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The influence of culture: holistic versus analytic perception

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There is recent evidence that perceptual processes are influenced by culture. Westerners tend to engage in context-independent and analytic perceptual processes by focusing on a salient object independently of its context, whereas Asians tend to engage in context-dependent and holistic perceptual processes by attending to the relationship between the object and the context in which the object is located. Recent research has explored mechanisms underlying such cultural differences, which indicate that participating in different social practices leads to both chronic as well as temporary shifts in perception. These findings establish a dynamic relationship between the cultural context and perceptual processes. We suggest that perception can no longer be regarded as consisting of processes that are universal across all people at all times.

Introduction

Since the 1950s there has been little attempt to examine the effect of culture on perception or indeed on individual differences of any kind. In this article we have three goals: (1) to establish our contention that there are effects of culture on perceptual categorization, storage in memory of perceived information, and perceptual attention; (2) to present evidence indicating that cues that mimic or 'prime' culture also affect perception; and (3) to speculate on the mechanisms by which different cultures produce different characteristic default patterns for perception. We believe that the evidence forces a reconceptualization of attentional and perceptual processes as being susceptible to cultural influences that are both long-term and temporary. The evidence is too new to have prompted a critical reaction on the part of experts in perception, and it is our hope that this article will have the effect of encouraging debate about the findings and their implications for traditional notions of perception and attention.

Nearly all the evidence about cultural influences on perception has been produced in the past five years. The work on perception was stimulated by work on cognition showing that inferential processes are affected by culture. For example, Westerners tend to attribute events to causes internal to the object or person whereas Asians are more likely than Westerners to attribute causality to the context or situation [1,2]. Westerners are more likely to use categorization and rules in reasoning about everyday life events whereas East Asians are more likely to emphasize relationships and similarities [3]. It is our contention that there are analogous cultural differences in perceptual processes [4–6]. People in Western cultures tend to engage in context-independent and analytic perceptual processes by focusing on a salient object (or person) independently from the context in which it is embedded. On the other hand, people in East Asian cultures tend to engage in context-dependent and holistic perceptual processes by attending to the relationship between the object and the context in which the object is located.

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Cultural differences in attention and perception

We believe that the evidence indicates that people in Western cultures focus on salient objects and use rules and categorization for purposes of organizing the environment. By contrast, people in East Asian cultures focus more holistically on relationships and similarities among objects when organizing the environment.

Relationships versus rules and categories

In one illustrative study [7], both rural Chinese and American children were presented with pictures that consisted of three objects (e.g. a man, a woman and a baby) and were asked to pick two objects out of three that went together. Whereas Chinese children tended to group two objects on the basis of the relational-contextual information (e.g. a woman and a baby are grouped together 'because the mother takes care of the baby'), American children tended to group objects based on shared analytic features or shared categories (e.g. a man and a woman are grouped together 'because they are adults'). Ji *et al.* [8] replicated these findings with Chinese and American college students. These two sets of results indicate that culture influences late stages of perception, namely perceptual categorization.

Cultural differences in the way people perceive similarities have been found not only at the conceptual level but also with more purely perceptual stimuli [3]. Norenzayan and colleagues presented European American, Asian American and East Asian participants with a target object and and asked them to judge which of two groups of four objects the target object was most similar to (see Figure 1a). All the objects in one group shared a particular feature with the target object, whereas the members in another category shared a large number of features with the target, although no one feature was

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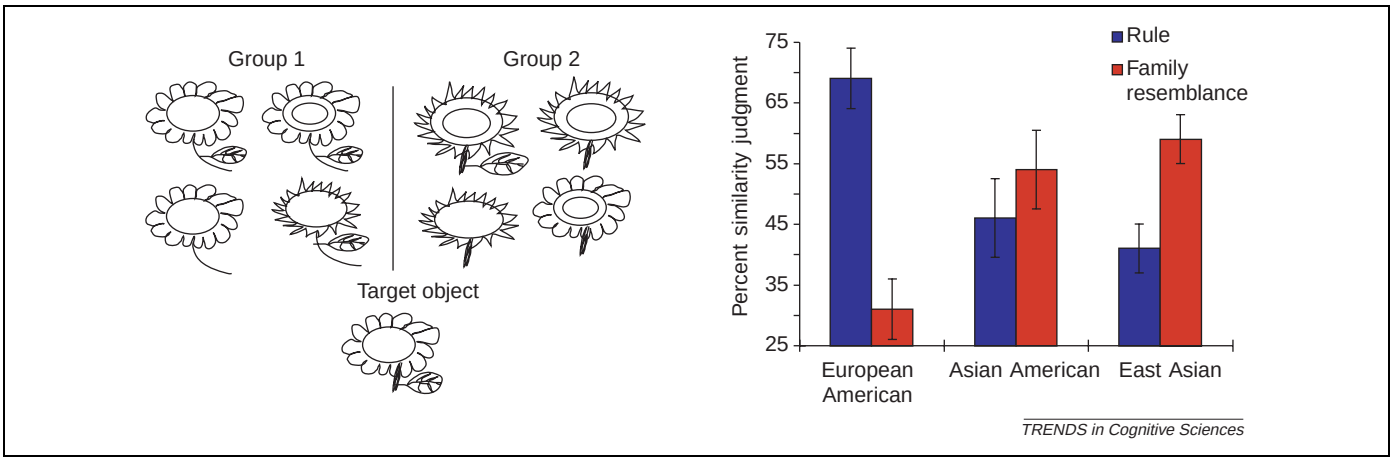

Figure 1. An example of categorization tasks and results from Norenzayan *et al.* [3]. **(a)** Participants were presented with a target object and two groups of four objects, and were asked to judge which group the target object was most similar to. In this example, all the objects in group 2 share the same stem as the target object, whereas the members in group 1 share a large number of features with the target, although no one feature is shared by all the members. Thus, whereas the group 2 shares a unidimensional rule with the target, group 1 is holistically more similar to the target. **(b)** European Americans much more often perceived similarities based on the unidimensional rule, but East Asians more frequently perceived similarities based on holistic judgments of family resemblance.

shared by all the members. Thus, whereas the former category shared a unidimensional rule with the target, the latter category was holistically more similar to the target. As can be seen in Figure 1b, European Americans perceived similarities based on the unidimensional rule much more often, whereas East Asians more frequently perceived similarities based on holistic judgments of family resemblance. Asian Americans were intermediate. (In several other recent studies Asian Americans have been tested, and in all cases their behavior was intermediate between that of Asians and that of European Americans, and usually closer to that of European Americans.) We believe that this study indicates that there are cultural differences in the way stimuli are compared in the process of categorization.

Attending to the focal object versus context

Perceptual categorization differences appear to be linked to differences across cultures in patterns of attention. Abel and Hsu [9] presented Rorschach cards to China-born Chinese and American-born Chinese participants and found that China-born participants perceived the blots as a whole pattern more frequently than did the American-born participants. By contrast, American-born participants focused on a detailed part of the blots more frequently than did China-born participants.

East Asian perception seems to be holistic not merely with respect to perception of a single stimulus but with respect to perception of the visual field as a whole. Ji *et al.* [10] presented European Americans and East Asians with the Rod-and-Frame Test developed by Witkin and colleagues [11]. In this task, a rod or line appears in a frame, which can be rotated independently from the rod. Participants were asked to judge when the rod appeared to be vertical but ignore the position of the frame. East Asians made more errors than European Americans, indicating that East Asians were attending more to the whole field and thus had more difficulty ignoring the frame. Extending this line of work, Kitayama *et al.* [12] recently developed the Framed-Line Test (FLT), which allows measurement of holistic versus analytic perception in the same task format, and they replicated the findings (see Figure 2). Furthermore, East Asians not only attend more to the field, they attend to it earlier, they remember more about it, and they 'bind' salient target objects to the field in memory (see Box 1).

Additional evidence that Asians attend more to the context comes from work by Masuda and Nisbett [15], using the change blindness paradigm [16,17]. They presented Americans and Japanese subjects with two animated vignettes of scenes (e.g. a farm) that differed in various small details. Some of the changes were made in the attributes of the salient, focal objects and other changes were made in the field or context, including the background objects and location of objects. Consistent with the previous findings, Americans detected more changes in the focal objects whereas Japanese detected more changes in the field and relationships between objects. The findings reveal subtle yet qualitatively different styles of attending to information in the environment.

If Asians and Westerners are seeing different things then it seems likely that they are actually looking at different things. Indeed, Chua *et al.* have found cultural differences in eye movements [18]. They presented European Americans and Chinese participants with pictures of a focal object (e.g. a tiger) placed on a background (e.g. the jungle). Participants rated how much they liked each picture, and their eye movements were tracked for three seconds. Compared with the Chinese participants, Americans looked at the focal object sooner and fixated for longer on it. Chinese subjects made more saccades (rapid eye movements from one location to the next) both in general, and in particular to the background. We contend that these results provide clear evidence that attention is broader for Asians and relatively narrow for Westerners.

Differential patterns of attention to focal object versus context are not confined to controlled stimuli stripped of any socio-cultural context. It has been demonstrated that perception and memory of social behavior in everyday life events also depends on culture [19]. In free recall of written narratives about personal experiences, written

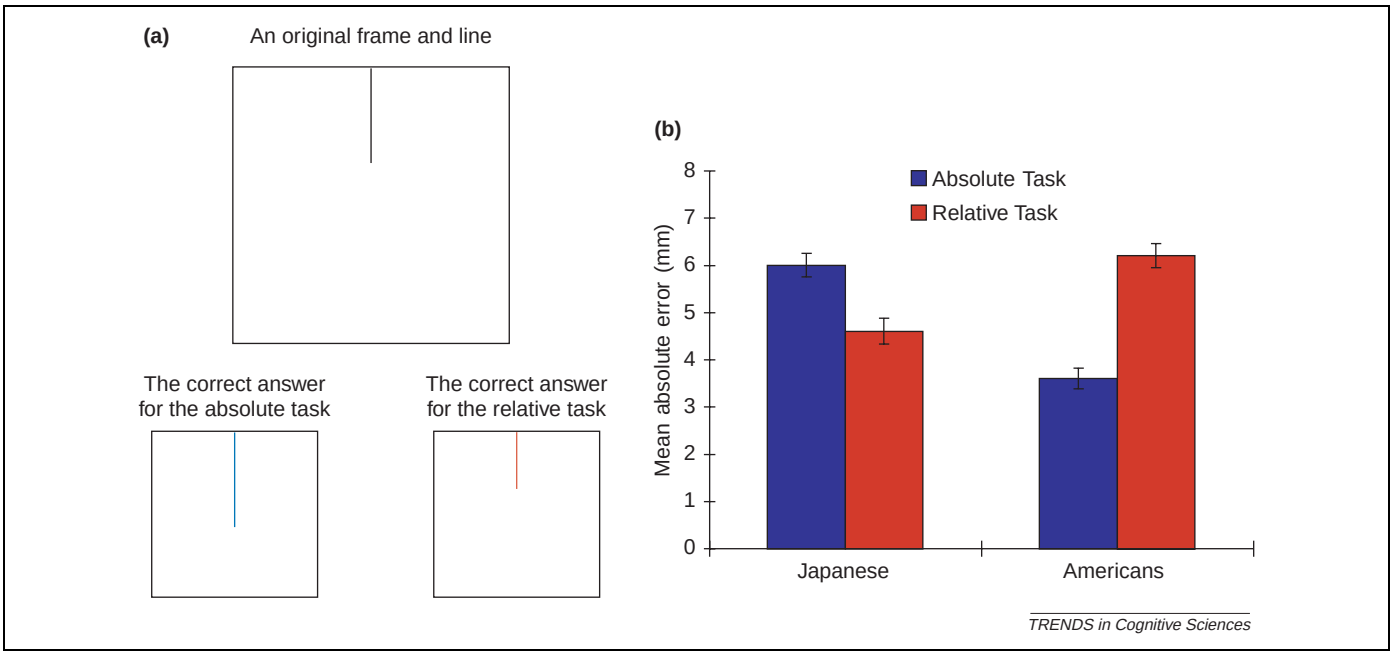

Figure 2. An illustration of the Framed-Line Test and results from Kitayama *et al.* [12]. This is an innovative task that allows measurement of holistic versus analytic perception. **(a)** Participants were shown a square frame with a vertical line like the one at the top. They were then shown a new square frame of a different size and were asked to draw a line that was identical to the first line in either absolute length (absolute task), like the blue line at the bottom left, or in proportion to the surrounding frame (relative task), like the red line at the bottom right. **(b)** The error scores show that American participants were more accurate in the absolute task than the relative task, whereas Japanese were more accurate in the relative task, suggesting that Japanese were paying more attention to the frame than Americans were.

descriptions of events occurring to other people, and video presentations, it was found that Americans mentioned more events and actions involving the main character relative to the other characters, than did Taiwanese participants [19].

Thus, we believe there is considerable evidence that shows that Asians are inclined to attend to, perceive and remember contexts and relationships whereas Westerners are more likely to attend to, perceive and remember the attributes of salient objects and their category memberships. It should be noted that the perceptual and attentional differences just described are in general quite large, sometimes even close to one standard deviation. Indeed, in the typical study, Asians and Westerners were found to behave in qualitatively different ways.

Mechanisms underlying cultural differences

Why should cultural differences in perception and attention exist? Several possible mechanisms have been explored.

A number of investigators have proposed that differences in social structure and social practice underlie differences in perception [4,8,7,20–22]. If one lives in a complex, interdependent social world with many role prescriptions, one needs to attend to relationships and to the context. On the other hand, if one lives in relatively independent, individualistic social circumstances, one might attend primarily to objects and one's goals with respect to those objects without being overly constrained by other people's demands and needs [4]. Asian societies are more interdependent and thus attend more to context. In support of the contention that social practices underlie attentional and perceptual ones, Knight *et al.* have contrasted non-Asian interdependent societies with non-Asian independent societies (N. Knight *et al.*, unpublished). They found that Eastern Europeans showed more context-dependent attentional patterns than did Western Europeans and that Southern Italians and working-class Italians showed more context-dependent reasoning styles than did Northern Italians and middle-class Italians. Social structures and relationships have historically been more close-knit, role-prescribed and interdependent in Eastern Europe than in Western Europe [23–26], in Southern Italy than in Northern Italy [27–29] and among the working-class than among the middle-class [30–35], so these findings suggest that Asian–Western differences in perception might well be rooted in social structure and social practice differences.

Chronic effect of culture on perception

People could acquire a specific attentional pattern through participation in socialization processes characteristic of each culture, including child rearing practices. Most such socialization practices are handled by caregivers who themselves have a specific pattern of attention and, in rearing children, they are likely to reproduce a pattern of attention specific to each culture.

When mothers and infants are observed playing with toys in their own home (e.g. [36,37]) it is found that American mothers label toys and point out their attributes more often than do Japanese mothers. By contrast, Japanese mothers tend to engage their infants in social routines more than do American mothers. American mothers' emphasis on labeling objects might lead infants to focus on the objects and their appropriate categorizations whereas Japanese mothers' emphasis on social practices might direct infants' attention to the relationship or to the context in which the object is located.

Box 1. Attending to context and the relation between the object and the context

Masuda and Nisbett showed Japanese and American subjects short video clips depicting an underwater scene with salient, focal objects (fish), as well as contextual objects, such as small animals, plants and rocks (Figure I shows a still picture from one of the video clips), and asked them to report what they saw in the clip [13]. Americans started their statements by referring to salient objects (defined as being larger, brighter and more rapidly moving) far more frequently than did Japanese subjects, whereas Japanese started their statements by referring to context information (defined as non-moving objects or objects that appeared to be in the background) almost twice as frequently as Americans did. Overall, Japanese subjects reported 60 percent more information about the context than did Americans. In a subsequent recognition task, participants were presented with objects they had seen previously, either with their original background, a novel background, or no background, and were asked to indicate whether they had previously seen the objects. Whereas Americans' performance was not affected by the background manipulation, Japanese performance was impaired when the background was novel. These results indicate that Japanese tended to perceive the object and the field as a whole and 'bind' them in perceptual memory [14]. The findings overall indicate marked differences in what is attended to by Easterners and Westerners.

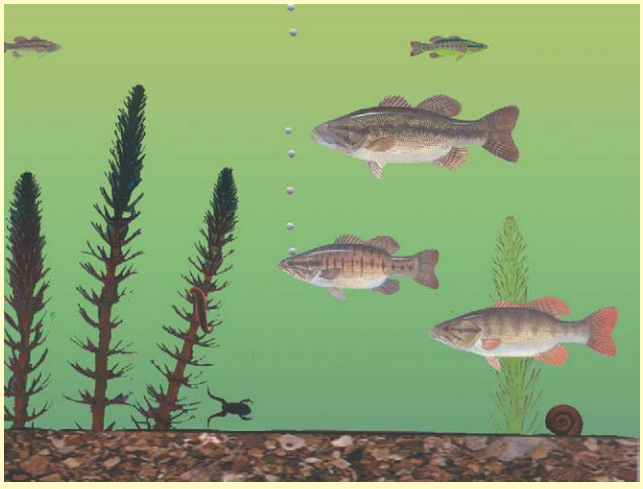

Figure I. A still picture from one of the animated vignettes from Masuda and Nisbett [12]. They lasted for 20 s and were shown twice before participants were asked to report what they saw.

American mothers' emphasis on labeling objects extends to the prevalence of nouns in American mothers' speech in general. Tardif and her colleagues found that whereas Mandarin-speaking mothers produced more verbs than nouns, English-speaking mothers produced more nouns than verbs when talking with their toddlers [38,39]. Corresponding to the mothers' speech, Mandarin-speaking toddlers produced relatively more verbs and fewer nouns than English-speaking toddlers (see also [40]). Such language usage and communication practices can guide children's attention to either the object (noun) or to the relationship between the object and the field (verb).

Some researchers have started to explore the developmental trends resulting from such social practices. Using the FLT [12], one recent study found that whereas 4-year-olds in both Japan and the US performed better on the relative judgment task than on the absolute judgment task, American 5-year-olds became more accurate in the absolute task than in the relative task (S. Duffy *et al.*, unpublished). Their results seem to suggest that both Americans and Japanese show holistic perception at age 4, but American children start to diverge from Japanese children by beginning to ignore the context and focusing on salient objects around age 5.

Box 2. Priming culture

Independent and interdependent social orientations are obviously both familiar in all cultures. (For example, consider the difference in orientation between playing an individual sport and playing a team sport.) Kühnen and Oyserman [41] primed Americans with either an interdependent or independent orientation and subsequently gave them a letter-identification task. The priming procedure consisted of having participants read a brief paragraph about an ordinary activity (e.g. a trip to a city) and instructing them to circle all the pronouns in the test. In the interdependence condition, all the pronouns in the paragraph represented the self in relation to others (e.g. 'we', 'our', 'us'), whereas in the independence condition the pronouns represented the self independent of any relationships (e.g. 'I', 'my', 'me'). In the subsequent letter identification task, a large letter made up of smaller letters was presented and the participants were asked either to identify the small letters while ignoring the large letter (i.e. an analytic task focusing on features), or to identify the large letter (i.e. a holistic task focusing on the entire stimulus object). Those who were primed with independence were quicker in identifying the small letters than the large letter, whereas those primed with interdependence identified the large letter as quickly as the small letters. Similar priming effects have also been observed among Koreans (O. Cha *et al.*, unpublished). Using the Framed-Line Test [20], it was found that Koreans who were primed with independence performed better on the absolute task than did Koreans primed with interdependence.

Temporary effects of culture on perception

Recently, several studies have shown a direct link between *temporary* social orientation (i.e. independent or interdependent notions of relationship) and analytic versus holistic perception. One way of showing this is to 'prime' social orientation (see Box 2).

Researchers have taken advantage of the fact that some people are bicultural. If people have been exposed to two different kinds of social system, they might be expected to reason and perceive either holistically or analytically, depending on the cues prompting one cultural orientation or another. Chinese students in Hong Kong, where both traditional Chinese practices and Western social practices are well represented, were first shown cultural icons belonging to one of the two cultures (e.g. the American flag vs. a Chinese dragon) [42]. In a subsequent, ostensibly unrelated task, they were found to attribute cause to context after exposure to Chinese icons and to be more likely to attribute cause to the salient actor (actually, a fish in this task) after exposure to Western icons. Peng and Knowles [43] conducted a similar experiment with Chinese Americans. Instead of being presented with different cultural icons, participants were asked to recall an experience that clearly marked their identity either as an American or as an Asian, and were then given causal attribution tasks. Those who were primed with the American identity made more attributions to properties of a physical object and fewer contextual attributions than

did those primed with the Asian identity. These findings indicate that the relationship between culture and cognition can be flexible and dynamic, at least for individuals who are bicultural.

Cultural affordances: daily practices

In everyday life, people are constantly exposed to particular cultural practices and environments that encourage culturally specific patterns of attention. Under normal circumstances, these practices and environments contribute to the 'default' patterns of perception that are characteristic of a given culture. But changing the environment might be expected to produce at least a temporary change in default patterns of perception. There are some recent findings supporting this speculation.

As discussed above, Masuda and Nisbett [15] found with the change blindness task that American subjects detected more changes in the focal objects, whereas Japanese subjects detected more changes in the field. However, these cultural differences depended in part on the type of scenery. Three types of scenery were used: Japanese scenery (e.g. a Japanese city), American scenery (e.g. an American city), and culturally neutral scenery (e.g. a construction site). Cultural differences were most pronounced with the neutral scenery. When they were viewing the Japanese scenery, both Japanese and American participants detected more changes in the field, whereas when they were viewing the American scenery, both groups detected more changes in the focal objects. These findings suggest that the perceptual environment prompts culturally specific patterns of attention.

In order to examine how cultural differences in perceptual environments might influence patterns of attention, Miyamoto *et al.* took 1000 photographs of randomly selected hotels, post offices and schools in small, medium and large Japanese and American cities [44]. Based on both objective and subjective measures, they found that the Japanese perceptual environments were more complex and contained a larger number of objects than the American perceptual environments. Japanese scenes therefore might encourage perception of the overall context and American scenes a focus on the few salient objects. Miyamoto *et al.* showed that cultural differences in the perceptual environment actually lead to somewhat different patterns of attention. American and Japanese undergraduates were presented with either 95 Japanese or 95 American scenes, like those in Figure 3a, and asked them to rate how much they liked each scene. In a subsequent, ostensibly unrelated study, participants were given a change blindness task. As can be seen in Figure 3b, regardless of the cultural background of the participants, those who were exposed to the Japanese perceptual environment detected more changes in the field or context than did those who were exposed to the American perceptual environment. These findings indicate that the perceptual environment can afford specific patterns of attention.

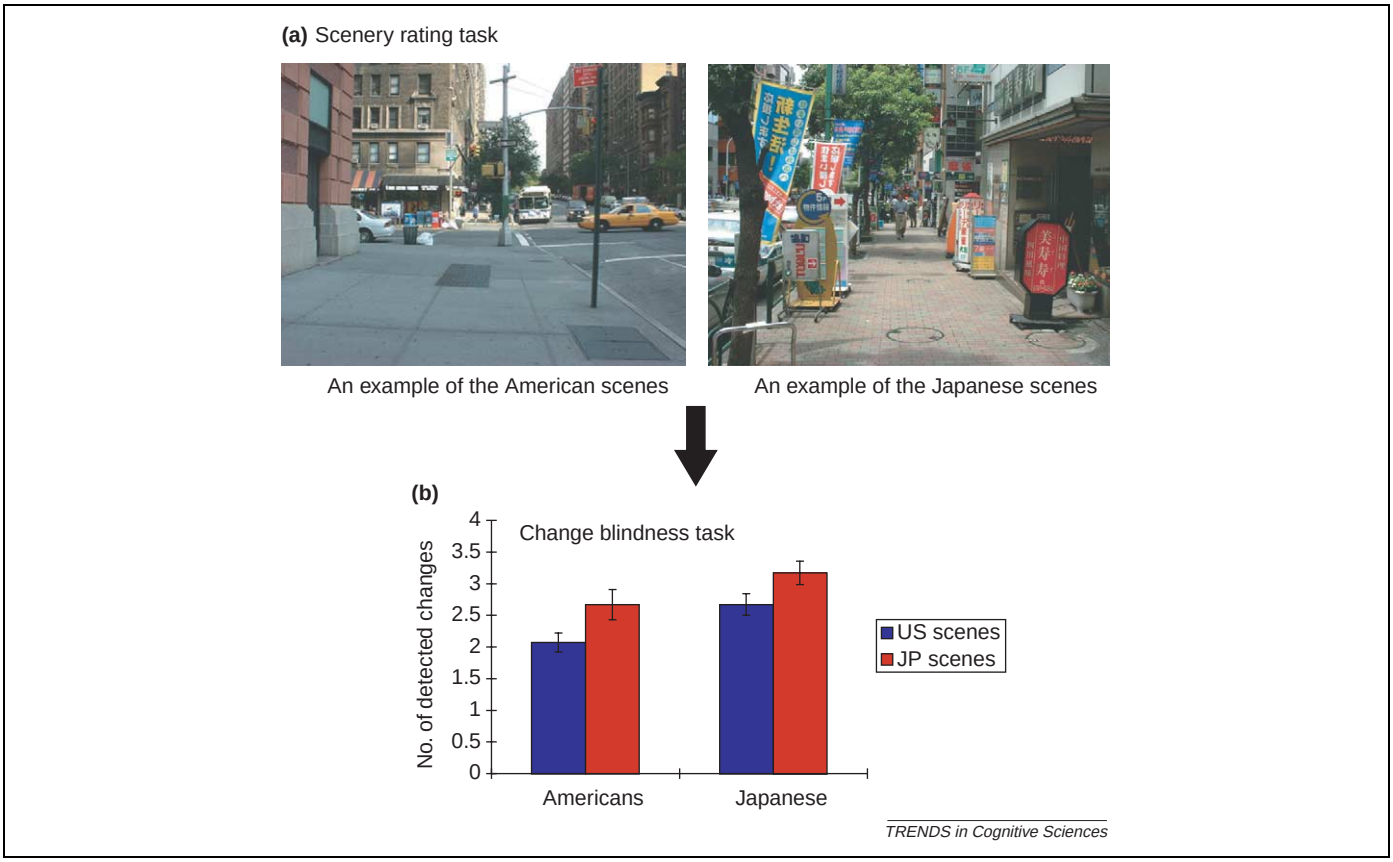

Figure 3. An illustration of cultural affordances. **(a)** Miyamoto *et al.* [44] first presented American and Japanese participants with either 95 Japanese or 95 American scenes and asked them to rate how much they liked each scene. In a subsequent, ostensibly unrelated study, participants were given a change blindness task. **(b)** Regardless of the cultural background of the participants, those who were exposed to the Japanese perceptual environment (red bars) detected more changes in the field or context than did those who were exposed to the American perceptual environment (blue bars).

Box 3. Questions for future research

- How deeply are perceptual processes affected by culture? For example, is the actual field of vision wider for those from interdependent cultures than for those from independent cultures?
- Can people from independent cultures be trained to see more of the context, and more relations between objects and context?
- What are the developmental trends of cultural differences? At what age do independent cultures begin to diverge from interdependent ones, and for which kinds of tasks?
- How much can cultural default tendencies be influenced by temporary cues and priming? Might it be possible to obtain complete reversals of characteristic perceptual tendencies by manipulating powerful cues? Would repeated exposure to such cues and priming permanently alter a chronic attentional pattern?
- The lore in priming research is that the effects of priming normally lasts only a few minutes at most. What is the duration of primes such as independent versus interdependent orientation or complex versus simple environments? How ambiguous must the target stimulus be in order for primes to have an effect?

Conclusions

There is growing evidence to demonstrate that perceptual processes are influenced by culture. People in Western cultures have been found to organize objects by emphasizing rules and categories and to focus on salient objects independently from the context, whereas people in East Asian cultures are more inclined to attend to the context and to the relationship between the objects and the context. Furthermore, researchers have explored mechanisms underlying such cultural differences. This work suggests that participating in particular social practices leads to chronic differences in perceptual processes (see also Box 3). But default patterns can also be modified temporarily by priming with cultural cues. These findings establish a dynamic relationship between perceptual processes and the cultural context.

One of the basic assumptions about human cognition and perception has been that information-processing machinery is fixed and universal. However, the evidence we have reviewed suggests that cognitive and perceptual processes are constructed in part through participation in cultural practices. The cultural environment, both social and physical, shapes perceptual processes.

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