

Culture and nonverbal cues: How does power distance influence facial expressions in game contexts?

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Abstract

Power distance is one of the most prominent cultural dimensions underlying cultural differences in beliefs and values. However, how power distance is evident in the more tangible domain of behavior, such as nonverbal cues, has not been well-documented. In our study, we recruited Dutch (low power distance culture) and Chinese (high power distance culture) university students to play games against two opponents via an ostensibly real-time internet connection. Unbeknownst to the participants, the two opponents were in fact confederates, who assumed the role of either a highly successful full professor or a down-to-earth undergraduate freshman. Throughout the game, participants were videotaped. Analyses of the resulting recordings showed that Chinese students showed more submission in their nonverbal behavior than Dutch students in general; what was most remarkable was that such a cultural difference in submission was more evident when the opponent was a professor than when the opponent was a fellow student. To the best of our knowledge, these findings are the first to illustrate that the role of power distance could indeed be reflected in nonverbal behavior exhibited in a naturalistic social setting.

Index Terms: nonverbal cues, facial expressions, culture, power distance, game contexts

1. Introduction

Power distance refers to the extent to which equality between more powerful and less powerful members of a society is accepted or expected [1]. In a high power-distance society, respect and obedience to superiors are expected and highly valued. In a low power-distance society, however, it is more common for superiors and subordinates to regard each other as equals; disagreements with one's superiors are not frowned upon. Although power distance is considered one of the most influential cultural dimensions, and despite the fact assumptions regarding its influence on nonverbal cues seem most intuitive, surprisingly little research has been done to investigate its influence on nonverbal cues.

Accumulated cross-cultural studies have mostly focused on the influence of culture on beliefs; it is not entirely clear to what extent such beliefs translate to real nonverbal behavior. Moreover, the paradigm used in existing studies often suffers from a lack of ecological validity. These limitations are prevalent in previous cross-cultural research on emotion expression and perception, a specific form of audiovisual displays. In studies on emotion expressivity, questionnaires are typically administered to members of different cultural groups to assess how they think they should express their emotions (i.e., display rules; e.g., [2] and [3]). In studies that examine emotion perception across cultures, the common approach is to employ still photographs of

posed emotional displays (e.g., [4]) or acted vocal expressions of emotions (e.g., [5]) as stimuli. Yet, self-reported display rules do not necessarily translate to actual displays. Still or vocal displays of posed emotions only bear little resemblance to the fluid flow of spontaneously nonverbal cues we commonly encounter in daily life.

Given the dearth of existing research, as well as the artificial nature of the paradigms used in previous studies, we have set out to conduct the present study. We would like to employ a more ecologically valid paradigm, allowing for a fine-grained analysis of how power distance may influence spontaneous nonverbal cues exhibited in a more naturalistic context.

2. Method

2.1. Design

2.1.1. O-Cam paradigm

Our primary interest was to employ a paradigm that would, on the one hand, bear a close resemblance to a naturalistic social interaction involving addressees of different levels of power and, on the other hand, still assert sufficient control over the addressees such that they are the same for all participants.

To this end, we have devised a paradigm based on the O-Cam paradigm [6]. The O-Cam consists of a simulated web conference during which participants have to interact with other participants via the webcam. However, unbeknownst to participants, the supposedly real-time reactions transmitted by the webcam have actually been pre-recorded. To make the web-based interaction plausible, the experimenter accompanying the participant only needs to conduct scripted interactions with the confederates in the recordings at timed intervals.

We found this paradigm ideal for our current study, as we could pre-record our confederates well in advance and use the same recordings for all participants. This would allow us to have optimal control over all aspects of our experimental setup and manipulation, as well to ensure that all participants would experience the same interactions. Moreover, this paradigm realistically resembles a real social interaction; it would ensure that how participants behave in our experiment would most likely correspond to how they would react in face-to-face communication.

2.1.2. Ultimatum game

Ultimatum game is a negotiation game for investigating irrational economic behavior [7]. In a classic ultimatum game, a sum of money is available for division between two people. One of the two players gets to propose to the other regarding how to split the money between them. If the offer is accepted by the

other player, both of them will receive the amount stipulated in the offer; if the offer is rejected, neither player will receive anything. Afterwards, the other player gets to make an offer too; the same rules apply.

We have chosen the ultimatum game as the main task for participants for a number of reasons. As it is a negotiation game, having to communicate with one's opponents via a webcam is nothing out of the ordinary; this game feature would reduce potential suspicion of participants regarding the actual intent of our study. Moreover, our confederates could make unfair offers (i.e., offers that are far from equal splits) so as to introduce a certain degree of challenge or feelings of unfairness to participants. These would likely be reflected in the nonverbal expressions of participants, which were essentially what we would be most interested in.

2.2. Participants

Fifty-nine students from the Tilburg School of Economics and Management enrolled in the study and received 5 Euros for their participation. The reason for recruiting this particular pool of participants was twofold: First, the ultimatum game is a classic economic experiment familiar to most, if not all, economics students. Novelty of the experiment to participants could then be reasonably excluded as an explanation for any resulting finding. Second, the confederates of our study were members from a different school (i.e., Tilburg School of Humanities). This ensured that the nonverbal expressions of participants could not be attributed to pre-existing acquaintance with the confederates.

As the cultural background of participants was the key variable of concern, only participants who were born and raised in either the Netherlands or China, and whose parents were also born in the same countries, were included in subsequent analyses. Moreover, data from participants who expressed skepticism about the authenticity of the paradigm were also discarded. After these screening procedures, data from 25 Dutch and 23 Chinese participants were retained, of which 23 were male and 25 female.

2.3. Procedure

Upon arriving at the laboratory, participants were informed that the study intended to examine how economics students play the ultimatum game against opponents on an online platform. All participants gave consent to be videotaped throughout the whole experiment.

2.3.1. Connecting to game server

Participants received instructions regarding the ultimatum game and were given the opportunity to practice. When the practice was over, the experimenter entered the lab cubicle and initialized the game interface. Specifically, the experimenter switched on the webcam, entered an IP address, and connected to a server which ostensibly hosted the ultimatum game for the participant and the opponent.

Shortly after the bogus connection was established, the opponent and a lab assistant appeared on the screen. Unbeknownst to the participants, they were in fact confederates whose actions had been prerecorded. To lend credibility to the interaction, the confederates appeared to interact spontaneously with the experimenter at timed intervals. For example, at the beginning of the interaction, the experimenter and the lab

assistant waved at each other (Figure 1a) and inquired if they were loud enough to be heard by each other. Moreover, the experimenter asked the opponent to move his chair twice such that he would be more visible on the screen.



(a)



(b)



(c)

Figure 1: Stills of recordings showing (a) Lab assistant waving at experimenter (not pictured), (b) High-status opponent greeting participant (not pictured), and (c) Low-status opponent greeting participant (not pictured).

2.3.2. *Being introduced to opponent*

After taking the aforementioned steps to make the connection appear legitimate, the experimenter introduced the participant to the opponent, who waved back at the participant (Figure 1b). On the pretext of checking the quality of the video connection, the experimenter asked the opponent to introduce himself to the experimenter as well. This self-introduction, which had been prerecorded, served as a key manipulation of the status of the opponent.

In the high-status condition, the opponent was allegedly a full professor who was dressed in a formal suit with a tie. He was consistently addressed as ‘Professor Swerts’ by the experimenter and the lab assistant. When introducing himself, he highlighted his impressive career successes which rendered him powerful (e.g., appearing on TV and radio regularly, having received a one-million-euro research grant, and leading a remarkably large number of junior researchers).

In the low-status condition, the opponent was introduced as an undergraduate freshman. He was dressed in a casual tee shirt, and was referred to as ‘Hans’ by the experimenter and the lab assistant. In his self-introduction, he touched on mundane topics that were common among students (e.g., what he studied, what his hobbies were, and where he lived).

As mentioned earlier, the status of the opponent was a within-subject factor in our study. The procedures described in 2.3.1 to 2.3.4 concerned the game against one opponent; afterwards, they were repeated for the other opponent. Half of the participants were randomly assigned to play against the high-status opponent first, the other half the low-status opponent first.

2.3.3. *Receiving offer and responding*

After the introductions, the participant was left alone to play the game. The game began with an unfair offer from the opponent, who told the participant that he would like to keep 15 euros and offer the remaining 5 euros to the participant. Participants could choose to either accept or reject this offer; afterwards, a summary of the game was shown on screen: In the case of an acceptance, the opponent would receive 15 euros and the participant 5 euros, as stated in the offer. In the case of a rejection, neither received anything.

2.3.4. *Making offer and seeing outcome*

Next, the opponent appeared on screen again and asked the participant for his/her offer. While the participant was telling the offer, the opponent was still visible on the screen; he appeared to be pondering over what the participant had just told him. As soon as the participant pressed a button to indicate that he/she had finished telling the offer, the opponent faded out. Participants were then prompted to type the offer they had just made, just in case the sound did not manage to get through.

After the participant had finished typing, a loading time of five seconds was inserted to create the impression that the opponent was taking his time to decide whether to accept the offer or not. Depending on the offer made by the participant, the respective game summary was shown on screen. The experimental algorithm ensured that any fair offer (i.e., with a minimum of 10 euros offered to the opponent) would be accepted, whereas anything unfair would be rejected.

2.4. Coding of Video Recordings

Participants were videotaped throughout the entire experiment. In the current study, we have analyzed fragments consisting of the moment at which participants began the game (at the onset of procedure 2.3.3) up to the moment at which their reaction to seeing whether their offer had been accepted or not had subsided (at the end of procedure 2.3.4). On average the fragments lasted one minute per opponent per participant.

To analyze the nonverbal cues of participants systematically, the fragments were annotated according to the Ecological Coding System for Interviews (ECSI, [8]), which was developed and had been validated as a coding scheme of nonverbal behavior. ECSI describes 37 nonverbal behavioral patterns, subsumed under seven categories. In the current study, we have chosen to code for the occurrence of 11 behavioral patterns, encompassing five categories: Affiliation (head to side, eyebrow raise, and smile), Flight (look away and look down), Displacement (lick lips and bite lips), Assertion (shake and frown), and Submission (lips in and nod). Examples stills of these facial expressions displayed by participants are shown in Figure 2. As required by ECSI guidelines, the fragments were coded without audio; only visual cues were annotated.

2.5. Inter-Rater Reliability

A total of 96 segments (i.e., two per participant: one against a high-status opponent and the other a low-status opponent) were coded. To establish inter-rater reliability, two coders annotated 16 fragments independently, after having received training and feedback. In order to preclude in-group bias in coding, we intentionally opted for a Dutch coder and a Chinese coder. Average percentage of inter-rater agreement was 78%, which was deemed reasonably high. Moreover, no disagreement was observed for the type of cue being coded; all disagreements pertained to whether a cue was present or not. Given the sufficiently high inter-rater reliability, the remaining segments were randomly assigned to either coder for annotation.

3. Results

Our paradigm allowed for a wealth of data to surface, which pertained to nonverbal behavior, prosodic cues, as well as game strategies. As the current study focuses on nonverbal cues, the results reported hereafter are limited to only the nonverbal expressions exhibited by participants in the chosen fragments.

Repeated measures ANOVA were conducted, with nationality of participants (Dutch or Chinese) as a between-subject factor and the status of opponent (high-status or low-status) as a within-subject factor. Occurrences of the ECSI nonverbal behavior served as the dependent variables. Initial analyses revealed no differences between male and female participants; therefore, analyses reported hereafter did not include gender as a factor.

Significant effects have been observed for Submission only. Participants exhibited more signs of submission when playing against a high-status opponent ($M = 7.64$) than when playing against a low-status opponent ($M = 5.00$), $F(1, 46) = 13.55$, $p = .001$. Moreover, Chinese participants appeared to be more



(a)



(b)

Figure 2: Example stills of participants who are (a) smiling and (b) frowning.

submissive ($M = 8.48$) than Dutch participants ($M = 4.16$), $F(1, 46) = 13.54, p = .001$.

These effects were qualified by a significant interaction effect, $F(1, 46) = 10.46, p = .002$. As shown in Figure 3, Chinese participants were more submissive when playing against a high-status opponent ($M = 5.48, SD = 2.98$) than when against a low-status opponent ($M = 3.00, SD = 2.07$), $t(46) = 4.79, p < .001$. The size of this effect was large, as indicated by a Cohen's d of 1.22. This suggested that the standardized mean values for the high-status and low-status conditions were 1.22 standard deviations apart.

On the contrary, Dutch participants seemed to make no differentiation between the two opponents; they were equally (non-)submissive in their nonverbal cues against the high-status ($M = 2.16, SD = 2.48$) and low-status ($M = 2.00, SD = 1.97$) opponents, $t(24) = 0.32, ns$. The effect size was much smaller, as Cohen's $d = 0.50$.

No other significant effect has been observed for the other categories; significance values ranged from $p = .14$ (effect of culture on Flight) to $p = .92$ (effect of opponent status by culture on Flight).

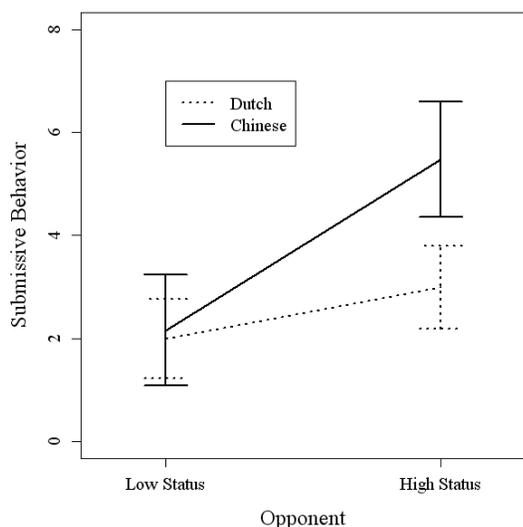


Figure 3: Interaction effect between culture and opponent status on Submission.

4. Discussion

The significant findings of our study are in line with predictions derived from the cultural dimension of power distance. We have found that Chinese appear to be more submissive in their nonverbal behavior when interacting with a professor than with a fellow student; however, Dutch appear to be equally non-submissive when interacting with both. These results correspond to the theoretical expectations that members of high power-distance cultures are sensitive to power differences between themselves and their addressees. By means of subtle nonverbal displays of submission, Chinese convey respect and obedience to their superiors. To their counterparts, such displays are uncalled for. For Dutch, displaying extra deference to a person solely based on their relative differences in status is not an expected practice.

The findings of our current study are certainly encouraging; nevertheless, we are aware of issues that could have been addressed as well. The results reported are based on annotations made by trained coders who were explicitly instructed to spot certain nonverbal cues. One could argue that naïve viewers might not harbor the same impressions when watching the same recordings; it could well be that spontaneous judgments made by uninformed viewers are based on only a subset of the nonverbal cues included in the coding scheme, or even on cues that have not been taken into account by us at all. Therefore, we are currently conducting a perception test in which we ask Dutch and Chinese participants to view the recordings and give ratings on a number of aspects; resulting findings could be compared with those of our current study and shed light on the correspondence between them. Moreover, data from perception tests would be valuable for examining the equivalence in meaning of nonverbal cues, as judges from different cultures may or may not interpret the same nonverbal expression in the same manner.

We have chosen to analyze fragments consisting of the moment at which participants began the game up to the moment at which their reaction to seeing whether their offer had been accepted or not had subsided. Given that these fragments actually encompass various stages of the game, one could also argue that finer distinctions could have been made. For instance, it is plausible that participants might display different nonverbal cues, depending on whether they were listening or doing the talking themselves.

5. Conclusions

To the best of our knowledge, our study is the first of its kind to demonstrate that power distance also manifests itself in nonverbal behavior in a naturalistic social situation. Members of high power-distance cultures display more signs of submission against high-status addressees than against low-status addressees; a differentiation as such is not evident for members of low power-distance cultures.

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