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BRIEF REPORT

Cultural Norms Influence Nonverbal Emotion Communication: Japanese Vocalizations of Socially Disengaging Emotions

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Nonverbal vocalizations of some emotions have been found to be recognizable both within and across cultures. However, East Asians tend to suppress socially disengaging emotions because of interdependent views on self-other relationships. Here we tested the possibility that norms in interdependent cultures around socially disengaging emotions may influence nonverbal vocal communication of emotions. Specifically, we predicted that East Asians' vocalizations of socially disengaging emotions would be less recognizable to Westerners than those of other emotions. To test this hypothesis, we performed a balanced cross-cultural experiment in which 30 Dutch and 30 Japanese listeners categorized and rated Dutch and Japanese vocalizations expressing nine emotions including anger and triumph, two socially disengaging emotions. The only condition for which recognition performance failed to exceed chance level was Dutch listeners' judgments of Japanese anger vocalizations, $p = .302$. The magnitude of the in-group advantage (i.e., enhanced recognition accuracy when producer and perceiver cultures match) was also largest for Japanese anger vocalizations out of all the 18 conditions investigated, $p < .001$. The second largest in-group advantage was obtained for Japanese triumph vocalizations, $p < .001$. In addition, Dutch listeners rated Japanese vocalizations of anger and triumph as less intense, negative/positive, and aroused than did Japanese listeners, $ps < .001$. Taken together, these findings suggest that East Asian-specific cultural norms of interpersonal relationships are associated with specificity in nonverbal vocal communication of socially disengaging emotions, especially anger, to the point that some signals can only be understood by individuals who are culturally familiar with them.

Keywords: socially disengaging emotions, vocal expressions, emotion recognition, in-group advantage, culture

Supplemental materials: <http://dx.doi.org/10.1037/emo0000580.supp>

Nonverbal vocalizations like laughs, screams, and sighs, are a powerful way of communicating emotions, and research has demonstrated that some vocal signals are consistent across even dramatically different cultures (Cordaro, Keltner, Tshering, Wangchuk, & Flynn, 2016; Laukka et al., 2013; Sauter, Eisner, Ekman, & Scott, 2010). Complementing this work, considerable evidence has shown that emotion recognition is more accurate when the producer and perceiver of a vocal signal belong to the same cultural group (Sauter et al., 2010; Sauter & Scott, 2007). This in-group advantage (Elfenbein & Ambady, 2002) indicates

that cultural factors can help shape nonverbal expressions (Elfenbein, 2013; Laukka, Neiberg, & Elfenbein, 2014; Sauter, 2013). Here, we test the prediction that nonverbal expressions of emotions can reflect cultural affordances, that is, cross-cultural differences in central concerns.

One major factor thought to produce variety in central concerns is cultural norms regarding the relationship between the self and others. Psychological and anthropological evidence suggests that interpersonal norms can be broadly divided into two types: The *independent view* of the self, prominent in American and Western

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European cultures, sees each individual as self-contained and independent from others (Markus & Kitayama, 1991). In independent cultures, communicating one's own needs or goals is encouraged as a prerequisite for autonomy and independence (Boiger, Mesquita, Uchida, & Feldman Barrett, 2013). In contrast, the *interdependent view*, prominent in East Asian cultures among others, holds that each individual is a part of a larger social unit (Markus & Kitayama, 1991). In interdependent cultures, the emphasis is put on harmonious interdependence with others, and members tend to prioritize group goals over personal ones (Triandis, 1989). These interpersonal norms form cultural affordances of interdependent cultures to de-emphasize socially disengaging emotions that focus on personal goals (Kitayama & Markus, 1999; Kitayama, Mesquita, & Karasawa, 2006). Studies on emotional experience have indeed found that Japanese individuals report experiencing socially disengaging emotions less strongly and frequently than do Americans (Boiger et al., 2013; Kitayama et al., 2006). Based on these findings, we hypothesized that the norms in interdependent cultures around socially disengaging emotions may affect the nonverbal vocal communication of these emotions.

To test this hypothesis, the present study used a balanced cross-cultural design comparing the vocal communication of emotions in a Western and an East Asian culture. Dutch and Japanese listeners were asked to categorize and rate nonverbal vocalizations produced by Dutch and Japanese native speakers posing a variety of emotions. Previous literature suggests that personal achievement and unfair infringement of personal desires constitute two major types of socially disengaging situations (Kitayama et al., 2006). The former situation is associated with positive socially disengaging emotions such as pride and triumph, and the latter with negative socially disengaging emotions such as anger and frustration (Kitayama, Markus, & Kurokawa, 2000; Kitayama et al., 2006). We therefore used nonverbal vocalizations of a positive socially disengaging emotion (triumph), and a negative socially disengaging emotion (anger). The stimuli also included vocalizations expressing seven other emotions, which were classified in terms of social engagement based on the specific scenarios used to produce them (Supplemental Table S1 in the online supplemental material). These included four socially engaging emotions (amusement, relief, sadness, and sensual pleasure) and three emotions that are neutral with regard to social engagement (fear, disgust, and surprise). Based on previous cross-cultural studies of nonverbal vocalizations, participants were expected to recognize the expressed emotions of in-group and out-group vocalizations at better-than-chance levels, but to be more accurate with expressions from their own group (Sauter et al., 2010). We also made the novel prediction that the magnitude of the in-group advantage and the differences in ratings between the two listener groups would be larger for Japanese vocalizations of the two socially disengaging emotions than for the other types of vocalizations.

Method

Participants

Thirty Dutch adults (14 men, $M_{\text{age}} \pm SD = 23.2 \pm 4.8$ years) and 30 Japanese adults (15 men, $M_{\text{age}} \pm SD = 21.0 \pm 2.1$ years) participated in this study (see Supplemental Method, Participant Inclusion Criteria in the online supplemental material). The exper-

iment was approved by the University of Amsterdam Department of Psychology and the AIST ethics committees. All participants gave written informed consent.

Stimuli

A total of 288 posed nonverbal emotional vocalization stimuli (144 Dutch; 144 Japanese) were used, with the set from each culture consisting of 16 tokens (eight male) of each of nine emotions (triumph, amusement, anger, fear, disgust, relief, sadness, sensual pleasure, and surprise). The Dutch stimuli were taken from a previously validated set of vocalizations (Sauter, 2013), and the Japanese stimulus set was developed to match the Dutch set (see Supplemental Method, Development of Japanese Stimuli, Supplemental Table S1 in the online supplemental material).

Design and Procedure

On each trial, participants heard one of the 288 stimuli through headphones, played in a pseudorandom order (see Supplemental Method, Presentation of Stimuli in the online supplemental material), and performed the following tasks in a fixed order.

Categorization. Participants categorized the emotion expressed in each vocalization by pressing one of nine number keys (1–9) corresponding to each of nine emotion labels, or the 0 key corresponding to *none of the above*. Performance was not timed, and no feedback was provided. Accuracy was assessed using unbiased hit rates (Hu scores) to control for any biases in the use of different response types (Wagner, 1993). We calculated Hu scores separately for each stimulus type and for each participant (see Supplemental Method, Calculation of Hu Scores in the online supplemental material).

Ratings. Participants then rated each stimulus on three scales: First, the perceived intensity of the emotion of their choice in the categorization task was rated on a seven-point scale ranging from 1 (*not at all intense*) to 7 (*extremely intense*). Second, perceived valence was rated on a seven-point scale ranging from 1 (*extremely negative*) to 7 (*extremely positive*). Finally, perceived arousal was rated on a seven-point scale ranging from 1 (*completely calm*) to 7 (*extremely excited*). We calculated mean rating scores of the three scales separately for each stimulus type and for each participant.

Results

We first examined whether categorization accuracy was significantly better than chance by performing one-sample *t* tests on the Hu scores (Figure 1; Supplemental Tables S2 and S3 in the online supplemental material). Both Dutch and Japanese listeners could correctly categorize all nine emotions expressed in the Dutch stimuli at better-than-chance levels, $ps < .001$. The categorization accuracy of Japanese listeners also exceeded chance for all nine types of Japanese stimuli, $ps < .001$. However, although Dutch listeners could accurately categorize eight types of Japanese stimuli at better-than-chance levels, $ps < .023$, their performance was not better than chance for Japanese anger stimuli, $p = .302$.

We then investigated whether the magnitude of the in-group advantage and the intercultural differences in the three types of ratings would vary across stimulus types. We performed the following statistical analyses on the Hu and rating scores separately:

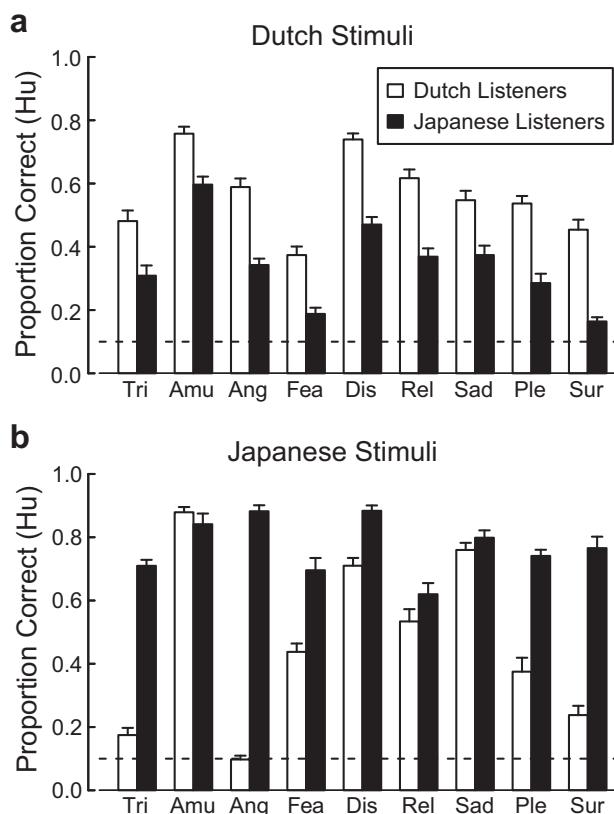


Figure 1. Accuracy of emotion categorization in Dutch (white) and Japanese (black) listeners. The bar graphs show the means of raw Hu scores, which can range from 0 (no correct responses) to 1 (perfect performance), for Dutch (a) and Japanese (b) stimuli. The error bars represent standard errors. The dashed lines indicate chance-level performance. See Supplemental Tables S2–S6 in the online supplemental material for full statistical results. Tri = triumph; Amu = amusement; Ang = anger; Fea = fear; Dis = disgust; Rel = relief; Sad = sadness; Ple = sensual pleasure; Sur = surprise.

We first performed three-way analyses of variance (ANOVAs) of Emotion Type (nine expressed emotions) \times Producer Culture (Dutch or Japanese) \times Listener Culture (Dutch or Japanese). Because the three-way interactions were significant for all four dependent variables, $ps < .001$ (Supplemental Tables S4, S9, S12, and S15 in the online supplemental material), we subsequently performed follow-up two-way ANOVAs of Producer Culture \times Listener Culture separately for each emotion type. Where the two-way interaction was found to be significant, independent-samples t tests were used to compare the two listener cultures for each producer culture.

Two-way ANOVAs performed on the Hu scores revealed significant Producer Culture \times Listener Culture interactions for all nine emotion types, $ps < .010$, together with significant main effects of Producer Culture for seven emotion types, $ps < .002$ (Supplemental Table S5 in the online supplemental material). Subsequent t tests demonstrated significant in-group advantages for all nine types of Dutch stimuli, $ps < .002$, and six types of Japanese stimuli, $ps < .001$ (Figure 1 and Supplemental Table S6 in the online supplemental material). Comparisons of the absolute values of effect size estimates

of the t tests (d) showed that the magnitude of the in-group advantage was substantially larger for Japanese stimuli of anger (6.00) and triumph (4.06) than other stimulus types (<2.57). The absolute difference in correct categorization rates (Supplemental Tables S7 and S8 in the online supplemental material) was also greater for Japanese stimuli of anger (69.7%) and triumph (57.5%) than all other stimulus types ($<37.6\%$).

We next tested our prediction that the intercultural differences in ratings would also be larger for Japanese vocalizations of socially disengaging emotions compared to other types of vocalizations (Table 1 and Supplemental Figure S1 in the online supplemental material). Two-way ANOVAs performed on the intensity ratings showed significant Producer Culture \times Listener Culture interactions for five emotion types, $ps < .016$ (Supplemental Table S10 in the online supplemental material). Subsequent t tests (Supplemental Table S11 in the online supplemental material) demonstrated that the largest intercultural differences were found for Japanese stimuli of anger and triumph, with Japanese listeners perceiving them as more intense than did Dutch listeners, $ps < .001$. Interestingly, Japanese listeners also perceived Dutch anger stimuli as more intense than did Dutch listeners, $p = .003$.

Two-way ANOVAs performed on the valence ratings revealed significant Producer Culture \times Listener Culture interactions for seven emotion types, $ps < .003$ (Supplemental Table S13 in the online supplemental material). Subsequent t tests (Supplemental Table S14 in the online supplemental material) demonstrated that the largest intercultural difference was found for Japanese triumph vocalizations, with Japanese listeners perceiving them as more positive than did Dutch listeners, $p < .001$. Among the nine types of Japanese vocalizations, the second largest intercultural difference was found for anger, with Japanese listeners perceiving them as more negative than did Dutch listeners, $p < .001$.

Two-way ANOVAs performed on the arousal ratings revealed significant Producer Culture \times Listener Culture interactions for six emotion types, $ps < .001$ (Table S16). Subsequent t tests (Supplemental Table S17 in the online supplemental material) demonstrated that the largest intercultural differences were found for Japanese stimuli of anger and triumph, with Japanese listeners perceiving them as more aroused than did Dutch listeners, $ps < .001$. These results indicate that intercultural differences in ratings were especially pronounced for Japanese vocalizations of the two socially disengaging emotions.

Discussion

The aim of the present study was to test the specificity of Japanese vocal communication of socially disengaging emotions. To this end, we asked Dutch and Japanese listeners to judge Dutch and Japanese vocalizations expressing nine different emotions. Consistent with previous empirical studies (Cordaro et al., 2016; Sauter et al., 2010), both Dutch and Japanese listeners were generally able to recognize emotions expressed by both in-group and out-group members at above chance level. Furthermore, in line with previous literature on the in-group advantage in emotion recognition (Elfenbein & Ambady, 2002), recognition performance was better for in-group than out-group vocalizations for listeners in both cultures.

Uniquely, however, recognition performance failed to exceed chance level for Dutch listeners' judgments of Japanese vocalizations expressing anger, a negative socially disengaging emotion. The mag-

Table 1
Mean Ratings of Perceived Intensity, Valence, and Arousal in Dutch and Japanese Listeners

Emotion type	Intensity			Valence			Arousal		
	Dutch	Japanese	<i>p</i> ^a	Dutch	Japanese	<i>p</i> ^a	Dutch	Japanese	<i>p</i> ^a
Dutch stimuli									
Tri	4.99 (.14)	5.20 (.11)	.438	5.26 (.11)	4.84 (.09)	.023	4.71 (.15)	4.98 (.12)	1.00
Amu	4.70 (.13)	5.11 (.13)	.175	5.39 (.10)	4.93 (.09)	.006	4.15 (.18)	4.57 (.12)	.438
Ang	4.69 (.14)	5.36 (.11)	.003	2.74 (.11)	2.79 (.16)	1.00	4.50 (.13)	4.71 (.12)	1.00
Fea	4.78 (.13)	5.06 (.11)	.438	2.98 (.10)	3.39 (.10)	.039	4.58 (.11)	4.69 (.10)	1.00
Dis	4.84 (.13)	5.31 (.11)	.073	2.70 (.11)	2.73 (.14)	1.00	3.91 (.16)	3.98 (.12)	1.00
Rel	4.81 (.11)	5.06 (.10)	.438	4.96 (.08)	4.18 (.11)	<.001	3.91 (.15)	3.54 (.12)	.438
Sad	4.49 (.12)	4.78 (.13)	.438	3.21 (.10)	3.30 (.12)	1.00	3.88 (.15)	3.88 (.09)	1.00
Ple	5.14 (.14)	4.73 (.11)	.175	5.44 (.11)	4.20 (.12)	<.001	4.78 (.18)	3.94 (.10)	.001
Sur	4.44 (.13)	4.74 (.13)	.438	3.82 (.07)	3.52 (.08)	.039	4.00 (.13)	4.12 (.10)	1.00
Japanese stimuli									
Tri	5.42 (.11)	6.20 (.07)	<.001	3.74 (.14)	5.84 (.08)	<.001	5.12 (.13)	6.00 (.09)	<.001
Amu	4.94 (.12)	5.48 (.11)	.004	5.52 (.08)	5.40 (.10)	.656	4.40 (.16)	4.92 (.11)	.027
Ang	4.01 (.13)	5.46 (.12)	<.001	3.62 (.08)	2.53 (.17)	<.001	3.81 (.13)	4.81 (.11)	<.001
Fea	5.77 (.10)	6.22 (.06)	<.001	2.23 (.13)	2.68 (.22)	.232	5.39 (.13)	6.05 (.09)	<.001
Dis	5.17 (.13)	5.78 (.10)	.002	2.47 (.11)	2.32 (.22)	.656	4.33 (.14)	4.30 (.12)	.858
Rel	5.07 (.13)	5.39 (.11)	.066	5.21 (.10)	4.88 (.14)	.208	4.40 (.18)	4.00 (.13)	.150
Sad	5.35 (.12)	6.00 (.09)	<.001	2.09 (.13)	2.75 (.19)	.031	4.36 (.17)	5.26 (.14)	<.001
Ple	5.11 (.16)	5.62 (.10)	.018	4.79 (.21)	5.63 (.12)	.006	4.99 (.16)	5.54 (.10)	.026
Sur	4.55 (.13)	5.28 (.13)	<.001	3.36 (.09)	3.76 (.09)	.015	4.35 (.12)	5.00 (.12)	.002

Note. The numbers within brackets indicate standard errors. See Supplemental Tables S9–S17 in the online supplemental material for full statistical results. Tri = triumph; Amu = amusement; Ang = anger; Fea = fear; Dis = disgust; Rel = relief; Sad = sadness; Ple = sensual pleasure; Sur = surprise.
^aThe *p* values for independent-samples *t* tests (corrected for multiple comparisons across nine emotion types with the Holm method).

nitude of the in-group advantage for Japanese anger vocalizations was also largest out of all the 18 conditions investigated. Our results are in line with previous cross-cultural studies employing multimodal presentations (facial expressions and verbal vocalizations) of Japanese emotion expressions. These studies have indicated that the in-group advantage is larger for Japanese expressions of anger than for those of other basic emotions (Shimoda, Argyle, & Ricci Bitti, 1978; Tanaka et al., 2010).

Moreover, in the present study, the intercultural differences in both perceived intensity and arousal were the largest for Japanese anger vocalizations, with Dutch listeners perceiving them as less intense and aroused than did Japanese listeners. Among the nine types of Japanese vocalizations, the intercultural difference in perceived valence was also the second largest for anger, with Dutch listeners perceiving them as less negative than did Japanese listeners.

Similar, but weaker results were obtained for Japanese vocalizations of triumph, a positive socially disengaging emotion. Though Japanese triumph vocalizations were recognized at above chance level by Dutch and Japanese listeners, the magnitude of the in-group advantage and the intercultural differences in perceived intensity and arousal for these vocalizations were the second largest out of the 18 conditions. Moreover, the intercultural difference in perceived valence for Japanese triumph vocalizations was the largest among the 18 conditions, with Dutch listeners perceiving them as less positive than did Japanese listeners.

Taken together, Japanese vocalizations of both negative and positive socially disengaging emotions were less recognizable to Western listeners compared to other types of vocalizations. The results of ratings indicate that Japanese vocalizations of socially disengaging emotions were perceived as less intense, negative/positive, and aroused by Western listeners. A recent study also found that, in Western listeners, the difference in recognition rates between vocal-

izations from independent and interdependent cultures was largest for anger among a variety of emotions (Laukka et al., 2013). Together, these findings suggest that Western listeners generally struggle to understand vocalizations of socially disengaging emotions produced by members of interdependent cultures. Importantly, Japanese listeners could recognize Western vocalizations of socially disengaging emotions as accurately as those of other emotions, corroborating previous findings (Cordaro et al., 2016; Koeda et al., 2013). There is thus an asymmetry in the recognition of nonverbal vocalizations of socially disengaging emotions between independent and interdependent cultures.

Previous literature suggests that the interdependent view of the self in East Asian cultures considers socially disengaging emotions as inappropriate in interpersonal relationships (Kitayama & Markus, 1999). Japanese individuals also report experiencing socially disengaging emotions less strongly and less frequently than Westerners (Boiger et al., 2013; Kitayama et al., 2006). These cultural affordances may have led Japanese to express socially disengaging emotions in a specific and subtle way that is unrecognizable to Western perceivers. The daily experiences of nonverbal communication using the subtle vocal expressions of socially disengaging emotions may in turn have helped Japanese to become sensitive to these expressions. This interpretation is also consistent with the finding that Japanese listeners perceived Dutch anger vocalizations as more intense than did Dutch listeners, which indicates Japanese listeners' sensitivity to expressions of this negative socially disengaging emotion.

An intriguing finding unrelated to our hypothesis is that recognition accuracy was overall higher for Japanese than for Dutch vocalizations, a pattern differing from findings on facial expressions of emotions (Wood, Rychlowska, & Niedenthal, 2016). Previous literature has found that, compared to Westerners, Japanese tend to rely more on vocal tones than verbal contents (Ishii, Reyes, & Kitayama, 2003)

or facial expressions (Tanaka et al., 2010) when inferring emotions. These findings point to the possibility that Japanese people tend to both express and perceive emotions through nonverbal vocal information to a greater degree than Westerners. This could be a possibility worth testing in the future.

It is worth noting some limitations of the present study. First, the present study focused only on two socially disengaging emotions. Future work should test whether the present findings also occur for a range of other socially disengaging emotions. Second, the present sample was limited to Dutch and Japanese participants. Future work should recruit producers and listeners with a variety of cultural backgrounds characterized by different levels of independent or interdependent cultural norms, and directly test whether the level of independence/interdependence mediates the cultural differences in the nonverbal vocal communication of socially disengaging emotions. Third, the stimuli used here were posed vocal expressions of emotions. Future work should investigate whether the present findings also apply to spontaneous vocalizations (Sauter & Fischer, 2018) and to nonverbal emotion communication in other channels (e.g., facial expressions).

In summary, the present results demonstrate that Japanese vocalizations of socially disengaging emotions, especially anger, are challenging to interpret for Western listeners. We argue that cultural affordances in interdependent societies likely lead to the suppression of socially disengaging emotions, resulting in them being vocally expressed in a less clear manner than in independent cultures, which may in turn make members of interdependent cultures more sensitive to these expressions. These specific social signals may consequently be less recognizable to members of independent cultures, to the point that some signals can only be understood by members of interdependent cultures.

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