across Culture

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Abstract

We tested an implication of the community of knowledge hypothesis, that people fail to distinguish their own knowledge from other people's knowledge in a collectivist society (China) as they do in individualistic societies like the United States. As predicted, despite the absence of any actual explanatory information, people rated their own understanding of novel natural and economic phenomena as higher when they were told that experts understood the phenomena than when they were told that experts did not yet understand them. This suggests that the community of knowledge effect may hold across cultures.

Keywords: cognitive processes; knowledge level; judgment; collective cognition; community of knowledge; contagious sense of understanding

Literature Review

Part of what makes humans unique is their ability to apportion cognitive labor to jointly achieve exceedingly difficult tasks. Extensive evidence has been generated in support for the community of knowledge (CoK) hypothesis, that knowledge is a collective enterprise. People depend on others to possess most of their understanding of complex phenomena as well as to store the evidence that supports that understanding (Sloman & Fernbach, 2017). On this view, most individual reasoning uses causal models that include markers indicating that more information—including mechanistic details that most people lack for complex phenomena like global climate change—can be found *outside* the individual. This system is effective because it affords group actions requiring complex knowledge, such as sending a person to the moon, without any single member of the group possessing all of that knowledge. Furthermore, it ties metacognitive assessments of one's own knowledge to knowledge in fact held by others.

One form of support for this hypothesis is the contagious sense of understanding effect (Sloman & Rabb, 2016; Rabb, Han, & Sloman, in press). In these studies, researchers presented participants with descriptions of novel scientific phenomena and policy proposals and found that people consistently reported a higher sense of understanding when told that experts understood how they work. Such evidence suggests that people fail to draw a sharp boundary between the knowledge they carry in their own heads and the knowledge they can access in their community. The current work seeks to investigate whether this is influenced by *how* the individual views herself in relation to the community.

The contagious sense of understanding effect is grounded in a capacity that gives humans our intellectual power: our ability to think and work as a social unit. But it is nevertheless a sign of fallacious inference: Whether someone else understands why a phenomenon occurs should have no bearing on one's own personal sense of understanding. Conflating our knowledge with that of others has been shown to influence the extremity of our political views as well as how we perceive policy issues such as climate change (Fernbach, et al., 2013; Rabb, Han, & Sloman, in press; Sloman & Rabb, 2016), suggesting that it contributes to political polarization.

We now address whether this is a universal trait of human social cognition or a pattern that varies by culture. We examine whether the same effect arises in China, a country that is known to score relatively highly on collectivist traits and power distance characteristics, such as polarized subordinate-superior relationships and submission to authority (Hofstede, 1983; see Farh, Hackett, & Liang, 2007, and Banfe, 2008, for review).

In Western societies, individualism is prized (Triandis, McKuster, & Hui, 1990; Markus & Kitayama, 1991). In collectivist societies, self-identity is determined to a greater extent by membership in a social system relative to one's status as an individual. A plethora of studies have confirmed that China ranks very high on collectivism (see Banfe, 2008 for review). In the eighties researchers described the construct of Chinese traditionality and later research identified submission to authority (i.e., filial piety) as one of the five factors that mapped onto the values and beliefs of traditional Chinese society (Yang, 1991). Despite the cultural influences

that have come from marketization, relational collectivism remains integral to Chinese culture. In his seminal work *From the Soil: Foundations of Chinese Society (乡土中国)*, Fei (1992) explains this as a remnant of agrarian society. Modern vertical collectivism has an institutional foundation not only by virtue of the ideology of the Communist Party but through other cultural facets such as Confucian ideology and the modern education system that reinforces it via collectivistic teaching practices.

Given that Confucian society is authority and relation oriented (Yang, 1991; Ho, 1993; Hwang, 2000), and because the CoK effect rests on the individual's assessments of his or her own understanding in relation to that of others (in these studies, experts), it follows that the effect could vary by culture. It could go either way. We could see a much stronger effect because collectivist societies might engage in more collectivist thinking. Alternatively, collectivist societies might be more aware of their tendency to think collectively because it is relatively common, and so they might be more likely to correct for it. In this case, we would see a weaker or perhaps no effect of being told that experts understand.

If the effect is culture-dependent, in one direction or the other, then understanding how will help inform us of the mechanisms behind the CoK effect. In particular, it will tell us if the mechanism is sensitive to the degree of collectivist thinking in a society. It will also help us to identify a broad cultural difference in social cognition.

A second motivation for this study is to rule out an alternative interpretation of prior published work on the contagious sense of understanding. Sloman and Rabb (2016) interpreted their findings as evidence that others' understanding increases people's sense of their own understanding. But it could be that the effect arises because of decreased understanding when others do not understand. That is, news that others fail to understand may cause some participants who felt some sense of understanding to become less confident by virtue of discovering that even experts do not understand. To contrast these two explanations, the current experiment includes a control condition that omits information about whether experts understand the phenomena or not. According to the Sloman and Rabb (2016) view that expert understanding is contagious, understanding in this control condition with no information should be rated the same as the condition with no expert understanding. On the alternative view, this condition should be rated the same as the condition with expert understanding.

Experiment

In order to test whether the contagious sense of understanding effect occurs in the collectivist culture of China using Chinese students, we adapted methods from Sloman & Rabb (2016) and created a Qualtrics survey in Mandarin. Stimuli were translated, then back translated by native bilingual Mandarin speakers to check for accuracy. The translations were modified to ensure they were as close as possible to the original materials. We borrowed questions pertaining to three fictional scientific phenomena from Sloman & Rabb (2016). We also wanted to generalize the effect to a greater range of items, so we added questions pertaining to three fictional economic phenomena. Each scenario was manipulated to reflect three experimental conditions: communal knowledge (hereafter denoted by CoK), no communal knowledge, and no information. The third condition was added to see how no information regarding communal knowledge would impact ratings; we predicted that perceived understanding in the no information condition would be equal to the no communal knowledge condition. When a previously unknown natural or economic phenomenon is discovered, there is no communal knowledge about how it works until somebody comes up with a convincing account of it. We tested the CoK hypothesis by eliciting ratings of understanding for newly discovered scientific or economic phenomena while varying whether a group of experts understood it. We predicted low ratings of understanding overall, given the unfamiliarity of the stimuli, but higher ratings for items that were said to be understood by experts.

Methods

Chinese college students were recruited by placing the link to the survey along with a brief description in various WeChat group chats created for students who want to participate in research for a small payment. Sample size was chosen to satisfy counterbalancing schemes and was in keeping with prior related research. The instructions, adapted from Rozenblit and Keil (2002), explained in detail how to use a rating scale to reflect a sense of causal understanding. Participants read six fictional descriptions of newly discovered natural and economic phenomena and rated their understanding ("How well do you understand how well ___ works?") on a scale of 1 to 7 (1 = little to no understanding, 4 = moderate understanding, and 7 = detailed and deep understanding). Each participant read two descriptions indicating that a given phenomenon had been thoroughly explained by the experts cited (communal knowledge, or CoK, condition), two indicating that it had not yet been explained (no-CoK condition; see Table 1 for examples), and two descriptions providing no information about whether there was communal knowledge or not. The primary intent of including the economic phenomena was to mask the design of the experiment. The order of conditions and phenomena was fully counterbalanced. Details about the scientists and reporting journals were included to camouflage the manipulation, but the descriptions contained no causal or explanatory information. Participants then answered a question about one of the descriptions that was incorporated as an attention check. Data from participants who spent less than five seconds or more than two minutes on a question were excluded. If a participant failed to answer a question in one of the two domains, it was replaced by the average value of the other two ratings in the other two domains. Across the board, participants took far less time to respond than we had

expected, suggesting they paid less attention than we had hoped. In cases where participants failed to answer two out of the three questions in either of the domains, those individuals were removed from the analysis. Gender and age were collected for 228 of the 322 participants who took part in the study. Of these, 60% were female. 88% were in their twenties and the smallest and largest ages were 18 and 36, respectively.

Table 1: Example stimuli For Each Condition

No-Cok condition	CoK condition	No Info condition
A May 19, 2014 study in the journal *Geology* reported the discovery of a new rock that scientists have **not yet** explained. The rock is similar to calcite, yet it glows in the absence of a light source. The authors of the study, Rittenour, Clark, and Xu, **do not yet understand** how it works; they provided a description of the remarkable appearance of the mineral and outlined future experiments.	A May 19, 2014 study in the journal *Geology* reported the discovery of a new rock that scientists have **thoroughly** explained. The rock is similar to calcite, yet it glows in the absence of a light source. The authors of the study, Rittenour, Clark, and Xu, **fully** understand how it works; they provided a description of the remarkable appearance of the mineral and outlined future experiments.	A May 19, 2014 study in the journal *Geology* reported the discovery of a new rock that is similar to calcite yet glows in the absence of a light source. The authors of the study, Rittenour, Clark, and Xu provided a description of the remarkable appearance of the mineral and outlined future experiments.

Table 2: Mean Ratings of Understanding for Each Item.

	Scientific stimuli				**Economic stimuli**				**All**
	Glowing rocks	Warm ice	Helium rain	Total	Successful company	Curve IPO		Total	Total
CoK	3.30 (1.77)	2.58 (1.42)	2.38 (1.69)	2.73 (1.65)	3.03 (1.70)	2.92 (1.82)	2.85 (1.72)	2.95 (1.71)	2.88 (1.54)
NoInf	2.45 (1.23)	2.71 (1.46)	2.83 (1.73)	2.67 (1.48)	2.68 (1.63)	2.47 (1.50)	3.10 (1.70)	2.78 (1.63)	2.78 (1.38)
No-CoK	2.59 (1.46)	2.57 (1.66)	2.67 (1.64)	2.49 (1.53)	2.69 (1.44)	2.21 (1.39)	2.76 (1.73)	2.59 (1.55)	2.60 (1.43)

Note: Values in parenthesis are standard deviations.

Results

In total, 213 participants remained in the analysis for all scenarios after cleaning. 171 participants remained for the scientific domain and 188 remained for the economic domain. As expected, ratings tended to be low. Mean understanding ratings from all conditions are shown in Table 2.

Overall, there was a community of knowledge effect. A two-way ANOVA with community of knowledge (no-CoK/CoK/no-information) and domain (scientific versus economic) as within-participants variables was conducted on understanding ratings. People rated their understanding of the phenomena significantly higher when they learned that scientists understood them, $F(2, 306) = 6.16$, $p < .01$, $\eta_{p2} = 0.04$. The effect of domain on understanding was not significant, $F(1, 153) = 1.84$, $p = .18$, $\eta_{p2} = 0.01$, nor was the interaction between condition and domain on understanding, $F(2, 306) = .309$, $p = .73$, $\eta_{p2} = 0.04$.

The scientific stimuli were borrowed from Sloman and Rabb (2016). To see how our results differed from theirs, we also analyzed the responses elicited for the scientific and economic domains separately. An ANOVA with community of knowledge (no-CoK/CoK/no-information) as between-participants factor and domain (scientific versus economic) as within showed a main effect of community knowledge; $F(2,420) = 6.43$, $p < .01$, $\eta_{p2} = 0.03$, $M_{\text{no-CoK}} = 2.60$, $M_{\text{CoK}} = 2.88$, $M_{\text{NoInf}} = 2.78$. In the scientific domain, the main effect of community of knowledge was marginally significant; $F(2,336) = 2.85$, $p = .06$, $\eta_{p2} = 0.02$, $M_{\text{no-CoK}} = 2.49$, $M_{\text{CoK}} = 2.73$, $M_{\text{NoInf}} = 2.67$. In the economic domain, the main effect of community of knowledge was significant; $F(2,374) = 5.20$, $p < .01$, $\eta_{p2} = 0.03$, $M_{\text{no-CoK}} = 2.59$, $M_{\text{CoK}} = 2.95$, $M_{\text{NoInf}} = 2.78$.

The sense of understanding generated from no information regarding expert understanding tends to be in between the CoK and the no-CoK condition, a little closer to the CoK condition. Linear contrasts were performed to compare two of the three conditions. The ratings under the CoK condition were not significantly higher than those for the No Information condition; $F(1, 212) = 1.52$, $p = .22$. The no-CoK condition significantly differed from the No Information condition; $F(1, 212) = 5.68$, $p < .05$. In the economic domain, the no-CoK condition was marginally significantly lower than the No Information condition; $F(1, 187) = 3.18$, $p = .08$. The ratings under the CoK condition did not differ significantly from the No Information condition $F(1, 187) = 2.01$, $p = .16$. In the scientific domain, the same trend held; the no-CoK condition was also marginally significantly lower than the No Information condition; $F(1, 171) = 3.37$, $p = .07$ and the ratings under the CoK condition did not differ significantly from the No Information condition; $F(1, 171) = 0.31$, $p = .58$.

On the assumption that the No Information condition represents people's default sense of understanding before learning whether experts understand or not, performance in these conditions suggests that people's default is a greater sense of understanding that gets reduced when they learn that experts don't understand. But the data are not strong enough to rule out the possibility that there is also a contagious sense of understanding: an increased sense of understanding when people learn that experts do understand.

General Discussion

As has been shown in previous studies (Fernbach et al., 2013; Sloman & Rabb, 2016), people rely on their communities not only for emotional and physical support but also to think about and execute complex cognitive tasks. This study sought to investigate a handful of questions about the community of knowledge hypothesis that had yet to be addressed by previous research. With regards to the cross-cultural comparison, the findings from the Chinese sample are similar to the findings from the American sample in Sloman and Rabb (2016), but it is not possible to know how they differ in a relative sense without directly comparing samples from each country in exactly the same experiment. Nevertheless, the evidence suggests that the community of knowledge effect does not differ significantly between U.S. and Chinese participants: overall, both groups are more likely to rate their own understanding of novel phenomena as higher when they hear that experts in the community understand them. Furthermore, our results suggest that knowledge of others' level of understanding may operate in the other direction; hearing that experts don't understand a phenomenon may make people less confident in their ability to understand it, causing them to adjust their own sense of understanding accordingly.

The fact that the effect arises in China suggests that members of a collectivist culture are just as likely as Americans—members of an individualist culture—to have their sense of understanding influenced by others. In that sense, the community of knowledge is similarly ingrained in the reasoning mechanisms of both cultures. The effects were of similar magnitude even though there is a stronger tradition of revering those with a high level of education and expertise in Chinese than American culture. This finding is reminiscent of Rabb et al.'s (in press) finding that American liberals and conservatives were equally affected by learning that experts understand.

Finally, the fact that the strength of the CoK effect was stronger for economic than scientific phenomena may indicate that the impact of communal knowledge varies by domain. One plausible explanation for this is that because economic phenomena are more familiar, due to the fact that they are reported in the news and often discussed in public, the sense of understanding them is more sensitive to one's assessment of others' understanding.

Without the successful division of cognitive labor, it is unlikely that humans would be able to achieve the remarkable accomplishments that have taken place over the course of human history. Our ability to think critically and incorporate the thoughts of others into our calculus not only makes us unique but is critical for moving forward to solve some of the most pressing issues of our time.

References

Banfe, P. L. (2008). Connections And Connectivity And In China; Guanxi And The Explosion Of Instant Messaging - The Marriage Of Relational Dyads, Group Membership, And Web Based Communications. *International Business & Economics Research Journal (IBER)*, *7*(12). https://doi.org/10.19030/iber.v7i12.3309

Farh, J., Hackett, R., & Liang, J. (2007). Individual- Level Cultural Values as Moderators of Perceived Organizational Support-Employee Outcome Relationships in China: Comparing the Effects of Power Distance and Traditionality. *The Academy of Management Journal*, *50*(3), 715-729. www.jstor.org/stable/20159880

Fei, X.T. (1992). From the Soil, Foundations of Chinese Society: a translation. (乡土中国). The Regents of the University of California. London, England.

Fernbach, P. M., Rogers, T., Fox, C. R., & Sloman, S. A. (2013). Political Extremism Is Supported by an Illusion of Understanding. Psychological Science, 24(6), 939–946. https://doi.org/10.1177/0956797612464058

Ho D. Y. F. (1993). Relational orientation in Asian social psychology. *Indigenous Psychologies: Research and Experience in Cultural Context. Cross-Cultural Research and Methodology Series*. (17), 240–259.

Hofstede, G. (1983). National Cultures in Four Dimensions. *International Studies of Management & Organization*, *13*(1/2), 46–74. https://doi.org.revproxy.brown.edu/10.1080/00208825.1983.11656358

Hwang K. K. (2000). Chinese relationalism: theoretical construction and methodological considerations. *J. Theory Soc. Behav.* 30 155–178.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. Psychological Review, 98(2), 224–253.

Rabb N., Han J. J., & Sloman S. A. (in press). How Others Drive Our Sense of Understanding of Policies. *Behavioral Public Policy*.

Rozenblit, L., & Keil, F. (2002). The misunderstood limits of folk science: an illusion of explanatory depth. *Cognitive science*, *26*(5), 521–562. doi:10.1207/s15516709cog2605_1

Sloman, S. A., & Fernbach, P. (2017) *The knowledge illusion : why we never think alone.* Penguin Group. New York, New York.

Sloman, S.A., & Rabb, N. (2016). Your Understanding Is My Understanding Is My Understanding: Evidence for a Community of Knowledge. *PSYCHOLOGICAL SCIENCE*, *27*(11), 1451–1460.https://doi org.revproxy.brown.edu/10.1177/0956797616662271

Triandis, H. C., McCusker, C., & Hui, H. (1990). Multimethod Probes of Individualism and Collectivism. *Journal of Personality and Social Psychology*, (5), 1006. https://doi- org.revproxy.brown.edu/10.1037/0022-3514.59.5.1006

Yang K. S. (1991). Chinese social orientation: perspective of social interaction. *Psychology and Behaviors of Chinese*. eds. Yang K. S., Yu A. B. 87–131.

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