Processing of Emotional Utterances: Is Vocal Tone Really More Significant than Verbal Content in Japanese?

Keiko Ishii and Shinobu Kitayama

An affective priming paradigm was used to test the hypothesis that when presented with an emotionally spoken emotional word, speakers of a high-context language (e.g., Japanese) process its vocal tone more thoroughly than its verbal content. Native Japanese speakers were presented with such an utterance (prime), immediately followed by a neutrally spoken emotionally valenced word (target). They were to judge the emotional meaning of the target as quickly as possible. In support of the foregoing hypothesis, Study 1 showed that this judgment is made more quickly if the prime is spoken in a congruous emotional vocal tone than if it is spoken in an incongruous tone. However, no comparable effect was found as a function of the emotional verbal meaning of the prime. This was the case despite the fact that emotional vocal tones of primes were considerably less extreme than their verbal meanings. Furthermore, Study 2 predicted and found that when a prime is spoken in a neutral tone of voice, the verbal meaning of the prime has a reliable priming effect. Implications for culture, communication, and cognition are discussed.

Keywords: Japanese, emotional utterances, vocal tone, affective priming

Previous studies in cultural anthropology and cultural and cross-cultural psychology have suggested one marked difference in communicative style between European languages and cultures and Asian ones (Fiske, Kitayama, Markus, & Nisbett, 1998; Hall, 1976; Nisbett, Peng, Choi, & Norenzayan, 2001). In European languages and cultures, both speakers and listeners tend to share an implicit rule that what is said in word is what is meant. Accordingly, verbal content serves as the primary means by which information is conveyed. Contextual information including vocal tone plays a relatively minor role. By contrast, in Asian languages and cultures, both speakers and listeners tend to share an implicit rule that what is said makes best sense when placed in a particular context. Hence, the proportion of information conveyed by verbal content is less, and contextual information including vocal tone plays a relatively more prominent role. Hall (1976) referred to these two styles of communication as low-context and high-context, respectively.

Drawing on this literature, we have examined whether and to what extent the low versus high-context patterns of communicative practices and conventions may be reflected in the nature of processing systems (Kitayama & Ishii, 2002). Specifically, Kitayama and Ishii (2002) used a Stroop-type interference paradigm (MacLeod, 1991; Stroop, 1935), and found evidence for culturally divergent attentional biases. Native English (low-context language) and Japanese (high-context language) speakers were presented with a number of emotionally spoken emotional words,
one at a time. Their task was either to judge the pleasantness of the vocal tone of each utterance while ignoring its verbal meaning, or to judge the pleasantness of its verbal meaning while ignoring its vocal tone. To the extent that subjects spontaneously attend to the to-be-ignored channel of information, there should be an interference effect such that the response time for the focal judgment becomes faster when information in the to-be-ignored channel is congruous than when it is incongruous. Kitayama and Ishii observed that an interference effect by verbal meaning in the vocal judgment condition was larger in English than in Japanese. This demonstrates an attentional bias for verbal content is stronger for English speakers than for Japanese speakers. However, the comparable effect by vocal tone in the verbal meaning judgment was larger in Japanese than in English. This indicates that a converse attentional bias that favors vocal tone is more pronounced for Japanese speakers than for English speakers. The basic finding has since been replicated with better experimental controls (Ishii, Reyes, & Kitayama, in press). Together, this work provides support for the hypothesis that in English verbal information is processed more thoroughly than attendant vocal tone; but in Japanese vocal tone information is processed more thoroughly than attendant verbal meaning.

In the present research, we examined some further implications of the hypothesis that speakers of a high context language and culture (e.g., Japanese) process vocal tone of an emotional utterance more thoroughly than its verbal meaning. For this purpose, we used an affective priming procedure (Bargh, Chaiken, Govender, & Pratto, 1992; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). Native Japanese speakers were presented with an emotionally spoken emotionally valenced word (prime), immediately followed by a neutrally spoken emotionally valenced word (target). They were to judge the emotional meaning of the target as quickly as possible. We suggest that upon exposure to a prime, native Japanese speakers spontaneously allocate attention primarily to the vocal tone of the prime rather than to its verbal meaning. The vocal tone information thus activated will then influence the processing of the target. Specifically, the processing of the target should be facilitated if the vocal tone information is congruous with the emotional meaning of the target.

The primary purpose of the current study was to test the foregoing prediction about the relative priority accorded on vocal tone over verbal content in the processing of Japanese utterances. In addition, however, we also addressed one subsidiary issue. It related to a unique characteristic of auditory processing, namely, the significant role played by physical auditory cues in selective attention. Unlike written materials, speech stimuli typically come with a number of auditory cues that can be used to guide attention. These cues include the location of different sound sources, distinctly sounding voices such as male vs. female voices, and different languages such as English vs. Japanese. In their classic work, Broadbent and colleagues showed that individuals are very sensitive to these auditory cues in guiding their attention (e.g., Broadbent, 1958).

As suggested by Broadbent and others, the foregoing mechanism of selective attention makes it possible to engage in a conversation with someone in the midst of background noise, hence producing a cocktail party effect (Cherry, 1953). To be more specific, in speech comprehension, when brought to the focus of attention, any utterance (say, a target utterance in the affective priming paradigm) will be readily related or referenced back to immediately preceding utterances (e.g., a priming utterance). In this way, higher order structures of communication such as phrase and sentence are constructed from specific words (Gernsbacher, 1990). When this retrospective referencing happens, we may expect considerable priming effects by the preceding utterances on the processing of the target. However, the ret-
respective referencing would happen if and only if both the target and the preceding utterances were judged to have come from the same source. If the speaker was judged to have been switched from the priming utterance to the target, attention would be readily released from the prime, shifted, and focused solely on the target. Under these latter cases, there should be no priming effect.

To test the foregoing hypothesis, we varied the similarity of auditory qualities of a prime and a target that are presented on each trial. One most distinctive feature associated with physical vocal qualities is the sex of the speakers. In general, voices of speakers of the same sex are much more similar to each other than those of speakers of different sexes. Furthermore, our pilot test revealed that especially when vocal tones were emotional, individual speakers of the same sex could hardly be differentiated, although the sex of the speakers could readily be perceived. For these reasons, we compared trials where both a prime and a target were spoken by speakers of the same sex with those where they were spoken by speakers of different sexes. We predicted that Japanese speakers would show a strong priming effect as a function of the vocal tone, rather than the verbal meaning, of a prime. Furthermore, this priming effect was predicted to be much more pronounced when the prime and the target were spoken by speakers of the same sex than when they were spoken by speakers of different sexes.

Finally, we examined incidental memory of priming words. The purpose was to examine the degree to which the verbal meaning of the primes was explicitly encoded. If no attention was paid to the verbal meaning of a priming word, no memory of the word should be formed (Kitayama, 1996; Kitayama & Burnstein, 1988). Accordingly, if there was a reliable memory of priming words, this would suggest that the word meanings of the primes had been explicitly encoded and consciously recognized.

Study 1
Method
Respondents and Procedure
Fifty-eight undergraduates at a Japanese national university (44 males and 14 females) participated in the experiment. Each respondent was seated in front of a personal computer and asked to wear a pair of headphones. The respondents were instructed to listen to two successively presented words and to judge the meaning of the second word (the target stimulus) as pleasant or unpleasant. They were asked to ignore the first word (the priming stimulus). The experiment consisted of 72 trials, preceded by 10 practice trials. On each trial, a “ready” sign appeared first at the center of the screen. When the respondent pressed the space bar, a prime stimulus was played from the headphones. After 350 msec from the onset of the prime utterance, a target utterance was presented. In this procedure, we held constant the onset asynchrony between a prime and a target. In part because of this, the tail end of a prime often overlapped with the beginning of a target. In order to make targets clearly understandable, primes were played at a lower volume. The respondents were asked to respond as quickly as possible without sacrificing accuracy in judgment. Response time was measured in msec from the onset of the target stimulus. 1500 msec after the response, the next trial began. The order of 72 trials was randomized for each respondent.

Upon completion of the word meaning judgment task, the respondents worked on a filler task. They were then given a recognition test of the priming words. The respondents were presented with 36 words, one at a time, and asked to indicate whether each word had been presented as a prime stimulus in the first part of the experiment. Half of the 36 words had actually been presented and the remaining half were fillers. Further, half of the fillers were pleasant in emotional meaning and the remaining half were unpleasant.
Table 1  Words used in the two studies  
(Translation equivalents in English are given in parentheses)

<table>
<thead>
<tr>
<th>Word Meaning</th>
<th>Pleasant</th>
<th>Unpleasant</th>
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<tbody>
<tr>
<td><strong>Prime Stimuli</strong></td>
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<tr>
<td>AKARUI (BRIGHT)</td>
<td>BAKA (FOOL)</td>
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<tr>
<td>KAWAI (CUTE)</td>
<td>BINBOU (POVERTY)</td>
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<tr>
<td>SAWAYAKA (REFRESHING)</td>
<td>FUAN (ANXIETY)</td>
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<td>SHINSETSU (KINDNESS)</td>
<td>ITAI (PAINFUL)</td>
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<tr>
<td>SUBARASHI (WONDERFUL)</td>
<td>JIGOKU (HELL)</td>
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<td>URESHII (JOYFUL)</td>
<td>KITANAI (DIRTY)</td>
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<tr>
<td>UTSUKUSHII (BEAUTIFUL)</td>
<td>MUNASHII (FRUITLESS)</td>
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<tr>
<td>YASASHII (GENTLE)</td>
<td>NIKUI (HATRED)</td>
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<tr>
<td>YASURAGI (CALMNESS)</td>
<td>OSOROSHII (TERRIBLE)</td>
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<td><strong>Target Stimuli</strong></td>
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<tr>
<td>HYOKINNA (JOCULAR)</td>
<td>AKIPPOI (CAPRICIENTIOUS)</td>
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<tr>
<td>KANDAINE (GENTLE)</td>
<td>HIGAMI (PREJUDICE)</td>
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<tr>
<td>KINBENNA (INDUSTRIOUS)</td>
<td>IRADACHI (IRRITATION)</td>
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<td>KOMAMENA (BRISK)</td>
<td>KUDOI (PERSISTENT)</td>
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<td>OORAKANA (BROAD-MINDED)</td>
<td>MEMESHI (EFFEMINATE)</td>
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<td>OMOSHIRIOI (INTERESTING)</td>
<td>NOROI (SLOW)</td>
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<tr>
<td>RICHIGINA (UPRIGHT)</td>
<td>SAWAGASHII (NOISY)</td>
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<td>SHIZUKANA (QUIET)</td>
<td>URUSAI (LOUD)</td>
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<tr>
<td>SEIJIKOSU (SINCERE)</td>
<td>ZURUI (SLY)</td>
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Materials  
Thirty-six utterances served as prime stimuli. These utterances were adopted from the stimulus set developed in our earlier study (Kitayama & Ishii, 2002). From this work, the average pleasantness rating of verbal meaning and the average pleasantness rating of vocal tone were available for each of 144 utterances. By examining pleasantness ratings of content-filtered utterances, Kitayama and Ishii (2002) had ensured that the vocal tone ratings were unrelated to the attendant verbal meanings. On the basis of the normative ratings from the Kitayama and Ishii (2002) study, we selected nine pleasant meaning words and nine unpleasant meaning words in such a way, first, that all the words were spoken in both pleasant and unpleasant vocal tones, second, that approximately half of the words were spoken by male speakers and the remaining half were spoken by female speakers, and, third, that the vocal tone of the utterances was uncorrelated with their verbal meaning. The words thus selected are listed in the upper half of Table 1. It is important to note that in the Kitayama and Ishii stimulus set, verbal meanings were considerably more extreme than vocal tones. The same asymmetry existed in the current stimulus set as well. This confounding, however, goes against our primary hypothesis that for Japanese the affective priming effect should be stronger for vocal tones than for verbal meanings.

Another set of nine words with pleasant meanings and nine more with unpleasant meanings were used as targets (see the lower half of Table 1). The targets were chosen from a list of personality trait adjectives provided by Aoki (1971). The adjectives adopted as targets were all unequivocally emotional, either pleasant or unpleasant. One male and one female speakers—different from those who generated the primes—read the 18 target words in a neutral vocal tone. Each of the 18 targets was used once in each of the four prime stimulus conditions (+/+, +/−, −/+, −/− in meaning/vocal tone), resulting in the total of 72 trials (18 x 4). Further, these 72 trials were prepared in two versions. In the same speaker sex version, the speaker of the prime and the speaker of the target were always of the same sex; whereas in the different speaker sex version, they were of different sexes. In the
latter version, in approximately half of the trials (40) the prime was spoken in a male voice and the target in a female voice and in the rest of the trials this combination was reversed\(^1\).

**Results and Discussion**

**Response Times**

Data from two respondents who failed to follow the instructions were discarded. Responses were highly accurate in all conditions, with the accuracy of greater than 95%. Response times for the correct responses were thus used as the main dependent variable. Because response times increased as a function of the length of target utterances, we controlled for the effect of utterance length. In order to do this, we regressed response times for all correct responses on the length of the stimulus utterances. For each data point, we obtained a predicted response time — a value predicted as a linear function of the length of the target stimulus. Deviations from the predicted values (i.e., residuals) were then added to the overall mean response time to obtain adjusted response times.

These adjusted response times were analyzed in a 2 x 2 x 2 x 2 MANOVA (speaker sex condition [same vs. different] x word meaning of the prime [pleasant vs. unpleasant] x vocal tone of the prime [pleasant vs. unpleasant] x word meaning of the target [pleasant vs. unpleasant]). First, pertinent means were computed for each respondent and subsequently submitted to the MANOVA. We predicted that there should be a strong priming effect by vocal tone of primes especially when the primes and the targets were spoken by the speakers of the same sex. That is, under these conditions, the judgment of the emotional meaning of the primes should be more quickly made if the vocal tone of the priming utterances was emotionally congruous than if it was incongruous. Further, we also predicted that a priming effect by verbal meaning should be considerably weaker.

As predicted, a two-way interaction involving speaker condition, vocal tone of primes, and word meaning of targets proved significant, F(1, 54) = 8.93, p < .01. As shown in Figure 1, the pattern of data was very different in the two speaker sex conditions. To begin with, in the same speaker sex condition, we observed a strong priming effect by vocal tone of primes. Specifically, the emotional meaning of targets was judged more quickly if the vocal tone of primes was congruous than if it was incongruous. The simple interaction between the vocal tone of primes and the emotional meaning of targets was significant (t(54) = 3.30, p < .01). Pair-wise comparisons revealed that the time required to judge a pleasant target was significantly less if the vocal tone of the attendant prime was pleasant than if it was unpleasant (t(54) = 2.44, p < .02). Likewise, the time required to judge an unpleasant target was less, albeit marginally, if the vocal tone of the attendant prime was unpleasant than if it was pleasant (t(54) = 1.88, p < .10). Seen from a different angle, when the vocal tone of primes was pleasant, the response time was significantly shorter for pleasant targets than for unpleasant targets (t(54) = 2.83, p < .01). When the vocal tone of primes was unpleasant, however, such a difference entirely disappeared (t < 1).

The data pattern in the different speaker sex condition was very different: No priming effect was found as a function of the vocal tone of priming utterances. As shown in Figure 1-B, mean response times did not depend on the congruence between the vocal tone of primes and the meanings of targets (t(54) = 1.01, n.s.). It is noteworthy that the mean response time was somewhat shorter in the different speaker sex condition than in the same speaker sex condition although the difference failed to attain statistical significance (p > .10). If borne out in future work, this difference would support the hypothesis that when sound sources are judged to be different, preceding utterances are simply ignored and, hence, they do not tax any processing ca-

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1) Stimuli used in the current work are available, upon request, from the authors.
pacities when a judgment is made on a target.

Finally, the MANOVA showed no significant interactions involving the verbal meaning of priming utterances. In Figures 2-A and B, we plotted response times as a function of the emotional meaning of priming utterances and the emotional verbal meaning of target utterances. As can be seen, regardless of the speaker sex conditions, no priming effects were obtained. Simple interactions were negligible ($F$s < 1). This provides support for the prediction that in Japanese verbal meaning of emotional utterances would not be thoroughly processed.

**Recognition of the primes**

An accuracy measure for the recognition test of priming words was first computed within a signal detection framework. We adopted a measure developed by Grier (1971). In this measure, chance accuracy is indexed by .5 and perfect accuracy, by 1. The accuracy measure was reasonably high and did not depend on the speaker sex conditions ($M$s = .80 in the same speaker sex condition and .81 in the different speaker sex condition). This suggests that verbal meanings of priming utterances were explicitly encoded. It is all the more interesting, then, that we did not observe any priming effect due to the verbal meaning of the priming utterances.
Study 2

One striking aspect of the results from Study 1 concerns the remarkably high accuracy of memory for verbal meanings of priming utterances. This finding provides a clue into a mechanism underlying the absence of any priming effects due to these meanings. Because the verbal meanings are clearly activated and transferred to long term memory, we can readily reject the most simple-minded hypothesis that Japanese speakers pay attention only to vocal tone and, therefore, they fail to take note of verbal meanings. Instead, the memory data indicates that Japanese speakers do pay attention to verbal meanings and, thus, the verbal meanings are activated. Accordingly, it would seem more reasonable to hypothesize that although verbal meanings are initially activated, Japanese speakers subsequently inhibit this activation. Because of this active inhibition, the verbal meanings may fail to have any priming effects on the processing of subsequent target utterances.

According to this analysis, the active inhibition of verbal meanings takes place because the attendant vocal tone is perceived to be far more informative and, thus, worthy of focused attention. To put it differently once vocal tone information is registered, it may recruit attentional resources and, as a consequence, it may readily inhibit the information activated by the verbal meanings. This analysis has an important implication. If the inhibition of verbal meaning is initiated by a recognition of informativeness of vocal tone, it should not occur if no obvious information is discernible in vocal tone. More specifically, if the vocal tone of priming utterances was emotionally neutral and, thus, carried little or no information, then the attendant verbal meanings should receive no inhibition and, as a consequence, there ought to be a reliable priming effect due to the verbal meanings. The purpose of Study 2 was to test this prediction. We thus used, as priming utterances, neutrally spoken words with either positive or negative verbal meanings.

Method
Respondents and Procedure

Thirty-four undergraduates at a Japanese national university (23 males and 11 females) participated. The procedure was identical to that of the same speaker sex condition in Study 1 but for a minor change. The prime stimuli were presented in a neutral vocal tone only, reducing the total number of combinations of primes and targets by half. These combinations were repeated in two blocks, yielding the same number of trials (72) as in Study 1.

Results and Discussion
Response time

Mean response times from correct responses were obtained after controlling for the effect of the length of target utterances. They were then submitted to a 2 x 2 x 2 MANOVA (trial blocks x word meaning of the prime x word meaning of the target). The pertinent means are summarized in Figure 3. As predicted, there was a priming effect by the verbal meanings of priming utterances. Specifically, the mean response time was shorter when the verbal meanings of primes and those of targets were congruous than when they were incongruous. The interaction implied by this pattern, namely, the one between prime verbal content and target verbal content, approached statistical significance, \( F(1, 33) = 3.75, p < .07 \). Pair-wise comparisons revealed that the time required to judge an unpleasant target was significantly less if the vocal tone of the attendant prime was unpleasant than if it was pleasant \( t(33) = 2.15, p < .05 \). This difference, however, disappeared for the time required to judge pleasant targets \( t < 1 \).

This pattern was quite different from the corresponding pattern we obtained in the same sex speakers condition of Study 1 (see Figure 2-A). Whereas the prime verbal meaning x target ver-
Figure 3  Mean response times as a function of the emotional verbal meaning of primes and the emotional verbal meaning of targets: Unlike Study 1, Study 2 used neutrally spoken primes and found evidence for a priming effect due to verbal meanings of the primes.

verbal meaning interaction was negligible in Study 1, it was clearly present in Study 2. Indeed, when these two patterns were examined within a MANOVA, prime vocal tone (present [Study 1] vs. absent [Study 2]) x prime verbal meaning x target verbal meaning interaction proved significant, $F(1,61) = 6.05, p < .02$. This provides initial evidence for the hypothesis that in the processing of spoken Japanese, verbal meanings of emotional utterances are actively inhibited when the attendant vocal tone is recognized to be informative.

Recognition of the primes

As in Study 1, the recognition accuracy for the priming words was fairly high ($M = .80$). The accuracy in this study (where the primes were spoken in neutral tones) was no different from the one in Study 1 (where the primes were spoken in emotional tones).

General Discussion

Building on our earlier work (Ishii et al., in press; Kitayama & Ishii, 2002), the present research provides further evidence that processing systems of native Japanese speakers are attuned primarily to vocal tone rather than to verbal content. Whereas the previous evidence for this point comes from a Stroop-type interference paradigm, the current evidence is based on an affective priming paradigm. Thus, Study 1 showed that when emotionally spoken, emotionally valenced words were used as primes, their vocal tones had a significant priming effect on the processing of subsequently presented target utterances. Importantly, the verbal meanings of the primes were clearly activated (as indicated by a quite high recognition performance) and, yet, when the primes were spoken in emotionally toned voices, they failed to have any priming effect on the processing of the targets. This pattern of data suggests that the verbal meanings of the primes were actively inhibited when the attendant vocal tone was judged to be more informative. In support of this analysis, Study 2 showed that the verbal meanings of primes do have a reliable priming effect on the processing of targets if the voices used to speak the primes were emotionally neutral and, thus, relatively uninformative.

Importantly, Study 1 showed that the priming effect due to vocal tone happened only when the primes and the targets were similar in vocal characteristics (i.e., they were spoken by speakers of the same sex), but not when they were quite distinct (i.e., they were spoken by speakers of different sexes). This provides evidence for the notion that preceding utterances are quickly removed from working memory once they are judged to belong to a sound source different from the source for an utterance that is currently at the focus of attention.

The current evidence will have to be supplemented with data from other languages and cultures. It is especially important to extend the current analysis to other high-context languages and cultures. Ishii et al. (in press), in fact, has provided evidence that native speakers of Tagalog in the Philippines are more sensitive to vocal tone than to verbal meaning. It is also important to examine similar priming effects in low-
context cultures (e.g., North America) and languages (e.g., English). In view of the evidence that in English verbal content rather than vocal tone receives a greater priority of processing (Ishii et al., in press; Kitayama & Ishii, 2002), it would seem likely that in English it is verbal content rather than vocal tone that causes a significant priming effect. Above and beyond this, it would also be important to determine whether physical similarities of voices would have an analogous effect in English.

Our theoretical analysis is quite consistent with post-Whorfian views in psycholinguistics where cultural practices involved in actual use of language are highlighted and are assumed to mediate effects of language on cognition (Krauss & Chiu, 1998). Previous work on linguistic relativity focused mostly on structural features of language (Au, 1983; Bloom, 1981). We have veered away from this typical view because in any communicative practice, linguistic and non-linguistic or cultural aspects are tightly connected and even inseparably meshed with each other. Our analysis implies that some other specific processing biases may also be traced back to certain known characteristics of the communicative practices of different cultural groups (Kitayama & Miyamoto, 2000; Nisbett et al., 2001).

In conclusion, the current evidence further reinforces the cultural psychological hypothesis of potential multiplicity of mental processes (Fiske et al., 1998; Kitayama, 2002). According to this hypothesis, human mental processes draw importantly on species-specific potentials. At the same time, however, they are significantly shaped by cultural practices and meanings in which they are engaged. Because practices and meanings are cross-culturally variable, so will be the attendant mental processes. Furthermore, this analysis implies that the cultural influence should be most pronounced when the mental processes at issue operate spontaneously, on line, in attunement with the cultural practices and meanings. Under these conditions, the cultural influence may occur even when the actor is unaware of it (Kitayama, 2002; Nisbett & Wilson, 1977). These considerations highlight important limitations of self-report measures. Instead, they encourage a more concerted research program of cross-cultural experimentation with both rigid control and creative design. The work reported here is aspiring to contribute to this literature.

Authors Notes
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