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Spontaneous Trait Inference Is Culture-Specific: Behavioral and Neural Evidence

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Abstract

People with an independent model of the self may be expected to develop a spontaneous tendency to infer a personality trait from another person's behavior, but those with an interdependent model of the self may not show such a tendency. We tested this prediction by assessing the cumulative effect of both trait activation and trait binding in a diagnostic task that required no trait inference. Participants first memorized pairings of facial photos with trait-implying behavior. In a subsequent lexical decision task, European Americans showed clear evidence of spontaneous trait inference: When they were primed with a previously studied face, lexical decision for the word for the implied trait associated with that face was facilitated, and the antonym of the implied trait elicited an electrophysiological sign associated with processing of semantically inconsistent information (i.e., the N400). As predicted, however, neither effect was observed for Asian Americans. The cultural difference was mediated by independent self-construal.

Keywords

Cultural psychological research has documented sizable cultural variation in social explanation (Choi, Nisbett, & Norenzayan, 1999). Relative to European Americans, Asians are less likely to use another person's personality traits in accounting for the person's behavior. This cultural difference is consistent with a well-accepted two-stage model of person perception (Gilbert & Malone, 1995). This model proposes that when observing a behavior of another person, the social perceiver initially infers a trait from the behavior and then, in a second stage, deliberately adjusts the initial trait judgment by taking into account available situational constraints. Initial trait inference is held to be highly automatic and universal. However, because Asians are more attentive to situations or social contexts than European Americans are (Kitayama, Duffy, Kawamura, & Larsen, 2003; Masuda & Nisbett, 2001), Asians may be expected to dilute initial trait inferences more in explaining observed behavior. In this view, then, the initial trait inference may be expected to occur spontaneously in all cultures.

But is trait inference really spontaneous for Asians? Uleman, Carlston, Skowronski, and their colleagues have shown that upon observing another person's behavior, individuals automatically infer the corresponding trait (i.e., *trait activation*) and also automatically ascribe the trait to the actor (i.e., *trait binding*). At present, however, with only one important exception, this evidence has come exclusively from Western

cultures (Carlston & Skowronski, 1994; Todorov & Uleman, 2002, 2004; Van Duynslaeger, Sterken, Van Overwalle, & Verstraeten, 2008; Winter & Uleman, 1984).

According to Markus and Kitayama (1991, 2010), cultures vary in the model of the self they sanction. European American cultures emphasize a model of the self as independent. This model depicts behavior as internally motivated. Because people with such a model of the self may routinely engage in trait inference, spontaneous trait inference may be expected to have roots in the Western independent model of the self (Duff & Newman, 1997). In contrast, Asian cultures place a much greater emphasis on a contrasting model of the self as interdependent. People with such a model of the self may *not* draw trait inferences on any regular basis because the interdependent model highlights situational constraints on the actor. Accordingly, for these individuals, trait inference may prove not to be spontaneous. Spontaneous trait inference, then, might be unique to the Western cultural context.

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Zárate, Uleman, and Voils (2001) tested a similar prediction focusing on Latino Americans and European Americans. Because Latinos are less independent and more interdependent than European Americans, they may be less spontaneous in making trait inferences. In Study 1, Zárate et al. examined whether participants would infer corresponding traits when reading trait-implying behaviors and found some trend toward the predicted pattern. Although the cultural difference fell short of statistical significance, the task used in this study enabled the researchers to examine only the effect of trait activation. It is possible that the cultural difference would have been more pronounced if the cumulative effect of both trait activation and trait binding had been tested.

In Study 2, Zárate et al. (2001) had participants memorize many pairings of faces with trait-implying behaviors. Subsequently, participants were shown each stimulus face and asked to rate the person on a few trait dimensions, one of which referred to the trait implied by the behavior paired with the face (see also Carlston & Skowronski, 2005). European Americans gave more extreme ratings on these implied traits than did Latino Americans. Although the researchers interpreted the result as consistent with the predicted cultural difference in spontaneous trait inference, this interpretation can be called into question because participants were explicitly asked to make trait judgments during the testing phase. This procedure makes it difficult to exclude the possibility that participants made the trait inferences on the basis of behaviors that they recalled during the testing phase (as opposed to the traits that had been inferred during the memorization phase).

At present, then, there remains a need to further investigate the predicted cultural difference in spontaneous trait inference. Finding that trait inference is not, in fact, spontaneous for individuals with Asian cultural heritage would pose a significant challenge to the current two-stage model of person perception. In the two studies reported here, we tested the predicted cross-cultural difference by examining the cumulative effect of both trait activation and trait binding using a diagnostic task that required no trait judgment.

Study 1

In Study 1, we asked participants to memorize pairings of faces with trait-implying behaviors. Because participants were not asked to infer any traits, an association between an implied trait and the face with which it was paired during the memorization phase of the study would imply that the trait had been inferred (i.e., trait activation) and bound to the actor (i.e., trait binding) in a highly automatic fashion. To assess the magnitude of such associations, we used a lexical decision task with the faces as the priming stimuli. If an implied trait had been associated with a face, the face would activate that trait when presented during the lexical decision task and, thus, would facilitate lexical decision for that trait, as compared with lexical decision for a stimulus word that was semantically unrelated to that trait. We predicted that the priming effect would be more pronounced for European Americans than for Asian Americans.

Participants and procedure

We tested 67 European American students (39 females, 28 males) and 64 Asian American students (37 females and 27 males) at the University of Michigan.

We prepared 20 Caucasian faces (10 females, 10 males), 20 Asian faces (10 females, 10 males), and 40 behaviors. The behaviors were adopted from previous studies (Mitchell, Macrae, & Banaji, 2005; Uleman, 1987). A different group of participants (11 European Americans and 13 Asian Americans) rated each of the 40 behaviors on the degree to which it implied a trait designated as "implied" by the behavior and a trait designated as "unrelated" to the behavior (1 = *not implying at all*, 7 = *strongly implying*). For both European and Asian Americans, the implied traits were judged as much more implied by the behaviors than the unrelated traits were (Ms = 5.89 vs. 2.53), $F(1, 22) = 228.38$, $p < .001$, $\eta_p^2 = .921$.

Participants viewed the 20 stimulus faces that matched their own ethnicity, so that the ease of remembering the faces would be equated for the two groups of participants (see Hewstone, Rubin, & Willis, 2002, for a review of the in-group bias in face recognition). In previous studies, each face was typically paired with one behavior. To maximize the chance of observing trait inference, however, we paired each of the 20 faces with two different behaviors that implied the same trait, for a total of 40 face-behavior pairings for each participant. For each ethnicity, two sets of face-behavior pairings were used.

During the first phase of the study, participants were presented with 40 face-behavior pairs and asked to memorize them. On each trial, a face was presented first on a computer screen. After 2 s, the paired behavior was added to the display on the screen. Both the face and the behavior remained on-screen for an additional 4 or 7 s (i.e., total duration of 6 or 9 s for each face). This variation in presentation duration did not affect the results. After all pairs had been presented, a lexical decision task was given. Although it was presented as a filler task, it was actually designed to assess the magnitude of face-trait associations. On each trial of the lexical decision task, 1 of the 20 faces was first presented as a priming stimulus for 1,500 ms. (Participants had been told that these faces were fixation points and were asked to look at the faces when they were presented on the computer screen.) The priming face was immediately followed by a word or pseudoword (target stimulus), which stayed on the screen until the participant responded. Each face was presented four times, once with a trait that was implied by the behaviors previously paired with the face (20 trials), once with a trait that was unrelated to these behaviors (20 trials), and twice with a pseudoword (40 trials). The order of the 80 trials was randomized for each participant. Participants pressed one of two designated computer keys to report whether or not each target stimulus was an English word.

Results

Preliminary analysis showed no effect of either gender or stimulus set; so these factors were dropped. Accuracy (i.e.,

Table 1. Accuracy and Response Time (RT) in the Lexical Decision Task in Study 1

Measure and cultural background	Implied-trait words			Unrelated-trait words			Pseudowords		
	Presentation duration			Presentation duration			Presentation duration		
	6 s	9 s	Combined	6 s	9 s	Combined	6 s	9 s	Combined
Accuracy									
European	.99 (.04)	.98 (.03)	.98 (.03)	.97 (.11)	.92 (.07)	.95 (.10)	.95 (.07)	.94 (.07)	.95 (.07)
Asian	.99 (.04)	.99 (.03)	.99 (.03)	.99 (.03)	.98 (.04)	.99 (.03)	.92 (.10)	.95 (.08)	.94 (.09)
RT (ms)									
European	663 (128)	612 (139)	638 (135)	680 (143)	649 (165)	665 (154)	721 (134)	662 (147)	692 (137)
Asian	659 (160)	619 (158)	639 (159)	654 (158)	617 (137)	636 (148)	698 (137)	646 (125)	672 (130)

Note: Standard deviations are given in parentheses.

percentage correct) was log-transformed and submitted to a 2 (culture) × 2 (presentation time: 6 s vs. 9 s) × 2 (target: word vs. pseudoword) mixed analysis of variance (ANOVA). As shown in Table 1, accuracy was significantly higher for the word targets than for the pseudoword targets regardless of culture, $F(1, 125) = 18.74$, $p < .001$, $\eta_p^2 = .130$. We next focused on the trials with word targets. A 2 (culture) × 2 (presentation time) × 2 (trait type: implied vs. unrelated) ANOVA showed, as predicted, a significant Culture × Trait Type interaction, $F(1, 125) = 9.96$, $p < .05$, $\eta_p^2 = .074$. As shown in Figure 1a, European Americans' accuracy was higher for the implied traits than for the unrelated traits (.98 vs. .95), $t(64) = 3.25$, $p < .01$, a result suggesting that the implied traits had been inferred and ascribed to the priming faces during the

memorization phase of the study. Because there was no explicit instruction to draw such an inference, it was spontaneous. In contrast, the corresponding difference was negligible for Asian Americans (.99 vs. .99), $t(63) = 1.48$, $p = .14$. This result is consistent with the hypothesis that Asian Americans do not engage in spontaneous trait inference, although, in this case, a ceiling effect could have been involved. The cultural difference was moderate in size, $d = 0.47$.

Next, we analyzed response times (RTs) for correct responses after excluding outliers (values 3 *SD*s or more from the mean for each participant). Overall, as shown in Table 1, lexical decision was faster for the word targets than for the pseudoword targets, $F(1, 125) = 15.92$, $p < .001$, $\eta_p^2 = .119$. The overall RT did not vary across cultures, $F < 1$. For the trials with word
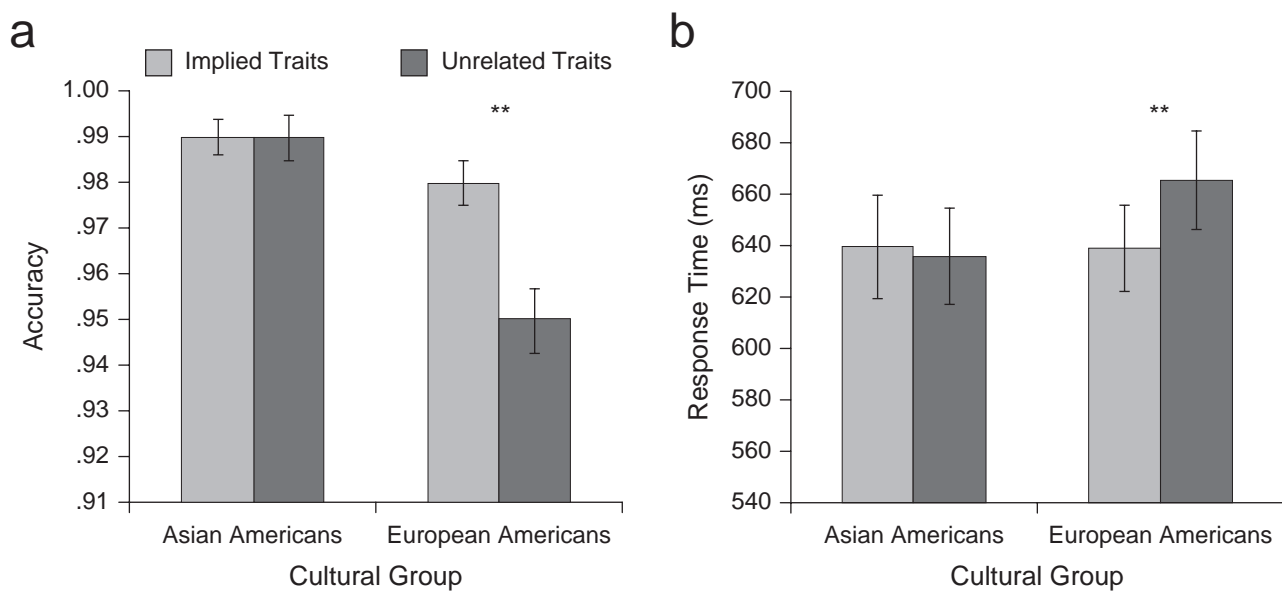

Fig. 1. Accuracy (a) and response time (b) in the lexical decision task of Study 1 as a function of trait type (implied vs. unrelated) and cultural group (European Americans vs. Asian Americans). Error bars indicate standard errors of the mean, and asterisks indicate significant differences between trait types (**$p < .01$).

targets, a 2 (culture) × 2 (presentation time) × 2 (trait type: implied vs. unrelated) ANOVA showed a significant interaction between culture and trait type, $F(1, 125) = 13.84$, $p < .001$, $\eta_p^2 = .10$. As illustrated in Figure 1b, for European Americans, lexical decision was significantly faster for the implied traits than for the unrelated traits (Ms = 638 vs. 665 ms), $t(64) = 4.94$, $p < .001$. Among Asian Americans, however, the difference completely disappeared (Ms = 639 vs. 636 ms), $t < 1$. The cultural difference was moderate in size, $d = 0.65$.

In Study 1, we used a procedure designed to assess the cumulative effect of both trait activation and trait binding without requesting any trait judgment. We found the first solid evidence for the predicted cultural difference in spontaneous trait inference. Results for both accuracy and RT indicated that European Americans made spontaneous trait inferences. However, there was no such evidence whatsoever in either measure for Asian Americans.

The evidence would be more convincing if we could show that Asian Americans can engage in trait inference when they intend to do so. We thus tested another group of 33 Asian Americans, who were explicitly instructed to form a clear trait impression of each stimulus person during the first phase of the study (except for this change, the procedure was identical to that of the 9-s condition). Under this condition of intentional trait inference, Asian Americans showed clear evidence of trait inference: Accuracy was higher (Ms = .99 vs. .95), $t(32) = 3.88$, $p < .001$, and RT was shorter (Ms = 653 vs. 685 ms), $t(32) = 3.85$, $p < .01$, for the implied traits than for the unrelated traits. Thus, the cultural difference observed in the main study can be attributed to the relative spontaneity of trait inference.

Study 2

When a trait is inferred spontaneously, the association between the trait and the actor is stored in a certain neural circuitry of the brain. This implies that a cultural difference similar to the one demonstrated in Study 1 should be observed with a neural indicator. In Study 2, we measured stimulus-locked electrical activity of the brain (event-related potential, or ERP). Specifically, we were interested in an ERP component called the N400, a negative deflection peaking approximately 400 ms after stimulus presentation. Typically observed in posterior electrodes, the N400 is thought to index detection of semantic incongruity (Kutas & Hillyard, 1980). Our analysis of Study 1 implies that during the memorization phase of the study, European Americans spontaneously inferred a trait corresponding to each behavior and associated the trait to the stimulus face paired with the behavior. When the face was presented as a fixation stimulus in the lexical decision task, the face automatically activated the inferred trait. Thus, if the activation of the inferred trait was followed by presentation of its antonym, a strong N400 component may be expected. In contrast, Asian Americans in Study 1 did not appear to infer any traits spontaneously during the memorization phase of the study. Our confidence in this conclusion would be greater if Asian Americans exhibited no N400 component in response to the antonyms of the implied traits.

Participants and procedure

Twenty-three European American undergraduates (12 females and 11 males) and 23 Asian American undergraduates (12 females and 11 males) at the University of Michigan participated in Study 2. First, they were presented with 60 face-behavior pairs (two behaviors for each of 30 faces) and asked to memorize them. On each trial, a face was presented first (as in Study 1, the ethnicity of the faces was matched to the ethnicity of the participant). After 2 s, the paired behavior was added to the display on the screen. Both the face and the behavior remained on the screen for 7 s. This memorization phase was followed by a lexical decision task similar to the one used in Study 1. As illustrated in Figure 2a, each trial of this task consisted of a face prime presented for 1,500 ms as a fixation stimulus, immediately followed by presentation of a target stimulus for 200 ms. Participants were given up to 5,000 ms to make a lexical decision on the target. The next trial started 1,400 ms after the response was made. In Study 2, our focus was on the brain response that signifies the detection of semantic incongruity. We therefore used traits implied by the stimulus behaviors and the antonyms of these traits as word targets in the lexical decision task (30 trials each). An equal number of pseudoword targets (60 trials) was also included, for a total of 120 trials, which were divided into two blocks (30 word-target and 30 pseudoword-target trials in each). The blocks were repeated twice, for a total of four blocks and 240 trials. The order of trials within each block was randomized for each participant. The electroencephalogram (EEG) was recorded during the task. After the computer task, participants filled out Singelis's (1994) scale of self-construal.

EEG was recorded from 32 Ag/AgCl electrodes embedded in an elastic cap according to the 10-20 system. Electrooculogram (EOG) was also recorded, with electrodes placed above and below both eyes, as well as at a position lateral to the left outer canthus. EOG was used to monitor horizontal and vertical eye movements. In addition, two electrodes were placed on the left and right mastoid (M1 and M2, respectively). EEG and EOG were recorded with a bandwidth of DC to 104 Hz (3 dB/octave) using a Biosemi Active Two system (Biosemi, Inc., Amsterdam, The Netherlands) with a sampling rate of 512 Hz.

For off-line analysis, EEG was rereferenced to average activity of the left and right mastoids and resampled at 256 Hz. The EEG for each trial was corrected for vertical and horizontal EOG artifacts, as recommended by Gratton, Coles, and Donchin (1983). ERPs to word targets were averaged over an epoch of 1,200 ms (starting 200 ms prior to the presentation of each target), using a 200-ms prestimulus baseline. Only trials with correct responses were averaged. Trials with deflections exceeding ±100 μV were excluded from averaging.

Results

Behavioral data. Mean accuracies and RTs are presented in Table 2. ANOVAs performed on these means showed no significant effects of our experimental variables. When trait
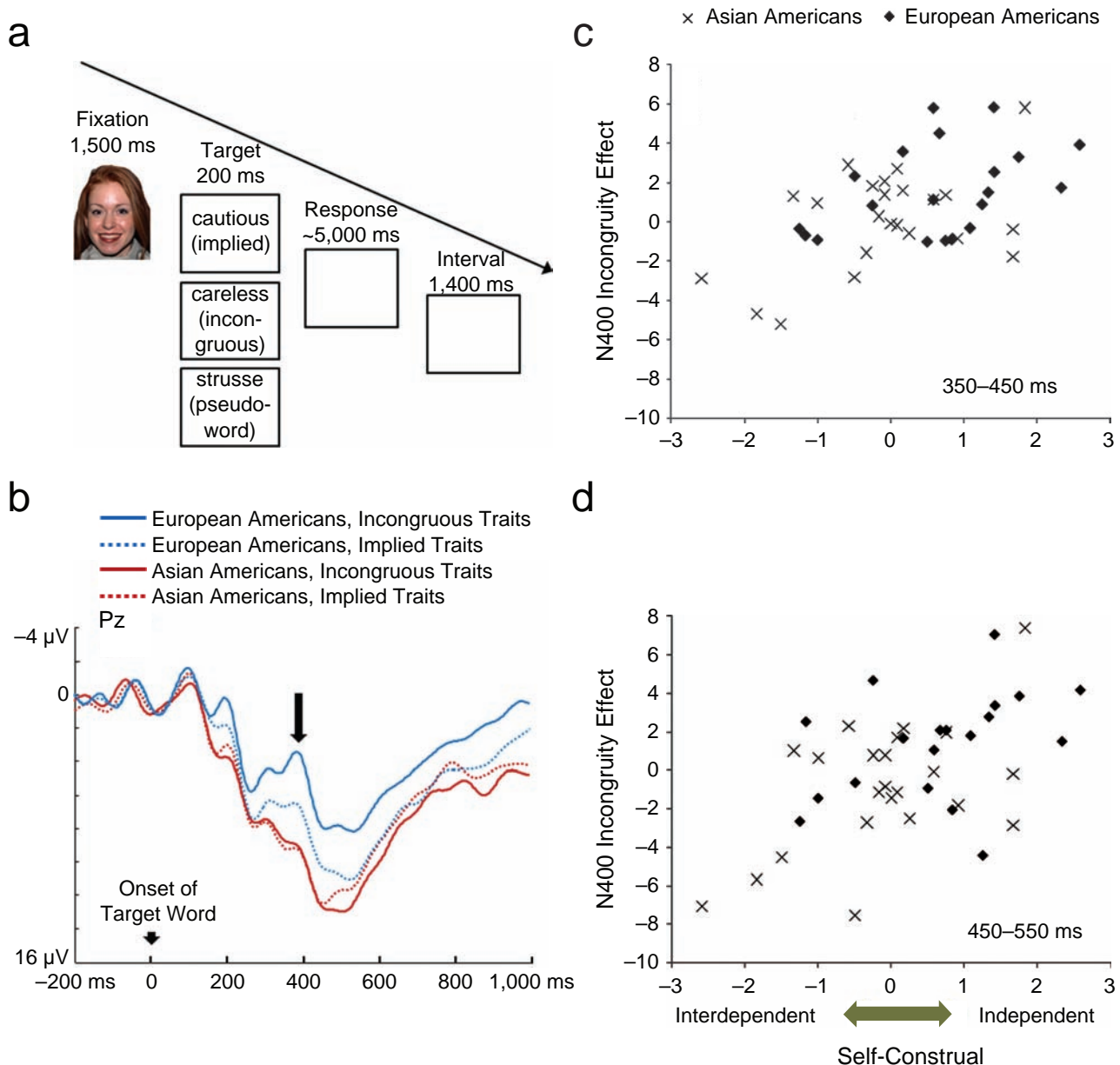
Fig. 2. Trial structure of the lexical decision task in Study 2 (a) and experimental results (b–d). On each trial, a previously studied face was presented as a priming stimulus, before presentation of a word or pseudoword target. Participants had 5,000 ms to respond. The waveforms (b) are grand-averaged event-related potentials (ERPs) at electrode Pz; results are shown separately for European Americans and Asian Americans in the implied-trait condition and in the incongruous-trait (antonym) condition. The data were digitally low-pass filtered at 12 Hz. Note that negative deflections are shown in the upward direction on the *y*-axis. The large arrow points to the N400 component. The scatter plots show the correlations between independent/interdependent self-construal and the N400 incongruity effect (N400 during the implied-trait trials minus N400 during the incongruous-trait trials) during two time windows: (c) 350 to 450 ms and (d) 450 to 550 ms.

information is activated by a face prime, this activation may spread to the trait's antonym as well (see Todorov & Uleman, 2002, for evidence). This could facilitate lexical decision for both the implied trait and its antonym even though participants would still be able to recognize the meaning of the antonym as incongruous with the trait.

ERP analysis. The time course of ERPs was examined at all scalp locations first. The clearest pattern was identified in the posterior central (Pz) scalp location. This result is consistent

with previous work showing that the visual N400 is most clearly observed in the centro-posterior region of the brain (Kutas & Federmeier, 2000).

As shown in Figure 2b, for European Americans, a clear N400 component was identified when the targets were antonyms of the implied traits. The N400 component would be expected only if the faces activated traits implied by the behaviors associated with the faces. Hence, this ERP pattern clearly indicates that European Americans spontaneously inferred a trait of a stimulus person from his or her behaviors during the memorization phase

Table 2. Accuracy and Response Time (RT) in the Lexical Decision Task in Study 2

Measure and cultural background	Implied-trait words	Incongruous-trait words	Pseudowords
Accuracy			
European	.96 (.03)	.96 (.03)	.97 (.03)
Asian	.97 (.04)	.97 (.03)	.95 (.06)
RT (ms)			
European	530 (96)	536 (101)	536 (92)
Asian	481 (65)	484 (59)	504 (63)

Note: Standard deviations are given in parentheses.

Fig. 3. Standardized regression coefficients (betas) from regression analyses examining self-construal as a mediator of the effect of culture on the N400 incongruity effect. Results for the 350- to 450-ms period are presented above the arrows, and those for the 450- to 550-ms period are presented below the arrows. Along the lower path, values outside parentheses indicate the effect of culture on the N400 incongruity effect when self-construal was not statistically controlled, and values inside parentheses indicate this effect when self-construal was statistically controlled. The numbers in the brackets show the confidence intervals generated by the bootstrapping test. Asterisks indicate statistical significance (*p < .05, **p < .01).

of the study. For Asian Americans, however, there was no such incongruity effect. This finding lends further support to the hypothesis that Asian Americans do not engage in spontaneous trait inference.

To look more closely at the cross-cultural difference in the N400 at Pz, we computed both the mean amplitude and the peak amplitude for each of two relevant time periods (350–450 ms and 450–550 ms) for each participant and submitted these values to 2 (culture) × 2 (trait type) ANOVAs. The results were largely identical for the two indices, so we focus here on the mean amplitude. As predicted, we found a significant interaction between culture and trait type during both the earlier (350–450 ms) and the later (450–550 ms) periods, $F(1, 44) = 6.51, p < .05, \eta_p^2 = .129$, and $F(1, 44) = 9.67, p < .01, \eta_p^2 = .180$, respectively. European Americans showed a significantly greater negativity for the incongruous traits (i.e., antonyms) than for the implied traits in the 350- to 450-ms period, $t(22) = 3.06, p < .01$, and in the 450- to 550-ms period, $t(22) = 2.89, p < .01$. For Asian Americans, however, there was no such difference, $t(22) = 0.21$, n.s., and $t(22) = 1.29$, n.s., respectively. The cultural difference in the incongruity effect was quite sizable, $d = 0.77$ for the 350- to 450-ms period and $d = 0.93$ for the 450- to 550-ms period.

Self-construal. We argued that the cultural difference in spontaneous trait inference is due to a corresponding difference in independent versus interdependent self-construal (Duff & Newman, 1997). To test this proposition, we examined whether the cultural difference in the N400 incongruity effect was mediated by this construct.

In both cultural groups, the ERP incongruity effect (the magnitude of negativity during the implied-trait trials minus the magnitude of negativity during the incongruous-trait trials) significantly increased with increasing independent self-construal; further, the relationship was reversed for interdependent self-construal. We therefore subtracted each participant's interdependence score from his or her independence score to obtain a summary index of independent self-construal. European Americans were more independent than Asian Americans, as predicted
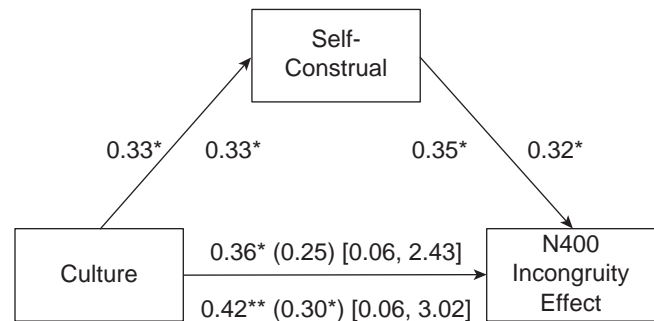
($M = 0.70, SD = 1.09$, vs. $M = -0.10, SD = 1.09$), $t(44) = 2.25, p < .05, d = 0.68$, or $\beta = 0.33, p < .05$. Also as predicted, the ERP incongruity effect was positively associated with independent self-construal during both the 350- to 450-ms period, $\beta = 0.32, p < .05$, and the 450- to 550-ms period, $\beta = 0.35, p < .05$. The relevant scatter plots are shown in Figures 2c and 2d. Controlling for independent self-construal resulted in a decrease in the cultural difference in the ERP incongruity effect, from $\beta = 0.36, p < .05$, to $\beta = 0.25$, n.s., in the 350- to 450-ms period and from $\beta = 0.42, p < .01$, to $\beta = 0.30, p < .05$, in the 450- to 550-ms period. In a bootstrap mediation model following the procedure recommended by Shrout and Bolger (2002), the 95% confidence intervals for the path from culture to the incongruity effect did not include zero when the mediator was included in the model (see Fig. 3). This result shows that the cultural difference in spontaneous trait inference was partially mediated by independent self-construal.

Discussion

We have provided the first unequivocal evidence that spontaneous trait inference is quite robust among European Americans, but not among Asian Americans. We went beyond previous work by using a diagnostic task that assesses the cumulative effect of both trait activation and trait binding. Furthermore, our task required no trait judgment, so that trait inference during the diagnostic task cannot explain the results. The cultural difference was partially mediated by individual differences in independent (vs. interdependent) self-construal. One possible limitation of these studies stems from the fact that we tested the degree of spontaneous trait inference when Asian and European Americans processed information about members of their respective in-groups. More work is required

to test whether our conclusions would hold for the perception of out-group members. Furthermore, different ethnic groups are associated with different stereotypes, which might in turn have effects on spontaneous trait inference.

Our lexical decision procedure is notable because it lends itself to a robust ERP measure of spontaneous trait inference. Curiously, in another recent ERP study on spontaneous trait inference, Van Duynslaeger et al. (2008) looked at a different ERP component (see also Van Overwalle, Van den Eede, Baetens, & Vandekerckhove, 2009). In that study, Dutch participants merely read a trait-implying description of a target person (e.g., "friendly"). Next, they were asked to read a series of sentences describing various behaviors of that person; these behaviors were either congruous or incongruous with the trait implied by the initial description (e.g., "Tolvan gave her a hug" vs. "Tolvan gave her a fist"). Results were consistent with the fact that Western Europeans, including the Dutch, have relatively independent self-construals (Kitayama, Park, Servincer, Karasawa, & Uskul, 2009). ERPs differed between behaviors that were congruous with expectations and behaviors that were incongruous with expectations. Curiously, however, this difference was observed not in the N400, but in a late positive potential (positive-going deflection beginning around 400–500 ms poststimulus).

In our study, semantic incongruity was clearly manipulated by pairing a stimulus face with an incongruous trait. Because of this, we predicted that the N400 would be a sensitive index of spontaneous trait inference, and we found that it was. But in the study by Van Duynslaeger et al. (2008), even when a behavior was seemingly incongruous with an expectation (e.g., "giving a fist" is typically not friendly), the behavior might still have been interpretable as fitting into the expectation (perhaps the person was joking). This may explain why, in their study, the late positivity indicated greater *context updating* (updating one's representation) (Donchin & Coles, 1988), for incongruous behaviors than for congruous behaviors.

In the literature, the cultural variation in social explanation is typically explained in terms of deliberate attention applied to information about social constraints (Choi et al., 1999; Gilbert & Malone, 1995). Central to this approach is the premise that initial trait inference is automatic in all cultures. Along with an earlier finding that the cultural difference in correspondence bias (the tendency to infer a trait that corresponds to an observed behavior) persists even when attentive processing of the behavior is minimized (Miyamoto & Kitayama, 2002), the current findings call this premise into question.

Another important contribution of the present work concerns its use of the N400 ERP component to investigate a cultural difference in information processing. As in other recent studies (e.g., Goto, Ando, Huang, Yee, & Lewis, 2010; Ishii, Kobayashi, & Kitayama, 2010), the N400 component was quite sensitive to cultural influences. These data suggest that culture's effects are quite pervasive, being evident even quite early, during highly automatic stages of processing. Our work, then, joins the emerging literature on cultural neuroscience (Chiao & Ambady, 2007; Kitayama & Park, 2010) in highlighting the promise of using brain measures to uncover the nature of cultural influences.

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