On Thanksgiving:

Cultural Variation in Gratitude Demonstrations and Perceptions

between the United States and Taiwan

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Abstract

We propose a methodological paradigm for testing the functions of an emotion using culture. Taking gratitude as an example, we predicted that, for gratitude to function, people in Confucian cultures would use self-improvement (cultivating personal skills and living up to social roles) to communicate gratitude, whereas people in individualist cultures would use bodily contact. Indeed, while Taiwanese (Confucian) and American (individualist) participants showed gratitude similarly via verbal acknowledgment and reciprocating kindness (Studies 1 & 2), participants from both countries also demonstrated their uniquely hypothesized respective cultural behaviors when showing gratitude, prioritizing such behaviors more in daily life than did participants from the comparison culture (Study 1). Additionally, compared to the gratitude demonstration uniquely hypothesized for the comparison culture, American and Taiwanese participants reported applying their unique cultural demonstrations similarly to applying the *a priori* culturally-similar demonstrations (e.g., reciprocity; Study 2), implying that the culture-specific demonstrations are as common as the non-specific within the respective cultures. Finally, Americans perceived gratitude through others' bodily contact (v. self-improvement) similarly to perceiving gratitude through reciprocity—that is, the two behaviors communicated similar information for Americans—whereas it was self-improvement but not bodily contact that communicated gratitude similarly to reciprocity for the Taiwanese (Study 3). Together, this research deconfounds gratitude's underlying relational function from its ostensible manifestations, and demonstrates the utility of studying culture to further functionalist emotion theories. We also developed and demonstrate a new method for de-biasing cross-cultural comparisons along the way.

Keywords: Gratitude, Emotion, Culture, Self-improvement, Touch

Introduction

In Italy, finishing the plate at a dinner party shows the feeling of gratitude to the host by implying the food is tasty, whereas in Hong Kong, leaving a little behind communicates the same emotion by implying the food is abundant. This cultural contrast in "how to thank" is apparent; it is thus curious why scant endeavor has been made to investigate how culture influences the communication of the emotion of *gratitude*—including both gratitude demonstrations and perceptions.

Building on existing research on the many influences of culture on emotion experience (e.g., Boiger et al., 2018; Mesquita, Boiger, & De Leersnyder, 2016) and expression (see Matsumoto, Yoo, & Fontaine, 2008), we aim to delve into how culture can inform not only theory about gratitude but also the methodological utility of culture in emotion research. We thus describe and demonstrate a cultural paradigm for emotion research, using gratitude as an example emotion. Beyond substantive contributions, we also developed and demonstrate here a new statistical procedure that tackles a long known issue in cross-cultural comparisons: culture often distorts respondents' use of rating scales regardless of the content of the scales (see Boer, Hanke, & He, 2018). Addressing this methodological challenge not only helps practically realize the cultural paradigm that we propose; the method itself is readily adoptable for psychological constructs that have been known to cause similar cross-sample scale distortions.

It might be worth noting that, although guided by emotion (expression) research, we intentionally avoid the term emotion *expression* and replace it with *demonstration* throughout. This is because expression has been mostly reserved in the literature for a rather specific, fixed-level unit of analysis focusing on the face—i.e., facial expressions of emotions (e.g., Darwin, 2009; Ekman, 2007; Gendron, Roberson, van der Vyver, & Barrett, 2014; Keltner, 1996; Lazarus, 1991,

p. 69). Nonetheless, a large body of research has now documented that individuals may convey emotional states through several communicative channels other than the face (e.g., Haidt, 2003; Hertenstein, Keltner, App, Bulleit, & Jaskolka, 2006; Russell, Bachorowski, & Fernández-Dols, 2003; Weidman, Tracy, & Elliot, 2016). Emotions can further induce and, thus, manifest themselves through actions (e.g., seeing pride in social others via their behavioral continuation and persistence; Weidman et al., 2016), interactions (e.g., seeing contempt in relationship partners via sarcasm in arguments;Carstensen, Graff, Levenson, & Gottman, 1996) and even inactions (e.g., seeing frustration via social withdrawal and the so-called "stonewalling"; Gottman & Levenson, 2000). As a result, the emotions that one experiences may be directly *demonstrated* by, indirectly inferred from, and communicated through intended or unintended behavioral effects of the emotions. [1] Consequently, culture may have the potential to moderate how emotions and, specifically, gratitude are socially communicated by setting up different norms for how various emotions should be demonstrated. [2]

Tackling this issue, we follow these steps in the current cultural investigation into gratitude. First, we introduce the functionalist theory of gratitude that guides the present research. We then bring in the perspective of culture, putting the social function of gratitude theorized in this theory into the cultural context. We argue that such a relational-regulatory function of gratitude may be realized via different demonstrations by people in different parts of the world, because cultures have their own relational norms that may require unique regulatory behavior to achieve the same

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[1] This prediction can be formally deduced from the social projection theory (Krueger, 2007), which states that one interprets the minds of others following how one interprets one's own mind. An example for emotion might be "I kick a vending machine when feeling annoyed; *therefore* they must be feeling annoyed too when doing the same." This formula has been specifically applied in research on social communication of emotions (e.g., Chang, Algoe, & Chen, 2017), but we save it from the main text because it is not the current focus and is not necessary in its full form to support the rather simple point that emotions are communicated beyond the face.

[2] There is research on whether the emotion of gratitude would arise in similar social contexts in different cultures and what other emotions would tag along (Morgan, Gulliford, & Kristjánsson, 2014). The findings are informative but not what we focus on here: the differences in gratitude demonstrations *after* gratitude has arisen.

functional goal. Following these differential yet theoretically predictable demonstrations, people from each culture will then perceive the demonstrations as conveying gratitude or not. As such, we examine both the demonstration and the perception hypothesis by studying two countries—the United States (U.S.) and Taiwan. This pair of cultures would be likely to reveal meaningful different communication behaviors of gratitude and, at the same time, shed light on how culture can be factored into the broader emotion research.

Gratitude Finds, Reminds, and Binds

The find-remind-and-bind theory of the emotion of gratitude (Algoe, 2012) proposes that *gratitude* (i.e., the warm and positive emotion people commonly experience after receiving another person's goodwill) *functions* (i.e., increases survival) by promoting the individual's relationship with a potential high-quality social partner. Specifically, gratitude fulfills such a function by alerting the person feeling grateful that they have *found* a potentially good partner or—if the two parties know one another—*reminding* the grateful person of the partner's good qualities. Subsequently, the emotion of gratitude facilitates behavioral demonstrations of gratitude from the grateful individual to the partner (e.g., Jia, Lee, & Tong, 2015; Kubacka, Finkenauer, Rusbult, & Keijsers, 2011), that are likely to make the partner more interested and invested in the grateful person in the future (e.g., Algoe, Haidt, & Gable, 2008; Gordon, Impett, Kogan, Oveis, & Keltner, 2012), thereby ultimately psychologically binding the two more closely together.

Culture, the Missing Piece in Gratitude Research

Notwithstanding the seemingly robust evidence of the relationship-promoting function of gratitude, issues remain for past research from a cultural perspective. It is not difficult to see that much of the research is produced in the United States (e.g., Algoe, Kurtz, & Hilaire, 2016) or, at most, primarily-English-speaking countries (e.g., Singapore; Jia et al., 2015). In addition, little

gratitude research has addressed individuals' cultural backgrounds, although such differences have been shown to affect interpersonal communication generally (Gudykunst, Ting-Toomey, & Chua, 1988).

Despite the omission of culture, there is a wealth of theoretical rationale for considering it in gratitude communication. First and foremost, since the beginning of the modern psychological investigation into culture, culture research has been defined mostly, if not solely, by a focus on social relationships (e.g., Hofstede, 1984, pp. 39-64)—the domain in which gratitude functions (Algoe, 2012). A recent investigation has also analyzed the effects of culture specifically on emotion demonstrations by the cultural *heterogeneity-homogeneity* of a society—that is, how many ethnicities the society's population consisted of over the past five centuries. Researchers argue that this dimension of culture is relevant to interpersonal emotion communication because the more heterogeneous a population was, the less shared knowledge among the people regarding how to convey social intentions in relationships through emotion demonstrations. To avoid misunderstandings and unnecessary conflicts, then, more direct and harder-to-miss demonstrations of emotions would have been selected to form a set of culture-like conventions for the demonstration of emotions between individuals—the *emotion culture* (Rychlowska et al., 2015).

More than raising the overall expressivity of emotion demonstrations, qualitative differences in the uses of specific demonstration behaviors may have evolved into emotion cultures, too. Empirical evidence reveals that, today, people in more historically heterogeneous societies not only show higher general emotion expressivity; they also show a stronger tendency to convey interpersonal affiliation intentions with a specific behavior—smile—and a weaker tendency to convey interpersonal dominance with the same demonstration than do those in homogenous societies, thereby reflecting qualitative differences (Rychlowska et al., 2015). Here,

the researchers again reason that, in heterogeneous cultures, where *little* shared emotion culture existed in the past, common emotion demonstrations—e.g., smile—might have been prioritized over other behaviors to lower interpersonal uncertainty, the possibility of conflicts, and thus selected to convey friendly affiliative intentions. Yet in homogenous cultures, with a great degree of prior shared emotion culture, the same behavioral demonstration could have been selected to gently communicate riskier, more conflict generating, but also highly important relational intentions such as negotiating responsibilities and hierarchical positions (Rychlowska et al., 2015).[3]

Overall, the implication is that emotion demonstrations—including those of positive emotions such as smile (Rychlowska et al., 2015) and showing gratitude—may have come a long way to fit into the history and culture of a society and have given the people a unique culture of emotion demonstrations that support the relationship structure in the society. Given that gratitude functions to support relationships and social bonding (Algoe, 2012), this general cultural prediction may be readily and especially observable for gratitude. By studying the chosen cultures carefully, specific behavioral predictions may also be made for cross-cultural similarities and differences in gratitude communication.

Culture, the Needed Piece in Gratitude Research

More than showing phenomenological associations between culture and gratitude communication, we would argue that a consideration of culture may help examine the underlying function of gratitude and advance theoretical understandings of this emotion of gratitude. Such use

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[3] To be clear, there are multiple facial movements in the family of smiles, and research suggests that affiliation- and dominance-showing smiles are systematically different in terms of what facial muscles and features to use (Rychlowska et al., 2017). In other words, they are not the "same" at the physiological level. However, this does not undermine the finding that, when being asked to "smile" without further specifications, individuals around the world use this "same" demonstration to convey different social signals.

of culture, critically, may apply to emotions other than gratitude to shed light on the functional nature of those emotions too. Specifically, it is possible to combine a functionalist theory of an emotion—for instance, the find-remind-and-bind theory of gratitude (Algoe, 2012)—with knowledge of specific cultures—e.g., the U.S. and Taiwan—to generate predictions of concrete emotion-demonstration behaviors within the selected cultures. Comparing the differences and similarities in such behavioral predictions between the cultures, subsequently, may help scrutinize whether the underlying function of the focal emotion generalizes across cultures—showing a *functional universal* (Norenzayan & Heine, 2005). From this perspective, the proposed cultural paradigm may be thought of as an emotion-centered approach, with the focal emotion being the constant, the conceptual independent variable, while much existing research would center around chosen cultures of interest (or their underlying dimensions) and study emotions as the non-constant dependent variables influenced by the cultures (e.g., Imada & Ellsworth, 2011).

Take gratitude for example. For the relational function of gratitude and, thus, its functionalist theory to hold, the ostensible demonstration behaviors of gratitude would need to be "predictably" flexible between cultures—e.g., as behavior B_x in culture C_x but as another behavior, B_y, in another culture, C_y—in that B_x and B_y promote relationships in and primarily in their respective cultural contexts. [4] Accordingly, if one empirically finds that the demonstrations of gratitude contradict this deduced cultural dependence—e.g., gratitude induces only B_x but not B_y in both C_x and C_y while B_x is adaptive only in C_x but not C_y—one may infer that gratitude may have a *behavioral* universal B_x but not a *functional* universal underlying the demonstrations (in this example, gratitude induces B_x in C_y but B_x is not functional in C_y). Consequently, by extending research to a culture (e.g., C_y) that uses demonstration behaviors other than those the research field

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[4] The adaptive values of B_x and B_y can be established either on empirical evidence or on theoretical review of the literature. We follow the latter, theoretical route in the present research.

is already familiar with (e.g., B_y), researchers may conceptually deconfound the behavior of an emotion from its purported function, thereby making culture an analytical tool to sharpen functionalist theories of emotions and testing functionalism at the level of functions.

Cultural Similarities in Gratitude Demonstrations

Following this cultural paradigm for studying emotions, we chose two culturally distinct countries and closely analyzed their relational norms to identify the societies' unique relational behaviors. The two focal societies chosen are the U.S. and Taiwan, which are arguably among the most typical instances of their respective cultural types in the literature, namely, individualism and Confucian collectivism (or simply, Confucianism). Individualism is the most documented in psychological research, especially as represented in the U.S. (Henrich, Heine, & Norenzayan, 2010) The country is therefore a common point of reference. Moreover, the U.S. is often contrasted with collectivism, which is currently disproportionately represented by East-Asian Confucian-collectivist countries such as Japan, South Korea, and Taiwan (Henrich et al., 2010).

For the U.S. and Taiwan, we identified both cultural similarities as well as differences in how people in the two countries might demonstrate gratitude. For similarities, we found the behavior of verbal acknowledgment (e.g., saying "thank you") and reciprocating kindness (e.g., returning a favor) to be potentially shared between the U.S. (e.g., Algoe & Haidt, 2009) and Taiwan (e.g., Chen & Li, 2007), because these demonstrations have been regularly reported from both cultures; reciprocity has long been theorized as universal too (Gächter & Herrmann, 2009; Gouldner, 1960; McCullough, Kimeldorf, & Cohen, 2008). To derive potential differences, below, we first followed the heterogeneity-homogeneity literature as it addresses emotion culture directly and generally. We then took a close look at cultural considerations specific to the chosen societies to study—the U.S. and Taiwan.

Cultural Specialties in Gratitude Demonstrations in the U.S.

As noted, prior research reasons that cultures that are heterogeneous, such as the U.S. (which has the highest heterogeneity score according to; Putterman & Weil, 2010), have evolved in such a way that the people have not only quantitatively tuned up emotion expressivity but also qualitatively tuned to emotion demonstrations that are direct, unsubtle, and unmistakable (Rychlowska et al., 2015). Specifically for the U.S., a study has also documented that, compared to three other discrete positive emotions, the emotion of gratitude prompts American individuals to show behavior that *acknowledges* the positive actions of their benefactors. Critically, this acknowledgment, coded within open-ended responses of participants, covers both *verbal* acknowledgments such as saying "thank you" as well as *physical* acknowledgment such as hugging (Algoe & Haidt, 2009). In short, these American authors saw physical gestures and, specifically, hugging, to have the potential to convey the same interpersonal information as a verbal "thank you".

Further, it might be worth noting that the phrase "stay in *contact*" is often equivalent to "stay in *touch*" in daily conversation among Americans. This equivalence might be of special relevance, because gratitude is about extending relationships (Algoe, 2012) and these phrases are the most common ways to convey such relational intent when building and extending relationships is needed—when people are saying goodbye to each other and temporarily ending their relationships. Here, we do not have much interest in pursuing a formal cross-cultural linguistic investigation. Yet it is suggestive that, although "stay [保持] in contact [聯絡]" does have a literal translation in Taiwanese Mandarin and is used similarly, this translation only makes sense when contact is translated through its communicative meaning [聯絡; as social connection] but not the behavioral one [碰觸; as bodily contact], and "in touch" simply does not translate.

To summarize, we found that "touching to thank" fits uniquely with the cultural conventions of the U.S. and is likely an American demonstration of gratitude. From a theoretical perspective, *bodily contact* takes extra perceptive qualities and sensational channels—the haptic—than demonstrations without physical contact. Bodily contact can thus be a relatively direct, unsubtle, and unmistakable emotion demonstration. Consequently, we hypothesized that <u>people from the U.S. may show gratitude with more bodily contact than do those from Taiwan</u>. [5]

Cultural Specialties in Gratitude Demonstrations in Taiwan

Compared to heterogeneous societies, which lack a common emotion culture, previous research has argued that people in homogenous societies—e.g., Taiwan, 95% Han in the past five centuries (Putterman & Weil, 2010)—have both a shared emotion culture and a tight pre-structured social network within them. Relative to building new relationships, maintaining existing ones may, therefore, be prioritized in the communication of emotion (Rychlowska et al., 2015). The question that follows then, is what unique features or behavior, if any, would help with the goal of maintaining the relational structure in homogenous and, specifically, Confucian societies such as Taiwan.

Searching the literature, we found the behavior of *self-improvement* (自我精進) to have potential. Self-improvement is the behavior of cultivating personal skills needed for better fulfilling one's responsibilities and living up to one's social role (Heine et al., 2001). As such, the behavior has value of communicating, maintaining, and strengthening relationships in

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[5] We had formulated the cultural paradigm described here in the Introduction (Chang, 2015) and hypothesized self-improvement as a gratitude demonstration for the Taiwanese (Chang & Chen, 2013) before conducting this empirical investigation. We had, however, not yet predicted the specific demonstration of bodily contact for Americans until we watched some participants' gratitude videos recorded in Study 1 Task A. That is, the idea of this one prediction concerning bodily contact emerged after we viewed the empirical evidence through a theoretical lens (i.e., Matsumoto et al., 2008; Rychlowska et al., 2015) and then revisited the literature for theoretical significance. We then developed hypotheses, formalized a behavioral code—implemented by naïve judges—to test the hypothesis, in all studies reported here, including Study 1 Task A.

Confucianism. [6] Specifically, although in practice, self-improvement is helpful to the self and prompts an unlimited possible set of behaviors, its cultural value is that, when recognized by others, it can increase a person's social recognition, called *face* (面子). Through increased face, this would influence social others' willingness to affiliate with the person in the long run (Heine & Buchtel, 2009; Heine et al., 2001). Indeed, when asked by students what an ideal ("humane") interpersonal structure would be, Confucius (2007, sec. 12) says "To master the self and return to ritual [interpersonal harmony] is to be humane [the ideal]. For one day [all people] master the self and return to ritual, and the whole world will become humane. Being humane proceeds from you yourself. How could it proceed from others?" In other words, Confucianism assumes that ideal interpersonal relationships start from self-mastering and individual improvement. Gratitude, as the emotion that induces behavioral demonstrations to better relationships (Algoe, 2012), may thus make people in Confucian societies motivated to improve themselves. Together, we hypothesized that people from Taiwan may show gratitude with more self-improvement than do those from the U.S.

The Current Research

Investigating the associations between gratitude demonstrations and culture, we propose both cultural similarities and differences between the U.S. and Taiwan. It was hypothesized that

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[6] As Heine et al. (2001), we define the construct of self-improvement following a cultural analysis of Confucianism. It might be worth noting that one piece of evidence from a U.S. sample has named a similar construct in a narrower way. There, researchers coded for Americans' spontaneous mentions of "moral self-improvement"—becoming a more virtuous person—and found the behavior was *not* induced differently by gratitude compared to other positive emotions under investigation (Algoe & Haidt, 2009). In addition, published after the current work was conceptualized and conducted, a recent theoretical review suggests that gratitude interventions may promote "self-improvement" through different intervention mechanisms. The authors of the review, however, define the behavior differently from ours and seemingly allow more positive personal changes (e.g., better peer relations) in their use of the term and rather than basing self-improvement on fulfilling social duties and contributing to the society as we do here (Armenta, Fritz, & Lyubomirsky, 2017). Consequently, we believe that it is an open question as to whether self-improvement, as defined by Heine et al. (2001) and here, can be induced by gratitude for the Taiwanese and, critically, more so for them than for Americans.

both Americans and the Taiwanese would use verbal acknowledgment and reciprocating kindness to show gratitude. However, we also hypothesized that people from the U.S. would show gratitude with more bodily contact than would those from Taiwan, whereas those from Taiwan would show gratitude with more self-improvement than would those from the U.S. To test these predictions, we had American and Taiwanese participants show gratitude freely on camera to someone they pre-selected (Study 1 Task A), as well as list their everyday gratitude demonstration strategies toward anyone (Task B). The responses were content-coded to test against the hypotheses. We also took a more top-down approach by having American and Taiwanese participants rate on a scale how likely they would be to perform each of several different demonstrations of gratitude toward another person: bodily contact, self-improvement, reciprocating kindness, verbal acknowledgment, paying it forward, and socializing (Study 2). Here, we further addressed whether the predicted effects are due to general positive valence as well as whether the effects are due to the specificities of benefactor-beneficiary relationship being confounded by culture. Finally, we hypothesized that, so long as people from a culture (e.g., the U.S.) prefer to *demonstrate* gratitude in a certain way (e.g., bodily contact), they would also *perceive* gratitude through that preferred demonstration compared to non-preferred demonstrations (e.g., self-improvement). To test this demonstration-perception matching, we presented American and Taiwanese participants with messages wherein we manipulated the messenger's intended demonstrative behavior (i.e., bodily contact, self-improvement, or reciprocating kindness). Participants rated how grateful the messengers were (Study 3).

Study 1

In this first study [7], which consists of two tasks—Tasks A (the video task) and B (the writing video)—we adopted a naturalistic bottom-up approach to explore how individuals from the U.S. and Taiwan demonstrate gratitude. Participants' answers to our open-ended questions were content-coded to test against the hypotheses. Below, given the differences between the two tasks, we describe Task A and its results first, and then Task B and its results. We then discuss both tasks of Study 1 together.

Task A Procedure

Task A involved participant-recorded webcam videos. In an online survey [8], participants in the U.S. and Taiwan were told to first "think back to a time when a person did something good for you and made you feel positive and grateful". They then recorded a video in which they "showed gratitude to the person as if talking to the person face-to-face" using the webcam recorder embedded in the online survey [9]. These videos could, therefore, include whatever participants wanted to say and to do. Seven trained coders unaware of the hypotheses then independently coded the videos for the ways participants demonstrated their gratitude. Here, the videos were presumably recorded in the participants' primary languages, so coders who spoke either Taiwanese Mandarin, American English, or both were enlisted to the coding team. [10] This resulted in seven coders for each American-English-speaking participant and their video, as well as five coders for each Taiwanese-Mandarin-speaking participant and their video.

Task A Participants

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[7] Research activities in this and all other studies in the present research were reviewed and approved by the Office of Human Research Ethics and the Institutional Review Board of the University of North Carolina at Chapel Hill.
[8] Written in American English for American participants and in Taiwanese Chinese for the Taiwanese.
[9] Participants were also told they could instead record on another device and then upload the video using the file upload box embedded in the survey.
[10] This included three native American English speakers among whom one is fluent in Taiwanese Mandarin, three native Mandarin speakers fluent in English, and one native South Korean speaker fluent in both Mandarin and English.

Undergraduate students in the U.S. (N = 197; 31.47 % females; age = 20.68, SD = 2.35) and Taiwan (N = 67 [11]; 34.33 % females; age = 19.94, SD = 1.46) were recruited for Study 1 in exchange for course credits or monetary compensation. Among the participants, 106 American and 54 Taiwanese participants uploaded a video for the present Task A. However, some videos did not show required content (e.g., did not play, had no sound, or contained unrelated cartoons), so the final data were 92 American and 51 Taiwanese videos for the task, and the projected effect sensitivity was medium ($d = .49$) in a t-test design, with power = .80.

Task A Measures

Bodily contact. Coders answered two items about bodily contact, one more general and one more specific: "Participant expressed a desire to touch any part of the benefactor's body," (general touch; e.g., hand-shaking and kissing) and "Participant mentioned he/she wanted to hug the benefactor" (hug [12]). In addition to stating the desire, if either coded *action* appeared in a video—a handful of participants actually made hugging motions toward their webcams—coders checked off a box to indicate the presence (versus absence) of the behavior. The intra-class correlations (ICCs) of the touch and the hug code were .67 and .93 respectively.

Self-improvement. Given the novelty of self-improvement as a behavioral demonstration of gratitude and that we were not aware of a nonverbal indication of self-improvement that could be unambiguously extracted from the recordings, the coding scheme first introduced self-improvement to coders as "actions that an individual takes to make him/herself more competent",

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[11] Across all studies in the current research, we planned to recruit 70 Taiwanese participants in a study, because we know that was about the number of people that we could practically achieve given our recruitment opportunities. For Americans, the plan was to stop recruiting when the sample size of the Taiwanese hit 70, because we expected it to be easier and faster to recruit Americans as we are based in the U.S. and this strategy, assuming an ≥ 70 sample size for Americans, would render our target, at-least-medium effect sensitivity $d < .45$ under power = .80 in a two-sample/culture t-test. The effect size was so chosen because, theoretically, we expected cross-cultural comparisons to be usually larger and easier to be observe.

[12] We did not ask coders to exclude hugs from general touch, so the latter code might contain the former.

and then presented three exemplifying aspects of self-improvement, one by one, again checking off a box to indicate the presence (versus absence) of the behavior. The three exemplifying aspects were "Participant explicitly expressed willingness to improve him/herself" (intention of self-improvement; e.g., to improve skills in sports or understanding of school work), "Participant had improved" (action of self-improvement; descriptions of improvement in skills and performance having been achieved), and "Participant explicitly expressed awareness that self-improvement could be a way to realize thankfulness" (cognition of self-improvement; either of the previous codes with a casual signifier such as "to show how thankful I am, I would improve in…"). Readers are also advised to refer to the short example descriptions of self-improvement provided by participants in Task B; we show the exemplars from Task B instead of A simply because, in B, participants actually wrote down their answers in more concise sentences than they did in recorded videos. Finally, the ICCs of the intention, action, and cognition codes for self-improvement were .45, .28, and .42 respectively. Here, the internal consistency of the action code did not reach the conventional criterion for ICC (i.e., < .40; Cicchetti, 1994). We, however, did not average across or arbitrate among coders on this or any behavioral code in the current task as is often done in traditional methods. Instead, the data were analyzed in a multilevel framework where such inter-coder variation is explicitly estimated and thus controlled for. Please see Results for more information.

Reciprocating kindness. The coding scheme introduced this demonstration as "actions that an individual nicely treats or wants to do so to a person who did something nice to the individual" and then presented two exemplifying aspects of the behavior in the same presence/absence format: "Participant explicitly expressed willingness to reciprocate" (intention; e.g., saying explicitly "I'd like to do *the same* for you.") and "Participant had reciprocated" (action;

e.g., "I did the same for you."). The ICCs of the intention and action code here were .91 and .70 respectively.

Task A Results

We tested the effect of culture on each code in a multilevel logistic model where coders' ratings were nested within videos, with videos of American participants being the reference category. This multilevel approach accounts for unexpected missing codes and extracts the most information from the data, while avoiding the need to arbitrate among coders if they disagreed with each other. Compared to the traditional coder-average method, the present modeling would also take within-video variability into account as opposed to eliminating it and, therefore, theoretically requires relatively little internal consistency among coders to make an efficient estimation.

As predicted, results in Table 1 showed that Taiwanese participants' videos were more likely to contain the intention, action, and cognition of self-improvement, and less likely to contain references to hugs and general bodily touch than were Americans'. In addition, there were no differences between the two cultures in the intention and action of reciprocating kindness. Here, we note that the odds ratio and the confidence interval of the hug code were statistically zero and thus mathematically impossible. This modeling error was likely caused by the fact that, in the data, no coder detected Taiwanese participants' inclination to hug. Although this finding supported the hypothesis even better, to still formally test the hypothesis, we supplemented with another analysis in which each video was classified as either with a hug detected by any coder or no hug detected by all coders (and this processing only affected Americans' videos given no detection of hug at all for the Taiwanese). The results confirmed that U.S. videos contained significantly more hug attempts than did Taiwanese videos ($\chi^2 = 4.70$, $df = 1$, $p = .030$).

Insert Table 1 about here.

Task B Procedure

The writing task (Task B) took place between the recalling and the recording portion of the video task (Task A) in the same online survey. The data were coded by a different group of coders after Task A was fully analyzed, and served to consolidate the findings of Task A. Specifically, for this part of the study, participants were told to nominate one to seven "strategies that you use to show gratitude to people being kind to you", to give each nominated strategy a name, and then to write a short description of each strategy. Given that participants could list multiple discrete strategies, the current design provided an easy way to estimate the relative degree to which a demonstration of interest occupies one's general gratitude demonstration "toolbox." Specifically, unaware of the hypotheses, three trained coders who read both American English and Taiwanese Chinese [13] independently categorized each nominated strategy, focusing on whether or not the strategy described bodily contact, self-improvement, or reciprocating kindness—the three strategies studied in Task A—in addition to one more that has been widely studied in the literature, verbal acknowledgment (see review of McCulluogh et al., 2008). We then "profiled" each participant's demonstration toolbox by calculating the relative weight of each of these four targeted strategies to the total number of strategies nominated by the participant. For example, if a person nominated total 5 strategies among which 3 were indicated by most coders as reciprocating kindness, the person' reciprocating kindness weight would be 3 / 5 = 60% of their personal toolbox of gratitude demonstrations.

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[13] All coders spoke and read Chinese Mandarin as their native language.

Task B Participants

The same group of 254 participants of Task A generated 980 gratitude demonstration strategies in total as the data for Task B. For Americans, the average number of strategies generated by an individual was 3.81 (SD = 1.42); for the Taiwanese, it was 3.42 (SD = 1.51). Different from Task A, no participant here was removed from the analysis because everyone had listed at least one demonstration strategy. Accordingly, the projected effect sensitivity was a small-to-medium $d = .40$ in a t-test design, with power = .80.

Task B Measures

Bodily contact. Coders categorized any demonstration strategy that involved the behavior of touching the benefactor's body—such as hugging, kissing, and shaking hands—into the bodily contact category. Coders were instructed to only include behavior intended for bodily contact but not those that might lead to physical contact unintentionally (e.g., "dancing" might include touch at some point) in the category. Assuming independence between strategies, the ICC of all strategies collected was .73.

Self-improvement. Extrapolating from its definition, coders looked for three types of self-improvement: fulfilling personal responsibilities (e.g., "[…] show up and work hard every day" and "Love life and your purpose!"), performing an activity better (e.g., "[…] show him my best performance in return." and "[…] follow his advice and succeed in achieving my physical appearance/strength goals") and changing personality in a positive way (e.g., "[…] try to be independent", "Act humbly", and "To smile more"). If a demonstration strategy fit with any of these criteria, the demonstration was counted in the self-improvement category. The ICC of the current code was .71.

Reciprocating kindness. Coders identified the behavior of "providing the benefactor what she's in need of" (e.g., "[…] provide help when he is in need" and "[…] be available to them if they ever need me") as a common way to reciprocate kindness. We did not use the same definition as in Task A, because both bodily contact and self-improvement could often be deemed as treating someone nicely in return—the definition in Task A—and thus overlap with this broader reciprocating kindness code in the mutually exclusive coding system for the present Task. In contrast, with a narrowed definition, the present code of reciprocating kindness measured a specific kind of reciprocating kindness that is not bodily contact or self-improvement. The ICC here was .55.

Verbal acknowledgment. Coders identified three behaviors for the code: verbally saying "thank you," "thanks," or synonymous phrases; communicating such language through other media such as cards, emails, and social media; and using symbolic acknowledgment *without* bodily contact, such as nodding, smiling, and waving hands. Critically, for this last, relatively ambiguous type of behavior to qualify as language-like acknowledgment, participants needed to explicitly express the purpose of the behavior as conveying gratitude to the receiver. For example, by adding "to let the person know my appreciation" to "nodding". Without the qualification, nodding would not be counted. The ICC of the code was .78.

Task B Results

Having derived the percentage weight of each demonstration of interest, we tested the effect of culture on the percentage by Mann-Whitney U test, because percentages were by nature non-normally distributed. In addition, the U test is almost as efficient as the common t-test when the data approaches a normal distribution, so often serves as its alternative (Conover, 1999, p. 272). Following the analytic plan, results in Table 2 indicate that, as predicted, self-improvement

took up significantly more weight in Taiwanese participants' self-generated gratitude demonstration strategies than in that of American participants, whereas bodily contact showed an opposite pattern, more likely to occupy Americans' demonstration strategies than the Taiwanese's.

Interestingly, here we found 19.40% Taiwanese to list at least one demonstration of self-improvement as well as 9.14% Americans to do the same. In contrast, only about the same proportion of Americans—10.66%—had at least one of their demonstrations coded as bodily contact and, again as in Task A, there were almost no—merely 2.99%—Taiwanese participants who listed such behavior in their responses. Together, the results seem to suggest that, although self-improvement might be conceptually novel relative to bodily contact in the literature, it may, in fact, be equally or even more prevalent in both cultures than bodily contact.

Turning to the two potentially cross-culturally shared demonstrations, as expected, we found no significant difference between cultures in reciprocating kindness or verbal acknowledgment. Additionally, it was observed that the prevalence of reciprocating kindness was considerably lower than that in Task A, potentially because of its narrower definition in the current coding. Specifically, there were only 17.91% of Taiwanese participants and 26.90% of American participants who mentioned reciprocating kindness at least once in the current task, compared to more than half of participants in both cultures who did the same in Task A. Finally, the results showed that almost all participants—92.54% Taiwanese and 96.95% Americans—included at least one demonstration coded as acknowledgment among their gratitude demonstrations. Together, the analyses reveal expected cultural differences, while also showing great similarities between the U.S. and Taiwan in demonstrations of gratitude.

Insert Table 2 about here.

Discussion

Study 1 indicates that Americans tend to spontaneously (Task A) and deliberately (Task B) show bodily contact in their demonstrations of gratitude, more than the Taiwanese. The Taiwanese, on the other hand, display more self-improvement in their demonstrations of gratitude than Americans. These findings support the hypotheses of the current research, showing both bodily contact and self-improvement as novel and theoretically derived cultural demonstrations of gratitude. Together, the results bolster a functional universal (Heine & Buchtel, 2009) of gratitude in facilitating human social bonding (Algoe, 2012), over and above its observable behavioral manifestations. As a reference, we also find reciprocating kindness and verbal acknowledgment to be the more commonly-used demonstrations of gratitude than self-improvement and bodily contact, and there is no statistically significant difference in the uses of either demonstration between the U.S. and Taiwan.

A key strength of this study was its use of two different methods to potentially measure both the deliberate (Task B) and the spontaneous demonstrations (Task A) of gratitude. At the same time, in terms of theory testing, questions remain, which we address in Study 2. First, although there were multiple codes of each demonstration type to triangulate on the constructs of interest, one of the ten content codes did show unsatisfactory internal consistency among coders (i.e., < .40; Cicchetti, 1994). To complement the coding, in Study 2, we instead used participants' ratings of the pre-defined gratitude demonstration behaviors. Second, we argue that these chosen demonstrations are due to gratitude, but we did not address the possibility that they would be due to positive valence more generally (e.g., George, 1991), so took the opportunity in Study 2 to test

for this possibility. Third, we did not know to whom or within what type of social relationship our American and Taiwanese participants showed their gratitude. It was thus possible that participants in the different cultures thought of people to thank with whom they had different types of relationships. If so, to fit with the relational norms specific to the different types of relationships chosen, people might opt for different demonstrations in different cultures. To address this confound, we systematically varied relationship type in Study 2. Lastly, we conducted the study for American and Taiwanese participants in the U.S. and Taiwan, respectively, and in American English and Taiwanese Chinese, respectively. An alternative explanation of the findings was thus that these confounding linguistic features, not individuals' cultures, caused the results; if individuals were studied within the other culture, they might have been primed to show the behavioral pattern expected for the other culture as opposed that for their own. The next study controls for this possibility because it was conducted in a single country and in a single language for participants from both the U.S. and Taiwan.

Study 2

Complementing the previous study, we turned to a more top-down approach to again examine bodily contact, self-improvement, reciprocating kindness, verbal acknowledgement; to be more inclusive, we also included two more demonstrations of gratitude that have been suggested by past research—socializing (see the review of Algoe, 2012) and paying it forward (Chang, Lin, & Chen, 2012; DeSteno, Bartlett, Baumann, Williams, & Dickens, 2010; McCullough et al., 2008). For each of the six potential demonstrations, a closed-ended rating scale was used to measure the likelihood that participants would use the demonstration in common daily life to show their gratitude.

Insert Figure 1 about here.

Beyond conceptually replicating the results of Study 1, the current study sought to address the alternative explanations laid out in the above sectional discussion. First, we crossed each demonstration strategy by two emotion conditions: gratitude as the target emotion, and amusement as the positive emotion comparison. This design would help address the possibility that the findings in Study 1 were mere manifestations of the association between general positive affect and prosociality that has been suggested in the literature (George, 1991) and is not specific to gratitude but rather general to all positively valenced emotions. Following the theory of gratitude as a relationship-specialized emotion, we expected the effects of gratitude to be beyond the effects of other positive emotions—here, amusement. Accordingly, participants reported the extent to which they would show each of the six demonstrations, once assuming that they were feeling grateful, and once assuming they were feeling amused (within-participant; counter-balanced). Following the template of an actual stimulus in Figure 1, participants thus made 12 ratings in total—6 demonstrations x 2 emotions—with which we could then estimate the unique contribution of gratitude to each demonstration over and above that of amusement.

Second, we strived to standardize the relationship that the participant had with their (imaginary) interaction partner, by systematically varying one of the most classic, well-studied, and general dimensions of social relations: social distance (the frequency and intensity of interactions between people; Nedim, 2009). We did this because it seems plausible that physical bodily contact may appear more frequently in closer, shorter-distance relationships (Debrot, Schoebi, Perrez, & Horn, 2013), whereas self-improvement can happen with theoretically infinitely long distance, that is, without actual future interactions between the thanks-giving and

the thanks-receiving party. As such, social distance—currently operationalized as two discrete conditions of close versus distant relationships (between-participant)—may not only be a theoretically informative choice but also be a potential confounding variable of Study 1 that should be considered.

Third, individuals may show culture-like behaviors (e.g., being more culturally collectivist and thus behaviorally cooperative, v. individualist and thus competitive) when being primed by cultural symbols in their surroundings to use specific culture-like mindsets in the moment (e.g., using a collectivist v. individualist mindset after seeing people practicing Kung Fu v. playing football respectively; Wong & Hong, 2005). As such, it was unclear whether participants in Study 1 showed predicted cultural behaviors merely because they were primed by their different study surroundings consisting of the locations (the U.S. for Americans but Taiwan for the Taiwanese) and the languages (American English for Americans but Taiwanese Chinese for the Taiwanese). The current study helped examine this alternative explanation by recruiting American and Taiwanese participants only in the U.S. and testing both groups only in English. We again expected the same patterns of cross-cultural behavioral consistency and variability, because emotion culture is theoretically gradually formed in the history and then gradually learned by individuals through acculturation.

Analytical Approach to Account for Culture

As alluded to in the beginning of the paper, unlike the traditional approach, we did not directly compare the mean level ratings of each demonstration between cultures (e.g., by mixed ANOVA or multiple independent-culture/group t-tests) because such comparisons have been shown to be problematic in cross-cultural contexts (see the review of Boer et al., 2018). Specifically for the present research topic, research has further documented that individuals with

Eastern-Asian cultural heritage (e.g., the Taiwanese) show less positivity bias in attribution (Mezulis, Abramson, Hyde, & Hankin, 2004) and more dialectical thinking (Hamamura, Heine, & Paulhus, 2008) than do those with European cultural heritage (e.g., Americans). As a result, the Taiwanese may center their responses to a rating scale around a lower set point (because of low positivity bias) than Americans, and then avoid scoring extremely (because of dialectical thinking) on the scale around the point—on both the high and the low end—regardless of what the scale measures (Hamamura et al., 2008). Comparing the means of the two cultures, in turn, would be equivocal and reveal little substantive meaning; the comparison itself might also violate the universal-metric assumption required by traditional methods.

Tackling this problem, we developed a procedure in which we introduced theoretically-derived cross-cultural anchor variables—analogous to what Poortinga and Van De Vijver (1987) call "context variables" [14]—and only analyzed the data *within* cultures using such anchors, so that the resulting *intra*-cultural analytical approach would conceptually standardize individuals' mental metrics—including both the set points and the units—and test how multiple gratitude demonstrations are structured into different behavioral (principal) components *within* the groups of Americans and the Taiwanese. Cross-cultural comparisons would be made conceptually after conclusions are drawn for each culture from its respective quantitative analyses.

Specifically, to derive one score for each behavior for each participant, we first estimated the extent to which a demonstration of interest was induced by gratitude relative to by amusement by subtracting the rating of each behavior in the amusement condition from its counterpart rating

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[14] We did not conduct exactly the same analysis as do Poortinga and Van De Vijver (1987), so did not label the variables the same way they do, as we believe the current research took their insight of finding an external variable as the translational bridge between cultures a bit further when we combined their method with a more modern, comprehensive, analysis of the variance-covariance matrix—i.e., PCA. Yet we were largely inspired by Poortinga and Van De Vijver (1987) and believe the current method is consistent with their work.

in the gratitude condition. We then conducted principal component analysis (PCA) *within* each of the two cultures on the six difference scores of demonstrations, in order to profile how the demonstrations bundle and structure together into the cultural toolbox of gratitude demonstrations in each culture as in Study 1 Task B.

Accordingly, the predictions of the present study were, for American participants, bodily contact but not self-improvement would fall within the same principal component as verbal acknowledgment and reciprocating kindness—the two most common, non-cultural-specific *anchor* demonstrations. This would imply that bodily contact is a demonstration strategy that is treated and preferred similarly to the anchor demonstrations in the American sample. In contrast, we expected bodily contact to be replaced by self-improvement for Taiwanese participants to indicate that, for the Taiwanese, self-improvement is a way of demonstrating one's gratitude that is deemed similar to verbal acknowledgment and reciprocating kindness, while bodily contact is not.

Design and Procedure

The study followed a two-emotion-condition (gratitude v. amusement) by two-social-distance-condition (close v. distant) design. Specifically, in an online survey, participants first answered questions on demographics, including the country in which they considered themselves to have mainly grown up. This was the operationalization of culture in the present and the next study, and we removed the data of those who chose countries other than the U.S. or Taiwan. Participants then rated each of the six chosen demonstration behaviors for the likelihood that they would use the behavior to demonstrate the assigned emotion (i.e., gratitude and amusement; within-participant, counter-balanced) toward a person the participants know with the assigned social distance (i.e., close or distant; between-participant). In practice, participants responded to

the question "When someone makes you feel grateful [or amused], would you…" followed by a rating question of how likely they would use a given demonstration strategy in the situation. The survey presented one demonstration per page, so participants could focus on one behavior at a time. The demonstration behavior was always ordered from more short-term to more longer-term behavior—that is, in the order of verbal acknowledgment, bodily contact, reciprocating kindness, paying-it-forward, socializing, and then self-improvement. After having rated all six demonstrations, the emotion-condition prompt changed to the next emotion, showing "When someone makes you feel amused, would you…", followed by ratings of the same six demonstrations in the same order. The order of the two emotions was counter-balanced.

To build social distance into the procedure, the "someone" in the prompts was never merely "someone" but randomly assigned between subjects to read "a close other" for a shorter distance or "an acquaintance" for farther distance for a given participant. "Close other" was described as "someone you've interacted with at least once a week in the recent past" and "acquaintance" was "someone you've not interacted with before". The goal of this aspect of the procedure was simply to experimentally balance social distance and deconfound it from culture. The factor was not the focus of the current investigation; we had no specific hypotheses about this factor and did not plan for statistical power to test it as a moderator. We thus collapsed across the two conditions of social distance in all following analyses.

Finally, it might be worth noting that each demonstration strategy had examples of how the behavior might be manifested. The information was provided to participants to communicate in detail what kinds of demonstration behaviors we meant, circumventing the issue of inter-rater consistency in Study 1. By providing examples, it was believed that participants' understandings of the demonstrations would be relatively restricted and, thus, enhanced in terms of consistency.

Together with the above, please find in Figure 1 an example of the full rating prompt of "verbal acknowledgement (v. other five demonstrations) for a close other (v. an acquaintance) when feeling grateful (v. amused)," as well as the key information of other demonstrations described in the Measures section, which follow the same template.

Participants

We recruited participants who were between twenty-five to thirty-five years old through the listserv and the Taiwanese student association of a public university in the U.S. The age requirement was so set because it was identified that most Taiwanese nationals at the university fell in this range as international graduate students or visiting scholars, as opposed to most American nationals at the university, who were younger undergraduates. The requirement would thus help prevent unnecessary confounding from age and related demographic variables such as education. Having specified the culture requirement for participation in the consent form, we received total 161 completed surveys among which 89, 69, and 3 were from participants who had self-reported as having mainly grown up in the U.S. (77.53 % females; age = 29.88, SD = 3.46), Taiwan (49.28 % females; age = 31.03, SD = 2.88) and other countries respectively. We removed the data of the last three participants because they did not fulfill the participation requirement. We also removed the data of 1 American and 7 Taiwanese because they failed at least one of the two attention checks. The checks were, first, choosing the correct planet in the solar system (i.e., Earth) when being asked about the planet one is on; this was positioned between demographic questions and ratings of demonstrations. Having rated all demonstrations in the first emotion condition and switching to the next, participants then answered the second check that explicitly asked one to scroll a bar to "negative 20" between negative and positive 50. Together, the projected effect sensitivity was thus a medium d = .47 in a t-test design, with power = .80.

Measures

For each demonstration strategy, as in the example above, we presented the name of the strategy, followed by a few examples and/or explanations, then the likelihood rating. The rating used a negative-to-positive-50 scroll bar, with the two ends labeled "extremely unlikely" and "extremely likely". Below we describe the specific prompt of each demonstration.

Verbal acknowledgment. The demonstration was named "Thank the person [who either made them feel grateful or amused] verbally" with examples of "Verbally saying thanks, thank you, or I appreciate it; Expressing thanks in writing, e.g., emails, cards, Facebook posts; Explaining to the person why you feel thankful".

Bodily contact. The demonstration was named "Touch the person" with examples of "Hugging; Kissing; Shaking hands; Any other behavior that leads to physical touch".

Reciprocating kindness. The demonstration was named "Repay the person" with an explanation of "Anything, as long as what the person did for you and what you'd do for her/him are similar."

Paying it forward. The demonstration was named "Pay it forward" with an explanation of "Anything, as long as what the person did for you and what you'd do for others are similar."

Socializing. The demonstration was named "Socialize with the person" with examples of "Doing pleasurable activities with the person, e.g., hanging out together, shopping together; Showing care of her/his life and well-being, e.g., calling/mailing the person to talk about the person's life, listening to the person's frustration, giving the person birthday gifts, food, prayers, kindness, or affection; Sharing things with the person, e.g., course notes, kitchenware, other resources, and positive or negative emotions; Showing respect to the person, e.g., listening to the person's advice, valuing the person's opinions".

Self-improvement. The demonstration was named "Improve yourself" with examples of "changing personal character or doing something to change personality in a positive way, e.g., trying to be a more humble, thankful, diligent, or forgiving person; working harder, e.g., studying harder, or practicing sports harder; fulfilling personal responsibilities, e.g., doing one's share of housework".

Results

Having extracted the effects of gratitude beyond those of amusement, we subjected the gratitude-amusement behavioral-likelihood difference scores to a PCA for each culture independently, as planned. The results shown in Figure 2 indicated that, in either of the target cultures, the behavioral consequences of gratitude, beyond those of amusement, could be similarly summarized by one (following parallel analysis) to two (following the eigenvalue criterion) components. Here, because of the inconsistent numbers of components and the fact that the method supporting the lower number of components (i.e., 1) was also very close to suggesting one more component (i.e., 2), we followed the strategy of estimating the higher number of component (i.e., 2) and letting the later rotation "rotate out" the component if it is in fact superfluous. We also ran the low-number (i.e., 1) model for comparison.

Insert Figures 2 and 3 about here.

As noted in Table 3 and visualized in Figure 3, in either culture, the first component in the two-component model likely summarized the "demonstration" aspect of the behavior of gratitude, as it consisted mainly of behaviors of verbal acknowledgment, reciprocating kindness, and paying it forward, within either culture. By contrast, the second component likely summarized the

"affiliation" aspect of gratitude as it consisted mainly of socializing, again, within either culture. Critically, supporting the research hypotheses, the results in Table 3 showed that bodily contact and self-improvement loaded highly on the demonstration component for the U.S. and for Taiwan respectively and, in line with the predictions, *not* vice versa. [15] Specifically, on the demonstration component for the U.S., the bodily contact loading was .684 whereas the self-improvement loading was .132; on the demonstration component for Taiwan the bodily contact loading was .341 whereas the self-improvement loading was .700. These findings were complemented by the results of the single-component model that showed loadings of bodily contact and self-improvement were .544 and .336 respectively for Americans, and the pattern reversed to that the loadings were .513 and .660 respectively for the Taiwanese.

Moreover, behaviors not loading on the demonstration component in the two-component model (i.e., bodily contact for the Taiwanese, self-improvement for Americans, and socializing for both cultures) were "pushed" to load on the affiliation component, manifesting divergent effects for both cultures. These findings for the uniqueness of bodily contact for grateful Americans and self-improvement for grateful Taiwanese thus fortify the evidence from Study 1, while ruling out several methodological and theoretical alternative explanations. At the same time, these findings extend the research to two more demonstrations of gratitude that have been of interest to the field for the past decade (i.e., socializing and paying it forward).

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[15] Per reviewers' feedback, we explored the potential moderation effect of social distance by separating those who were in the shorter distance—closer other—condition from those who were in the longer distance—acquaintance—condition and then conducting the same PCA within each group. The results partially reinforced the current findings by showing that, for Americans, bodily contact loaded on the same component as did verbal acknowledgement across both social distance conditions while self-improvement never did. In contrast, the Taiwanese's self-improvement always loaded on the same component as did verbal acknowledgement across both social distance conditions, while bodily contact did not load on the same component in the longer distance condition and loaded highly but still less than did self-improvement in the shorter distance condition. The statistics can be found in the online supplemental materials.

Insert Table 3 about here.

Study 3

Studies 1 and 2 used various designs to provide convergent evidence that individuals from the U.S. and Taiwan systematically show gratitude to social others using behavioral demonstrations that would theoretically fit with the demonstrators' cultural-relational contexts. Now in Study 3, we turned the focus to the reception side in order to examine the full gratitude communication interaction. The study followed the premise that the social signal of the demonstrations of an emotion must be effectively and successfully received. Otherwise, the communication of the emotion would not have been successful in cultural-evolutionary history. The demonstrations, in turn, would not have been fixed as a functional feature of the emotion culture that we see today.

Following this logic, the hypothesis was that there exists a matching between emotion demonstrations and emotion perceptions: how an emotion is demonstrated in a culture is how the emotion would be perceived in the culture. For the two focal cultures, we thus predicted that, relatively, bodily contact would convey gratitude among Americans, whereas self-improvement would do the same work among the Taiwanese. To test these predictions, participants were presented with a series of interpersonal messages—voicemails and hand-written post-it notes— wherein a fictional messenger first referred to an event having happened between the messenger and the message receiver. The messenger then expressed willingness to take a specific action presumably to demonstrate their grateful feeling for the receiver. Here, the demonstrations were manipulated to imply one of the three behaviors of interest—bodily contact, self-improvement, or again reciprocating kindness as the cross-cultural anchor. We did not include verbal

acknowledgment as another anchor, so it was less obvious that the messages were demonstrations of *gratitude*, and participants could be reasonably asked to rate each of the stimuli in how grateful the demonstrator was (i.e., perceived gratitude of the demonstration).

Analogous to Study 2, participants also rated perceived amusement in the demonstrator/messenger, so we could control for the alternative explanation of general positivity. Based on a similar analytical rationale in Study 2, we predicted that, for Americans, perceived gratitude from bodily contact would track with perceived gratitude from reciprocating kindness, more so than would perceived gratitude from self-improvement. For the Taiwanese, however, we predicted that a reversed pattern would emerge in which perceived gratitude from self-improvement would track with perceived gratitude from reciprocating kindness, more so than would perceived gratitude from bodily contact. Overall, the predictions test whether Americans treat bodily contact as a more typical way to communicate gratitude—more similar to reciprocating kindness—whereas the Taiwanese treat self-improvement as a more typical, reciprocity-like channel of communication.

Design and Procedure

After answering the same demographic questions used in Study 2 in an online survey, a participant was presented with 12 randomly ordered gratitude demonstration messages to rate with respect to the messengers' perceived gratitude and amusement, one stimulus after another. Among the stimuli (all embedded in the online survey), 6 were voicemail messages—3 focal demonstrations x 2 speakers, one male and one female—and the other 6 were photographs of post-it notes—again, 3 focal demonstrations x 2 writers, one each sex. All 12 stimuli were created in a single scripting procedure that gave every stimulus a few carefully designed sentences that together lasted about 10 seconds (± 2 secs.) in recorded messages and filled up the space of one post-it note.

For instance, a script was "Hi girl. I want to tell you that the gift you gave me yesterday really made my day, and I want to do the same for you. Alright, see you soon."

In the sentences, "to do the same for you" and "to repay you" were designed to signal the intention to reciprocate the kindness, "to make myself a better person" and "to improve myself" showed self-improvement, and "to give you a big hug" and "to hug you" demonstrated bodily contact. All these six phrases appeared once within each format of stimuli and, therefore, twice in the study for a participant. To increase psychological realism and to again address potentially confounded relationships as in Study 2, several linguistic components were also considered (as detailed in Appendix). For instance, we systematically varied the social distance between the demonstrator and the receiver by, say, using "Hi dear" to signal a presumably closer distance than "Hi friend". We also randomized (a) the gender of the receiver by inserting the most popular first names of women and men in the participants' age range (see Participants below), (b) the objects of the feelings of the demonstrator (e.g., "the gift you gave me" and "what you did"), (c) the temporal distance to these objects of feelings (e.g., "yesterday" and "the other day"), and (d) arguably the formality of the language (e.g., "Hello" is likely more formal than "Hey"). Finally, the 12 scripts were first carefully made in American English and then translated to Taiwanese Chinese for American and Taiwanese participants respectively. As a result, the two groups of people received the same stimuli and study setups except for stimulus languages.

Participants

As in Study 2, we recruited participants who were between twenty-five to thirty-five years old through a U.S. public university listserv and a Taiwanese graduate student association based in the U.S. (the association was not associated with a specific university). We used the same item to screen for culture as in Study 2. We received total 134 completed surveys from 72 Americans

(76.39 % females; age = 29.41, SD = 3.83) and 62 Taiwanese participants (69.35 % females; age = 29.18, SD = 3.71). Among the participants, 5 Americans and 5 Taiwanese failed at least one of the same two attention checks used in Study 2; their data were removed. The projected effect sensitivity was, therefore, a small-to-medium d = .42 in a t-test design, with power = .80.

Measures

For each stimulus, participants rated the emotions that the speaker/writer of the voice message/post-it note was perceived to be experiencing. For perceived gratitude, the emotion was rated with the item "grateful, appreciative, and thankful"; for perceived amusement, the item was "amused, fun-loving, and silly" (both items adopted from the Modified Deferential Emotion Scale; Fredrickson, 2013). The items were rated on a 7-point Likert-type scale with points 1, 4, and 7 labeled "Not at all", "Moderately", and "Extremely", respectively.

Results

As in Study 2, we first subtracted amusement that a participant perceived in a given stimulus from gratitude that the participant perceived in the same stimulus. For each participant, this processing produced 12 difference scores of purified gratitude—for 3 demonstrations of interest x 4 demonstrators for each demonstration—over and above amusement. We then regressed purified gratitude perceived in bodily contact and purified gratitude perceived in self-improvement together on perceived gratitude in reciprocating kindness. As in Study 2, this was done for each culture individually. We used this rather straightforward multiple regression framework as opposed to a PCA as in Study 2, because we did not have multiple anchor variables (only reciprocating kindness here; cf. three anchors in Study 2) to be correlated with the non-anchors. This then, mathematically, reduced the PCA to a regression. Finally, we conducted the regression in a multilevel (two-level, with demonstrators nested in participants) framework to account for the

fact that each rating of reciprocating kindness had its own same-demonstrator ratings of bodily contact and self-improvement nested within a participant, that is, four such three-behavior sets nested within participants.

Supporting our predictions, the modeling revealed that American participants' point slope coefficient of bodily contact was .38 ($df = 238.45$, $t = 6.74$, $p < .001$, $CI_{95\%} = [.27, .49]$) and significantly larger than that of self-improvement, which was .21 ($df = 258.87$, $t = 3.32$, $p < .001$, $CI_{95\%} = [.10, .33]$), given that the two confidence intervals did not cover each other's point slope estimate. In contrast, an opposite pattern emerged for Taiwanese participants: their slope of bodily contact was .26 ($df = 219.34$, $t = 3.91$, $p < .001$, $CI_{95\%} = [.13, .39]$) and *smaller*—although non-significantly—than that of self-improvement, which was .36 ($df = 220.02$, $t = 5.60$, $p < .001$, $CI_{95\%} = [.23, .44]$). Here, because of the trending difference between the two slopes, multi-cultural data scarcity, and a lack of power in traditional methods thereof, we supplemented the analysis with 5000-resample bootstrapping and found that, as predicted, the effect of perceived gratitude in bodily contact was significantly smaller than the effect of perceived gratitude in self-improvement for the Taiwanese in predicting perceived gratitude in reciprocating kindness (bodily contact percentile $CI_{95\%} = [.00, .34]$, which does not cover the point effect estimate of perceived gratitude in self-improvement, which is .36). On the other hand, the same analysis confirmed that, for Americans, the effect of perceived gratitude in self-improvement was smaller than that of perceived gratitude in bodily contact (self-improvement percentile $CI_{95\%} = [.02 .27]$, which does not cover the effect of bodily contact, which is .38). Together, the results strengthen support for the predictions that the Taiwanese deem self-improvement more as a typical communication method of gratitude than bodily contact, whereas Americans deem bodily contact more typical than self-improvement.

Discussion

Combining existing theory of the emotion of gratitude with that of culture, we derived and tested the prediction that gratitude is communicated differently yet predictably in Taiwan and in the United States. The results support the specific hypotheses that, while individuals in both cultures similarly show gratitude by verbal acknowledgment and reciprocating kindness, Americans use bodily contact as an extra demonstration of gratitude and the Taiwanese use self-improvement instead. Extending the investigation to the perception side of communication, we further show that how people demonstrate gratitude within a culture translates to whether they perceive gratitude in the same demonstrations enacted by social others in that culture. Together, the present research connects both the signal-sending and the signal-receiving party in gratitude communication. The results, therefore, not only speak to the literature of gratitude, introducing the novel cultural behaviors that we identified, but also shed light on the general nature of emotion communication, as well as highlight the benefits of considering culture in emotion research. Along the way, we also developed and demonstrated a new statistical procedure for de-biasing comparisons of rating scales between cultures. This method is readily applicable to other psychological constructs that cause a similar distortion of rating scale responses.

Specifically, culturally-derived behavioral codes applied to video-recorded demonstrations of gratitude show that, although both Americans and Taiwanese have non-differentiable tendencies of reciprocating kindness, Americans demonstrate bodily contact and the Taiwanese show self-improvement more than do people in the comparison culture in their spontaneous gratitude demonstrations (Study 1 Task A). Beyond these potentially automatic demonstrations, we also find that individuals in both cultures deliberately report that they use their respective cultural demonstrations to show gratitude in typical daily life more than individuals in the comparison

culture: more bodily contact for Americans, more self-improvement for the Taiwanese, and similar levels of verbal acknowledgment and reciprocating kindness for both cultures (Study 1 Task B). Further, we document that, when demonstrating gratitude, Americans use bodily contact in a similar way to using verbal acknowledgment and to reciprocating kindness. Self-improvement belongs to another category of behavior for Americans, and is used differently than the previous three behaviors (i.e., bodily contact, verbal acknowledgment, and reciprocating kindness). On the other hand, the Taiwanese use self-improvement, but not bodily contact, in a similar way to using verbal acknowledgment and reciprocating kindness in gratitude demonstrations (Study 2).

Finally, building off the findings for demonstrations of gratitude, we report that Americans perceive gratitude in demonstrations of bodily contact in a similar way to perceiving gratitude in demonstrations of reciprocated kindness, relative to perceiving gratitude in demonstrations of self-improvement. The Taiwanese, in contrast, perceive gratitude in demonstrations of self-improvement in a similar way to perceiving gratitude in demonstrations of reciprocated kindness, relative to doing so in demonstrations of bodily contact (Study 3). These divergent patterns of perceptions of gratitude in Americans and Taiwanese map squarely on the cultures' divergent patterns of demonstrations of gratitude found in Studies 1 and 2. The results, therefore, bolster the underlying functional universal of gratitude communication in social relations, over and above the emotion's ostensible behavioral manifestations.

Alternative Explanations

Beyond evidence for the hypotheses, we also addressed a few alternative explanations for the results. First, the findings cannot be explained away by the possibility that Americans and the Taiwanese demonstrate bodily contact and self-improvement, respectively, simply out of general positive feelings. This alternative explanation is formally ruled out as the hypothesized cultural

effects on communication induced by gratitude emerged after we controlled for the corresponding effects induced by another positive emotion—amusement (Studies 2 and 3). Although indirect, the findings in Study 1 Task B may also speak to this alternative explanation, since American and Taiwanese participants reported consciously aiming to apply bodily contact and self-improvement, respectively, in order to show *gratitude*, as opposed to another emotional feeling.

Further, Studies 2 and 3, on both gratitude demonstrations and perceptions, address the possibility that culture might be confounded with social relationships. Specifically, we experimentally manipulated and controlled for a general and well-studied aspect of relationships—social distance (Nedim, 2009). The predicted cultural differences still showed up even when such distance between the demonstrator and the receiver of gratitude was balanced between the U.S. and Taiwan. The same pattern of cultural differences indeed emerged in Study 2 when we tested the hypotheses within each social distance condition.

Finally, we partially consider cultural priming (Wong & Hong, 2005), which is the possibility that individuals show culture-like behaviors because they are in situations where such behaviors are more mentally accessible and therefore influential in the moment. In the present research, specifically, this possibility resided in the fact that participants in Study 1 were presented with—potentially primed with—study materials only in their languages and only took the study in their countries. These environmental factors might be confounding priming sources that temporarily induced behaviors that conformed to the cultural contexts as well as our hypotheses. Ruling out the confound, Study 2 was conducted in single language and single country for all, and we still found the hypothesized results in demonstrations of gratitude.

Implications and Future Directions

The current research deduced hypotheses from a theory regarding a functional universal of an emotion—that is, regarding gratitude's underlying function of promoting human social bonding (Algoe, 2012). Combining this functionalist theory with knowledge of the social uses of various specific behaviors in their cultural contexts, we then derived the present predictions of both differences and similarities in social regulatory behavior in cultural contexts. Compared to only documenting cultural differences in emotion communication behavior, our approach may further reveal the level to which such communication is universal and *cross*-cultural. Critically, given that this cultural paradigm that we propose in the current research is not customized for gratitude and would likely fit with all functionalist theories of social emotions including but not limited to those of anger (Fischer & Roseman, 2007), awe (Bai et al., 2017), contempt (Fischer & Giner-Sorolla, 2016), disgust (Hutcherson & Gross, 2011; Schnall, Haidt, Clore, & Jordan, 2008), fear (Marsh, Adams, & Kleck, 2005), pride (Tracy & Robins, 2007), and sadness (Clark, Pataki, & Carver, 1996), we believe the demonstrated cultural paradigm to emotions would benefit the broader literature on emotion demonstrations in and *as* interpersonal communication (Scarantino, 2017). Indeed, the field has witnessed the budding theoretical fertility of moving beyond borders (e.g. Cordaro et al., 2018; Floyd et al., 2018; Gendron et al., 2014). We nonetheless would like to reemphasize the possibility and—to some degree—the necessity of explicitly considering culture in advancing emotion and affective science.

Culture in gratitude communication. More than formulating and demonstrating a methodological paradigm that utilizes culture to further emotion knowledge, the current research also offers the first set of empirical evidence that self-improvement can be a way to communicate gratitude. We consider the finding an example of how a cultural approach can help not only examine emotions but also reveal novel cultural practices around the world. Further,

although we argue and find the behavior to be more prevalent among the Taiwanese than among Americans, around one-fourth Americans in Study 1 Task A had self-improved, wanted to, and/or indicated that their self-improvement was *for the purpose of* demonstrating gratitude. As such, we suggest attention to self-improvement in the American cultural context as well. Indeed, given the high contrast of both cultures, we believe the current research implies that self-improving may exist as a demonstration of gratitude beyond the U.S. and Taiwan.

As with self-improvement, some intriguing findings surface for bodily contact too. That is, there was a very low (nearly zero in Study 1 Task A) inclination of Taiwanese participants to touch and, specifically, to hug people that they felt thankful for. The results stand out given that, on the other hand, Americans did show a fair amount of self-improvement. Researchers interested in the link between bodily demonstrations of emotions and interpersonal relationships (e.g., Jankowiak, Volsche, & Garcia, 2015) may thus want to dig deeper into the social communicative uses of touching and hugging, paying special attention to cultural context. This is true not only for the Taiwanese—who seem to be highly hug-avoiding—and not only for gratitude communication in relationships, but also for what roles affectionate and emotional physical contact generally plays in human relational processes (e.g., Jakubiak & Feeney, 2016).

Culture in emotion communication. Beyond gratitude, the present research also provides implications for general research on emotions in social communication. Although existing cross-cultural literature on emotions has (un)covered a broad range of demonstrations of discrete negative emotions (e.g., Sauter, Eisner, Ekman, & Scott, 2010), most work in the positive emotion domain has focused on happiness and general positive emotion (e.g., Kitayama, Markus, & Kurokawa, 2000; Oishi, 2010). Recently, emerging evidence has indicated extensive cross-cultural variations as well as commonalities in facial and gestural expressions of twenty-

two positive and negative discrete emotions (Cordaro et al., 2018). The study, nonetheless, does not included gratitude among the twenty-two, and it identifies the expressions of emotions, as does traditional research, by coding the objective observable in-the-moment movements of the body (including the face) that may or may not be conscious behaviors of the expresser (such as the behaviors in our Study 1 Task A). By contrast, the present research recognizes demonstrations of an emotion—gratitude—that can be deliberately understood and applied by the person feeling the emotion (e.g., in Study 1 Task B). As such, even though these demonstrations do not always conform to a fixed-time-frame, body-moment analysis, we were able to find that the demonstrations are used by individuals to communicate gratitude. In Study 3, we also report evidence that people perceive gratitude through these demonstrations as theorized. Accordingly, we believe the present cultural-meaning-oriented approach to emotions is another informative route to understanding emotions in everyday interpersonal communication.

Emotions in cultural social scripts. Not only can culture enlighten emotion theory; emotion can shed light on the nature of culture too. For example, revealing that the Taiwanese prefer to use a less socially interactive behavior of self-improvement to show gratitude and Americans prefer a more socially interactive behavior of bodily contact for the same goal, the current research seems to contradict the cultural analyses of Mesquita (2001), which suggest that emotional feelings in collectivism (e.g., Taiwan) are generally more socially oriented than those in individualism (e.g., the U.S.). Nonetheless, it seems possible that Americans appear to be more socially interactive in gratitude demonstrations than do the Taiwanese exactly because, as reviewed, Americans have a relative lack of shared (i.e. homogeneous) emotion culture (Rychlowska et al., 2015) and preexisting social bonds (Mesquita, 2001). Yet gratitude is for

43

promoting such bonds (Algoe, 2012). To fulfill the need for relationships within the American context, then, gratitude demonstrations may have evolved to be compensatorily social and, as we report, extra "touchy" in the U.S. On the other hand, the Taiwanese have already highly socialized personal lives following a collectivist norm (Mesquita, 2001); self-improvement may simply have evolved as an example of how ostensibly personal actions transform to conceptually and functionally relational ones in such culture. This echoes the argument of Mesquita (2001) that individuals' personal abilities, achievements, and honor are deemed social and relational within collectivist cultures. For the broader literature, the current research, therefore, fortifies the social functional theory of gratitude, and shows the possibility of deepening cultural understandings through analyzing emotions via their cultural demonstrations.

De-biasing cultural comparisons. Beyond substantive contributions, the current research also developed and demonstrated a novel method for studying psychological constructs in the cross-cultural context. Specifically, we tackle the issue of *measurement invariance*, the phenomenon that a measure manifests its latent construct in the same way between contexts, which is the bottom line for comparing the construct being measured between those contexts (see Boer et al., 2018). This methodological requirement is frequently violated in cross-cultural research (Hamamura et al., 2008), but cross-cultural research has been falling behind, too often ignoring the issue by directly presuming invariance (Boer et al., 2018). To address the problem, several general methods have been proposed to *detect* measurement variance, yet a recent review finds that the exiting methods are highly underused (Boer et al., 2018) and, even if they are used, to our knowledge, not much has been said about how to *restore* invariance once it is found violated.

This is where the present research comes in. Inspired by the insight of finding new common currencies when the conventional ones—the measurement scale, points, and labels—are failing (Poortinga & Van De Vijver, 1987), we developed the method where measures with theoretically or empirically derived cross-culturally shared meanings (e.g., reciprocating kindness to show gratitude in both the U.S. and Taiwan) would be identified to serve as the common *anchors*. The anchors would replace the measurement scale and be associated—in a PCA, regression, or even just t-test, depending on the research question—to the measures of interest (e.g., bodily contact and self-improvement) only *within* cultures (e.g., once for Americans and another for the Taiwanese separately), therefore preventing the reference measurement from varying *between* cultures. To some degree, this procedure is then analogous to the widely used meta-analysis, where a common currency—an effect size measure—would be chosen to help individual studies with different specific designs and operationalizations of constructs converse with one another. As such, the general analytical framework that we suggest here may be similarly adopted by non-cultural research to restore measurement variance.

Limitations

Cultural generalizability, a trade-off. As potentially all psychological constructs do, culture theoretically varies on multiple continuous dimensions within and between societies and across time. For the current investigation, we study two countries that represent the cultures on which much has been written—be it individualism/collectivism (Hofstede, 1984, pp. 39-64), in/inter-dependent self (Markus & Kitayama, 2010), historical hetero/homogeneity (Rychlowska et al., 2015), or simply West/East. This facilitated the goal of providing initial tests of the suggestion that the relationship-promoting function of gratitude (Algoe, 2012) can and should be combined with culture to predict social regulatory behavior (e.g., Heine et al., 2001; Rychlowska

et al., 2015). As such, we identified the demonstration behaviors with which the effect in question would be maximized in the focal cultures. In exchange, we cannot (and did not intend to) tease out what cultural dimension leads to such effects reported; nor can we prove that the similarities found generalize across any cultural dimension beyond the two countries chosen. Consequently, we look forward to future research that will address these issues and see to what extent the current findings map on known or unknown cultural dimensions.

Measuring the function. In addition, the two target social regulatory behaviors of gratitude—bodily contact and self-improvement—were identified carefully in theoretical analyses of their functions in their respective cultures. The functionalist analyses are supported directly by the literature, indirectly by our findings, but not explicitly measured in the present research. Therefore, even though participants did perceive gratitude differently through their cultural communication channels, it is still an open question as to whether perceived gratitude would eventually lead to the functional relationship fortification suggested by theory (Algoe, 2012). We believe it will; it is hard to imagine that individuals see social others in one way (i.e., being grateful), but interact with them in another way regardless of the perception. Although how grateful one seems should not be the only determinant of relationships, it has been demonstrated frequently as a key factor of relationships (e.g., Algoe, Fredrickson, & Gable, 2013). This prediction, nonetheless, awaits future empirical examinations and will help substantiate the present research.

Participant demographics. We also encountered methodological challenges in the present research, which, if solved, may inform theory as well. For example, the age and presumably socio-economic status of participants were likely limited, because all participants were recruited through higher education institutes and we actually set up an explicit age requirement for participation in

Studies 2 and 3. All these were due to practical considerations of data availability, quality, and interpretability in a cross-cultural-research context; we do not believe that they undermine the broad point that cultural knowledge of behaviors can help guide the study of their adaptive functions. Nonetheless, future researchers might want to broaden the scope in order to test—for instance—if there is a generational shift in how individuals prefer to communicate gratitude or if generations have their own cultures (as suggested by Twenge, 2006; Varnum & Grossmann, 2017).

Cross-cultural communication. In addition, the current investigation has not moved from a cross-cultural investigation to a *crossing*-cultural investigation, where the focus would shift from the cultural differences that exist in themselves—as in the present research—to the differences that meet each other on a global platform. That is, when a person from one culture expresses gratitude to a person from another. Moreover, it is arguably the case that, when participants answered the surveys in Study 1 Task B and Study 2 and actually showed gratitude to someone in Study 1 Task A, participants were thanking or thinking about thanking a target in their own cultures. That is, Americans thanked Americans, the Taiwanese thanked the Taiwanese. On the perception side, Study 3 may have even implicitly stipulated such assumption when presenting stimuli only in participants' languages. It is, therefore, an open question as to what people would do and what they should do to successfully communicate gratitude with people from the other and even any other culture. Given the trend of globalization, we believe this question would be increasingly relevant and worthy of research attention (as suggested by Hinds, Liu, & Lyon, 2011).

Conclusion

The current research argues that the relationship-promoting function of gratitude (Algoe, 2012) may be realized by different types of behavior in different cultures. It is because the behavior that fits with the relational norm of a culture and promotes relationships in that culture might not

do the same in other cultures given these other cultures' different relational norms. Carefully analyzing the literature and the cultures of the U.S. and Taiwan, we then hypothesize that, while individuals from both cultures may similarly show gratitude by verbal acknowledgment and reciprocating kindness, Americans add bodily contact to their gratitude demonstration toolkit, whereas the Taiwanese add self-improvement instead. Testing the predictions in Studies 1 and 2, we report evidence supporting the predictions concerning gratitude demonstrations. In Study 3, we further reason that what behavior a culture uniquely uses to show gratitude dictates whether people in that culture would perceive gratitude through the cultural behavior, because otherwise, that demonstration behavior would not have been useful in history and been retained. Bolstering this hypothesis, we find that Americans indeed deem bodily contact as a relatively typical communicative channel through which they may perceive and assess social other' gratitude for them; this is not the case for the Taiwanese. The Taiwanese, one the other hand, treat self-improvement but not bodily contact as the common channel. Together, the pattern of cultural gratitude perceptions we report maps squarely onto the pattern of cultural gratitude demonstrations we report. This culturally unique demonstration-perception matching thus provides insights not only for gratitude research but also for the broader literature on the roles of culture in emotion communication as well as the importance of studying culture in functionalist emotion research. Along the way, we further demonstrate a new statistical method for de-biasing cross-cultural comparisons and document the novel cultural behavior of self-improvement and bodily contact.

Appendix

Study 3 Stimulus Scripting

We generated 12 American-English scripts consisting of 4 versions—each version voiced by a different native-English professional voice actor, 2 of each gender—for each of the 3 demonstrations of gratitude. The stimuli each contained three sentences—an opening, a body, and an ending. To balance the compatibility and the diversity between stimuli, as detailed in Tables 4 to 6, each of the three sentences was broken down into components, and each component had a few options. Take the opening sentence for example. A greeting option was randomly chosen from Table 4 to match with a random target and a random speaker, so the sentence would be "Hi, it's me." if options "Hi", "(none)", and ", it's me." were chosen for the greeting, the target, and the speaker component of the sentence, respectively. The same design applied to the ending sentence

using the materials in the same table (Table 4), as well as to the body sentence combining the materials listed in Tables 5 and 6.

To make the scripts more realistic, the female and male name option for the speaker component of the opening sentence used three female (Jessica, Sarah, and Emily) and three male (Matthew, James, and Daniel) first names, respectively, that were the most popular for people born in 1990—those who were 28 at the time of the study and thus at about the center of the participants' age range. That said, unlike options for other components, each name only appeared once for a participant. Further, we manipulated the relationship between the speaker and the target in a message by combining options of the opening sentence. For instance, "Hi dear." might imply an intimate romantic relationship, while "Hey, it's me." and "Hello there, it's Jessica." might imply intermediate and relatively far friendships respectively. Following the same design, within the body sentence, the event component also helped to vary scripts in the specificity of the reason of gratitude (e.g., a gift is more specific and concrete than "what you did") and the event's temporal distance (e.g., "yesterday"). Together with different formations (e.g., in active or passive voice; see the emotion component in Table 5) and various options of other sentence components, the scripting procedure might increase the realism of stimuli, address some factors touched upon in previous studies (e.g., relationship distance in Study 2), while systematically holding enough compatibility between stimuli. Finally, it is worth noting that the procedure was solely designed for generating complex yet balanced and realistic experiences for participants (e.g., script "Hey friend, it's Matthew. I just wanna tell you what you said yesterday made me think a lot and want to make myself a better person. That's it. Talk to you soon."; all chunks underscored were replaceable). We were not interested in examining the effects of any linguistic components

factored in here—say, the object of gratitude or temporal distance of the object—nor did the study have the statistical power to assess the effects.

After creating the four sets of stimuli (each with a bodily-contact, a self-improvement, and a reciprocating-kindness stimulus) in English, we conducted a pilot test to determine which two out of the four voices of actors—one of each gender—sounded more realistic as a voicemail message that could be left for someone. We then had four native Taiwanese-Chinese professional voice actors (again two of each gender) who read and speak both English and Taiwanese-Chinese languages translate all four versions of English scripts to Chinese. The actors discussed and finalized the translations together, and then recorded in Chinese only the messages that matched their gender and were deemed more realistic in English. Subsequently, there were two Chinese versions of each of the two sets of English stimuli that were deemed more realistic, so we could again choose the more realistic Chinese version out of the two alternatives, once for each gender. The two chosen Chinese sets of recordings, with their English counterparts, were then the final audio stimuli. The English and Chinese scripts deemed not chosen as voice messages were then hand-written on post-it notes by research assistants who speak American English or Taiwanese Chinese as native languages and who had the same genders as the voice actors of the scripts. Together the procedure produced 24 stimuli—3 demonstrations of gratitude (a set) x 4 versions (2 genders nested in 2 formats) x 2 languages, and participants were presented the half of this set that matched the main languages of their cultures.

Insert Tables 4, 5, and 6 about here.

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Table 1. Results of Study 1 Task A

Codes	Expected presence		Observed odds ratios				
	Taiwan	U.S.	CI $_{95\%}$ lower	Odds ratio	CI $_{95\%}$ upper	t	p
Self-improvement							
Intention *	39.67%	27.87%	1.64	2.91	5.15	3.69	.001
Action *	34.28%	24.08%	1.90	3.44	6.23	4.11	.000
Cognition *	30.90%	23.31%	1.62	2.87	5.08	3.64	.001
Bodily contact							
Touch *	17.40%	24.44%	0.10	0.19	0.36	-5.16	.000
Hug *	4.75%	20.17%	0.00	0.00	0.00	-30.59	.000
Reciprocating kindness							
Intention	51.40%	66.50%	0.37	0.64	1.13	-1.54	.126
Action	26.62%	27.07%	0.47	0.94	1.88	-0.17	.862

Note: * indicates $p < .05$; model: Logit(E(Code$_{ij}$)) = γ_{00} + γ_{01} × Culture$_j$ + u_{0j} , given Code$_{ij}$ | E(Code$_{ij}$) ~ BER(E(Code $_{ij}$)); odds ratios are tested against 1, i.e., no cultural difference, with the U.S. as the reference and $df = 141$; models are fitted by maximum-likelihood estimator with robust standard errors.

Table 2. Results of Study 1 Task B

Codes	Taiwan				U.S.				U	p
	Mean	RM	RS	Sk	Mean	RM	RS	Sk		
Self-improvement *	5.71%	142.41	9542.50	2.34	3.21%	129.13	25438.50	5.56	5935.500	.028
Bodily contact †	0.71%	124.94	8371.00	6.79	2.49%	135.07	26609.00	2.86	6093.000	.055
Reciprocating kindness	6.41%	124.05	8311.50	3.52	8.13%	135.37	26668.50	2.21	6033.500	.165
Verbal acknowledgment	68.34%	133.08	8916.50	-0.71	69.04%	132.30	26063.50	-0.10	6560. 500	.941

Note: * and † indicate *p* < .05 and .06 respectively; RM and RS indicate rank mean and sum respectively; Sk indicates skewness.

Table 3. Results of Pattern Matrices inw Study 2

Culture	The U.S.			Taiwan		
Component	Demonstration	Affiliation	Sole component	Demonstration	Affiliation	Sole component
Verbal acknowledgement	.804	-.050	.755	.712	.021	.687
Bodily contact	.684	-.383	.544	.341	.644	.513
Reciprocating kindness	.543	.326	.614	.796	.080	.785
Paying it forward	.650	.424	.745	.769	.288	.819
Socializing	-.045	.456	.089	-.141	.853	.112
Self-improvement	.132	.726	.336	.700	-.035	.660

Note: The demonstration and the affiliation component were estimated together in a two-component PCA, and the sole-component component was estimated solely in a one-component PCA; two-component models were varimax-rotated; loadings > .5 are underscored; although socializing does not load highly by itself on either component for Americans, the discrepancy between its loadings on the components indicates that it belongs to the affiliation component—true in both cultures—so the component is named affiliation; in contrast to affiliation and its items (mainly socializing), those under the demonstration component seem more behavior- and action-focused so the component is named demonstration; although bodily contact loads fairly highly by itself on the

sole component for the Taiwanese, the discrepancy between the loadings on the component indicates that bodily contact is still

meaningfully different from verbal acknowledgment, reciprocating kindness, paying it forward, and self-improvement.

Table 4. Composition of Opening and Ending Sentence of Voice Messages

Opening sentence			Ending sentence	
Greeting	Target	Speaker	Transition	Farewell
Hello	(none)	(none)	(none)	See you later
Hey	dear	, it's me.	That's it.	See you around.
Hi	friend	, it's [a female first name].	That's all.	See you soon.
	there	, it's [a male first name].	Anyway.	Talk to you later.
				Talk to you soon.
				We'll catch up.

Note: Unlike other options of components of sentences, each name only appeared once so there were six female and six male names.

Table 5. Composition of Emotion Manipulation of Body Sentence of Voice Messages

Purpose		Event		Emotion
Part 1	Part 2	Object	Time	
I wanna	let you know	what you did	(none)	I thought a lot about *
I just wanna	say	what you said	the other day	was awesome
I want to	tell you	the gift you gave me	yesterday	made me really happy
I just want to		the joke you made		

Note: * indicates Event and Emotion switched the order in the sentence.

Table 6. Composition of Expression Manipulation of Body Sentence of Voice Messages

Transition		Expression	
Emotion	Causal link		
I thought a lot about *	and want to	give you a big hug.	(Bodily contact)
was awesome	, and got me want to	hug you.	
made me really happy	, and let me want to	make myself a better person.	(Self-improvement)
		improve myself.	
		do the same for you.	(reciprocating kindness)
		repay you.	

Note: Emotion is only to show the condition of Causal link here; they were not randomly matched.
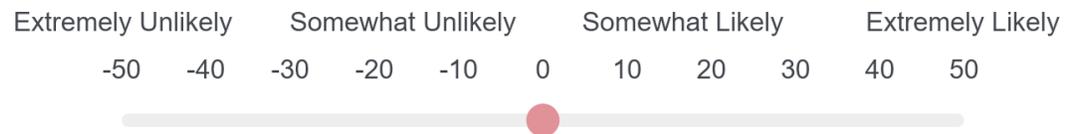
Figure 1. Exemplar stimulus of Study 2

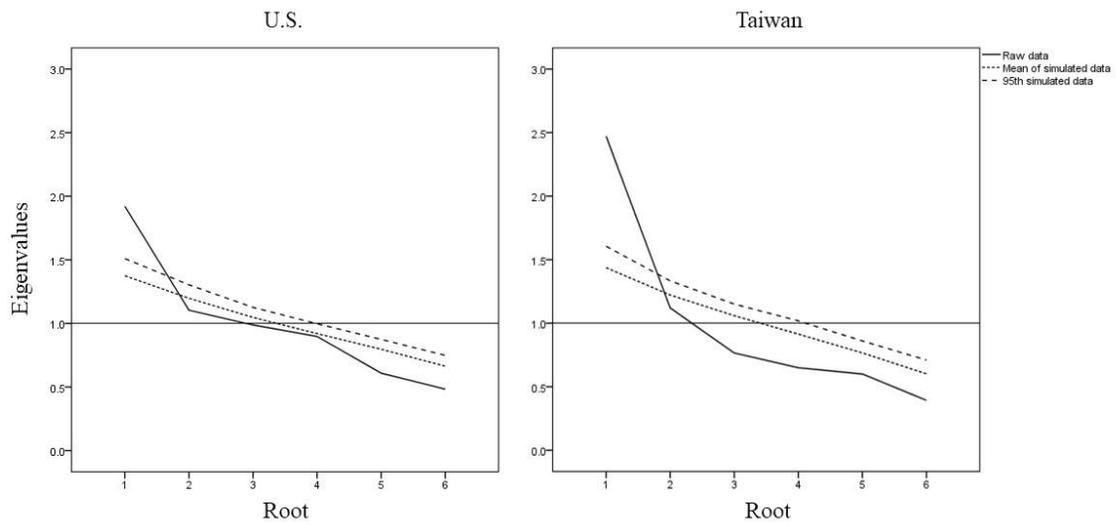*Note:* This example trial tests the condition of close other X verbal acknowledgment.

Figure 2. Scree Plots of PCA of Study 2

Note: The solid lines are of the raw data; the higher dashed lines are of the mean eigenvalues of roots of simulated data based on the raw data; the lower dashed lines are of the 95th percentiles of the same simulated data.
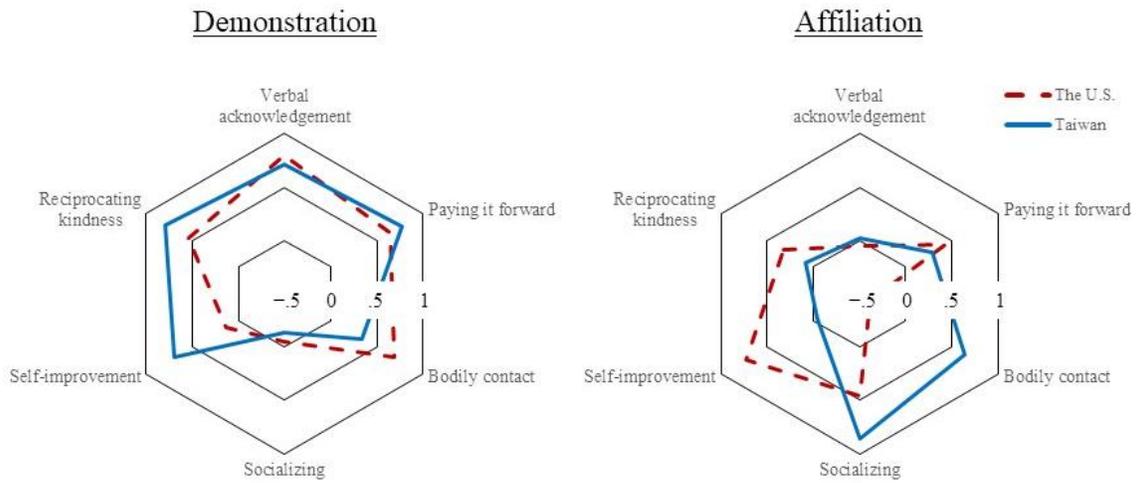
Figure 3. Profiles of Americans' and the Taiwanese's Likelihoods of each demonstration of

Gratitude beyond Amusement

Note: The data are each demonstration's varimax-rotated principal component loading on either

the demonstration or the affiliation component in different cultures; legends are in the right,

affiliation, profile.

Table 1. Supplemental Results of Pattern Matrices in Study 2

Culture	The U.S.			Taiwan		
Component	Demonstration	Affiliation	Sole	Demonstration	Affiliation	Sole
Close other						
Verbal acknowledgement	.747	.086	.746	.771	.097	.776
Bodily contact	.681	-.319	.686	.683	.300	.719
Reciprocating kindness	.708	.089	.706	.819	.057	.819
Paying it forward	.823	.102	.821	.835	.107	.841
Socializing	-.236	-.543	-.227	.057	.961	.193
Self-improvement	-.177	.805	-.190	.787	-.229	.746
Acquaintance						
Verbal acknowledgement	.722	.364	.695	.561	-.297	.604
Bodily contact	.914	-.141	.372	.160	.720	.031
Reciprocating kindness	-.130	.748	.561	.779	-.229	.807
Paying it forward	.123	.701	.657	.801	.275	.740
Socializing	.039	.437	.389	-.169	.803	-.308
Self-improvement	.298	.625	.688	.510	.112	.482

Note: The demonstration and the affiliation component were estimated together in a two-component PCA, and the sole (component)

was estimated solely in a one-component PCA; two-component models were varimax-rotated; loadings > .5 are underscored.