

## Supplemental materials

The Recognition of 18 Facial-Bodily Expressions

Across Nine Cultures

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### Section 1: Additional information about the stimuli.

**Photographs of Facial-Bodily Expressions.** In Table S1, we present the empirical sources of facial-bodily expressions for psychological states other than anger, disgust, fear, happiness, sadness, and surprise.

**Power analysis.** To investigate whether our samples were of sufficient size to detect significant effects, we conducted a power analysis using simulated sample size and accuracy rates (effect size). The simulation contained the following three steps: (1) We simulated the number of participants ( $N$ ) ranging from 30 to 90; (2) Next, we simulated the effect size (recognition accuracy rate)—in this case 0.30 (low accuracy rate), 0.58 (the average recognition rate observed in the meta-analysis of Elfenbein and Ambady, 2002), and 0.90 (high accuracy rate); (3) We simulated 2000 binomial tests with each combination of the  $N$  and effect size. The statistical power for each combination was estimated in terms of the chance of rejecting the null hypothesis across all 2000 tests. The results of the simulation tests (see Figure S1) suggest that when the recognition accuracy is at or above 0.58, a sample with 30 participants or more will generate a greater than 80% probability of observing a statistically significant result given

conventional levels of alpha ( $\alpha_2 = .05$ , two-tailed). At lower accuracy rates (e.g., 0.30) a sample size of 50—close to the size of our samples—is not powered enough to detect significant effects.

**Causal antecedent stories.** For each psychological state, we created one-sentence stories, with the exception of desire for which we had stories about food and sexual desire. Each antecedent story focused on a readily understood antecedent or appraisal theme of the state as well as the target word. In Table S2, we provide the stories used.

### **Section 2: Additional information for the recognition task**

For each target expression, we included three other expressions that were of the same valence, including one alternative choice with the most anatomical similarity to an expression of the “Basic 6” (see Table S3). In Table S4, we provide additional information about the accuracy rates observed in each culture for both negative and positive states. An analysis of variance showed significant cultural differences in overall accuracy ratings between countries,  $F(8, 473) = 20.12, p < .001, \eta^2 = .25$ . Further analysis using Tukey's HSD, which adjusts for multiple comparisons, demonstrated the following cultural differences at  $p < .01$ : Indian, Japan, and South Korea were significantly lower in overall-recognition rates than China, Germany, Pakistan, Poland, Turkey, and USA.

### **Section 3: Additional information about selected cultures for this study**

**Information about the nine cultures.** To encompass diverse cultures beyond the West, we included participants from China, Germany, India, Japan, Pakistan, Poland, South Korea, Turkey, and the United States (USA). These nine countries differ in cultural dimensions, values, self-construals, egalitarianism (Schwartz, 2008), individualism vs collectivism, long vs short term orientation, and power distance (Hofstede, 2010; see Table S5).

Table S1

*Sources of facial-bodily expressions for psychological states Other than the “Basic Six”*

Psychological State	Study	Induction of State	Observed Behavior
Amusement	Keltner & Bonanno, 1997  Ruch, 1997	Participant talking about deceased romantic partner.  Experimenter wore funny clothes and used several props aimed at inducing laughter and cheerfulness/hilarity, and asked laughter-provoking questions.	Open mouth, smile, head back, gaze up  Lip corner pulled, cheeks raised.
Boredom	Scherer & Ellgring, 2007	Actors’ expression of boredom and other states.	Eye lids droop, tightness the of lip corners and pulled inwards (dimpler). Upper body collapsed, head back-ward
Confusion	Rozin & Cohen, 2003	Participants’ observations of people’s expressions of confusion in their natural environment.	Symmetric narrowing of the eyes. Asymmetric eyebrow raised, and eye narrowing.
Contentment	Cordaro et al., 2018	Participants in five cultures express in voluntary fashion what it would look like to be resting on a peaceful day.	Slight smile, eye lid droop.
Coyness	Reddy, 2000	Observation of children at home when receiving renewed social attention from adult.	Smile plus head turn away and gaze aversion and then eye contact.

Desire	Gonzaga et al., 2001	Romantic partner talking with partner about intimacy.	Lip lick, lip pucker, lip bite
Embarrassment	Keltner, 1995	Participant makes funny face in front of camera.	Gaze down, smile, lip press, head movements to left and down, face touch.
Interest	Reeve, 1993	Participant watches interesting film clips.	Widening of eyes, open mouth.
Pain	Grunau & Craig, 1987	Injection, heel lance, to newborn infants.	Brow bulges, eyes squeezed shut, nasolabial furrow deepened, lip press or mouth open.
Pride	Tracy & Matsumoto, 2008	Observations of spontaneous expressions of victory in the Olympic or Paralympic Games.	Head tilt, smile, arms out from the body, arms raised, hands on fists, chest expanded, torso pushed out.
Shame	Keltner, 1995	Participant makes funny face in front of camera.	Gaze down, head movement down.
	Tracy & Matsumoto, 2008	Observations of spontaneous expressions of defeat in the Olympic or Paralympic Games.	Shoulders slumped forward, chest narrowed.
Sympathy	Eisenberg et al., 1988	Participants (adults, children) watch video of injured child in hospital	Forward lean, concerned gaze, lip press.

Table S2

*Causal Antecedent Stories*

<b>English</b>	<b>Causal antecedent story that contains this word</b>
<b>Amused</b>	<b>His/her friend just told him a very funny story, and he feels very amused by it.</b>
<b>Angry</b>	<b>He/she has been insulted and is very angry about it.</b>
<b>Bored</b>	<b>He/she has been waiting for a long time with nothing to do, and he feels very bored.</b>
<b>Confused</b>	<b>Something is difficult to understand, and he/she feels very confused about it.</b>
<b>Content</b>	<b>He/she has been resting comfortably on a peaceful day, and he feels contented.</b>
<b>Coy</b>	<b>He/she is flirting shyly with someone across the room, because he is feeling coy.</b>
<b>Desire</b>	<b>He/she is hungry and sees some delicious food that he desires.</b>  <b>He/she sees someone who is very sexually attractive, and he/she feels a strong desire to have sex with them.</b>
<b>Disgust</b>	<b>He/she has just eaten some rotten food and feels very disgusted.</b>
<b>Embarrassed</b>	<b>He/she had been passionately singing his favorite song until he/she realized his friends were watching, and how he/she feels embarrassed.</b>
<b>Fear</b>	<b>He/she is suddenly faced with a dangerous animal and feels very afraid.</b>
<b>Happiness</b>	<b>He/she has just met his friend and feels happy that his friend is here.</b>
<b>Interested</b>	<b>He/she is learning some useful information which he finds very interesting.</b>
<b>Pain</b>	<b>He/she just hit his/her leg on a rock, and it feels painful.</b>
<b>Pride</b>	<b>He/she just achieved great honor for himself and his country, and he/she feels a great sense of pride.</b>
<b>Sadness</b>	<b>His/her cousin has just died, and he/she feels very sad.</b>
<b>Shame</b>	<b>He/she has been caught doing something that is disgraceful to himself/herself and to his/her family, and he/she feels very ashamed.</b>
<b>Surprise</b>	<b>He/she sees a bright light in the middle of the night and is very surprised.</b>
<b>Sympathy</b>	<b>He/she sees someone with an injury, and he/she feels sympathy for them.</b>

Table S3

*Most anatomically similar, well-studied emotion for each facial-bodily expression.*

<b>Facial Expression</b>	<b>Similar Expression From “Basic 6”</b>
Amused	Happiness
Bored	Sadness
Confused	Anger
Content	Happiness
Coy	Happiness
Desire	Happiness
Embarrassed	Sadness
Interested	Happiness
Pain	Disgust
Pride	Happiness
Shame	Sadness
Sympathy	Sadness

Table S4

*Average recognition ratings across nine cultures for positive & negatively-valenced facial-bodily expressions.*

	China N=54	Germany N=54	India N=44	Japan N=55	Pakistan N=46	Poland N=64	South Korea N=50	Turkey N=61	USA N=55
Amused	89.8(3.1)	87.7(3.8)	78.4(5.5)	62.7(5.2)	92.4(2.7)	91.4(2.6)	54(5.9)	90.2(3.3)	89.1(3.6)
Anger	90.7(3.5)	91.3(2.9)	84.1(4.5)	72.7(4.8)	70(5.3)	92.1(2.6)	78.6(5.2)	86.1(3.1)	93.6(2.3)
Bored	99.1(0.9)	100(0)	84.1(3.9)	94.5(2.1)	95.7(2.1)	100(0)	93(2.9)	96.7(2)	95.5(2.3)
Confused	90.7(3.3)	82.1(4.2)	70.5(5.5)	80.6(3.3)	81.5(4.8)	59.5(5)	91(3.1)	86.9(2.8)	95.5(2)
Content	68.5(5.2)	78.3(4.3)	50(4.9)	58.2(5)	70.7(5.1)	65.6(4.3)	52(5.5)	79.5(4.3)	79.1(3.8)
Coy	50.9(5.2)	85.8(3.6)	64.8(5.5)	57.4(5.1)	66.7(5.2)	77.3(4)	32(4.9)	63.9(4.8)	85.2(3.6)
Desire (f)	75.9(5.2)	74.5(5.4)	53.4(5.7)	63(5.7)	68.9(5.9)	62.7(5.1)	52(6.4)	73(4.8)	82.7(4.3)
Desire (s)	73.1(5.1)	52.8(5.6)	37.5(6.3)	34.3(5.4)	46.7(6.8)	47.7(5.6)	51(6.1)	45.9(5.1)	64.5(5.8)
Disgust	88.9(3.1)	87.7(3.2)	93.2(3.1)	33.3(5.4)	78.3(5.1)	89.8(2.8)	77(5)	88.5(3.4)	82.4(4.4)
Embarrassed	73.1(4.3)	81.1(4.3)	45.5(5.8)	64.8(5.2)	62.2(6.1)	84.4(3.5)	49(5.8)	83.6(3.8)	69.1(5.4)
Fear	88(3.2)	86.8(3.8)	86.4(3.8)	86.4(4)	94.6(2.3)	81(4.4)	78.6(5.2)	91(2.5)	88.7(3.1)
Happy	71.3(4.3)	78.8(4.1)	61.4(5.6)	65.1(4.5)	76.1(5.1)	88.1(3.1)	69(4.9)	78.7(3.8)	87.3(3.5)
Interest	36.1(5.4)	61.3(4.9)	46.6(6.2)	10.2(3)	64.4(5.4)	43.7(4.8)	23(4.8)	69.7(4.6)	56.4(5.2)
Pain	74.1(5.1)	88.7(3.9)	61.4(4.8)	66.4(4.9)	85.9(3.7)	95.3(2.1)	80(4.5)	93.4(2.2)	85.5(4)
Pride	32.4(5.3)	60.4(5.2)	69.3(5.9)	39.8(5.3)	73.9(4.9)	84.9(3.1)	44(5.6)	63.9(5.2)	64.5(5)
Sad	52.8(4.1)	55.7(5.1)	55.7(3.7)	34.5(4.5)	51.1(4.8)	53.2(4.2)	45.9(3.8)	54.1(4.4)	62.7(4.5)
Shame	88.9(3.7)	93.4(2.3)	87.5(3.7)	52.7(5.9)	87(3.6)	89.5(2.8)	77(5.2)	86.9(3.5)	88.2(3.7)
Surprise	88(3.7)	74.5(5.1)	64.8(5)	89.1(3.1)	92.4(3.1)	67.2(5)	68(5.3)	77(4.5)	77.3(4.5)
Sympathy	77.8(4.1)	67(5.8)	14.8(3.8)	54.6(4.4)	64.1(6)	48.4(5.3)	52(5.1)	59.8(5.2)	58.2(5.3)
Overall accuracy	74.2 (1.7)	78.2 (2.1)	63.6 (1.9)	59.1(1.6)	74.9(1.4)	74.8(1.4)	61.5(2.1)	77.3(1.5)	79.2(1.8)

*Note.* These values represent average recognition rates in percentages across nine cultures, and the scores within the parenthesis represent the standard errors.

Table S5

*Information about the nine cultures in the study*

	Power Distance	Individualism	Egalitarianism	Long-Term Orientation
China	80	20	4.23	87
Germany	35	67	4.95	83
India	77	48	4.45	51
Japan	54	46	4.36	88
South Korea	60	18	4.42	100
Pakistan	55	14	4.65	50
Poland	68	60	4.48	38
Turkey	66	37	4.77	46
USA	40	91	4.68	26



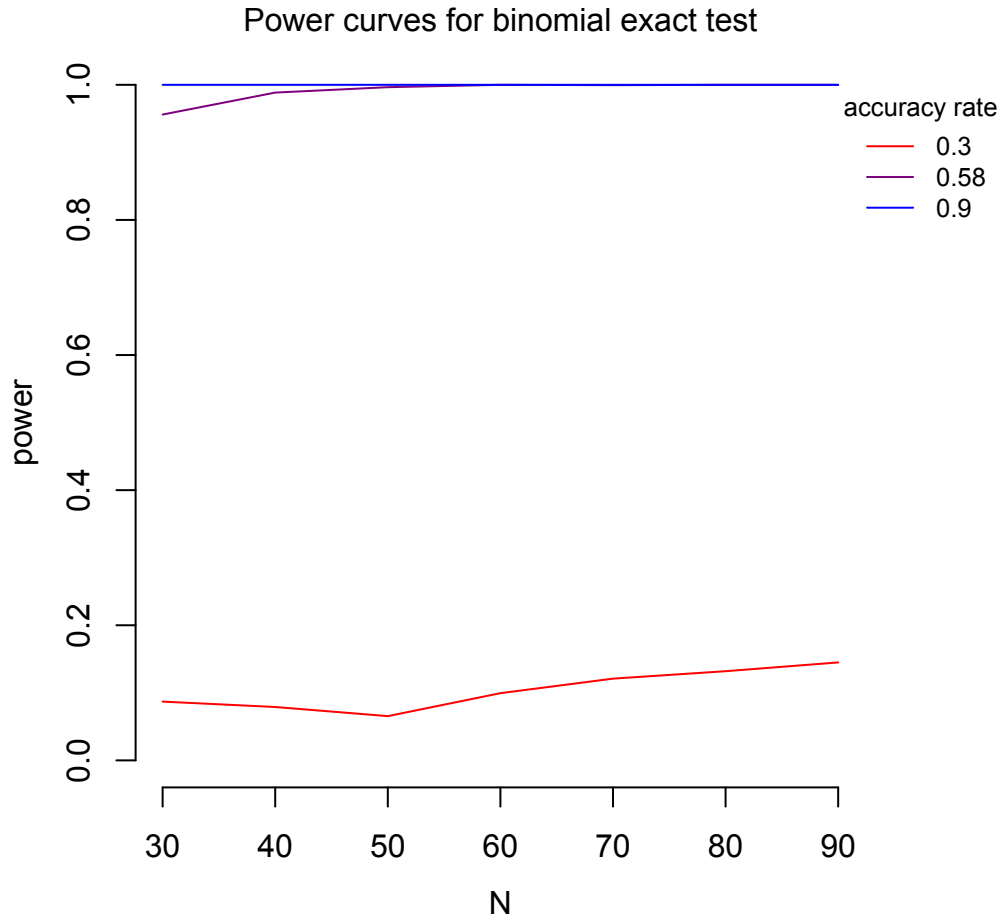


Figure S1. Results for a power analysis using simulated sample size ( $N$ ) and effect size (accuracy rate) for binomial tests.

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