Cultural Opacity Mindset: Exploring Barriers & Conduits to Cross-Cultural Collaboration

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Abstract

In an increasingly globalizing world, interactions with individuals from cultures other than one's own are unavoidable. Prior research has found that the success of social interactions, and specifically that of collaborative activities, depends in part on the mindset of the individual. However, in situations that demand collaboration with other-culture individuals, little research has been done thus far on the impact of mindset. In this study, we introduce the concept of "cultural opacity mindset," that is, the belief that the minds of those from other cultures are somehow "opaque," or harder to see. Our hypothesis is that individuals who enter collaborative paradigms with this opacity mindset will "self-handicap," struggling to mentalize with other-culture social partners. We test this in both low-level and high-level tasks: first, a perspective-taking visual exercise called the Director's Task, and then through a social-emotional modification of the classic Prisoner's Dilemma. Ultimately, mindset was not found to significantly impact results in our paradigms. However, we believe that further research is needed to build on these theories and findings, as they may have far-reaching implications: in the workplace, in communities, and in the minutiae of daily life. Cultural opacity may act as a barrier to collaboration, but through purposeful mindset shifts, we can hope to overcome this barrier, strengthen social bonds, and, despite differences, find common ground.

Key words: collaboration, cultural psychology, mindset, cultural opacity

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Cross-cultural coordination, or the ability to work with others who are from a background different than one's own, is a vital aspect of modern-day life. Our world is getting smaller and smaller, pushing together people from diverse backgrounds, cultures, and viewpoints. Recent data shows that globalization is ever-increasing, up nearly 300% in the past 50 years (Ortiz-Ospina & Beltekian, 2018). This rapid increase, enabled by growing trade and technology, also brings with it an increase of our own interactions with those from other cultures. These cross-cultural interactions often lead to heightened conflict and high costs. In 1940's Germany, many people were convinced to shun, imprison, and murder others, simply because of their difference in cultural background. The Holocaust is often pointed to as a glaring reminder of how cross-cultural interactions have historically gone wrong, but this remains all too common in our present-day world as well. In Israel/Palestine, in China, in Syria, and even here in the United States, bias against those whose culture differs from our own has dire results. In fact, most of the world's biggest problems today -- wars, inequality, racism, xenophobia -- can be boiled down to an inability to live in harmony with other cultures. Which begs the question: Is this just human nature? Are we destined to like what's familiar and fight against what's not? And if so, how can we ever hope to change?

From a psychological perspective, coordination with both in-group and out-group members offers many benefits for collaboration and community well-being. For example, in the classic Common Goods Game paradigm, individuals must make personal decisions that have the potential to benefit or harm the group as a whole. Groups whose members weigh mutual benefit above individual cost are most successful in this paradigm, because goods are shared equitably

across individuals. However, in order for these values to be upheld, members must trust each other and achieve coordinated action, which is often more difficult when some members may be from "out-group" cultures. One primary means of coordination is by mentalizing, also known as mind perception, which is defined as the process of inferring the thoughts, feelings, and intentions of those around us. Through mind perception, we can anticipate other people's actions and predict the outcomes of interactions. It is important to perceive minds, not just in coordinated efforts, but in many facets of everyday life. Theoretical proposals on the nature of mind perception suggest there are many benefits to this practice, including power of prediction, ability to bridge subjectivity, and promotion of intimacy (Epley et al., 2013).

Not all individuals have the same demonstrated capacity for mind perception. Without the benefits of this practice, these individuals often suffer severe social consequences. For example, those who are on the Autism spectrum often struggle to perceive and respond to social cues, earning the eponym "mind blind" in some literature (Baron-Cohen, 1990; Frith, 2001). In more extreme examples, those who are diagnosed with psychotic conditions, such as psychopathy and sociopathy, are often most recognizable by their lack of other-focused sociality and inability to adhere to social norms. All of these conditions require long-term treatment and severely impair individuals' ability to lead a normal life in a society that is inherently socially-driven.

If we hope to coordinate across cultures, we must first understand the benefits and challenges of cross-cultural mind perception. There exist certain "gaps" in mind perception across cultures, especially when it comes to emotion. Meta-analyses and reviews have reliably found and replicated specific cultural effects when analyzing the ability to perceive emotion cross-culturally (Elfenbein & Ambady, 2002; Jack, 2013). Certain cultures seem to prioritize and

utilize emotion perception differently than others, in accordance with differences in values and norms. In fact, it appears that even basic cues often differ entirely across cultures. When a given emotion is expressed, there is some evidence for the fact that the expectations for expressions and cues differ across culturally-diverse societies (Jack et al., 2012; Jack et al., 2012; Chen & Jack, 2017). In this vein, facial expressions and other common emotion cues that have long been thought to be shared universally may in fact be as culturally varied as language. Therefore, our predictive and perceptual power for the emotions of others may be severely limited by our own cultural lens. In addition, motivations differ when perceiving emotions or minds of out-group members as compared to in-group (Evans & Elfenbein, 2014). We approach mind perception of out-group members differently, with different goals and priorities, widening the "gap" of cross-cultural mind perception.

This "gap" may be even further widened by a mindset effect, impairing our ability to mentalize about out-group members. This proposed mindset effect comes from the idea that people in some societies have folk beliefs about the opacity, or "unseeable nature," of minds. In anthropological studies, some societies are reported to view the minds of others as more opaque, including even those who come from the in-group (Robbins & Rumsey, 2008). In other words, this opacity mindset changes how individuals from these societies view the minds of others in all contexts. In addition to these differences at societal level, there are also varied individual differences in tendency to infer mind. It is possible that this variation is not due to lack of ability, but instead due to individual differences in belief about the accessibility of other minds and the effort that should be expended to do so. This would be characterized as a mindset effect.

Mindsets, even those manipulated by external sources, can have profound impacts on behaviors. For example, in pioneering work on this topic, mindset about intellectual achievement

can be classed into two varieties: growth mindset and entity mindset. A growth mindset views intellect as malleable whereas an entity mindset views intellect as fixed. Researchers found that the mindset of students had an impact on their ability to perform in school. This finding suggests that ability is not the only factor that drives action, instead, mindset, too, plays a vital role (Dweck, 2016). In other studies, participants' ratings of attractiveness and taste were dramatically altered due to mindset manipulations (Crum et al., 2011; Jamieson et al., 2012). Perhaps most relevant, researchers have also found that mindset about empathy, including experimentally manipulated mindsets, can impact the effort expended to empathize with other individuals, including those who have opposing viewpoints (Schumman, Zaki & Dweck, 2014). In all of these findings, there is a clear conclusion: mindset matters. Mindset affects decisions and behavior, even overriding fundamental biological cues such as satiety signals. Mindset can also be manipulated, and these manipulations alter behavior. Thus, it stands to reason, that when empirically examining the ability to mentalize about others, manipulating mindset and examining the consequences will allow the field to gain further insight into this phenomenon.

In terms of measurement of mind perception, there are two broad sets of approaches within the field: explicit and implicit (Apperly, 2010). Explicit measures can vary in the degree to which mentalizing is directly instructed versus allowed to spontaneously occur. For example, in the widely used Reading the Mind in the Eyes task, participants are provided with a set of descriptors of mental states and are asked to match a choice to pictorial stimuli featuring different eyes. These overt explicit measures are admittedly attractive, due to their ease of implementation and interoperability. However, there are significant drawbacks to this approach. First, explicit tasks often carry the downside that it is very apparent to participants what these tasks are looking for. Participants may alter their behavior to "fit" what they think the

experimenters expect to find (expectancy effects). Thus, it difficult to adjudicate between a generalizable psychological effect or participants merely performing to match expectations. Other explicit tasks examine mental state inference in a spontaneous manner. These tasks often involve open, free labeling. For example, in "story book" tasks, participants are prompted to tell a story about the characters and action depicted in a book with no words (e.g., Doan & Wang, 2010). In tasks of this nature, mentalizing must be assessed based solely on language use and involves elaborated subjective coding by the researchers. These cons ultimately weighed against the viability of an explicit mentalizing task.

In light of these drawbacks, we pursued an implicit measurement approach to mentalizing. Implicit measurement, though less common and more complex to design and validate, offers the advantage of lessening expectancy effects. Additionally, as a more nuanced approach, implicit measurement allowed us to still ask how mentalizing occurs, unprompted. Both of our tasks are designed to incite mentalizing, without explicitly instructing the behavior. In our first task, participants do not receive any instructions related to the thoughts or feelings of their partner. Instead, they are told to follow a series of locative cues. Following these locative cues correctly necessitates perspective-taking, but participants are not told this at the task's onset. Thus, they must take this next step to mentalize with no experimenter interference, allowing us to independently manipulate the outside factors that may inhibit or encourage this behavior. In our second task, participants are faced with a socially ambiguous situation. Their decisions and outcomes are tied to that of their partner, and very little instruction is given into how to gain insight on the partner's choices. However, motivating factors will drive participants to seek out social information, such as partner behavior and facial expression, to decrease ambiguity and increase odds of success. In this manner, we are again employing a paradigm that

implicitly encourages participants to mentalize, with no explicit instruction given. Whether decoding locative cues or navigating social ambiguity, our participants were free to make the independent choice to mentalize with their partner.

Both mentalizing tasks are adapted from pre-existing methods that were previously established to examine mentalizing.

Task 1 Our first task is inspired by a study examining variation in perspective-taking behavioral errors in children and adolescence (Dumontheil, Apperly, & Blakemore, 2010). In this task, participants received auditory instructions from a virtual "director," embodied by 2-D figure on the computer screen. The director's instructions led participants to move certain objects around a partially-occluded grid (Appendix a). For example, "Move the small ball left." In most trials, the task was quite straightforward. However, in the experimental trials, the instruction was purposefully ambiguous. Two objects matched the description, but only one was visible from the perspective of the director. Thus, participants needed to take the perspective of the director, or mentalize, in order to answer correctly. Both response time and accuracy were measured, and compared across ages and trials (Dumontheil, et al. 2010). In our study, we are utilizing a similar design. Participants were presented with a clickable computer image of the original grid, with a photo of an "other culture" partner in place of the director. Just as in the original, participants faced both regular and experimental trials, and their ability to mentalize was tested. Results were measured in accuracy and speed.

Task 2 The second task was inspired by a study that considered an added social element to the classic Prisoners' Dilemma paradigm. In this study, participants played 3 rounds with a computer-generated avatar. In the first two rounds, the participants' choice (cooperate/defect) was made for them. In these trials, the participant received feedback from the avatar in the form

of facial expressions -- neutral/smile/frown (Appendix b, c, d). This "social feedback" implicitly influenced the participants' choices in the third round (de Melo et al., 2018). In our study, we keep the basic paradigm -- three rounds, two forced choice, one open -- but the partner was instead an "other culture" participant. The social feedback from this partner may factor differently into participants' decision-making depending on their degree of mentalizing.

We manipulated the mindset of our participants in one of two ways: universalism or opacity. Our hypothesis is that those participants who receive the opacity manipulation will perform worse overall in the directors task, and show a lessened consideration of social feedback in the PD game. Overall, we expect an opacity mindset to act as a "self-handicap" for mentalizing those from other cultures, making success in these cross-cultural collaborative tasks much more difficult.

Methods

Participants

Participants are 100 individuals (40 females) recruited via Amazon Mechanical Turk for this experiment. Participants were selected to be adults between the ages of 18-45, to control for any age-related variance, and U.S. nationals, to ensure uniform cultural distance from the out-group collaboration partners. Subjects were compensated for their time. An a priori power analysis shows that this sample size will be sufficiently powered to detect a medium effect size (Appendix g).

Procedure

The entire study was conducted online, using a combination of MTurk and Qualtrics platforms for recruiting, task presentation, and data collection. Participants were given a standard

consent form outlining the experiment's conditions at a high level. Each participant checked a box to agree to the consent conditions before proceeding any further in the experiment.

Following consent, participants were introduced to the framing of the study. In this portion, participants were presented with the following information:

Here at the Affective Science and Cultural Lab of Yale (ASCL at Yale), we are committed to studying and understanding psychological phenomena across cultures. Because of this, we often work with partner labs around the world, to compare and contrast these phenomena in U.S. and non-U.S. samples.

For example, this study you're about to participate in was developed in collaboration with our sister lab at the University of Central Asia in Tekeli, Kazachstan. In this study, you will engage in several collaborative tasks with partners. Your partners, selected at random, are all participants in a parallel study from the University of Central Asia.

As you engage in these collaborative tasks, your interaction partner will be Kazakhstani participant who completed these same tasks ahead of time in the lab at the University of Central Asia. We have randomly paired you with interaction partners ahead of time and you will see their responses in the tasks that follow.

Opacity Mindset Manipulation

After the experimental framing, participants are told that they will be reading a news article from popular psychology magazine *PsychToday*. This article is presented as additional framing for the psychological phenomena at play in the experiment. In reality, this article serves as the main mindset manipulation in our study. Participants are randomly assigned into two groups. The first group is presented with a "universality" condition article, and the second is presented with an "opacity" condition article (Appendix e, f). The "universality" group's article

biases its reader toward a view of cultural universalism, in which minds from out-group cultures can be considered comparable to minds of one's in-group. The "opacity" article presented an alternate bias, skewing readers towards a perspective in which out-group cultures have out-group minds -- more difficult to understand, empathize, and mentalize. After reading their assigned article, participants were asked one question, framed as a comprehension check. For experimental purposes, this question also served as a manipulation check. For participants in both conditions, the question was the same: *According to the article, are minds culturally universal?*

Collaborative Tasks

After reading the article and responding the comprehension check item, participants began the main portion of the study, which was made up of two different collaborative game tasks. The Director's task assesses visual perspective-taking, whereas the Modified Prisoner's Dilemma involves inferences of emotions and motives. Both are framed as interactive tasks, although in reality there are no other participants. Instead we use images and vocal instructions to create the illusion that there is an interaction partner. Critically, both tasks require some degree of mentalizing about these ostensible interaction partners. We hypothesize that participants who are in the opacity condition will mentalize to a lesser degree about the minds of other culture individuals, performing worse on these tasks than participants in the universalism condition.

Director's Task. The Director's task is modeled after a paradigm which examined variation in visual perspective-taking abilities in adolescents. All stimuli and prompts in the task are adapted from this original paper. In our adapted paradigm, participants were presented with a virtual bookshelf, filled with assorted household objects. The participant had visual access to all

items on the bookshelf from their perspective, but the other side of the bookshelf had partial occlusions in certain cells. Therefore, although the participant could see everything, an observer from the other side would only be able to see some items. In the task, the participants collaborated with a partner, the "director," to select the correct objects from the bookshelf grid. The participants were told that they were collaborating with a director partner from our sister lab. This "other culture" partner was ostensibly giving instructions from the director's point of view, meaning that our participant had more visual access to items than their collaborative partner. We placed an image of the director in the upper right-hand corner of the screen.

On a given trial, the participant saw the full open view of the grid, with grey squares indicating those spaces that are occluded to their partner (Appendix a). Then, the participant heard the auditory instructions of the director, for example, *"Click the small truck."* The instructions were recorded by a confederate in accented English. Each set of instructions contained two regular prompts and one key experimental prompt. In the experimental prompt, the director's instruction would be intentionally ambiguous. For example, if the experimental instruction was "*Click the small candle,"* then the grid would contain two small candles, one of which is the target item, and one of which is the distractor. The target item is visible to both participant and director, while the distractor is visible only to the participant, and is occluded from the director. This type of prompt necessitated perspective-taking on the part of the participant, allowing us to measure mentalizing based on both accuracy and speed measures. On experimental trials, the participant had to take the perspective of someone from another culture in order to successfully complete the task. The trials were grouped in sets of three instructions per grid image, advancing to the next screen after a participant's click or auto-advancing every three seconds.

The "social" nature of this paradigm was entirely constructed. The other culture participant was phony, with the role of "partner" being filled by pre-recorded instructions in accented English and a still photo of a racially ambiguous female. The auditory instructions and presented images were fixed and automated, to allow for the correct pacing and balance of experimental to control trials. However, the participants knew none of this context, and were led to believe that they were socially cooperating with a real, other-culture individual.

Modified Prisoner's Dilemma (MPD). At the end of the director's task, participants moved forward to the second task, Prisoner's Dilemma. This is a collaborative task premise in which the participant's reward payoff is directly dependent on the decisions that both they and their partner make. In each round, participants have the choice to cooperate or defect. Their virtual partner has the same choice. Importantly, participants will not know what their partner chose until after they make their own choice, and the point payoffs are announced (Appendix b).

The design for this modified Prisoner's Dilemma is inspired by deMelo and colleagues (2015), in which participants played rounds of a PD game with both an avatar and a human agent, both of which gave emotion feedback after each round. The emotion feedback was indicative of the partner's tendencies, as either collaborative or competitive.

For our experiment, we adapted this basic pattern to fit with our "other culture" manipulation. Instead of a human or avatar agent, participants played the game with 6 different phony human agents, who were ostensibly from the same "other culture" out-group as their partner from the director's task (Appendix c, d). Participants received instructions which explained that they were going to play a series of Prisoner's Dilemma games with different partners. Each game was made up of three rounds, so that the participants played a total of 18 rounds, three per partner. Each round introduces the payoffs for cooperate and defect choices, for

both the participant and the partner. In the first two rounds, the participant's choice is always decided by the computer. This is explained to the participant as "necessary to keep pace with the overall timing of the experiment." Therefore, it is only in the third round that participants are able to choose whether to cooperate or defect. In each round, the participant is introduced to a new partner, seeing an image of this person's face with a neutral expression. Then, after the first round is decided by the computer, the participant receives emotion feedback from the partner via their reactionary facial expression. This emotion feedback is pre-set to follow two patterns: collaborative agent or competitive agent. If the agent is demonstrating the collaborative agent pattern, they behave in the following manner: display joy after mutual cooperation, display remorse after exploitation. Concretely, this could play out like this:

*A participant begins a game with a **collaborative agent**. The agent shows a **neutral** expression. In round 1, the computer selects that the participant will cooperate. The agent also chooses to cooperate. The payoff is equal. After this mutual cooperation, the agent shows joy, as a **happy** expression. In round 2, the agent reverts back to a neutral expression. The computer selects that the participant will cooperate. The agent chooses to defect. The payoff is higher for the agent. After this exploitation, the agent shows remorse, as a **sad** expression. In round 3, the agent again reverts to a neutral expression. The participant must now choose whether to cooperate or defect.*

Conversely, if the agent is demonstrating the competitive agent pattern, they behave in the following manner: display regret after mutual cooperation, display joy after exploitation. Concretely, this could play out like this:

*A participant begins a game with a **competitive agent.** The agent shows a **neutral** expression. In round 1, the computer selects that the participant will cooperate. The agent also chooses to cooperate. The payoff is equal. After this mutual cooperation, the agent shows regret, as a **sad***

expression. In round 2, the agent reverts back to a neutral expression. The computer selects that the participant will cooperate. The agent chooses to defect. The payoff is higher for the agent. After this exploitation, the agent shows joy, as a ***happy*** *expression. In round 3, the agent again reverts to a neutral expression. The participant must now choose whether to cooperate or defect.*

Collaborative and competitive agents are distributed evenly and presented randomly across the 6 blocks of the task . Importantly, the participant does not know if a given agent will follow a collaborative or competitive pattern. Instead, to predict their next move, they must rely on the emotion feedback which requires an inference about agent's mental state based on their facial expression. If a participant is able to make inferences about these cues, they will be able to anticipate the agent's likely choice in the third round.

Demographics

At the end of the experiment, subjects were asked to report on their own demographics, including their age and ethnic/racial background. This information was not included in final analysis, but may be pertinent for follow-up studies.

Results

Data Preparation

We excluded data points for accuracy in the Director's Task by examining the dataset for extreme outliers (using the median absolute deviation method; Leys, 2013) and removed those participants, leading to the exclusion of 9 participants in this portion. Across both mindset conditions, all but 9 participants (91%) passed the manipulation check.

Analyses

We conducted a 2x2 mixed model analysis of variance on the accuracy data, with a between subjects factor of mindset: opacity versus universal and a within subjects factor of trial type:

control or experimental. We predicted that we would observe a main effect revealing a lower accuracy rate with experimental trials compared to control. We additionally expected to see an interaction, such that this difference in accuracy between control and experimental trials is significantly increased in the opacity condition. We found a significant main effect of trial type, such that participants were more accurate in the control condition (M=.85, SD=.093) compared to the experimental condition (M=.49, SD=.308), $F(1,89)= 134.8$, $P<.001$. We did not find a significant main effect of mindset, $F(1,89)= 0.889$, $P=0.348$, nor an interaction between trial type and mindset, $F(1,89)=0.7$, $P=.405$.

We ultimately decided not to analyze the RT data, as the current paradigm did not allow for the granularity of measurement that would significantly distinguish participant reaction times. Additionally, this was not our primary dependent variable, as the task was speeded, which often may induce a speed accuracy trade-off (Wickelgren, 1977).

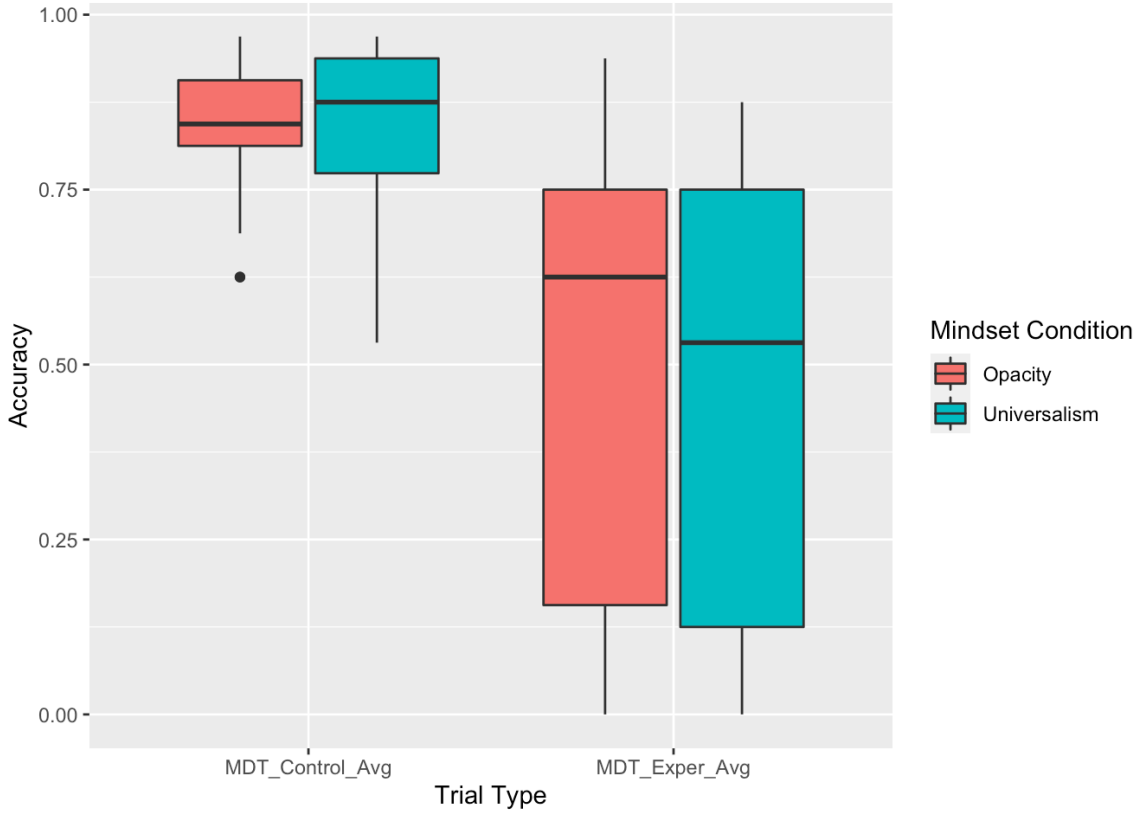

Fig. 1 Results from Task 1 Director's Task

The number of cooperative choices served as the dependent variable of interest in the MPD. We conducted a non-parametric ANOVA with one between subject factor with two levels: universalism versus opacity and one within-subject factor with two levels: collaborative and competitive partner. We predicted that we would observe a main effect revealing a lower cooperation rate with competitive agents compared to collaborative agents. We additionally expected to see an interaction, such that this difference in cooperation rate between competitive and collaborative agent trials is significantly decreased, if not eliminated entirely, in the opacity condition. We found a significant main effect of agent type, such that participants were more cooperative with collaborative agents (M=.596, SD=.392) as compared to the competitive condition (M=.454, SD=.344), $F(1,89)= 15.87$, $P<.001$. We did not find a significant main effect of mindset, $F(1,89)= .286$, $P=0.594$, nor an interaction between agent type and mindset, $F(1,89)=0.11$, $P=.741$.

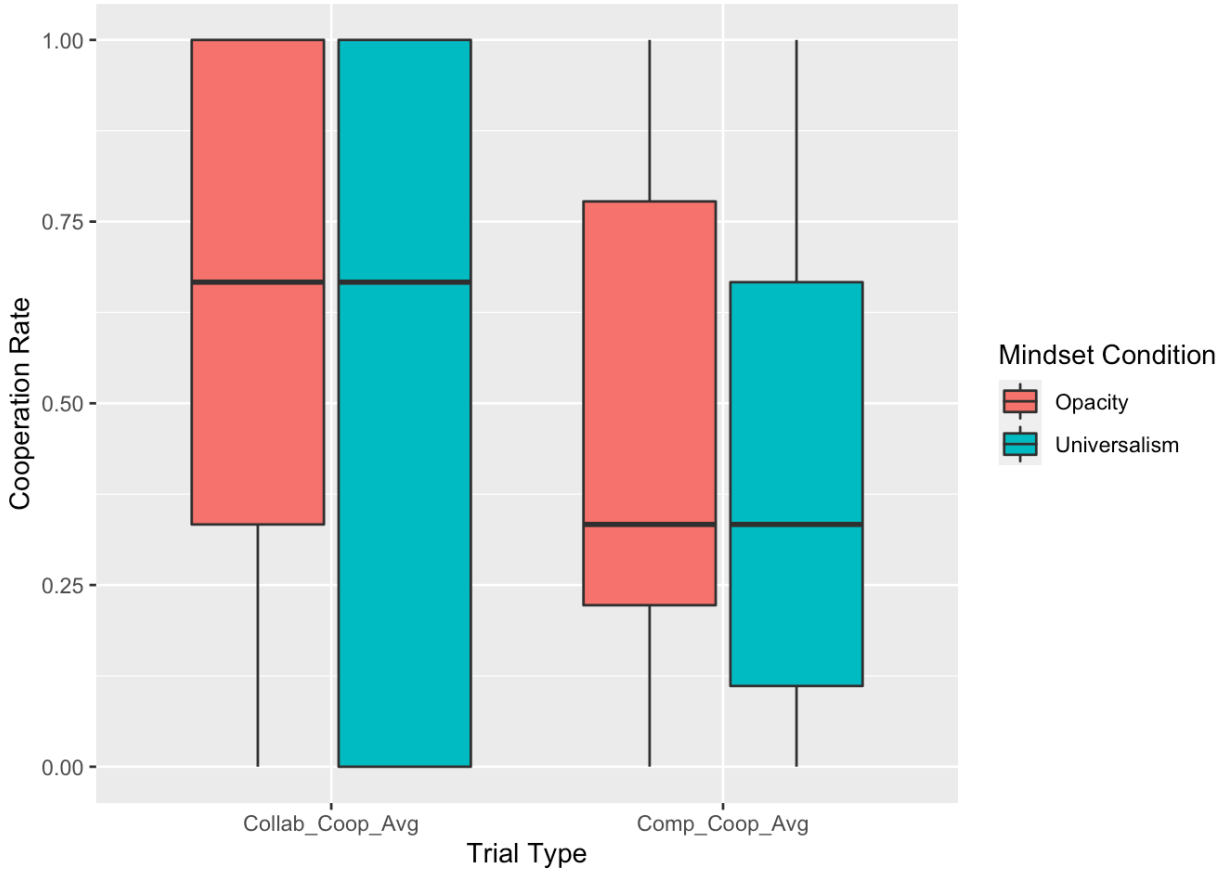

Fig. 2 Results from Task 2 Modified Prisoner's Dilemma

Discussion

Our hypothesis was that those participants who receive the opacity manipulation would "self-handicap" when mentalizing those from other cultures, making success in cross-cultural collaborative tasks much more difficult. In the Director's Task, this would have been reflected in lower accuracy to engage in visual perspective taking. In the modified Prisoner's Dilemma Task, this would have been reflected in insensitivity to the social behavior of the target signaling competitive versus cooperative intent.

In task 1, the Director's Task, participants in both groups were measured on how accurately they responded to the director's instructions, and how fast those responses were. In terms of accuracy in this task, we found no significant difference between opacity and

universalism groups, meaning that we were unable to reject the null hypothesis. We might conclude either that the mindset manipulation was unsuccessful, the task premise was unbelievable, or that this kind of low-level visual task is not subject to the same kind of mindset effects as a higher-level social task might be. As for the final option, task 2 results shed some light on this possible phenomena.

No reaction time data was analyzed due to limits in the task paradigm. If a follow-up study is run, RT data could be considered as another manifestation of the original hypothesis. If a follow-up study finds some difference in speed, we might conclude that opacity mindset only delays perspective-taking ability, rather than handicapping it entirely. In regards to speed, if we find that participants in the opacity condition respond slower than those in the universalism condition, we could conclude that opacity mindset might slow down an individual's ability to take the perspective of an other-culture collaboration partner. If we find that the response times were not significantly different, than we could conclude that opacity mindset might not impact how quickly an individual is able to engage in perspective-taking, although it may still impact other aspects of this ability. If we find that the response times were higher for universalism participants as compared to opacity participants, we could conclude that the director's task might be subject to a speed-accuracy trade-off, that is, the quicker a participant responds, the less likely they are to answer accurately. Additionally, we might conclude that those who have an opacity mindset tend to "trust their gut" more, not sacrificing the time to take the perspective of the other, and instead remaining centered in the self. Further research with more RT granularity would be needed to test these claims.

In task 2, the modified prisoner's dilemma, we analyzed a 2x2 difference between opacity and universalism groups by measuring cooperation rate, that is, the number of times a

participant chooses to cooperate, when given the choice in the third round of each trial. This choice has different meanings, depending if the game partner is a collaborative agent or a competitive agent. For agents that show a collaborative pattern, the participant should ideally have a high cooperation rate, to maximize payoff. For agents that show a competitive pattern, the participant should ideally have a low cooperation rate, to minimize loss risk and maximize payoff. However, recognizing the pattern of an agent relies on the participant's ability to internalize the social emotional feedback given during the task. In the opacity mindset condition, we hypothesized that it may be more difficult for the participant to mentalize, and therefore more difficult to recognize and internalize this pattern-revealing feedback. Therefore, in regards to cooperation rate, the result we most expected to see is:

$$Universal\text{-}Collaborative > Opacity\text{-}Coll > Universal\text{-}Competitive \geq Opacity\text{-}Comp$$

In which the opacity mindset is lessening the strength of the partner's social emotional signals to the participant.

However, we might have also expected to see the following:

$$Universal\text{-}Coll > Universal\text{-}Comp > Opacity\text{-}Coll \geq Opacity\text{-}Comp$$

In which the opacity mindset may be leading participants to be overall less cooperative towards all other-culture agents, regardless of social emotional cues.

After analysis, we found no significant difference based on mindset (universal vs. opacity), meaning that we were unable to reject the null hypothesis. This finding could indicate either that the mindset manipulation was not as effective as we predicted, the task premise was not as believable as we'd hoped, or that opacity mindset may simply not affect these kinds of structured online collaborative interactions.

In subsequent analysis, we analyzed participants' overall response to the task paradigms, regardless of mindset condition, and found that our results were reliably consistent with the original papers. This means that any lack of support for the hypotheses cannot be attributed to the design of the study itself, as the effects hold across both prior research and in our sample. Furthermore, we analyzed the participants' response to a manipulation check, and found that an overwhelming majority (91%) passed this check. Thus, lack of support for the hypothesis can also most likely not be attributed to a lack of understanding on the part of the participant regarding which mindset condition the phony article was designed to induce. Therefore, it seems likely that the results found are due to a disconnect between the component parts of the study, rather than a product of any one part being flawed. It is possible that participants read and understood the article, but this understanding did little to alter their mindset, causing them to enter the task with only their pre-conceived notions about opacity. Additionally, it is equally possible that the mindset manipulation was successful, however, it did not manifest significantly in the types of tasks we tested. It is possible that opacity mindset is most powerfully seen in in-person paradigms, as it has thus far been tested, and has little to no effect on online interactions.

My study has several limitations. As the first study of its kind, focusing on a new concept of cultural opacity mindset, this study seeks to both test the existence of this concept and also its downstream consequences. Therefore, a major limitation of this study is that null results are inconclusive, indicating either that this phenomena does not exist, or that it is not testable in this manner. For example, it is possible that while individuals may have opacity mindsets, it is not possible to induce them in such a minimal manner (using a bogus article manipulation). Further, even if opacity mindsets are induced, it is possible that the tasks we chose are simply not sensitive to this manipulation. We attempted to account for this by relying on validated prior

research as much as possible, and sticking closely to those established study designs. A second limitation of this study is the level of abstraction. In its conception, this study was originally designed to be an in-person lab experiment involving two real participants from two different cultures. However, due to time constraints, lab bandwidth, and feasibility concerns, this study was moved to an online format. In shifting to online, some key pieces of the initial study were lost. First, the participant in the present study "collaborates" with a phony agent, pre-programmed to randomly respond in a set number of ways, rather than a real individual from another culture. This means that the overall premise of the study is less believable to the participant, and also that the psychological distance between the two collaborating partners is substantial. In a study focused on mentalizing and collaborative ability, this is admittedly a major limitation. However, we tried to correct for this by making every part of the manipulation seem as realistic as possible: an accented voice in the director's task, a real university as our sister school, photos of real ethnically-ambiguous individuals as the stimuli. Another limitation of this study is that it does not control for the possibility of gender effects. In our tasks, all of the "other culture" partners are female-presenting, although participants are not controlled for gender. We chose all-female agents to match the task designs of prior literature, but this is certainly an unexplored potential limitation. A final limitation is the lack of consideration for cultural nuance. Our study's approach to cultural-othering is essentially a high-level "in-group" vs. "out-group" distinction. We limited our sample to U.S.-only participants, but it is clear that this group in itself is made up of many individuals from many different cultural groups. We hope that the "out-group" signal was strong, given prior research that shows simple cues can indicate out-group status in a profound way. However, this is certainly a barrier to participant "buy-in," and thus a limitation.

A final note about my study is that this data was collected during the month of April 2020, when the United States population was nearing the peak of the COVID-19 global pandemic. Fear, paranoia, stress, and xenophobia across the population were at levels far above average conditions. While we cannot estimate to what extent this heightened, nation-wide stress may have impacted our results, it seems likely that participants, at the very least, were coping with a higher cognitive and emotional load while completing our study. This heightened cognitive load could have made participants less vulnerable to mindset manipulations, for example, or increases in anti-foreigner rhetoric could have raised the level of baseline opacity mindset. Looking forward to calmer, healthier times, a future follow-up study should be run to test how significantly COVID-19 impacted our results.

Future studies should build on these findings and address these limitations. For one, a follow-up study should be conducted in-lab, to test how these abstracted results translate to in-person paradigms. An in-person replication of these findings would address several of the limitations, including believability, abstraction, and clarity of "out-group" signaling. Additionally, a future study should pilot test for gender effects, in both participants and collaborative partners, and use the findings to inform subsequent testing paradigms.

Cultural opacity may be a relatively new term in the psychological sphere, but its possible implications in everyday life are pervasive. In the workplace and in communities, micro-behaviors fueled by cultural opacity deter collaboration. More and more companies have begun to recognize and emphasize the importance of bringing diverse voices into the workplace. However, if the existing employees are "handicapped" by cultural opacity mindset, they will struggle to collaborate with these diverse new hires, making the point moot. That is to say, simply hiring individuals with different backgrounds and perspectives is not enough to improve

workplace culture. Instead, these hiring decisions must be accompanied by deliberate mindset shifts, toward a universalism perspective, to fully include these new individuals in collaborative tasks and cooperative conversations. Only then will a company see the true benefits of workplace diversity.

In our communities, too, cultural opacity creates barriers to progress. Many communities are experiencing an influx of immigrants, people whose cultural background is clearly different from that of the established community, made apparent by explicit signals like skin tone or accent. In these cases, communities often set the goal of being inclusive and welcoming to newcomers, but may find themselves falling short in collaborative engagement efforts due to the persistence of implicit cultural opacity mindsets. Again, a shift from this mindset to a universalism perspective could offer a way for these communities to achieve their inclusion goals and become more unified overall.

Whether it's a workplace project group, a community event, or even a small-scale daily interaction with someone from another culture, the possible negative effects of cultural opacity have increasing relevance in all aspects of an individual's life. The results from this experiment, and future studies to come, should offer the following: cultural opacity mindset may have a profound, unseen impact across a variety of collaborative social efforts. However, this may not be a fixed mindset. By shifting our perspectives to be more universally inclusive, we hope to be able to combat opacity mindset, allowing cultural difference to unite us, rather than divide us.

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References

Apperly, I. (2010). *Mindreaders: the cognitive basis of" theory of mind"*. Psychology Press.

Baron-Cohen, S. (1990). Autism: A Specific Cognitive Disorder of & lsquo; Mind-Blindness'. *International Review of Psychiatry*, *2*(1), 81-90.

Chen, C., & Jack, R. E. (2017). Discovering cultural differences (and similarities) in facial expressions of emotion. Current opinion in psychology, 17, 61-66.

Crum, A. J., Corbin, W. R., Brownell, K. D., & Salovey, P. (2011). "Mind over milkshakes: Mindsets, not just nutrients, determine ghrelin response": Correction to Crum et al. (2011). Health Psychology, 30(4), 429–429.

de Melo, C. M., Khooshabeh, P., Amir, O., & Gratch, J. (2018). Shaping Cooperation between Humans and Agents with Emotion Expressions and Framing. In Proceedings of the 17th International Conference on Autonomous Agents and MultiAgent Systems (pp. 2224-2226). International Foundation for Autonomous Agents and Multiagent Systems.

Dweck, C. S. (2016). Mindset: the new psychology of success. New York: Ballantine Books.

Elfenbein, H. A., & Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: a meta-analysis. Psychological bulletin, 128(2), 203.

Dumontheil, I., Apperly, I. A., & Blakemore, S. J. (2010). Online usage of theory of mind continues to develop in late adolescence. Developmental science, 13(2), 331-338.

Epley N., Schroeder J., Waytz A. (2013) Motivated Mind Perception: Treating Pets as People and People as Animals. In: Gervais S. (eds) Objectification and (De)Humanization. Nebraska Symposium on Motivation, vol 60. Springer, New York, NY

Evans, K., Jang, D., & Elfenbein, H. A. (2014). Motivation and emotion in multicultural psychology.

Frith, U. (2001). Mind Blindness and the Brain in Autism. Neuron, 32(6), 969–979.

Jack, R. E., Caldara, R., & Schyns, P. G. (2012). Internal representations reveal cultural diversity in expectations of facial expressions of emotion. Journal of Experimental Psychology: General, 141(1), 19.

Jack, R. E., Garrod, O. G., Yu, H., Caldara, R., & Schyns, P. G. (2012). Facial expressions of emotion are not culturally universal. Proceedings of the National Academy of Sciences, 109(19), 7241-7244.

Jack, R. E. (2013). Culture and facial expressions of emotion. Visual Cognition, 21(9-10), 1248-1286.

Jamieson, J. P., Nock, M. K., & Mendes, W. B. (2012). Mind over matter: Reappraising arousal improves cardiovascular and cognitive responses to stress. Journal of Experimental Psychology: General, 141(3), 417–422.

Ortiz-Ospina, E., & Beltekian, D. (2018). Trade and Globalization. Retrieved from https://ourworldindata.org/trade-and-globalization

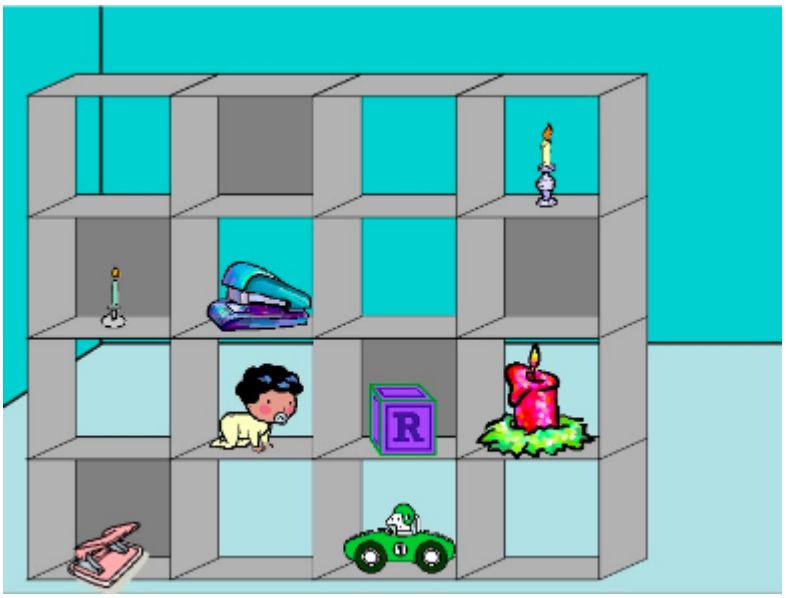
Robbins, J., & Rumsey, A. (2008). Introduction: Cultural and linguistic anthropology and the opacity of other minds. Anthropological Quarterly, 81(2), 407-420.

Schumann, K., Zaki, J., & Dweck, C. S. (2014). Addressing the empathy deficit: Beliefs about the malleability of empathy predict effortful responses when empathy is challenging. *Journal of personality and social psychology*, *107*(3), 475.

Wickelgren, W. A. (1977). Speed-accuracy tradeoff and information processing dynamics. *Acta Psychol*. 41, 67–85. doi: 10.1016/0001-6918(77)90012-9

VI. Appendix

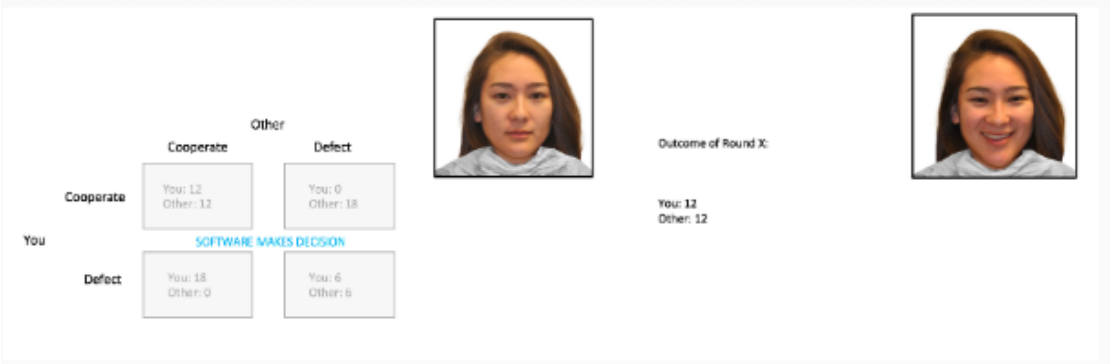
a. Snapshot of the stimuli for Director's Task



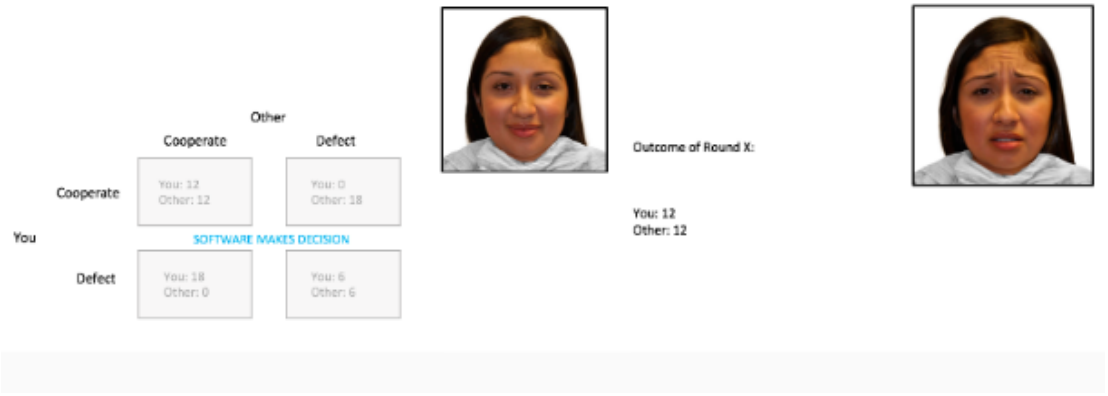
b. Prisoner's Dilemma Payoffs

		Other: Cooperate	Other: Defect
You	Cooperate	You: 12 Other: 12	You: 0 Other: 18
	Defect	You: 18 Other: 0	You: 6 Other: 6

c. Prisoner's Dilemma sample social stimuli (happy agent)



d. Prisoner's Dilemma sample social stimuli (sad agent)



e. Phony "Psychology Today" Article (Universalism)

"While recognizing the cross-cultural variance in our overt behaviors may come effortless to us even with the naked eye, researchers in Cultural Psychology have been investigating the differences that have seeped into the deepest structures of our lives—the way we think, the way we feel, the way we construe our sense of self and the way we conduct our relationships.
Their consensus?
Culture matters. Our cultures—diverse and magnificent—color the way we experience the world and shed light on the wonder that is to be human.
Despite cultural difference, our own experiences and assumptions do not seem to impair our basic ability to understand others. Recent research has found that individuals perform equally well at tasks related to understanding others' mind, thought, and feeling, when faced with someone from a different culture as compared to their own. This finding, termed "cultural universalism," demonstrates the limited role that cultural difference plays in everyday interactions, and will certainly inform future lines of research. In our increasingly globalizing world, psychologists hope that these findings can provide valuable information about how best to connect to those around us."

f. Phony "Psychology Today" Article (Opacity)

"While recognizing the cross-cultural variance in our overt behaviors may come effortless to us even with the naked eye, researchers in Cultural Psychology have been investigating the differences that have seeped into the deepest structures of our lives—the way we think, the way we feel, the way we construe our sense of self and the way we conduct our relationships.
Their consensus?
Culture matters. Our cultures—diverse and magnificent—color the way we experience the world and shed light on the wonder that is to be human.
Because of cultural difference, our own experiences and assumptions seem to impair our basic ability to understand others. Recent research has found that individuals perform worse at tasks related to understanding others' mind, thought, and feeling, when faced with someone from a different culture as compared to their own. This finding, termed "cultural opacity," demonstrates the powerful role that cultural difference plays in everyday interactions, and will certainly inform future lines of research. In our increasingly globalizing world, psychologists hope that these findings can provide valuable information about how best to connect to those around us."

g. Power analysis

A priori: Compute required sample size

Input:	Effect size f	=	0.25
	α err prob	=	0.05
	Power (1-β err prob)	=	0.80
	Number of groups	=	2
	Number of measurements	=	2
	Corr among rep measures	=	0.5
Output:	Noncentrality parameter λ	=	8.1666667
	Critical F	=	3.9401627
	Numerator df	=	1.0000000
	Denominator df	=	96.0000000
	Total sample size	=	98
	Actual power	=	0.8075979

- Assuming small to medium effect size
- Powered to detect interaction (2x2, between-within)

Yields sample size: 98 participants