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Case Report

Revisiting cultural differences in emotion perception between easterners and westerners: Chinese perceivers are accurate, but see additional non-intended emotions in negative facial expressions☆

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ABSTRACT

It is well established that East Asians (Easterners) are poorer at categorizing some emotional facial expressions than are North Americans and West Europeans (Westerners). We hypothesized that rather than Easterners failing to identify the intended emotions, they are more likely than Westerners to perceive multiple concurrent emotions. To test this hypothesis, we asked Chinese and Dutch participants to rate theoretically based facial expressions (Western prototypes from the Facial Action Coding System [FACS]) in Experiment 1, and empirically based facial expressions from each culture (Chinese and Dutch) in Experiment 2. Across experiments, both groups of perceivers consistently rated intended emotions higher than non-intended emotions, irrespective of emotion type and of whether the expressions were static or dynamic. Furthermore, Chinese participants produced smaller differences in ratings between intended and non-intended emotions than did Dutch participants. Machine learning based categorization supported the possibility that Chinese participants' poorer categorization performance on forced-choice emotion categorization tasks can be explained by their tendency to perceive intended as well as non-intended emotions in facial expressions. Together, these results suggest that Chinese are more likely than Dutch to see multiple concurrent emotions in facial expressions, thus shedding new light on the role of culture in emotion perception.

1. Introduction

The extent to which cultural factors shape emotion perception is a matter of considerable debate (e.g., Elfenbein & Ambady, 2003a; Jack, Garrod, Yu, Caldara, & Schyns, 2012; Matsumoto, 1992). It is well established that the majority of observers across cultures reliably identify emotions from nonverbal expressions (e.g., Elfenbein & Ambady, 2003a; Paulmann & Uskul, 2014), but cross-cultural differences have been found in the absolute levels of agreement for certain negative facial expressions (e.g., Beaupré & Hess, 2005; Jack, Blais, Scheepers, Schyns, & Caldara, 2009; Matsumoto, 1992; Yik & Russell, 1999). Specifically, East Asians (Easterners) appear to be less accurate than West Europeans and North Americans (Westerners) in recognizing facial expressions of anger, disgust, and fear.

Two explanations have been put forth to account for this phenomenon. One is that negative emotions may pose a threat to group harmony, which is valued to a greater degree in collectivistic cultures (including many Eastern countries) compared to individualistic cultures (including many Western countries; Nisbett, Peng, Choi, & Norenzayan, 2001). On this view, reduced exposure to negative emotions could affect the perception of emotion (i.e., emotion decoding) (Matsumoto, 1989). Specifically, due to a lack of experience with negative emotional expressions, Easterners may be less accurate in categorizing different negative expressions (Biehl et al., 1997). Another explanation is that Easterners use a decoding strategy that is inadequate for distinguishing some negative facial expressions: Easterners focus more on information in the eye region, while Westerners weigh information more evenly across different parts of the face (Yuki, Maddux, & Masuda, 2007). Easterners may therefore be poorer at judging expressions that share similar morphological features around the eye region, such as anger and disgust, and fear and surprise (Jack et al., 2009). These two accounts suggest that Easterners' lower performance in categorizing negative

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facial expressions is caused by their failure to identify the *intended* emotions signaled by facial expressions.

Here we propose another possibility, namely that Easterners tend to see multiple concurrent emotions when perceiving negative facial expressions. Previous findings indicate that Easterners commonly *experience* multiple different emotions simultaneously, while Westerners tend to report experiencing specific feelings (Bagozzi, Wong, & Yi, 1999; Schimmack, Oishi, & Diener, 2002). We propose that the tendency to experience mixed emotions may predispose Easterners to also perceive others' emotional expressions as more mixed. Suggestive evidence comes from studies showing that, when describing facial expressions, Easterners use more words referring to non-intended emotions than do Westerners (Beaupré & Hess, 2005; Leu, Mesquita, Masuda, Ellsworth, & Karasawa, 2003), but no study to date has directly examined the concurrent perception of multiple emotions from negative facial expressions portrayed by actors from both groups of participants' cultural backgrounds (Easterners and Westerners). Here we test the hypothesis that, rather than Easterners failing to identify the intended emotion, they perceive multiple emotions simultaneously.

This hypothesis was tested by examining multi-scalar intensity ratings for two pairs of emotions for which Easterners are known to make more confusion errors than Westerners: anger-disgust and fear-surprise. Specifically, Easterners more frequently misclassify disgust expressions as anger (and vice versa), and misclassify fear expressions as surprise (e.g., Jack et al., 2009). Both static and dynamic emotional expressions were used to test the robustness of the findings, and stimuli from both of the ethnic groups employed as participants (Chinese and Dutch) were included. All measures, manipulations, and exclusions are reported below.

2. Experiment 1

2.1. Participants and design

The study included 582 individuals, who participated for course credits or monetary compensation. Twenty-two participants were excluded for failing to complete the task. The final sample consisted of 280 Dutch participants from the University of Amsterdam and 280 Chinese participants from Zhejiang University. One hundred forty-four Dutch participants (M_{age} = 22.56, SD = 3.57; 103 women; 95 of which saw Dutch faces and 49 Chinese faces) and 144 Chinese participants (M_{age} = 20.94, SD = 1.74; 103 women; 95 of which saw Dutch faces and 49 Chinese faces) judged facial expressions of anger, disgust, and fear; one hundred thirty-six Dutch participants (M_{age} = 21.51, SD = 3.12; 94 women; 84 of which saw Dutch faces and 52 saw Chinese faces) and 136 Chinese participants (M_{age} = 19.63, SD = 1.60; 94 women; 84 of which saw Dutch faces and 52 saw Chinese faces) judged facial expressions of anger, fear, and surprise. All participants provided written informed consent, and the ethics committee of the University of Amsterdam approved the study.

2.2. Stimuli and procedure

Six Dutch actors (three men, three women) and six Chinese actors (three men, three women) posing facial expressions of anger, disgust, fear, and surprise were selected from the Radboud Faces Database (Langner et al., 2010) and the Taiwan Corpora of Chinese Emotions (Shyi, Huang, & Yeh, 2013), respectively. Both sets are based on the Facial Action Coding System (FACS; Ekman, Friesen, & Hager, 2002). A pilot study was conducted to ensure that the Chinese and Dutch stimuli were matched for perceived intensity in both cultural groups (see Supplementary Materials for details).

Table 1
Chinese and Dutch translations of emotion terms of interest.

English	Dutch	Chinese
Anger	Boosheid	愤怒
Disgust	Walging	厌恶
Fear	Angst	恐惧
Surprise	Verrassing	惊讶

2.2.1. Static task

In the static task, each trial started with a fixation cross displayed in the center of the screen for 500 ms, followed by a photograph of an emotional expression (anger, disgust, or fear in condition 1; anger, fear, or surprise in condition 2) shown for 1000 ms.[1] Then a gray screen appeared with a prompt to judge the emotion expressed in the face. Ratings were made by moving sliders on three scales ranging from 0 (*not at all*) to 100 (*very much*), reflecting the three emotions shown in the respective condition. All scales were displayed on a single screen, with the order consistent for each participant, but counterbalanced between participants. Each participant completed three practice trials, followed by four blocks of 18 trials each (6 actors × 3 static expressions). The order of emotion displays was random. All participants were tested in their own language. The emotion terms were taken from the respective facial expression databases (i.e., the terms are used to denote the various facial expressions in each stimulus set; see Table 1), and they were translated back into English by a native speaker of each language to verify accurate translation.

2.2.2. Dynamic task

Based on the static stimuli, we used Fantamorph 5 (http://www.fantamorph.com/) to generate dynamic facial expressions that changed from one emotion to the target emotion of interest. Examples of the dynamic stimuli are available online (https://osf.io/k893a/). The dynamic stimuli consisted of 26-frame morphs, which were presented at the speed of 30 frames per second. Based on the unfolding time of natural dynamic expressions (Hoffmann, Traue, Bachmayr, & Kessler, 2010), the exposure time of the first frame (i.e., the start emotion) and the last frame (i.e., the target emotion) were set to 600 ms each. Thus, each clip lasted for 2000 ms. In total, 72 morphs (6 actors × 2 actor ethnicities × 6 emotional changes) were included for anger-disgust-fear (condition 1) and the same number of morphs for fear-surprise-anger (condition 2). The procedure of the dynamic task was identical to that of the static task, except that participants were asked to judge the *last emotion* expressed in the video. Six practice trials, followed by four blocks of 36 trials each (6 actors × 6 emotional changes) were included. The order of the static (15 min) and dynamic (30 min) tasks was counterbalanced between participants, with an unrelated filler task (15 min) in between.

2.3. Results and discussion

Based on confusion patterns established in previous research (Elfenbein & Ambady, 2003b; Jack et al., 2009), we focused on ratings of the intended emotion and of the non-intended emotion that has been found to be most confusable with (or morphologically similar to) the intended one, that is, anger with disgust and fear with surprise. An overall mixed-design ANOVA on the ratings was conducted separately for each of the target emotions (anger and disgust in condition 1; fear and surprise in condition 2). Emotion Scale (Intended, Non-intended morphologically similar) and Start Emotion (None [static], Emotion X,

[1] The emotions of interest were anger and disgust in condition 1, and fear and surprise in condition 2. The reason for including fear in condition 1 and anger in condition 2 was to ensure variation in the emotional stimuli and ratings. Additionally, for the dynamic stimuli, due to the inclusion of fear and anger, respectively, participants could not predict the target emotion based on the start emotion, and thus had to pay attention to the target emotion.

Emotion Y) were within-subjects variables, and Culture of Perceiver (Chinese, Dutch) and Culture of Expresser (Chinese, Dutch) were between-subjects variables.[2] A complete overview of effects can be found in Table 2.

We first examined whether perceivers identified the intended emotions in the expressions. The main effects of Emotion Scale were significant for all target emotions, $ps < 0.001$, η_p^2 s = [0.425, 0.829], with both Chinese and Dutch perceivers rating the intended emotions higher than the non-intended morphologically similar emotions (see Fig. 1; means and standard deviations of emotion ratings for all expressions are presented in Table 3); this pattern of results held when target emotions were further broken down by start emotions (see Fig. 1). This suggests that, on average, both Chinese and Dutch perceivers saw more of the intended than of the non-intended morphologically similar emotions in the facial expressions, irrespective of emotion type and of whether the expressions were static or dynamic.

We then examined whether the two groups of perceivers differed in the *degree* to which they perceived intended versus non-intended morphologically similar emotions. The two-way interactions of Emotion Scale and Culture of Perceiver were significant for all target emotions, $ps < 0.01$, η_p^2 s = [0.082, 0.447] (see Fig. 1). Dutch perceivers produced greater differences in ratings on the intended versus non-intended morphologically similar emotions as compared to Chinese perceivers.

These results fit with previous findings showing that Easterners are less accurate than Westerners in categorizing certain negative facial expressions (Beaupré & Hess, 2005; Jack et al., 2009; Matsumoto, 1992; Yik & Russell, 1999). This is based on the assumption that the larger the difference between the perception of intended and non-intended morphologically similar emotions in a multi-scalar intensity rating task, the more likely participants would be to choose the "correct" emotion category in a forced-choice task, and vice versa. Although no forced-choice task was included in this experiment, machine learning could be applied here to simulate what participants' responses would likely have been if we had used a forced-choice task. To establish this, we first used an unsupervised machine learning technique to perform a k-means clustering analysis in SPSS with k = 2 on Chinese and Dutch participants' responses, respectively. The purpose of the unsupervised machine learning here is to classify the response patterns into two groups (to simulate responses on a two-alternative forced-choice task) using only participants' ratings on emotion scales without referring to actual emotion categories. This was applied to (1) participants' ratings of anger and disgust for each type of trial (i.e., static anger, disgust-to-anger, fear-to-anger, static disgust, anger-to-disgust, and fear-to-disgust) in condition 1, and (2) participants' ratings of fear and surprise for each type of trial (i.e., static fear, anger-to-fear, surprise-to-fear, static surprise, anger-to-surprise, and fear-to-surprise) in condition 2. The 2-means clustering algorithm partitioned the response patterns into 2 clusters, in which each response pattern was assigned to the cluster with the nearest mean. The predicted cluster membership (i.e., cluster 1 or cluster 2) was saved for each participant's judgments on each type of trial. The predicted emotion category was assigned to each cluster based on the cluster center (i.e., the mean ratings of anger and disgust for each cluster; see Table S1). For example, the cluster that had a higher score for anger than disgust ratings was assigned to the predicted anger category, whereas the cluster that was higher on disgust than anger ratings was assigned to the predicted disgust category.

Second, for each participant's judgments on each type of trial, we compared the predicted emotion category generated in Step 1 with the actual emotion category. Classifications were coded as 1 if the categorization was correct (i.e., it matched the actual emotion category), and as 0 if the categorization was incorrect (i.e., it did not match the actual emotion category). Categorization performance of the 2-means clustering algorithm was significantly higher for Dutch participants than for Chinese participants across all emotions (details are provided in Table 4).

Third, we tested whether judgments endorsing multiple concurrent emotions would result in lower categorization accuracy of the 2-means clustering algorithm. This was done by conducting a logistic regression analysis in which the categorization accuracy generated in Step 2 was regressed onto the differences between participants' ratings on the two emotions (anger and disgust ratings for condition 1 and fear and surprise ratings for condition 2). As expected, higher difference scores by human raters positively predicted the classification accuracy of the 2-means clustering algorithm (condition 1: $B = 0.042$, $SE = 0.003$, $p < .001$; Nagelkerke R square for model = 0.266; condition 2: $B = 0.033$, $SE = 0.003$, $p < .001$; Nagelkerke R square for model = 0.139). These results suggest that perceivers' tendencies to perceive multiple concurrent emotions in facial expressions of emotion may explain their lower accuracy on forced-choice emotion expression categorization tasks.

Taken together, the current findings suggest that, rather than failing to identify the intended emotion, Chinese perceivers are more likely than Dutch perceivers to see multiple concurrent emotions in negative facial expressions.

3. Experiment 2

Experiment 1 showed that Chinese perceivers were more likely than Dutch perceivers to see multiple emotions in negative facial expressions. According to the dialect theory of nonverbal communication of emotion (Elfenbein & Ambady, 2003a, 2003b; Elfenbein, Beaupré, Lévesque, & Hess, 2007), different cultures vary in their nonverbal expressions, and the presence of such differences has the potential to make the recognition of emotion less accurate across cultural boundaries. Therefore, an alternative explanation for this result could be that the FACS-based (Western) prototypes of emotional expressions may have been more culturally appropriate for Dutch perceivers, and more ambiguous for Chinese perceivers. This may have led Chinese perceivers to perceive multiple concurrent emotions in the facial expression stimuli. To address this alternative interpretation, we used empirically based facial expressions from Chinese and Dutch cultures, respectively, in Experiment 2. If the pattern of results in Experiment 1 was due to the use of FACS-based (Western) prototypes of emotional expressions, then we would expect Dutch participants to be more likely than Chinese participants to perceive multiple emotions when describing empirically based facial expressions from Chinese culture, while the reverse pattern should occur for empirically based facial expressions from Dutch culture.

3.1. Participants

The study included 157 individuals, who participated for course credits or monetary compensation. Seventy-five Dutch participants ($M_{age} = 21.53$, $SD = 4.15$; 59 women) from the University of Amsterdam and 82 Chinese participants ($M_{age} = 24.16$, $SD = 5.10$; 58 women) living in Mainland China (mainly University students) were recruited via personal networks. All participants provided written informed consent, and the ethics committee of the University of Amsterdam approved the study. The sample size was determined before any data analysis.

3.2. Stimuli and procedure

The stimuli for Experiment 2 were taken from a study in which

[2] Start Emotion varied across target emotions. For expressions of target anger, for example, Emotion X and Y would indicate disgust and fear, respectively.

Table 2

Emotion Scale (Intended, Non-intended) × Culture of Perceiver (Chinese, Dutch) × Culture of Expresser (Chinese, Dutch) × Start Emotion (None, Emotion X, Emotion Y) [see table note] Mixed-Design Analysis of Variance for the Intensity Ratings of Expressions in Experiments 1 and 2.

Exp.	Effects	Target Anger				Target Disgust				Target Fear				Target Surprise			
		df	*F*	*p*	η_p^2	df	*F*	*p*	η_p^2	df	*F*	*p*	η_p^2	df	*F*	*p*	η_p^2
Exp. 1	Emotion Scale (S)	(1284)	473.88	< .001	.625	(1284)	513.95	< .001	.644	(1268)	198.41	< .001	.425	(1268)	1300.24	< .001	.829
	Start Emotion (A)	(2568)	4.79	.009	.017	(2568)	0.74	.478	.003	(2536)	3.40	.034	.022	(2536)	14.76	< .001	.052
	Culture of Perceiver (P)	(1284)	25.86	< .001	.083	(1284)	26.24	< .001	.085	(1268)	6.01	.015	.022	(1268)	2.10	.148	.008
	Culture of Expresser (E)	(1284)	0.18	.673	.001	(1284)	0.08	.780	< .001	(1268)	0.43	.512	.002	(1268)	3.95	.048	.015
	S × A	(2568)	46.29	< .001	.140	(2568)	17.57	< .001	.058	(2536)	22.75	< .001	.078	(2536)	34.90	< .001	.115
	S × P	(1284)	229.28	< .001	.447	(1284)	28.39	< .001	.091	(1268)	85.98	< .001	.243	(1268)	23.86	< .001	.082
	S × E	(1284)	0.44	.509	.002	(1284)	23.24	< .001	.076	(1268)	0.85	.357	.003	(1268)	6.90	.009	.025
	A × P	(2568)	3.62	.027	.013	(2568)	7.75	< .001	.027	(2536)	1.69	.186	.006	(2536)	5.06	.007	.019
	A × E	(2568)	0.84	.434	.003	(2568)	1.11	.329	.004	(2536)	1.18	.308	.004	(2536)	3.93	.020	.014
	P × E	(1284)	5.05	.025	.017	(1284)	0.03	.859	< .001	(1268)	10.89	.001	.039	(1268)	6.46	.012	.024
	S × A × P	(2568)	20.63	< .001	.068	(2568)	22.58	< .001	.074	(2536)	2.20	.111	.008	(2536)	0.56	.575	.002
	S × A × E	(2568)	5.22	.006	.018	(2568)	7.65	.001	.026	(2536)	1.18	.307	.004	(2536)	6.44	.002	.023
	S × P × E	(1284)	29.46	< .001	.094	(1284)	53.11	< .001	.158	(1268)	2.70	.102	.010	(1268)	4.09	.044	.015
	A × P × E	(2568)	2.50	.083	.009	(2568)	2.15	.117	.008	(2536)	1.36	.257	.005	(2536)	3.73	.025	.014
	S × A × P × E	(2568)	2.13	.120	.007	(2568)	7.88	< .001	.027	(2536)	1.05	.350	.004	(2536)	0.44	.643	.002
Exp. 2	Emotion Scale (S)	(1155)	383.24	< .001	.712	(1155)	335.48	< .001	.684								
	Culture of Perceiver (P)	(1155)	2.55	.112	.016	(1155)	3.09	.081	.020								
	Culture of Expresser (E)	(1155)	2.58	.110	.016	(1155)	0.57	.452	.004								
	S × P	(1155)	64.64	< .001	.294	(1155)	16.91	< .001	.098								
	S × E	(1155)	23.69	< .001	.133	(1155)	62.15	< .001	.286								
	P × E	(1155)	53.59	< .001	.257	(1155)	72.78	< .001	.320								
	S × P × E	(1155)	84.01	< .001	.351	(1155)	161.01	< .001	.510								

Note. The non-intended emotion denotes only one emotion, namely the non-intended emotion that has been found to be most confusable with (or morphologically similar to) the intended one in a given condition. For expressions of anger, for example, the non-intended emotion denotes disgust only. The factor of Start Emotion was only in Experiment 1, which varied across target emotions. For expressions of target anger, for example, Emotion X and Y indicate disgust and fear, respectively.

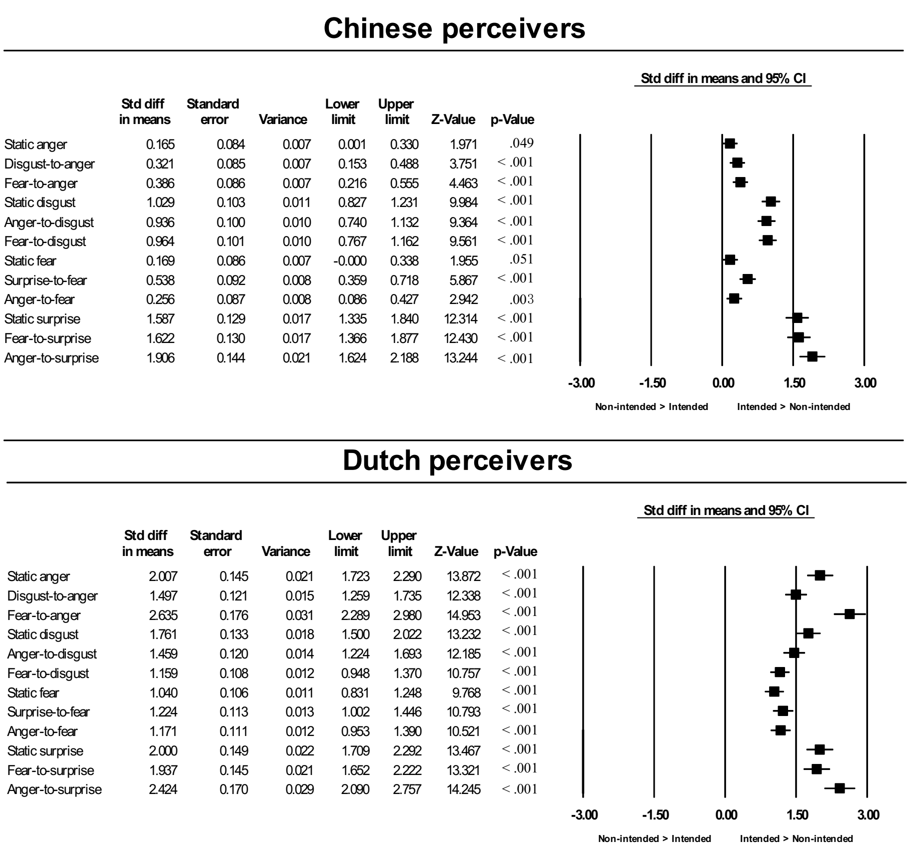


Fig. 1. Differences between ratings on intended and non-intended emotion scales for Chinese and Dutch participants in Experiment 1. The non-intended emotion denotes only one emotion, namely the non-intended emotion that has been found to be most confusable with (or morphologically similar to) the intended one in a given condition. The left panel presents the statistics numerically, while the right panel presents effect sizes (Cohen's *ds*) and associated 95% confidence intervals graphically. Std diff in means denotes the effect sizes of the differences (i.e., Cohen's *ds*). The reference line of the right panel denotes zero, indicating no difference between ratings on the intended and non-intended emotion scales. Squares located on the right side of the reference line represent ratings on the intended emotion scale that are higher than ratings on the non-intended emotion scale; squares to the left of the reference line represent ratings on the non-intended emotion scale that are higher than ratings on the intended emotion scale. Greater distances between squares and the reference line denote larger differences between the intended and non-intended emotion scales. The figure indicates that both Chinese and Dutch perceivers saw more of the intended than of the non-intended emotions in the various facial expressions.

Chinese and Dutch participants were asked to pose facial expressions of anger and disgust with the goal of being understood by their friends (Fang, Sauter, & Van Kleef, 2018). A total of 49 Dutch (13 men, 36 women) and 45 Chinese (23 men, 22 women) actors posed facial expressions of anger and disgust, yielding facial expressions based on Dutch and Chinese cultural prototypes, respectively.

Each trial consisted of a photograph of an emotional facial expression (anger or disgust) in the center of the screen and four scales

Table 3
Means and standard deviations of rating on the intended and non-intended emotions for all facial expressions in Experiments 1 and 2.

Exp.	Expressions	Chinese perceivers						Dutch perceivers					
		Intended emotion		Non-intended emotion				Intended emotion		Non-intended emotion			
				Morphologically Similar emotion		Morphologically Dissimilar emotion				Morphologically Similar emotion		Morphologically Dissimilar emotion	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Exp. 1	Static anger	57.67	21.06	54.24	20.77	21.72	16.66	72.33	16.38	24.72	19.97	11.70	12.50
	Disgust-to-anger	60.98	20.55	54.23	21.35	20.55	15.98	71.15	17.25	29.01	23.76	12.62	12.71
	Fear-to-anger	62.75	20.70	53.96	21.57	21.69	18.39	76.81	15.05	20.28	17.81	17.35	23.23
	Static disgust	74.01	16.14	53.76	20.14	23.46	18.14	75.95	14.94	32.23	19.46	11.17	11.22
	Anger-to-disgust	71.48	16.84	51.81	19.76	23.80	17.32	75.79	14.69	35.81	23.06	11.53	11.54
	Fear-to-disgust	73.29	16.13	52.57	20.26	23.18	19.27	70.11	16.99	36.84	20.51	17.77	22.53
	Static fear	70.77	17.12	67.48	20.45	20.92	16.91	79.98	14.10	51.87	25.21	10.15	10.24
	Surprise-to-fear	73.10	16.69	61.19	22.66	19.89	18.25	82.31	14.22	48.41	27.33	8.16	9.14
	Anger-to-fear	71.38	17.15	65.80	21.50	20.43	19.19	80.64	14.78	47.91	25.70	16.11	24.51
	Static surprise	71.98	17.65	39.48	20.71	14.73	14.59	80.32	12.64	35.98	21.40	8.17	9.44
	Fear-to-surprise	67.55	20.21	33.86	20.70	14.68	14.22	80.70	13.93	33.25	24.90	8.34	10.10
	Anger-to-surprise	74.32	16.81	33.74	20.26	15.59	16.83	83.03	12.15	29.66	20.63	15.77	24.63
Exp. 2	Chinese anger	28.86	12.90	15.92	11.54	9.76	8.78	33.55	12.38	11.38	9.14	9.93	6.63
	Chinese disgust	31.53	16.34	14.48	10.86	12.52	8.81	30.28	11.73	15.12	8.28	13.53	7.95
	Dutch anger	25.44	13.23	15.61	11.21	12.02	9.42	41.54	13.34	9.20	10.16	10.16	6.98
	Dutch disgust	26.69	15.46	13.66	12.49	15.70	9.54	42.26	13.66	9.91	7.60	13.73	9.00

Note. For expressions of anger, for example, the morphologically similar emotion denotes disgust and the morphologically dissimilar emotion denotes fear.

Table 4
Proportion of accurate categorizations by the 2-means clustering algorithm (based on Dutch and Chinese participants' ratings) and chi-square tests of categorization accuracy between Dutch and Chinese participants' responses.

Exp.	End emotion category	Culture of perceiver	Categorization of the 2-means clustering algorithm		Chi-square value	*p*
			Correct	Incorrect		
Exp. 1 con. 1	Anger	Dutch	91.40%	8.60%	148.57	< .001
		Chinese	54.60%	45.40%		
	Disgust	Dutch	96.10%	3.90%	365.63	< .001
		Chinese	34.00%	66.00%		
Exp. 2 con. 2	Fear	Dutch	97.80%	2.20%	41.18	< .001
		Chinese	85.30%	14.70%		
	Surprise	Dutch	89.20%	10.80%	49.96	< .001
		Chinese	69.10%	30.90%		
Exp. 2	Anger	Dutch	98.70%	1.30%	46.92	< .001
		Chinese	70.10%	29.90%		
	Disgust	Dutch	94.70%	5.30%	84.53	< .001
		Chinese	47.00%	53.00%		

(intensity ratings of anger, disgust, fear, and sadness, respectively) underneath the photograph.[3] Ratings were made by moving sliders on the four scales ranging from 0 (*not at all*) to 100 (*very much*). The scales were administered in this order for all participants: anger, disgust, fear, and sadness. The order of photographs was randomized across participants. Each participant completed 188 trials (94 actors × 2 emotional expressions). As in Experiment 1, all participants were tested in their own language.

3.3. Results and discussion

As in Experiment 1, we analyzed ratings of the intended emotion and of the non-intended emotion that has been found to be most confusable with (or morphologically similar to) the intended one, that is, anger and disgust. We conducted the same analysis as in Experiment 1, except that the factor Start Emotion was dropped (since all stimuli in Experiment 2 were static), and the factor Culture of Expresser was treated as a within-subjects variable in this experiment. A complete overview of effects can be found in Table 2.

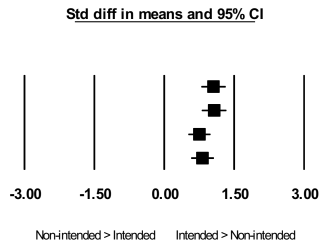
We first examined whether perceivers identified the intended emotions from the expressions. The main effects of Emotion Scale were significant for both emotions (anger: $F(1,155) = 383.24$, $p < .001$, $\eta_p^2 = 0.712$; disgust: $F(1,155) = 335.48$, $p < .001$, $\eta_p^2 = 0.684$), with both Chinese and Dutch perceivers rating the intended emotions higher than the non-intended morphologically similar emotions (see Fig. 2; all raw means and standard deviations of emotion ratings are available in Table 3). This suggests that both Chinese and Dutch perceivers saw more of the intended than of the non-intended morphologically similar emotion in facial expressions of anger and disgust.

We then examined whether the two groups of perceivers differed in the *degree* to which they perceived intended versus non-intended morphologically similar emotions, and whether this differed as a function of culture of expresser. The three-way interaction of Emotion Scale, Culture of Perceiver, and Culture of Expresser was significant for both emotions (anger: $F(1,155) = 84.01$, $p < .001$, $\eta_p^2 = 0.351$; disgust: $F(1,155) = 161.01$, $p < .001$, $\eta_p^2 = 0.510$). To test whether perceivers found expressions to be more ambiguous when judging facial expressions based on prototypes from another culture, the three-way interaction effect was broken down by Culture of Expresser. For Dutch expressions, the two-way interaction of Culture of Perceiver and Emotion Scale was significant for both emotions (anger: $F(1,155) = 101.68$, $p < .001$, $\eta_p^2 = 0.396$; disgust: $F(1,155) = 66.47$, $p < .001$, $\eta_p^2 = 0.300$). Replicating the results from Experiment 1, when judging Dutch expressions, Dutch perceivers produced greater differences in ratings on the intended versus non-intended morphologically similar emotions as compared to Chinese perceivers. For Chinese expressions, the two-way interaction of Culture of Perceiver and Emotion Scale was only significant for anger, $F(1,155) = 101.68$, $p < .001$, $\eta_p^2 = 0.396$, but not for disgust, $F(1,155) = 0.76$, $p = .386$, $\eta_p^2 = 0.005$. When judging Chinese expressions of anger, Dutch perceivers produced greater differences in ratings on the intended versus non-intended morphologically similar emotions as compared to Chinese perceivers. No cultural differences were found for Chinese expressions of disgust.

[3] Ratings on all negative “basic” emotions (anger, disgust, fear, and sadness) were included in Experiment 2. The reason for including fear and sadness was to ensure variation in the emotional rating.

Chinese perceivers

	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Chinese anger	1.058	0.138	0.019	0.788	1.328	7.671	< .001
Chinese disgust	1.071	0.139	0.019	0.799	1.342	7.730	< .001
Dutch anger	0.754	0.125	0.016	0.509	1.000	6.027	< .001
Dutch disgust	0.820	0.128	0.016	0.570	1.071	6.426	< .001



Dutch perceivers

	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Chinese anger	1.794	0.187	0.035	1.429	2.160	9.619	< .001
Chinese disgust	1.428	0.164	0.027	1.106	1.749	8.701	< .001
Dutch anger	2.164	0.211	0.045	1.751	2.578	10.253	< .001
Dutch disgust	2.383	0.226	0.051	1.940	2.827	10.533	< .001

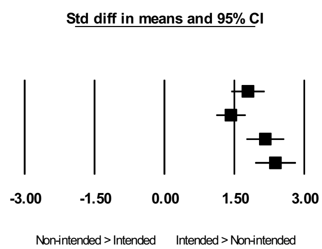


Fig. 2. Differences between ratings on intended and non-intended emotion scales for Chinese and Dutch participants in Experiment 2. The non-intended emotion denotes only one emotion, namely the non-intended emotion that has been found to be most confusable with (or morphologically similar to) the intended one in a given condition. Std diff in means denotes the effect sizes of the differences (Cohen's *ds*). As in Experiment 1, both Chinese and Dutch perceivers could accurately identify the intended emotions from facial expressions.

These results show that, when judging facial expressions based on Dutch prototypes, Chinese observers were more likely than Dutch observers to perceive multiple concurrent emotions; when judging expressions based on Chinese prototypes, Chinese observers were also more likely than Dutch observers to perceive multiple emotions in expressions of anger, whereas Chinese and Dutch observers judged expressions of disgust similarly.

As in Experiment 1, we used machine learning to test the idea that perceiving multiple concurrent emotions with low differentiation results in participants selecting the “wrong” emotion category in a forced-choice task. As expected, categorization performance of the 2-means clustering algorithm was significantly higher for Dutch participants than for Chinese participants across both emotions (details are provided in Table 4), and higher difference scores by human raters positively predicted the classification accuracy of the 2-means clustering algorithm, $B = 0.095$, $SE = 0.010$, $p < .001$, Nagelkerke R square for model = 0.312. This suggests that Chinese participants' lower performance in categorizing facial expressions may indeed be due to their tendencies to perceive multiple concurrent emotions with low differentiation.

In sum, as in Experiment 1, we found that both Chinese and Dutch perceivers perceived more of the intended than of the non-intended morphologically similar emotions in facial expressions, but that Chinese perceivers produced smaller differences in ratings between intended and non-intended morphologically similar emotions for Dutch facial expressions. For Chinese facial expressions, Chinese perceivers again produced smaller (for anger) or similar (for disgust) differences in ratings between the intended and non-intended morphologically similar emotions as compared to Dutch perceivers.

4. General discussion

Although there is an ongoing debate in the literature about the universality of emotional expressions, cultural variation in emotion perception is widely acknowledged (Elfenbein et al., 2007). The current research was designed to test for cultural differences in multiple emotion perception from facial expressions. Experiment 1 demonstrated that both Chinese and Dutch participants saw more of the intended than of the non-intended morphologically similar emotions in FACS-based (Western) prototypes of anger, disgust, and fear, but that Chinese participants produced smaller differences in ratings between intended and non-intended morphologically similar emotions than did Dutch participants. Experiment 2 further demonstrated that Chinese participants produced smaller (for anger) or similar (for disgust) differences in ratings between intended and non-intended morphologically similar emotions compared to Dutch participants when judging facial expressions based on Chinese prototypes. This speaks against the alternative explanation that Chinese participants perceive multiple emotions in the facial expression stimuli in Experiment 1 because the Chinese participants may have found these expressions to be ambiguous because they were based on Western (FACS-based) prototypes. Together, the current findings suggest that, rather than failing to identify the intended emotion, Chinese are more likely than Dutch to perceive multiple emotions simultaneously from negative facial expressions.

4.1. Theoretical implications

Although we focused on ratings of the intended emotion and of the non-intended morphologically similar emotion in the current study, it should be noted that cultural differences are not limited to non-intended morphologically similar emotions but also generalize to non-intended morphologically dissimilar emotions (see Fang et al., 2018). The difference between Easterners' and Westerners' inclination towards mixed emotions may reflect cultural differences in cognitive styles (holistic vs. analytical). Specifically, Easterners tend to attend to the entire field and make relatively little use of categories, while Westerners pay attention primarily to the focal object and the categories to which it belongs (Ji, Peng, & Nisbett, 2000; Markus & Kitayama, 1991; Nisbett et al., 2001). In the current study, Dutch participants' inclination towards attending to a specific emotion category may have rendered them less likely to endorse multiple emotions compared to Chinese participants. Another possible explanation relates to cultural differences in dialectical thinking (dialectical vs. non-dialectical). According to Ji, Nisbett, and Su (2001), “dialectical thought has a long history among the Chinese people. Objects are understood as unstable and inseparable from subjects. This type of thought emphasizes not only the coexistence and interpenetration of the two parts of a contradiction, but their change and transformation into one another as well”. From this perspective, the “contradictions” in Easterners are no longer contractions, as the parts of a “contradiction” are malleable. Easterners are thus comparatively less troubled by contradictions in their own and others' thoughts, emotions, and behaviors than are Westerners (Peng & Nisbett, 1999; Peng, Spencer-Rodgers, & Nian, 2006). As specific emotions are associated with distinct combinations of appraisals and action tendencies (Ellsworth & Smith, 1988; Frijda, Kuipers, & ter Schure, 1989; Scherer, 1984), endorsing concurrent distinct emotions can be seen as contradictory. As a result, Chinese participants may feel more comfortable endorsing multiple emotions in a facial expression compared to Dutch participants.

Existing explanations for cultural differences in emotion recognition accuracy cannot fully account for the current findings. One proposal is that Easterners have fewer opportunities to learn to identify negative emotional expressions as a result of these emotions being judged as socially undesirable and consequently expressed less (Biehl et al., 1997). Theoretically, however, it is equally conceivable that suppression of negative emotions in collectivistic cultures could make Easterners more, rather than less, sensitive to these signals; perceptual acuity may be particularly advantageous when clear signals are scarce. Another proposal is that Easterners have an attentional bias towards others' eyes, which provide inadequate information for distinguishing between certain negative facial expressions (Jack et al., 2009). However, in the current study we found that Chinese participants rated intended emotions higher than non-intended morphologically similar emotions, both for FACS-based (Western) prototypes of emotional expressions and for empirically derived facial expressions from Chinese and Dutch cultures. Furthermore, we found that Chinese participants had a greater tendency to perceive mixed emotions in both types of facial expression stimuli. By applying an unsupervised machine learning technique to categorize the facial expressions and conducting a logistic regression to predict the effect of emotion differentiation on categorization accuracy, we demonstrated that Chinese participants' lower performance in categorizing facial expressions may be due to them perceiving multiple concurrent emotions with low differentiation.

It is noteworthy that the semantic profiles of anger, disgust, fear, and surprise are similar in Chinese and Dutch (Fontaine, Scherer, Roesch, & Ellsworth, 2007; Fontaine, Scherer, & Soriano, 2013; Russell & Sato, 1995). This speaks against the possibility that Chinese perceivers' mixed perception of emotions was caused by larger semantic overlap between the Chinese terms of anger and disgust or larger semantic overlap between the Chinese terms of fear and surprise.

It should be also noted that although the overall results between Experiments 1 and 2 were by and large consistent, the magnitude of differences between the intended and non-intended morphologically similar emotions differed across the two experiments. Specifically, the effect sizes for Chinese participants perceiving anger expressions in Experiment 2 were more than twice as large as those in Experiment 1 (see std. diff in means in Figs. 1 and 2). This difference in results between Experiments 1 and 2 may have be caused by differences in the stimuli used: We used FACS-based facial expressions in Experiment 1, and facial expressions based on Chinese and Dutch prototypes, respectively, in Experiment 2. It is possible that the empirically based facial expressions (both Chinese and Dutch prototypes) are clearer to Chinese participants than the theoretically based facial expressions.

4.2. Limitations and future directions

Although the use of multi-scalar intensity ratings is not novel in cross-cultural studies of emotional facial expressions (e.g., Beaupré & Hess, 2005; Ekman et al., 1987), most studies in this area have employed forced-choice tasks and have primarily focused on the recognition of intended emotions (for exceptions, see Ekman et al., 1987; Yrizarry, Matsumoto, & Wilson-Cohn, 1998). Using a combination of static and dynamic stimuli portrayed by actors from both groups of participants' cultural backgrounds, the current study revealed a consistent pattern of cross-cultural differences in the perception of intended versus non-intended morphologically similar emotions from negative facial expressions. Nevertheless, the current study has limitations. Firstly, although morphs are perceived as natural and are commonly used in dynamic emotion research (e.g., Sacharin, Sander, & Scherer, 2012; Sato & Yoshikawa, 2004), the dynamic expressions employed here may not necessarily represent natural emotional change. Our dynamic stimuli involved simultaneous movements of facial components, but when emotional expressions change in real life facial muscles may change in different orders and at different rates. That caveat aside, the consistent pattern across the static and dynamic stimuli bolsters confidence in our general conclusion that both Chinese and Dutch observers perceive more intended than non-intended morphologically similar emotions in negative facial expressions, while Chinese observers are more likely than Dutch observers to perceive additional non-intended morphologically similar emotions as well. Secondly, our sample is not balanced in terms of gender. Some previous research has found that male and female perceivers differ in the accuracy of emotion perception (Montagne, Kessels, Frigerio, de Haan, & Perrett, 2005; but see Matsumoto et al., 2000). Furthermore, recent work has found that men and women differ in their likelihood of perceiving non-intended emotions from facial expressions (Fischer, Kret, & Broekens, 2018). However, concerns that gender could drive the effects in the present study are dispelled by the fact that the cultural samples were perfectly matched in terms of gender proportions in Experiment 1, together with the consistency in results between the two experiments.

Finally, although there is a large body of research showing that Easterners are more holistic and dialectical than Westerners (e.g., Nisbett et al., 2001; Peng et al., 2006), we did not include these measures in the current research. In order to elucidate the possible processes underlying the observed cultural differences in emotion perception, future research may measure or even manipulate holistic/analytic cognition and dialectical thinking.

In sum, the present article provides a theoretical and empirical addition to the literature on emotion communication across cultures. We found consistent evidence across FACS-based (Western) prototypes of emotional expressions and facial expressions based on culture-specific prototypes from both cultures (Chinese and Dutch), supporting our hypothesis that Chinese have a stronger inclination to perceive multiple concurrent emotions from negative facial expressions than do Dutch. It may thus be that, rather than failing to see the right emotions, Chinese in fact are more likely than Dutch to perceive multiple emotions in facial expressions. Together with previous research showing that Easterners are more likely than Westerners to experience mixed emotions (Bagozzi et al., 1999; Schimmack et al., 2002), these findings underline that culture plays a pervasive and consistent role in shaping emotional processes.

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Appendix A. Supplementary data

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References

Bagozzi, R. P., Wong, N., & Yi, Y. (1999). The role of culture and gender in the relationship between positive and negative affect. *Cognition & Emotion, 13*, 641–672. https://doi.org/10.1080/026999399379023.

Beaupré, M. G., & Hess, U. (2005). Cross-cultural emotion recognition among Canadian ethnic groups. *Journal of Cross-Cultural Psychology, 36*, 355–370. https://doi.org/10.1177/0022022104273656.

Biehl, M., Matsumoto, D., Ekman, P., Hearn, V., Heider, K., Kudoh, T., & Ton, V. (1997).

Matsumoto and Ekman's Japanese and Caucasian Facial Expressions of Emotion (JACFEE): Reliability data and cross-national differences. *Journal of Nonverbal Behavior, 21*, 3–21. https://doi.org/10.1023/A:1024902500935.

Ekman, P., Friesen, W. V., & Hager, J. V. (2002). *Facial action coding system* (2nd ed.). Salt Lake City, UT: Research Nexus eBook.

Ekman, P., Friesen, W. V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., Heider, K., ... Tzavaras, A. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology, 53*, 712. https://doi.org/10.1037/0022-3514.53.4.712.

Elfenbein, H. A., & Ambady, N. (2003a). Universals and cultural differences in recognizing emotions. *Current Directions in Psychological Science, 12*, 159–164. https://doi.org/10.1111/1467-8721.01252.

Elfenbein, H. A., & Ambady, N. (2003b). When familiarity breeds accuracy: Cultural exposure and facial emotion recognition. *Journal of Personality and Social Psychology, 85*, 276. https://doi.org/10.1037/0022-3514.85.2.276.

Elfenbein, H. A., Beaupré, M., Lévesque, M., & Hess, U. (2007). Toward a dialect theory: Cultural differences in the expression and recognition of posed facial expressions. *Emotion, 7*, 131–146. https://doi.org/10.1037/1528-3542.7.1.131.

Ellsworth, P. C., & Smith, C. A. (1988). From appraisal to emotion: Differences among unpleasant feelings. *Motivation and Emotion, 12*, 271–302. https://doi.org/10.1007/BF00993115.

Fang, X., Sauter, D. A., & Van Kleef, G. A. (2018). Seeing mixed emotions: The specificity of emotion perception from static and dynamic facial expressions across cultures. *Journal of Cross-Cultural Psychology, 49*, 130–148. https://doi.org/10.1177/0022022117736270.

Fischer, A. H., Kret, M. E., & Broekens, J. (2018). Gender differences in emotion perception and self-reported emotional intelligence: A test of the emotion sensitivity hypothesis. *PLoS One, e0190712*, 13. https://doi.org/10.1371/journal.pone.0190712.

Fontaine, J. J., Scherer, K. R., & Soriano, C. (Eds.). (2013). *Components of emotional meaning: A sourcebook*. OUP Oxford.

Fontaine, J. R., Scherer, K. R., Roesch, E. B., & Ellsworth, P. C. (2007). The world of emotions is not two-dimensional. *Psychological Science, 18*, 1050–1057. https://doi.org/10.1111/j.1467-9280.2007.02024.x.

Frijda, N. H., Kuipers, P., & ter Schure, E. (1989). Relations among emotion, appraisal, and emotional action readiness. *Journal of Personality and Social Psychology, 57*, 212–228. https://doi.org/10.1037/0022-3514.57.2.212.

Hoffmann, H., Traue, H. C., Bachmayr, F., & Kessler, H. (2010). Perceived realism of dynamic facial expressions of emotion: Optimal durations for the presentation of emotional onsets and offsets. *Cognition & Emotion, 24*, 1369–1376. https://doi.org/10.1080/02699930903417855.

Jack, R. E., Blais, C., Scheepers, C., Schyns, P. G., & Caldara, R. (2009). Cultural confusions show that facial expressions are not universal. *Current Biology, 19*, 1543–1548. https://doi.org/10.1016/j.cub.2009.07.051.

Jack, R. E., Garrod, O. G., Yu, H., Caldara, R., & Schyns, P. G. (2012). Facial expressions of emotion are not culturally universal. *Proceedings of the National Academy of Sciences, 109*, 7241–7244. https://doi.org/10.1073/pnas.1200155109.

Ji, L.-J., Nisbett, R. E., & Su, Y. (2001). Culture, change, and prediction. *Psychological Science, 12*, 450–456. https://doi.org/10.1111/1467-9280.00384.

Ji, L. J., Peng, K., & Nisbett, R. E. (2000). Culture, control, and perception of relationships in the environment. *Journal of Personality and Social Psychology, 78*, 943. https://doi.org/10.1037/00223514.78.5.943.

Langner, O., Dotsch, R., Bijlstra, G., Wigboldus, D. H., Hawk, S. T., & van Knippenberg, A. (2010). Presentation and validation of the Radboud Faces Database. *Cognition and Emotion, 24*, 1377–1388. https://doi.org/10.1080/02699930903485076.

Leu, J., Mesquita, B., Masuda, T., Ellsworth, P., & Karasawa, M. (2003, February). What's good? What's bad? Emotion perception and evaluation across cultures. *Symposium conducted at the meeting of the 4th conference of the Society for Personality and Social Psychology*. Los Angeles: CA.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*, 224–253. https://doi.org/10.1037/0033-295X.98.2.224.

Matsumoto, D. (1989). Cultural influences on the perception of emotion. *Journal of Cross-Cultural Psychology, 20*, 92–105. https://doi.org/10.1177/0022022189201006.

Matsumoto, D. (1992). American-Japanese cultural differences in the recognition of universal facial expressions. *Journal of Cross-Cultural Psychology, 23*, 72–84. https://doi.org/10.1177/0022022192231005.

Matsumoto, D., LeRoux, J., Wilson-Cohn, C., Raroque, J., Kooken, K., Ekman, P., ... Amo, L. (2000). A new test to measure emotion recognition ability: Matsumoto and Ekman's Japanese and Caucasian Brief Affect Recognition Test (JACBART). *Journal of Nonverbal Behavior, 24*, 179–209. https://doi.org/10.1023/A:1006668120583.

Montagne, B., Kessels, R. P., Frigerio, E., de Haan, E. H., & Perrett, D. I. (2005). Sex differences in the perception of affective facial expressions: Do men really lack emotional sensitivity? *Cognitive Processing, 6*, 136–141. https://doi.org/10.1007/s10339-005-0050-6.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review, 108*, 291–310. https://doi.org/10.1037/0033-295X.108.2.291.

Paulmann, S., & Uskul, A. K. (2014). Cross-cultural emotional prosody recognition: Evidence from Chinese and British listeners. *Cognition & Emotion, 28*, 230–244. https://doi.org/10.1080/02699931.2013.812033.

Peng, K., & Nisbett, R. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist, 54*, 741–754. https://doi.org/10.1037/0003-066X.54.9.741.

Peng, K., Spencer-Rodgers, J., & Nian, Z. (2006). Naïve dialecticism and the Tao of Chinese thought. In U. Kim, K. S. Yang, & G. Huang (Eds.). *The handbook of indigenous and cultural psychology* (pp. 247–262). Oxford, UK: Blackwell.

Russell, J. A., & Sato, K. (1995). Comparing emotion words between languages. *Journal of Cross-Cultural Psychology, 26*, 384–391. https://doi.org/10.1177/0022022195264004.

Sacharin, V., Sander, D., & Scherer, K. R. (2012). The perception of changing emotion expressions. *Cognition & Emotion, 26*, 1273–1300. https://doi.org/10.1080/02699931.2012.656583.

Sato, W., & Yoshikawa, S. (2004). The dynamic aspects of emotional facial expressions. *Cognition & Emotion, 18*, 701–710. https://doi.org/10.1080/02699930341000176.

Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K. R. Scherer, & P. Ekman (Eds.). *Approaches to emotion* (pp. 293–317). Lawrence Erlbaum: Hillsdale, NJ.

Schimmack, U., Oishi, S., & Diener, E. (2002). Cultural influences on the relation between pleasant emotions and unpleasant emotions: Asian dialectic philosophies or individualism-collectivism? *Cognition & Emotion, 16*, 705–719. https://doi.org/10.1080/02699930143000590.

Shyi, C. W., Huang, S. T., & Yeh, C. Y. (2013). Taiwan corpora of Chinese emotions and relevant psychophysiological data: A college-student database of facial expression for basic emotions. *Chinese Journal of Psychology, 55*, 455–475. https://doi.org/10.6129/CJP.20130314.

Yik, M. S. M., & Russell, J. A. (1999). Interpretation of faces: A cross-cultural study of a prediction from Fridlund's theory. *Cognition & Emotion, 13*, 93–104. https://doi.org/10.1080/026999399379384.

Yrizarry, N., Matsumoto, D., & Wilson-Cohn, C. (1998). American-Japanese differences in multiscalar intensity ratings of universal facial expressions of emotion. *Motivation and Emotion, 22*, 315–327. https://doi.org/10.1023/A:1021304407227.

Yuki, M., Maddux, W. W., & Masuda, T. (2007). Are the windows to the soul the same in the East and West? Cultural differences in using the eyes and mouth as cues to recognize emotions in Japan and the United States. *Journal of Experimental Social Psychology, 43*, 303–311. https://doi.org/10.1016/j.jesp.2006.02.004.