

Self-enhancement among Westerners and Easterners: a cultural neuroscience approach

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Abstract

We adopted a cultural neuroscience approach to the investigation of self-enhancement. Western and Eastern participants made self-referent judgments on positive and negative traits while we recorded their electroencephalography signals. At the judgmental level, we assessed trait endorsement (judgments of traits self-descriptiveness) and reaction times (speed of such judgments). Participants endorsed more positive traits as self-descriptive and more negative traits as non-self-descriptive, although the magnitude of this effect (level of self-positivity) was higher in the Western than Eastern sample. Moreover, all participants responded faster to positive self-descriptive traits and to negative non-self-descriptive traits, indicating that the self-enhancement motive is equally potent across cultures. At the neurophysiological level, we assessed N170 and LPP. Negative traits elicited larger N170 among Easterners, indicating initial allocation of attentional resources to the processing of negative information. However, negative compared to positive self-descriptive traits elicited a larger LPP, whereas negative and positive non-self-descriptive traits did not differ in the LPP they elicited. This pattern generalized across samples, pointing to a pancultural physiological correlate of the self-enhancement motive.

Key words: culture; ERP; self; self-enhancement; self-referent judgments

The last two decades have witnessed the simultaneous rise and boom of cultural psychology and cognitive neuroscience. An exciting development has been the emergence of cultural neuroscience, which focuses on the bidirectional relation between culture and brain or physiological processes. We adopt a cultural neuroscience approach to address a pressing issue in cultural psychology, namely, whether self-enhancement is culturally specific or generalizable across cultures (i.e. pancultural).

On the cultural specificity or panculturality of self-enhancement

Self-enhancement refers to the motivation to pursue a positive self and to manifestations of self-positivity (Judge *et al.*, 1998; Sedikides

and Gregg, 2008; Caprara *et al.*, 2013; Sedikides *et al.*, 2015). Whether the motivation for self-positivity (or self-enhancement motive) is culturally-specific versus pancultural has been hotly debated. Traditionally, the self-enhancement motive has been considered a human universal (Allport, 1937; Greenwald, 1980; Baumeister, 1998). A stream of cultural psychology research, however, challenged this view. It posited that the motive is potent in Western culture promoting an independent self-construal, but is virtually absent in Eastern culture resulting in an interdependent self-construal (Markus and Kitayama, 1991; Heine *et al.*, 1999). Westerners are motivated to self-enhance, Easterners to self-efface (Kitayama *et al.*, 1997; Heine *et al.*, 2000; Heine and Hamamura, 2007). Another stream of cultural psychology research disputed this view. It posited that the self-enhancement motive is equally strong across cultures: Westerners and

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Easterners express an equivalent desire for self-positivity (e.g. favorable feedback; Brown, 2010; Gaertner et al., 2012). Given that Western culture promotes an independent self-construal, Westerners regard individualistic attributes (e.g. original, unique) as desirable or personally important, and that is why they consider themselves superior to their peers on such attributes. Given that Eastern culture fosters an interdependent self-construal, Easterners regard collectivistic attributes (e.g. loyal, respectful) as desirable, and that is why they consider themselves superior to their peers on such attributes (Brown and Kobayashi, 2003; Gaertner et al., 2008; O'Mara et al., 2012; Tam et al., 2012).

Although the cultural specificity or generality of the self-enhancement motive has been intensely debated, the influence of socialization pressures, such as cultural constraints (e.g. norms, rules, values, inhibitions), has been taken for granted. Consensus is that Eastern (compared to Western) culture emphasizes avoidance or prevention goals and fosters concern with negativity (Hamamura et al., 2009; Elliot et al., 2012; Hepper et al., 2013). It is this cultural emphasis that largely accounts for the frequently observed lower levels of manifest (i.e. explicit) self-positivity or self-esteem in the East than the West (Kurman, 2002; Heine et al., 2001; Cai et al., 2011; Chiu et al., 2011).

The self-reference effect and self-enhancement

The self-reference effect (Rogers et al., 1977) refers to better memory and recognition for information (e.g. word adjectives) that is encoded under self-referent instructions ('does the word describes you?') relative to structural instructions ('is the word long or short?'), phonemic instructions ('does the word have a rhythmic or lyrical sound?'), semantic instructions ('is the word meaningful to you?') or other-referent instructions ('does the word describe the experimenter?'). The experimental tasks used to study the self-reference effect may have varied over the years (Symons and Johnson, 1997; Turk et al., 2008), but have focused persistently on self-other comparison, including self-referent vs other-referent judgments in neuroscience or cultural neuroscience (Kelley et al., 2002; Han and Northoff, 2009; Chiao et al., 2010). A relevant technical development entails a task where participants judge the self-descriptiveness, or lack thereof, of positive versus negative traits (D'Armenteau et al., 2005; Kwan et al., 2007). This self-reference valence (SR-valence) task permits researchers to disentangle the endorsement of positive versus negative traits (i.e. trait endorsement) from the relative speed of such an endorsement (i.e. reaction times).

Crucially, the SR-valence task allows for a judgment approach to self-enhancement, which entails cross-cultural tests of both the manifestation of self-positivity (i.e. trait endorsement) and the potency of the self-enhancement motive (i.e. reaction times). In addition, the SR-valence task allows for a cultural neuroscience approach to self-enhancement. Using cross-culturally adaptable neurophysiological correlates, such as event-related potentials (ERPs), both can be assessed: the Eastern emphasis on negativity could be reflected in the N170 component, and the potency of the self-enhancement motive in the Late Positive Potential (LPP) component. Below we elaborate on these two approaches and offer hypotheses.

A judgment approach to self-enhancement: rationale and hypotheses

In the SR-valence task, participants are presented with positive and negative traits and judge whether each trait is self-descriptive

or non-self-descriptive (*trait endorsement*). Self-positivity is indicated by participants deeming a higher number of positive than negative traits as self-descriptive, but deeming a higher number of negative than positive traits as non-self-descriptive (D'Armenteau et al., 2005; Kwan et al., 2007; Watson et al., 2007). During trait endorsement, researchers typically record *reaction times*. This index is relevant to the self-enhancement motive. That is, reaction times, and more generally measures that fall on the implicit than explicit continuum, are sensitive in detecting self-enhancement motivation (Paulhus and Levitt, 1987; Paulhus et al., 1989; Swann et al., 1990; Gebauer et al., 2012). Here, motive strength is indexed by participants responding faster to positive than negative self-descriptive traits, but responding faster to negative than positive non-self-descriptive traits. We formulated hypotheses for both trait endorsement and reaction times.

Trait endorsement. Trait endorsement reflects levels of self-positivity, which are higher in Western than Eastern culture (Heine et al., 1999; Kurman, 2002; Cai et al., 2011; Sedikides et al., 2015). As such, we hypothesized that participants would endorse more positive than negative traits as self-descriptive and would endorse more negative than positive traits as non-self-descriptive. However, the level of trait endorsement would be higher among Westerners than Easterners. Statistically speaking, we expected an interaction between trait valence (positive, negative) and referent (self-descriptiveness, non-self-descriptiveness) on trait endorsement. We also expected that this effect would be qualified by culture: The three-way interaction would show that level of trait endorsement was higher among Westerners than Easterners (i.e. the strength or effect size of the two-way interaction for Westerners would exceed that for Easterners).

The SR-valence task has been used in two Western samples (Moran et al., 2006; Kwan et al., 2007) and in one Eastern (i.e. Chinese) sample (Shi et al., 2016). In all cases, participants categorized more positive than negative traits as self-descriptive and categorized more negative than positive traits as non-self-descriptive. No studies, however, have implicated a direct cross-cultural comparison, and we aspired to fill this knowledge gap.

Reaction times. Reaction times reflect the strength of the self-enhancement motive. The cultural specificity perspective advocates that this motive is stronger in the West than the East (Heine et al., 1999; Kitayama et al., 1997; Heine and Hamamura, 2007), whereas the panculturality perspective advocates that the motive is equally potent in the West and the East (Brown, 2010; Chiu et al., 2011; Sedikides et al., 2015). Thus, according to the cultural specificity perspective, Westerners (compared to Easterners) will respond faster to positive than negative self-descriptive traits and to negative than positive non-self-descriptive traits. Statistically speaking, this perspective anticipates a three-way interaction, showing that the pattern of faster responding to positive than negative self-descriptive traits is observed among Western, but not Eastern, participants. According to the panculturality perspective, however, both Westerners and Easterners will respond faster to positive than negative self-descriptive traits and to negative than positive non-self-descriptive traits. This perspective does not anticipate a three-way interaction: the pattern of faster responding to positive than negative self-descriptive traits will be observed equivalently among Western and Eastern participants.

The SR-valence task has been used in a Western (Watson et al., 2007) and an Eastern (Shi et al., 2016) sample. In both cases, participants responded faster in categorizing positive than negative traits as self-descriptive and in categorizing negative than positive traits as non-self-descriptive. No studies have reported a direct cross-cultural comparison, and we aimed to do so.

A cultural neuroscience approach to self-enhancement: rationale and hypotheses

We adopted a cultural neuroscience approach to self-enhancement by capitalizing on ERPs. Specifically, we recorded participants' electroencephalography (EEG) signal while they completed the SR-valence task. We considered two ERP components as theoretically relevant: N170 and LPP. N170 is an attention-sensitive component, particularly in regards to valenced (i.e. positive, negative) stimuli (Montalan et al., 2008). We used it as an index of attentional engagement with valenced word adjectives (general negativity). LPP is an emotional arousal-sensitive component relevant to processing of self-relevant stimuli (Herbert et al., 2011). We interpreted it as an index of emotional engagement with valenced trait adjectives (motive for self-positivity).

N170. N170 is a negative deflection of ERP peaking at approximately 170ms after stimulus onset (Luck, 2005). N170 reflects early automatic (i.e. rapid) attention to visual stimuli, with larger N170 amplitude representing the allocation of more attentional resources (Ritter et al., 1983; Luck and Hillyard, 1994). Stimulus valence (negative vs. positive adjectives) modulates early attention of visual processing as indexed by a larger N170 (Montalan et al., 2008; Zhang et al., 2014). We asked whether culture modulates early attention to negative versus positive traits. Compared to Westerners, Easterners are avoidance-oriented, prevention-focused, and, more generally, attuned to negativity (Hamamura et al., 2009; Elliot et al., 2012; Hepper et al., 2013). As such, we hypothesized that negative (relative to positive) traits would elicit a larger N170 in Eastern than Western participants. Statistically speaking, we anticipated an interaction between trait valence (positive, negative) and culture (Western, Eastern) on N170.

Testing a Western sample, and assessing N170, Watson et al. (2007) reported null findings. There have been no relevant studies in Eastern samples. We will re-examine Watson et al.'s findings, using N170, but extending them cross-culturally. Support for our hypothesis would bolster the validity of N170 for detecting subtle information processing differences between the two cultural groups, thus preparing the ground for our second neurophysiological index, LPP. Support for our hypothesis would also showcase the temporal progression of cross-cultural information processing patterns: from differential processing of negative information (N170) to differential processing of (negative vs. positive) information about the self (LPP).

LPP. LPP is a positive-going ERP component appearing approximately 400-500ms after stimulus onset and lasting for several hundred milliseconds (Luck, 2005). LPP is not only related to emotional stimulus content and subsequent memory (Herbert et al., 2006, 2008), but also is an established, on-line index of evaluative categorization (Crites et al., 1995; Ito and Urland, 2003). A typical finding in the literature is that, in categorizing stimuli along a certain dimension, those that are inconsistent with categorical expectations evoke a larger LPP (Cacioppo et al., 1993, 1994).

The LPP can offer insights on the strength of self-enhancement motive. Evaluatively inconsistency is mostly evoked by discrepancies between what one desires to be (i.e., positive) and how one feels ought to judge oneself (i.e. as having negative traits) due to plausibility or reality constraints (Sedikides and Strube, 1997; Gregg, 2009). For example, assuming that persons are motivated to self-enhance, they will expect negative traits to be less self-descriptive than positive ones. By implication, finding themselves in a position of having to judge

negative traits as self-descriptive (due to plausibility/reality constraints) would violate their expectations, thus leading to an enlarged LPP. Statistically speaking, motivation for self-enhancement will be registered on LPP as an interaction between trait valence and referent. The panculturality perspective, proposing equivalent motive potency in Western and Eastern culture (Becker et al., 2014; Sedikides et al., 2015), predicts such an across-the-board interaction: negative (vs. positive) self-descriptive traits will elicit a larger LPP in both Western and Eastern participants (no three-way interaction). However, the cultural specificity perspective, proposing higher motive strength in Western than Eastern culture (Kitayama et al., 1997; Heine and Hamamura, 2007), predicts that negative (vs. positive) self-descriptive traits will elicit a larger LPP among Western, but not Eastern, participants (three-way interaction).

In a Western sample, Moran et al. (2006) reported that negative (vs. positive) self-descriptive traits elicited a larger LPP from 450 to 600 ms. We will test the replicability of these findings on an LPP from 350 to 850 ms and, more importantly, we will conduct a cross-cultural examination of the LPP in response to negative and positive (non-)self-descriptive traits.

Method

Participants and design

The sample consisted of 21 Eastern (Chinese) and 20 Western participants, all remunerated with 50 Chinese Yuan. The Chinese participants (12 men, 9 women; $M_{\text{age}} = 21.6$ years, $SD_{\text{age}} = 1.5$ years) were students (11 graduate, 10 undergraduate) from six Beijing-based universities (Beijing Forestry University: 13, University of Science and Technology Beijing: 2, China University of Mining and Technology: 2, Beijing Normal University: 2, Beihang University: 1, and China University of Geosciences: 1). The Western participants (11 men, 9 women; $M_{\text{age}} = 22.3$ years, $SD_{\text{age}} = 2.8$ years) were short-term exchange students from the U.S. (14), the UK (4), and Canada (2), who had been in China between 2 weeks and 6 months. No participant had a history of neurological or psychiatric disorders. All were healthy, right-handed, and with normal or corrected-to-normal vision. We excluded 12 additional Chinese participants (7 men) and eight additional Western participants (5 men), because they completed insufficient (< 30) trials, thus failing to meet the requirement for ERP analysis.

We used a 2 (trait valence: positive, negative) \times 2 (referent: self-descriptiveness, non-self-descriptiveness) \times 2 (culture: West, East) mixed design. The first two factors were within-subjects, the last factor between-subjects.

Stimuli and paradigm

The stimulus materials consisted of 240 positive words and 240 negative words selected from Anderson's (1968) trait adjective list. This list contains 555 traits rated on a 0 (*least favorable or desirable*) to 6 (*most favorable or desirable*) scale. The likableness ratings range from 26 to 573. We discarded 75 neutral traits, of which the likableness rating hovered around 300. The mean likableness rating of the selected positive traits was 435.10 ($SD = 63.10$), and the mean likableness rating of the selected negative traits was 172.30 ($SD = 65.15$). The two means differed significantly from each other, $t(478) = 44.89$, $P < 0.001$, $d = 4.10$. Finally, the extent of positivity for the positive traits was similar to the extent of negativity for the negative traits; stated otherwise, the mean likableness of positive traits ($M = 133.46$, $SD = 58.56$) and

that of negative traits ($M = 131.89$, $SD = 64.18$) were equivalently apart from the grand mean ($M = 303.70$, $SD = 146.16$), $t(478) = -0.28$, $P = 0.780$, $d = 0.03$. Participants viewed the trait adjectives in their native language, with the adjectives being translated and back-translated by a committee of bilingual speakers (Brislin, 1980).

We tested one participant at a time and randomized word presentation for each. Participants made a self-referential judgment (*describes me, does not describe me*) by pressing the left key or the right key. We counterbalanced the order of the two keys for each judgment type. Figure 1 depicts the time course of each trial. We presented each word stimulus on the screen until a response (key-pressing) occurred. We randomized interstimulus intervals (fixation) between 800 and 1200 ms, during which we presented a central fixation.

Data recording and data analysis

We recorded the brain electrical activity continuously from 64 scalp sites using Ag/AgCl electrodes mounted in an elastic cap (Neuroscan Inc., Herndon, VA), with an online reference to the right mastoid and off-line algebraic re-reference to the average of left and right mastoids. We recorded the vertical electrooculogram (VEOG) and horizontal electrooculogram (HEOG) from two pairs of electrodes, with one placed above and below the left eye, and another placed 10mm from the outer canthi of each eye. We maintained all interelectrode impedances below 5 k Ω . We amplified the EEG and EOG using a 0.05–100 Hz bandpass and sampled continuously at 500 Hz/channel for off-line analysis.

During the off-line analysis, the EEG data were digitally filtered with a 30 Hz low-pass filter, were epoched started 200ms prior to stimuli onset, and lasted 1700ms. We removed ocular artifacts from the EEG data using a regressing procedural implemented in the Neuroscan software (Semlitsch et al., 1986). We excluded from averaging trials with artifacts due to eye blinks, amplifier clipping, and burst of electromyographic (EMG) activity exceeding $\pm 120 \mu V$. We then averaged the ERPs separately for each of the four key experimental conditions (positive traits, self-descriptiveness; positive traits, non-self-descriptiveness; negative traits, self-descriptiveness; negative traits, non-self-descriptiveness). We excluded the data from trials where a participant had not responded or provided an improper response (in less than 200ms or with a reaction time > 3 SDs). This step led to discarding a maximum of 8 trials out of 480 for a given participant.

We extracted peak amplitude of N170 within 140–200ms from four parieto-occipital sites (PO5, PO3, PO4 and PO6). For the LPP, following evidence that LPP from frontal sites are more suitable as an evaluative index (Cunningham et al., 2005; Baetens et al., 2011), we extracted mean amplitudes from 350–850ms after stimulus onset from nine frontal-central sites: F3,

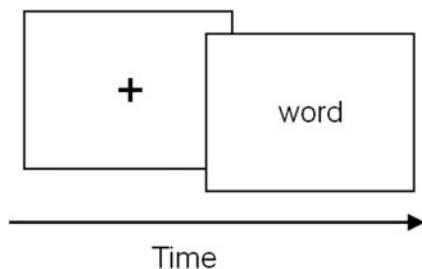


Fig. 1. Schematic description of the experimental task.

FZ, F4, FC3, FCZ, FC4, C3, CZ and C4. We used the Greenhouse-Geisser correction to compensate for sphericity violations.

Results

Judgments

Trait endorsement. We entered the number of traits endorsements into an Analysis of Variance (ANOVA) (Figure 2). The Trait Valence \times Referent interaction was significant, $F(1, 39) = 206.15$, $P < 0.001$, $\eta_p^2 = 0.84$. Participants endorsed more positive ($M = 165.54$, $SD = 28.02$) than negative ($M = 71.98$, $SD = 33.18$) traits as self-descriptive, $t(40) = 13.43$, $P < 0.001$, $d = 2.10$, but endorsed more negative ($M = 158.61$, $SD = 35.95$) than positive ($M = 65.83$, $SD = 25.40$) traits as non-self-descriptive, $t(40) = 13.32$, $P < 0.001$, $d = 2.11$. This results pattern is consistent with that obtained in Western (Moran et al., 2006; Kwan et al., 2007) or Eastern (Shi et al., 2016) samples.

The effect, though, was qualified by the three-way interaction, $F(1, 39) = 6.66$, $P = 0.014$, $\eta_p^2 = 0.15$. We proceeded to break it down separately for each cultural group. The Trait Valence \times Referent interaction was significant for Western participants, $F(1, 19) = 205.18$, $P < 0.001$, $\eta_p^2 = 0.92$. They regarded more positive ($M = 168.15$, $SD = 24.89$) than negative ($M = 57.5$, $SD = 20.69$) traits as self-descriptive, $t(19) = 14.50$, $P < 0.001$, $d = 4.86$, but regarded more negative ($M = 168.30$, $SD = 32.03$) than positive ($M = 58.15$, $SD = 16.23$) traits as non-self-descriptive, $t(19) = 14.13$, $P < 0.001$, $d = 3.35$. The Trait Valence \times Referent interaction was significant for Chinese participants as well, $F(1, 20) = 54.62$, $P < 0.001$, $\eta_p^2 = 0.73$. Likewise, they regarded more positive ($M = 163.05$, $SD = 31.12$) than negative ($M = 85.76$, $SD = 37.22$) traits as self-descriptive, $t(20) = 7.38$, $P < 0.001$, $d = 1.62$, but regarded more negative ($M = 149.38$, $SD = 37.78$) than positive ($M = 73.14$, $SD = 30.41$) traits as non-self-descriptive, $t(20) = 7.39$, $P < 0.001$, $d = 1.61$.¹ As hypothesized, self-positivity was evident in both cultural groups, but its magnitude was higher among Western than Eastern participants (Heine and Hamamura, 2007; Sedikides et al., 2015). No other effect reached significance, all $P_s > 0.05$.

Reaction times. We entered reaction times (in ms) into an ANOVA (Figure 3). The Trait Valence \times Referent interaction was significant, $F(1, 39) = 78.26$, $P < 0.001$, $\eta_p^2 = 0.67$. Participants responded faster to positive ($M = 1052.04$, $SD = 225.23$) than negative ($M = 1229.15$, $SD = 273.16$) self-descriptive traits, $t(40) = 9.85$, $P < 0.001$, $d = -1.68$, and responded faster to negative ($M = 1151.89$, $SD = 239.68$) than positive ($M = 1256.61$, $SD = 304.14$) non-self-descriptive traits, $t(40) = -5.71$, $P < 0.001$, $d = -1.03$. This results

1 We broke down the three-way interaction in an alternative manner, namely, on the basis of referent. The Trait Valence \times Culture interaction was significant for self-descriptiveness, $F(1, 39) = 6.52$, $P = 0.015$, $\eta_p^2 = 0.14$. Western ($M = 168.15$, $SD = 24.89$) and Eastern ($M = 163.05$, $SD = 31.12$) participants endorsed an equivalent number of positive traits, $t(39) = 0.58$, $P = 0.567$, $d = 0.18$, but Western participants ($M = 57.5$, $SD = 20.69$) endorsed fewer negative traits than Eastern participants ($M = 85.76$, $SD = 37.22$), $t(19) = 2.98$, $P = 0.005$, $d = 0.98$. The Trait Valence \times Culture interaction was also significant for non-self-descriptiveness, $F(1, 39) = 6.78$, $P = 0.013$, $\eta_p^2 = 0.15$. Western participants ($M = 58.15$, $SD = 16.23$) tended to endorse fewer positive traits than Eastern participants ($M = 73.14$, $SD = 30.41$), $t(39) = 1.96$, $P = 0.058$, $d = 0.64$, but Western ($M = 168.30$, $SD = 32.03$) and Eastern ($M = 149.38$, $SD = 37.78$) participants did not differ in the number of negative traits they endorsed, $t(39) = 1.73$, $P = 0.092$, $d = 0.54$. It appears that cultural differences in manifest self-positivity were due to trait valence differences in self-descriptiveness than non-self-descriptiveness.

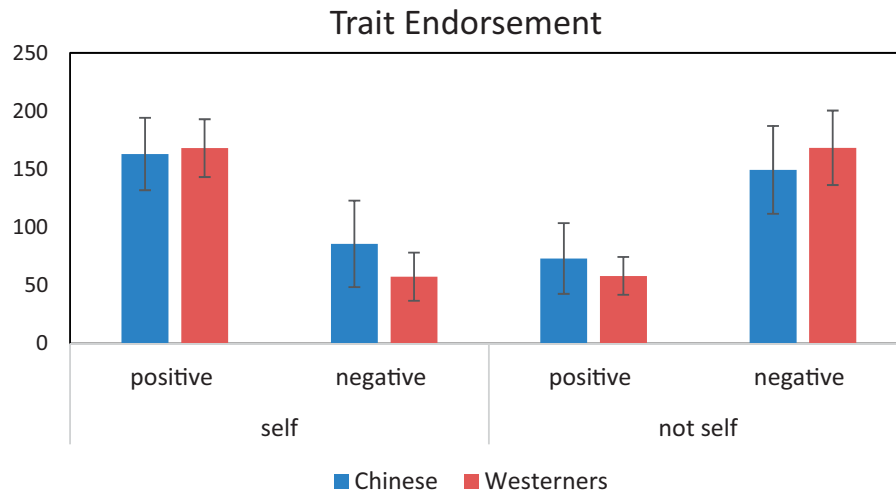


Fig. 2. Trait endorsement as a function of trait valence, referent, and culture; error bars represent SD.

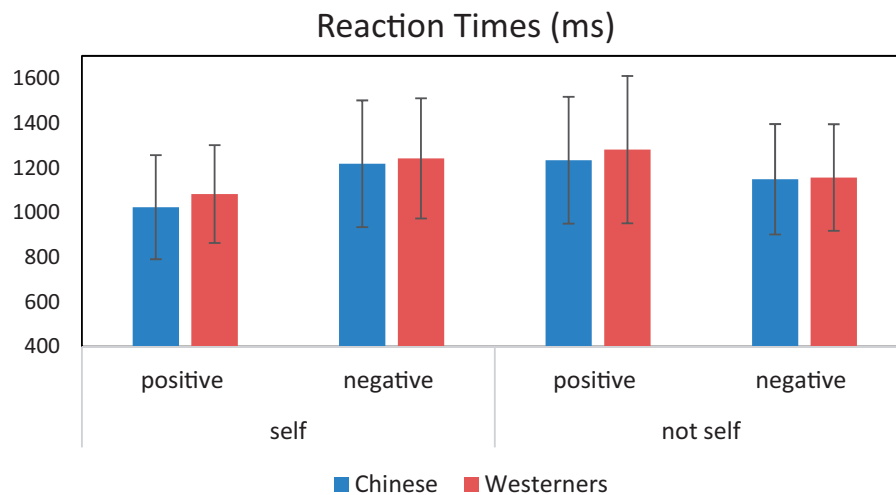


Fig. 3. Reaction times as a function of trait valence, referent, and culture; error bars represent SD.

pattern replicates previous findings obtained in Western (Watson *et al.*, 2007) or Eastern (Shi *et al.*, 2016) samples.

Importantly, this effect was unqualified by culture: The three-way interaction was not significant, $F(1, 39) = 0.005$, $P = 0.944$, $\eta_p^2 = 0.001$. The potency of the self-enhancement motive was equivalent in the two cultural groups. This result contradicts the cultural specificity perspective and supports the panculturality perspective (Becker *et al.*, 2014; Sedikides *et al.*, 2015).

In replication of past research in both Western (Watson *et al.*, 2007) and Eastern (Shi *et al.*, 2016) samples, participants responded faster to positive ($M = 1154.32$, $SD = 258.24$) than negative ($M = 1190.52$, $SD = 246.46$) traits, $F(1, 39) = 16.86$, $P < 0.001$, $\eta_p^2 = 0.30$. This trait valence main effect, however, was qualified by culture, $F(1, 39) = 4.65$, $P = 0.037$, $\eta_p^2 = 0.11$. Western participants did not differ significantly in their response speed to positive ($M = 1181.26$, $SD = 271.34$) and negative ($M = 1198.58$, $SD = 248.13$) traits, $t(19) = -1.27$, $P = 0.218$, $d = -0.33$, whereas Chinese participants responded faster to positive ($M = 1128.21$, $SD = 248.95$) than negative ($M = 1282.84$, $SD = 250.74$) traits, $t(20) = -4.83$, $P < 0.001$, $d = -1.09$. Finally, a significant referent main effect indicated that participants responded faster to self-

descriptive ($M = 1140.59$, $SD = 243.64$) than non-self-descriptive traits ($M = 1204.25$, $SD = 267.44$) traits, $F(1, 39) = 16.86$, $P < 0.001$, $\eta_p^2 = 0.29$. No other effect reached significance, all $P_s > 0.05$.

ERPs

N170. We entered the peak amplitudes of N170 into an ANOVA. The crucial Trait Valence \times Culture interaction was significant, $F(1, 39) = 6.62$, $P = 0.014$, $\eta_p^2 = 0.15$ (Figure 4). For Chinese participants, negative traits ($M = -3.10 \mu V$, $SD = 4.04$) elicited a larger N170 than positive traits ($M = -2.63 \mu V$, $SD = 3.88$), $t(20) = 2.33$, $P = 0.030$, $d = -0.52$. For Western participants, however, negative traits ($M = -1.54 \mu V$, $SD = 2.94$) and positive traits ($M = -1.77 \mu V$, $SD = 3.09$) elicited an equivalent N170, $t(19) = 1.27$, $P = 0.220$, $d = 0.29$. No other effect was significant, all $P_s > 0.05$. As hypothesized, culture moderated early attention to negativity: Chinese allocate more attentional resources to it than Westerners (Hamamura *et al.*, 2009; Hepper *et al.*, 2013).

LPP. We entered the LPP mean amplitude within 350–850 ms into an ANOVA. The critical Trait Valence \times Referent interaction was significant, $F(1, 39) = 7.02$, $P = 0.012$, $\eta_p^2 = 0.15$ (Figure 5).

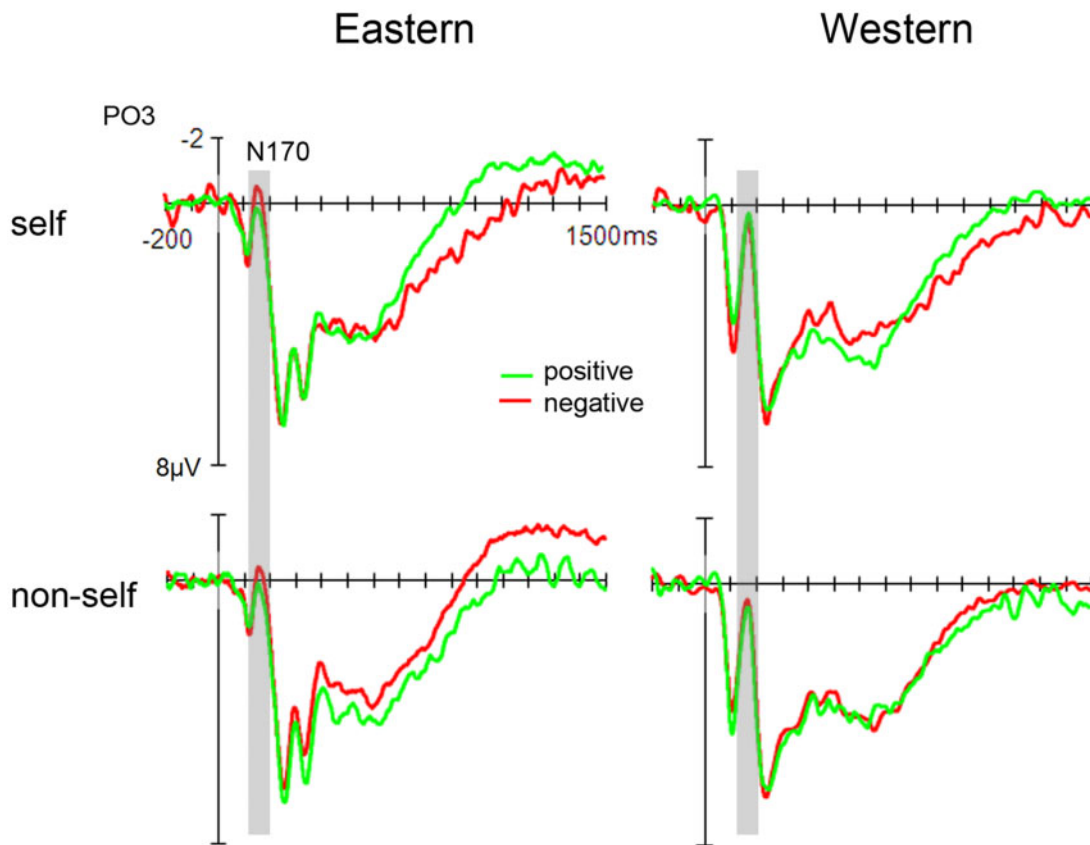


Fig. 4. PO3 activity as a function of trait valence, referent, and culture. The light gray shaded areas indicate the time window for the detection of the N170 component.

The elicited LPP was larger when participants regarded negative ($M = 3.57 \mu\text{V}$, $SD = 3.38$) than positive ($M = 2.81 \mu\text{V}$, $SD = 2.76$) traits as self-descriptive, $t(40) = 2.70$, $P = 0.010$, $d = 0.445$, but was equivalent when they regarded negative ($M = 2.58 \mu\text{V}$, $SD = 2.99$) and positive ($M = 2.81 \mu\text{V}$, $SD = 2.90$) traits as non-self-descriptive, $t(40) = 1.02$, $P = 0.312$, $d = 0.14$. Alternatively, the elicited LPP was larger when participants regarded negative traits as self-descriptive than non-self-descriptive, $t(40) = 3.85$, $P < 0.001$, $d = 0.61$, but was equivalent when they regarded positive traits as self-descriptive and non-self-descriptive traits, $t(40) = 0.40$, $P = 0.968$, $d = 0.01$. Thus, fluctuations in LPP were due both to trait valence (i.e. negativity) and referent (i.e. self-descriptiveness). These patterns validate further LPP as an index of motive strength: endorsing negative traits as self-descriptive is more evaluatively inconsistent than endorsing negative traits as non-self-descriptive or endorsing positive traits (as either self-descriptive or non-self-descriptive).

Importantly, the two-way interaction was unqualified by culture: the Reference \times Trait Valence \times Culture interaction was not significant, $F(1, 39) = 0.87$, $P = 0.357$, $\eta_p^2 = 0.02$. Contrary to the cultural specificity perspective, and consistent with the panculturality perspective (Becker et al., 2014; Sedikides et al., 2015), the strength of the self-enhancement motive, as registered on LPP, was equivalent between the two cultural groups.

Although the trait valence main effect was not significant, $F(1, 39) = 2.10$, $P = 0.155$, $\eta_p^2 = 0.05$, the referent main effect was: self-descriptive traits ($M = 3.21 \mu\text{V}$, $SD = 2.95$) elicited larger LPP than non-self-descriptive traits ($M = 2.72 \mu\text{V}$, $SD = 2.85$), $F(1, 39) = 15.17$, $P < 0.001$, $\eta_p^2 = 0.28$. This result is consistent with prior findings (Gray et al., 2004; Tacikowski and Nowicka, 2010). Finally, and unexpectedly, the culture main effect was significant:

The induced LPP was smaller among Westerners ($M = 1.90 \mu\text{V}$, $SD = 2.50$) than Easterners ($M = 3.98 \mu\text{V}$, $SD = 2.89$), $F(1, 39) = 6.07$, $P = 0.018$, $\eta_p^2 = 0.14$, an effect in need of replication.

Discussion

A central issue in cultural psychology concerns the cultural specificity or generality of self-enhancement. There is no disagreement that explicit manifestations of self-enhancement (e.g. levels of self-positivity or self-esteem) are subject to cultural constraints (e.g. norms, values, inhibitions). However, there is a long-standing debate on the potency, or even presence, of the self-enhancement motive. According to the cultural specificity perspective, the motive is potent in Western culture, but virtually absent in Eastern culture (Kitayama et al., 1997; Heine et al., 1999; Heine and Hamamura, 2007). According to the panculturality perspective, the motive is equally potent in the West and the East (Brown, 2010; Becker et al., 2014; Sedikides et al., 2015). We contributed to this debate by adopting a cultural neuroscience approach (Han and Northoff, 2009; Kitayama and Uskul, 2011). In particular, we examined cross-culturally both the manifestation and strength of self-enhancement and both at the judgmental and neurophysiological level.

Summary of findings

At the judgmental level, we focused on trait endorsement and reaction times, which we derived from the SR-valence task. We considered trait endorsement an index of level of self-positivity (D'Argembeau et al., 2005; Kwan et al., 2007), and reaction times an index of self-enhancement motive strength (Paulhus et al.,

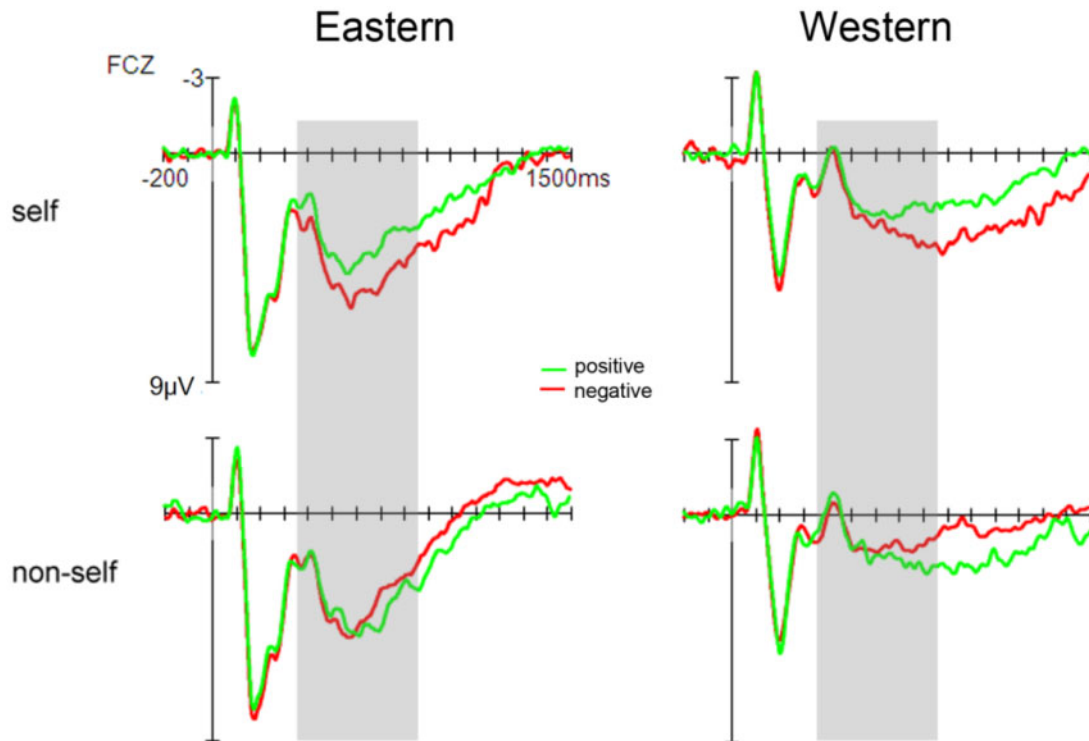


Fig. 5. FCZ activity. The light gray shaded areas indicate the time window for the detection of the LPP component.

1989; Gebauer et al., 2012). In both our Western and Eastern sample, participants endorsed more positive than negative traits as self-descriptive, and endorsed more negative than positive traits as non-self-descriptive. However, the magnitude of this effect was higher in the Western than Eastern sample. This pattern indicates that, although self-positivity evinces in both cultural groups, it is higher among Westerners than Easterners. The reaction times data allowed for a cross-cultural examination of self-enhancement motive strength. Both Western and Eastern participants responded faster to positive than negative self-descriptive traits, and responded faster to negative than positive non-self-descriptive traits. This pattern indicates that the strength of the self-enhancement motive is equivalent across the cultural groups. The findings align with the panculturality perspective (Becker et al., 2014; Sedikides et al., 2015).

At the neurophysiological level, we assessed two ERP components, N170 and LPP, while participants undertook the SR-valence task. We considered N170 an index of attention allocation to negative information, and LPP an index of sensitivity to valenced information about the self (self-enhancement motive strength). Negative compared to positive traits elicited a larger N170 among Eastern participants, but negative and positive traits elicited a similar N170 among Western participants. This finding is consistent with reports that Easterners (relative to Westerners) value avoidance goals, are prevention focused, and are attuned to negative information (Hamamura et al., 2009; Hepper et al., 2013). Importantly, the LPP data allowed for a cross-cultural examination of self-enhancement motive strength. In both samples, negative compared to positive self-descriptive traits elicited larger LPPs, but negative and positive non-self-descriptive traits elicited similar LPPs. These findings reinforce the notion that the motive is similarly potent across cultures (Becker et al., 2014; Sedikides et al., 2015).

Implications and limitations

In regards to our neurophysiological findings, we illustrated the temporal progression of trait information processing among Westerners and Easterners—from early attention to information (170ms post-stimulus onset; N170) to later-stage processing (350–850ms; LPP). Easterners initially allocate attentional resources to negativity in general before processing selectively valenced information about the self. It is in this latter stage that we observed how the self-enhancement motive regulates (equally potently) the processing of valenced information in both samples.

We wondered exploratorily about links between our judgmental and neurophysiological indices among Westerners and Easterners. In Western participants, none of the correlations was significant ($P > 0.05$), and only four (out of 32) were marginal ($P < 0.10$). The marginal correlations may have been spurious and revealed no consistent pattern. In Eastern participants, none of the 32 correlations was significant ($P > 0.05$). The lack of associations between judgmental and neurophysiological data is common in cross-cultural neuroscience (Kitayama and Murata, 2013; Park and Kitayama, 2014) or neuroscience (Watson et al., 2007; Wu et al., 2014) research. Resolution of this paradox is a priority for future investigations.

The 3-way interaction on LPP was not significant. Might the lack of moderation by culture be due to a seemingly small sample size? We argue that this is probably not the case. Although comparisons with similar studies should be treated with caution, our sample is equivalent in size, if not slightly larger, to that of an ERP study that used the SR-valence task (Watson et al., 2007: $N = 16$) and to those of cross-cultural ERP studies (Kitayama and Park, 2013: $N_{\text{Westerners}} = 19$, $N_{\text{Easterners}} = 20$; Murata et al., 2013: $N_{\text{Westerners}} = 17$, $N_{\text{Easterners}} = 17$) or, more generally, of cross-cultural neuroscience studies (Jenkins et al., 2010: $N_{\text{Westerners}} = 16$, $N_{\text{Easterners}} = 16$). Also, we found that culture moderated N170 and

reaction times; hence, our paradigm and sample were capable of detecting the influence of culture. Finally, post hoc (and demonstrational) power analyses indicated that most of our significant results have high power (>0.90, with the smallest being 0.60) and that our nonsignificant results are largely due to small effect sizes rather than a small sample (Cohen, 1988). Indeed, an unrealistically large sample (>67 for each cultural group) would be needed for these effects to reach significance.

Our Western participants were visiting students in Beijing. Acculturation may influence self-views (Heine and Lehman, 2004). These participants, though, were tested during their first 2 weeks to 6 months in China. A prior investigation on the cultural specificity versus panculturality of self-enhancement found that acculturation (duration of Japanese students' in the U.S. ranging from 2 to 22 months) did not affect self-enhancement (Sedikides et al., 2003).

Future research will need to test the boundaries, generality, and replicability of our findings. It will need to examine whether they are: (i) moderated by chronic self-positivity, self-esteem, or agency; (ii) generalized to a broader selection of cultures transcending the East-West divide; (iii) influenced by such cultural dimensions as on tightness versus looseness (Gelfand et al., 2006) and face versus dignity (Lee et al., 2014); and (iv) are obtained with different brain activity indices (N200: Wu et al., 2014; mPFC and OFC activity levels: Beer et al., 2010), varying techniques (fMRI: Beer et al., 2010; TMS: Kwan et al., 2007), or divergent paradigms (better-than-average effect: Beer et al., 2010; Go/No-go Association Task: Wu et al., 2014).

Coda

Our study pioneered the consideration of cross-cultural differences in self-enhancement from a cognitive neuroscience perspective. Combining the SR-valence task with ERP assessment, we illustrated that, although Easterners (relative to Westerners) attend to generically negative information at an earlier processing stage, they are still as strongly motivated by self-enhancement as Westerners in processing self-relevant information. We hope our findings provide the fodder for increasingly granular forays into these issues.

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