DOI: 10.1111/spc3.12363

WILEY

ARTICLE

Culture and attention: Recent empirical findings and new directions in cultural psychology

Takahiko Masuda

University of Alberta

Correspondence
Department of Psychology, University of Alberta, P355, Edmonton, Alberta, T6G 2E9, Canada.
Email: tmasuda@ualberta.ca

Funding information
Social Sciences and Humanities Research Council of Canada, Grant/Award Number: 435-2017-1070

Abstract

Over the past 3 decades, cultural psychologists have empirically investigated the influence of cultural meaning systems on human psychology. Under the rubric of holistic versus analytic thought, researchers have demonstrated that there are substantial cultural variations in social cognition, and that such variations are observable even in so-called fundamental psychological processes, such as attention. The aim of this paper is to review 3 major themes in culture and attention: (1) culture and attention to nonsocial scenes, (2) culture and attention to social scenes, and (3) culture and aesthetics. The paper also discusses 4 major strands of research that could be considered important candidates to further advance the understanding of culture and attention: (1) research on "culture ➔ human psychological processes," where we investigate how culture influences modes of attention; (2) research on "human psychology ➔ cultural processes," where we investigate how those who hold a specific mode of attention create cultural products and tangible representations of culturally shared meanings; (3) research on cultural neuroscience, where we investigate underlying mechanisms and processes of specific modes of attention; and (4) research on cultural transmission processes, where we investigate how specific modes of attention is taught by adults and internalized by children.

1 | INTRODUCTION

Over the past three decades, cultural psychology—an interdisciplinary field that integrates psychology, anthropology, linguistics, philosophy, and neuroscience—has empirically investigated the influence of cultural meaning systems on human psychology (Bruner, 1990; Geertz, 1973; Miller, 1999; Shweder, 1991). One of the major theoretical frameworks in this area of research, developed by Nisbett and colleagues (Masuda, Russell, Li, & Lee, 2017; Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005; Nisbett, Peng, Choi, & Norenzayan, 2001), contrasted two kinds of thinking styles: analytic and holistic. The *analytic thinking style*, dominant in Western cultures such as those in Western Europe and North America, is characterized by discourses that emphasize an object-oriented focus in visual attention (selectively focusing more on objects than on context). In contrast, the *holistic thinking style*, dominant in East Asian cultures such as China, Korea, and Japan, is characterized by discourses that emphasize a

context-oriented focus of attention (attending to objects in relation to their context). Based on this assumption, a substantial number of empirical studies have demonstrated that there are systematic cultural variations in aspects of social cognition such as human inference, attribution, and judgment (see Masuda, Russell, et al., 2017, for review).

Our group has also demonstrated that such differences in thinking styles even influence basic psychological processes, notably *attention*. The aim of this paper is to review three major themes on the issue of culture and attention: (1) culture and attention to nonsocial scenes, (2) culture and attention to social scenes, and (3) culture and aesthetics. The paper also discusses the implications of attention research for advancing cultural psychology in new directions.

1.1 | Culture and attention to nonsocial scenes

Needless to say, there are universal aspects of human attention. However, such basic psychological processes are often influenced by top-down attention processes—such as knowledge, expectation, motivation, feelings, values, and goals (Bruner, 1957; Bruner & Goodman, 1947)—as opposed to bottom-up processes (Chun & Wolfe, 2001; Posner, 1980). Researchers have assumed that when individuals' attention was top-down, cross-cultural variation in patterns of attention would also be substantial because members of a given cultural community interpret the information in a culturally meaningful manner, and such interpretation affects their mode of attention (Senzaki, Masuda, & Ishii, 2014). A plethora of attention studies have indeed demonstrated that East Asians are more likely than their North American counterparts to endorse context-sensitive patterns of attention (Boduroğlu, Shah, & Nisbett, 2009; Doherty, Tsuji, & Phillips, 2008; Ishii & Kitayama, 2002; Ishii, Reyes, & Kitayama, 2003; Ji, Peng, & Nisbett, 2000; Kitayama, Duffy, Kawamura, & Larsen, 2003; Kitayama & Ishii, 2002; Masuda, Akase, Radford, & Wang, 2008; Masuda, Ishii, & Kimura, 2016; Masuda & Nisbett, 2006; Savani & Markus, 2012).

For example, psychologists have long been assuming that modes of attention are basic, culturally invariant psychological processes. However, Masuda and Nisbett (2001) assumed that culturally shared meaning systems would influence people's mode of attention; therefore, even simple narratives based on visual scenes presented on a screen for a short period of time would be affected by such cultural-specific modes of attention. By measuring people's narrative styles as an indirect indicator of their attention, Masuda and Nisbett (2001) examined whether there are any cultural variations in Japanese and European Americans' way of describing visual information. They demonstrated that when asked to describe animated vignettes of underwater scenes, European Americans tended to selectively refer more to the focal objects, whereas Japanese participants tended to describe both focal objects and contextual information. These results suggest that European Americans, in keeping with their analytic mode of attention, use a strategy of detecting what they think is important and ignoring the peripheral information in the background. In contrast, Japanese people holistically capture the context as a frame of an event and then develop narratives for the focal objects.

Masuda and Nisbett (2001) further tested European American and Japanese recognition styles by targeting their recognition accuracy as an indirect indicator of attention. They first asked participants to evaluate how much they liked animals that appeared in wilderness scenes, and later (in an incidental memory task), to make a recognition judgment and state whether they had seen the animals previously. In this recognition task, the same animals were presented, either in the same wilderness scenes as before or in novel wilderness scenes. The results indicated that both cultures performed well when recognizing congruent images (previously presented animals with their previously matched wilderness scenes). However, when incongruent images were shown (e.g., previously presented animals with novel wildernesses), accuracy decreased for both groups, and accuracy was much poorer for Japanese than for Americans. These findings are the first to show that culture substantially influences human attention, indicating that Japanese tend to holistically bind foregrounds and backgrounds during their processing of scenes more than Americans do. Thus, these results open the field for researchers to further investigate the depth of cultural effect on so-called basic psychological processes, using more physiological and neural methodology such as eye tracking, event-related potential (ERP), and functional magnetic resonance imaging (fMRI) research.

Eventually, a series of eye-tracking studies further provided supportive evidence of this assertion by targeting eye-movement pattern as a direct indicator of attention (Chua, Boland, & Nisbett, 2005; Senzaki, Masuda, Ishii, 2014; Zhang & Seo, 2015). For example, Senzaki et al. (2014) demonstrated that although there was no cultural difference in modes of attention when European Canadians and Japanese simply observed animated vignettes of underwater scenes—selectively focusing on the foreground information rather than on background information—when Japanese were asked to narrate the story of the scenes, they were more likely than their European Canadian counterparts to allocate their attention to the background. These findings further advance Masuda and Nisbett's (2001) findings by demonstrating the condition under which people's attention becomes culturally invariant (e.g., their attention is usually directed to salient objects in the scene) or culturally specific (e.g., constructing narratives tends to activate culturally dominant modes of attention), thus suggesting the importance of a balanced view of basic psychological processes (e.g., Imai & Masuda, 2013).

Recent neuroscience research has also investigated *to what extent* such top-down processes influence the activation of neural responses during attention tasks. For example, Masuda, Russell, Chen, Hioki, and Caplan (2014) assumed that cultural variations in attention are not only observable in people's behavioral responses and patterns of eye movement but also deeply rooted in their neural processing mechanism. To initiate this investigation, we targeted their neural activities using an ERP methodology, since identifying the neural components that direct variant attention patterns is important to further elucidate mechanisms of culturally specific modes of attention. They analyzed the activation patterns of European Canadians and Japanese during Masuda and Nisbett's (2001) recognition task. Furthermore, Masuda et al. (2014) focused on FN400 activation, which is thought to indicate memory processes related to the recognition of the discrepancy between old and new images (e.g., Tsivilis, Otten, & Rugg, 2001). The results indicated that both European Canadians and Japanese showed similar FN400 responses. However, this increased processing recruited for the old animal; the new background incongruent pair only affected behaviors for the more holistic Japanese, suggesting that the more Japanese processed the background (seen through stronger FN400s), the more likely they were to mistake the old animal for being new. This provides evidence that Japanese bind contextual information in their memory judgments of the target objects.

Similarly, Goto, Ando, Huang, Yee, and Lewis (2010) measured the extent to which people naturally attend to contextual information when asked to make judgments of focal objects. They compared Asian Americans' and European Americans' N400 ERPs to scenes consisting of foreground objects placed on background scenes that were either congruent (e.g., a crab naturally belongs on the beach) or incongruent (e.g., a crab does not fit as well with a parking lot). Related to the properties of the N400, a stronger N400 response to the incongruent objects than to the congruent objects would suggest that the person was taking into consideration the foreground–background semantic fit. The results indicated that Asian Americans showed a stronger N400 response to the incongruent objects (vs. congruent objects) than their North American counterparts did, suggesting that Asian Americans are indeed attentive to the relationship between the foreground object and the background.

Finally, developmental research investigated the emergence timing of culturally dominant patterns of attention. Cultural psychologists assume that these cultural variations in attention are mainly attributable to cultural practices that members of a given culture have experienced since birth through multiple interactions with their caregivers, peers, and teachers, with children gradually internalizing attention patterns through such scaffolding processes (Rogoff, 2003, 2011; Wood, Bruner, & Ross, 1976). To date, only a few studies have successfully addressed the issue of exactly when and how children's mode of attention becomes culturally specific. Therefore, recent research has extensively investigated the timing of the emergence of culturally dominant patterns of attention.

For example, Imada, Carlson, and Itakura (2013) focused on children's susceptibility to an optical illusion and their description styles as indirect indicators of attention. They found cultural differences in susceptibility to the Ebbinghaus optical illusion. Participants were presented with two circles of slightly different sizes. When these circles are presented alone, it is not so difficult to indicate which of the circles is larger than the other. However, if the large circle is surrounded by several larger circles, and the small circle is surrounded by several smaller circles, people are influenced by the optical illusion and experience difficulty indicating the larger circle. Their judgment errors are used

as an indicator of context sensitivity with regard to abstract images. The results indicated that cultural-specific modes of attention started to emerge around the age of 6 to 7 for Japanese and American children, respectively, and became substantial at 8 to 9 years of age. That is, Japanese children were more susceptible to the illusion than were their American counterparts, suggesting that Japanese children's context sensitivity develops gradually over time.

Senzaki, Masuda, Takada, and Okada (2016) investigated the development of culturally unique narratives by adding a subsequent parent–child dyadic engagement component, in which children first engaged in the attention task alone and then, after a break, engaged in a conceptually similar task with their parent. The results indicated that 4- to 9-year-old children did not show culturally specific modes of attention when they engaged in the task alone. However, when parents and children jointly engaged in the task, cultural differences emerged, with only older children (ages 7–9) showing the cultural patterns and mirroring parental narrative styles (i.e., analytic narratives in Canada and holistic narratives in Japan). These findings support Bruner's (1990) assertion that communication styles and narratives activate culturally shared meanings, resulting in the endorsement of culturally dominant cognitive and perceptual patterns.

1.2 | Culture and attention to social scenes

Do people directly internalize culturally specific modes of attention by being exposed to abstract, nonsocial stimuli? Or is their mode of attention to such stimuli a generalized by-product of their attention to more social stimuli? While this issue has been debated and no conclusive evidence has been found so far, several researchers have advocated theoretical frameworks that support the latter case. For example, under the rubric of the social orientation hypothesis, Varnum, Grossmann, Kitayama, and Nisbett (2010) posited that social orientation plays an important role in the development of cultural-specific social practices, which leads people to develop cultural-specific patterns of cognition: Those who have been exposed to an independent social orientation (e.g., in North American societies) develop an analytic mode of attention, whereas those who have been exposed to an interdependent social orientation (e.g., in East Asian societies) develop a holistic mode of attention. These researchers further speculate that people's modes of attention to social events later generalize to nonsocial events.

In fact, cultural variation in people's attention to social events, such as emotion perception, has been investigated extensively in general psychology as well. Since Charles Darwin's (1872/1965) assertion regarding the association between facial expressions and emotions, researchers have investigated universalities in the recognition of facial expressions (Ekman, 1971; Ekman & Friesen, 1971; Ekman, Friesen, & Ellsworth, 1972; Izard, 1971, 1994). However, people's attention to emotions is subject to substantial cultural variations (Ko, Lee, Yoon, Kwon, & Mather, 2011; Masuda, Wang, Ishii, & Ito, 2012; Matsumoto, Kwang, & Yamada, 2010; Miyamoto, Yoshikawa, & Kitayama, 2011; Stanley, Zhang, Fung, & Isaacowitz, 2013). For example, Miyamoto et al. (2011) demonstrated that holistic thinkers apply a configural-oriented mode of attention (e.g., viewing the face as a whole, and being sensitive to the relationship among facial parts), and analytic thinkers apply a feature-oriented mode of attention (e.g., attending to each facial feature).

These cultural differences also affect how people view individuals' emotions. Masuda and colleagues used face lineups to examine the emotion context sensitivity of European Americans and Japanese (Masuda, Akase, et al., 2008; Masuda, Wang, Ishii, et al., 2012) and measured participants' judgment patterns as a cognition. The center person was surrounded by four figures who showed an emotion that was either the same as or different from that of the center person, and participants were asked to judge the intensity of the center person's emotion. This research found that Japanese were more likely than European Americans to take the background people's emotions into account and adjust their ratings of the center person's emotions accordingly. The participants' eye-movement patterns were also consistent with this cultural difference in social attention, with Japanese paying more attention to background faces. Interestingly, Asian Canadians' and Asian international students' eye-movement patterns fell between those of European Canadians (who focused their attention exclusively on the center figure) and Japanese (who significantly allocated their attention to the background figures as well). These results support the idea that cultural differences

in thinking styles also affect how people perceive social scenes. That is, those from more interdependent cultures tend to see a target person's emotions as embedded in the social context, and those from more independent cultures tend to regard people as free from social context.

Culture also affects early attention to, and classification of, this emotional content, as seen through ERP methods (Fong et al., 2014; Russell, Masuda, Hioki, & Singhal, 2015). For example, Russell et al. (2015) investigated ERP patterns when European Canadians and Japanese viewed the previously described face lineups created by Masuda and colleagues (Masuda, Ellsworth, et al., 2008; Masuda, Wang, Ishii, et al., 2012). They targeted the ERP components known as N400 and late positive complex (LPC), which are related to early processing of semantic incongruities; stronger N400s and LPCs occur when information is considered incongruent. These stronger N400 and LPC patterns might be expected for lineups with differing emotions between the center and background faces when such differences are considered problematic to people's worldviews (i.e., if people are worried about social harmony), and we expected this pattern for holistic cultures. Consistent with this prediction, the results indicated that only Japanese showed strong N400s and LPCs to differences (rather than similarities) between central and background emotions (vs. similar emotions), suggesting that holistic modes of attention also lead to additional early neural processing of emotional incongruence.

In terms of the lifespan development of these patterns, Masuda, Nand, et al. (2017) recently examined Canadian and Japanese school-age children's emotion judgment styles. The results indicated that children's judgment and narrative styles were similar across cultures up to age 9. However, 10-year-old children started to show signs of change toward culturally unique modes of attention: Compared to those of their North American counterparts, Japanese children's judgment and narrative patterns indicated more attention to background people's emotions.

Researchers have also examined whether context effects on recognition of facial expressions are observable even within North American cultural contexts (Carroll & Russell, 1996; Fazio, 2001; Russell, 1991; Russell & Fehr, 1987). For example, in order to test which information participants take into account when they judge the target's emotional experiences, Carroll and Russell (1996) presented North American participants with incongruent information, such as the target person's facial expressions (e.g., anger) accompanied by situational information (e.g., the person encountered a bear during hiking). The results indicated that even North Americans put more weight on the situational information than the person's facial expressions (e.g., the person felt fear rather than anger).

However, Ito and his colleagues (Ito, Masuda, & Hioki, 2012; Ito, Masuda, & Li, 2013) speculated that social orientation would play an important role in people's culturally specific beliefs (Varnum, Grossmann, Kitayama, & Nisbett, 2010): People who hold an independent social orientation, which emphasizes a self-contained model of self, would think that all of one's emotional experiences come from inside of oneself, and would pay little attention to the background figures. In contrast, people who hold an interdependent social orientation, which emphasizes the effect of forces external to the target agent, would think it would be prudent to take into account the background figures' emotion when judging the target figure's emotion. We also speculated that, while the context effect does indeed exist across cultures, Americans would constrain themselves from taking the background figures' emotion into account, because the background figures' internal states are independent from that of the target agent. Therefore, we predicted that among North Americans, the effect of context sensitivity would be attenuated, especially when the context information is agentic (e.g., other individuals near the target person), but the context effect would still remain when the context information is not agentic (e.g., positive or negative scenery). Ito and his colleagues also predicted that, since Japanese are in general context sensitive, and since the notion of the independency of emotional states is not strongly shared, it is natural for Japanese to incorporate not only scenery but also background figures' emotions into the judgment of the target agent.

Using a paradigm similar to that of Masuda, Wang, Ishii, et al. (2012), Ito and his colleagues (Ito et al., 2012, 2013) created experimental stimuli in which the center figure's facial expression was presented against a salient background that was either nonagentic (e.g., a beautiful beach or a burned-out building) or agentic (e.g., two background figures who both showed happy or sad facial expressions). The results indicated that when the contextual information was nonagentic, European Canadians' judgment of the center figure's emotion was affected, whereas when the contextual

information was agentic, their judgment was not affected by such information. However, the judgment of Japanese participants was affected by both nonagentic and agentic contextual information.

The findings suggest that even when the contextual information is salient, North Americans selectively include or exclude the information in their judgment in accordance with their lay belief about human emotional experiences. Future research can advance this line of studies by accumulating more scientific evidence and articulating when the contextual effects become intensified or attenuated, and to what extent such effects are observable among different cultural groups.

1.3 | Culture and aesthetics

Since Shweder (1991) asserted that the aim of cultural psychologists was to elucidate the mutual constitutions of culture and human psychology, researchers have extensively demonstrated how culture influences perception. However, they have only recently started to examine how people in a given community create visual representations that reflect the culture's dominant meaning system. Such visual representations are often called "cultural products," a tangible, public representation of culture such as mass media, textbooks, and advertisements (Morling & Lamoureaux, 2008). In this section, we discuss how holistic versus analytic thinkers create cultural products, especially visual representations such as fine arts, photography, web pages, and scientific reports.

One key factor in differentiating holistic from analytic information processing is how much information is considered optimal (Choi, Dalal, Kim-Prieto, & Park, 2003; Li, Masuda, & Russell, 2015). For example, Choi et al. (2003) found that when judging hypothetical murder cases, the more holistic Koreans took into consideration a greater amount of information than did European Americans or Asian Americans. It therefore seems reasonable to expect that when creating a visual representation, North Americans would be good at differentiating the main theme from peripheral, background information, and accentuating the salience of the main theme in the visual space, whereas East Asians would be good at holistically incorporating background and contextual information into the main theme while blurring the boundaries between them.

Several studies give credence to this assumption (Huang & Park, 2013; Masuda, Gonzalez, Kwan, & Nisbett, 2008; Nand, Masuda, Senzaki, & Ishii, 2014; Senzaki, Miyamoto, et al., 2014). For example, Masuda, Gonzalez, et al. (2008) asserted that throughout history, fine arts techniques are strongly influenced by culturally dominant messages. In East Asian cultures, where holistic thought is dominant, scenery painters have employed various ways of emphasizing field information such as a panoramic view of mountain chains and a bird's eye perspective, which allow viewers to capture entire scenes and attend to foreground information and background information equally (French, 1978; Gombrich, 1995; Paine & Soper, 1955). To implement this technique, close objects such as people and objects directly in front of the viewer are drawn in the bottom of the frame, and far objects such as mountains are drawn at the top, resulting in scenic images rich in contextual information and with the horizon high in the frame. Portrait painters in these cultures also reflect the holistic thought process, by embedding the model in rich context.

In Western cultures, where analytic thought is dominant, scenery painters use a technique called linear perspective. This technique, which was developed during the Renaissance, forces viewers to see the image from a fixed point, allowing them to perceive an illusion of three-dimensional images, where the foreground information becomes significantly more salient than the background information (Berque, 1986; Giedion, 1964; Kubovy, 1986). Close objects and people directly in front of the viewer are drawn larger, and far objects such as mountains, forests, and fishermen's boats are drawn smaller, resulting in scenic images with relatively little context information and with the horizon lower in the frame. Likewise, portraits in Western cultures feature highly salient models against less salient backgrounds.

To test this observation empirically, Masuda, Gonzalez, et al. (2008) analyzed electronic visual data from East Asian and American museums in order to examine the visual art styles regarded as masterpieces in the respective cultures. As expected, the results indicated that relative to Western art, in East Asian art, the horizon in scenic images is higher, and models in portraits are smaller. Nand et al. (2014) further analyzed drawing style trends between the 16th and 20th centuries by examining electronic images from multiple museums in Europe, North America, and Japan. They

found that although Japanese and Western scenic drawing styles strongly influenced one another during certain periods (e.g., the late 19th century), at the end of the 20th century, the culturally dominant drawing styles still prevailed.

Do contemporary members of each culture still sustain culturally dominant aesthetic styles? Masuda, Gonzalez, et al. (2008) explored this possibility by asking undergraduate students from different cultural backgrounds to produce landscape drawings and portrait photographs. The results indicated that compared to their North American counterparts, East Asian international students (1) drew the horizon higher and included richer contextual information and (2) took portrait photos with the models appearing much smaller relative to the frame size. Developmental data further support this finding: European Canadian and Japanese children and teenagers (Grades 1 through 12) gradually developed expressions unique to their respective cultures. That is, Japanese children and teenagers were more likely than their Canadian counterparts to place the horizon higher in the visual space and to include more pieces of information (Nand et al., 2014; Senzaki, Masuda, Nand, et al., 2014).

Such tendencies are also evident in other behaviors and preferences (Wang, Masuda, Ito, & Rashid, 2012). For example, East Asian researchers tended to produce more information-rich conference posters than their North American counterparts did, and East Asian governmental and university portal pages contained more words and links than North American ones did. East Asian international students were generally better than North American students at detecting target images on complex web pages and considered information-rich web pages to be functionally and aesthetically preferable. These findings suggest that there are systematic cultural variations in the optimality of the amount of information, which correspond to culturally shared beliefs.

Researchers now acknowledge that exposure to culturally dominant information seems to shape one's aesthetic preferences (Miyamoto, Nisbett, & Masuda, 2006; Ueda & Komiya, 2012). For example, Ueda and Komiya (2012) demonstrated that participants primed with Japanese scenes were more likely to move their eyes within a broader area and were less likely to fixate on central objects, whereas there were no significant differences in the eye movements of participants primed with American scenes. These results suggest that culturally specific patterns in eye movements are partly caused by the physical environment. Further research is needed to examine to what extent experiences influence people's visual perceptual patterns.

2 | TOWARD NEW DIRECTIONS IN RESEARCH ON CULTURE AND ATTENTION

The founders of cultural psychology acknowledged the importance of the mutual constitution of culture and the human mind (e.g., Miller, 1999; Shweder, 1991), and researchers have demonstrated empirically that culture is an indispensable factor in psychology. Resonating with the tenets of New Look psychology (Bruner, 1957; Bruner & Goodman, 1947), which emphasizes the importance of the top-down processes on perception, such evidence serves as a strong argument against the universalists' idea that psychological processes are independent of external influences (Fodor, 2008; Pinker, 1994, 1997, 2007; Pylyshyn, 1999; Tooby & Cosmides, 1992).

Recently, cultural psychologists have further advanced research on culture and psychology in multiple ways. For example, Varnum and Grossmann (in press), in their discussion of how historical changes in ecology influence psychological processes, addressed the dynamic transmission processes between culture and human psychology. Na et al. (2010) discussed the importance of differentiating cultural-level phenomena from individual-level phenomena and suggested that researchers should further elucidate subcomponents of holistic versus analytic cognition. Furthermore, beyond the contrast of holistic versus analytic modes of attention, several researchers have investigated other dimensions of culture that could influence modes of attention, such as positive versus negative valence of information (Grossmann, Ellsworth, & Hong, 2012).

These issues addressed in the above studies are applicable to research on culture and attention. In addition, there are other issues that are specifically important only for research on culture and attention. In this section, building on

the foregoing discussion of research on culture and attention, I will discuss four major strands of research that can be regarded as important candidates to further advance our understanding of culture and human mind: (1) research on culture ➔ human psychological processes; (2) research on human psychology ➔ cultural processes; (3) research on cultural neuroscience; and (4) research on cultural transmission processes (see Figure 1).

2.1 | Research on culture ➔ human psychological processes

In order to test cultural psychologists' assumptions about the mutual constitution of culture and human mind, researchers have begun to examine the extent to which meaning systems shape basic cognitive and perceptual processes (culture ➔ human psychology). In this paper, I have discussed how holistic versus analytic thought influences patterns of attention (e.g., Masuda, Russell, et al., 2017). However, researchers have now examined this issue by referring to many other factors, including social orientation (Markus & Kitayama, 1991, 2010; Varnum et al., 2010), economic and subsistence traditions (Uskul, Kitayama, & Nisbett, 2008), religious beliefs (Cohen & Rozin, 2001), and perceptions of honor (Nisbett & Cohen, 1996), as well as political discourses (Putnam, Leonardi, & Nanetti, 1993), discourses of social norms (Gelfand, Nishii, & Raver, 2006), residential or relational mobility (Oishi, 2010; Oishi, Schug, Yuki, & Axt, 2015), ideas of voluntary settlement (Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006), and social class (Grossmann & Varnum, 2011; Stephens, Markus, & Townsend, 2007). Future research is needed to further scrutinize (1) which meaning systems lead to what modes of attention and (2) how these different types of meaning systems mutually or independently influence modes of attention. Multilevel analyses, while identifying distal (e.g., historical and structural) and proximal (e.g., habitual and conventional) effects on psychological processes, will contribute to important breakthroughs in understanding human cognition (e.g., Miyamoto, 2013).

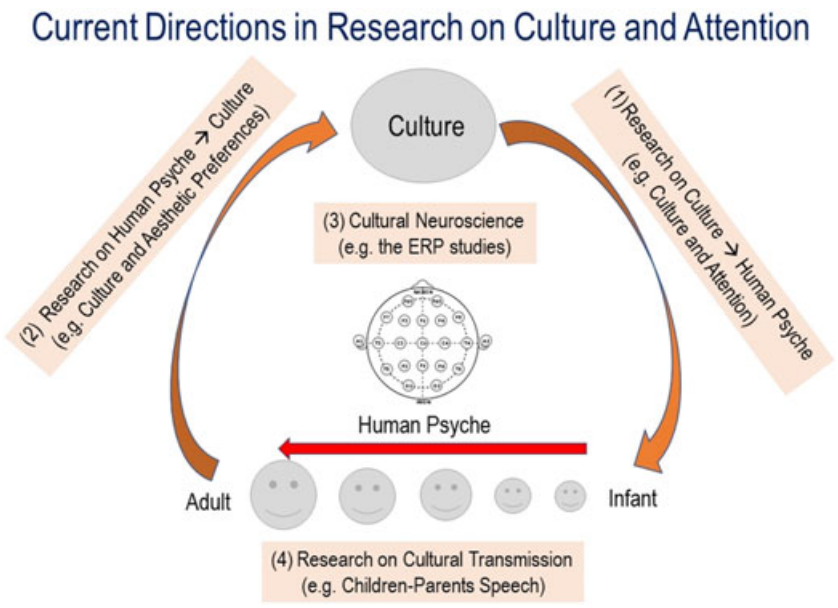

FIGURE 1 Current four directions in research on culture and attention. (1) Research on "culture ➔ human psychological processes," where we investigate how culture influences modes of attention; (2) research on "human psychology ➔ cultural processes," where we investigate how those who hold a specific mode of attention create cultural products and tangible representations of culturally shared meanings; (3) research on cultural neuroscience, where we investigate underlying mechanisms and processes of specific modes of attention; and (4) research on cultural transmission processes, where we investigate how specific modes of attention is taught by adults and internalized by children. ERP, event-related potential

2.2 | Research on human psychology ➔ cultural processes

Research on cultural processes has not been comprehensively examined. Under the rubric of "cultural products" (Morling & Lamoureaux, 2008), researchers have begun to investigate cultural variations in human-made cultural resources that convey dominant cultural messages. Such resources include media reports, social networking sites, newspaper articles, children's stories, magazine advertisements, picture books, textbooks, and music lyrics (e.g., Huang & Park, 2013; Imada, 2012; Imada & Yussen, 2012; Kim & Markus, 1999; Markus, Uchida, Omoregie, Townsend, & Kitayama, 2006; Masuda, Gonzalez, et al., 2008; Masuda, Wang, Ito, & Senzaki, 2012; Nand et al., 2014; Snibbe & Markus, 2005; Tsai, Louie, Chen, & Uchida, 2007; Wang et al., 2012). So far, research on cultural products has focused on archival data, and researchers have analyzed these data qualitatively and quantitatively using coding schemes and investigated the association between cultural products and cultural messages. To further advance this strand of research within the study of culture and attention, a feedback loop of human psychology ➔ culture ➔ human psychology should also be investigated. For example, researchers have demonstrated that long periods of exposure to culturally dominant patterns of information (e.g., scenic images) facilitate participants' cognitive and perceptual styles consistent with culturally shared messages (Miyamoto et al., 2006; Ueda & Komiya, 2012). Another line of studies has shown that participants find culturally dominant patterns of information aesthetically and functionally attractive (e.g., Wang et al., 2012) and are disposed to provide positive feedback to those who create cultural products consistent with dominant cultural values (Ishii, Miyamoto, Rule, & Toriyama, 2014).

As such, we maintain that the most pressing questions in this line of research would be detailed analyses in terms of (1) how cultural products are spread, transmitted, seen positively, and accepted by a given culture and (2) to what extent such popular cultural products convey culturally dominant messages.

2.3 | Research on cultural transmission processes

In addition to research on "the human psychology ➔ culture ➔ human psychology loop" among young adults, cultural psychologists are now starting to examine *when* in the course of children's development culturally unique patterns of attention become salient. The findings suggest that when children engage in rudimentary cognitive and perceptual tasks, some cultural variations in modes of attention can be seen by ages 3–6 (Chiu, 1972; Duffy, Toriyama, Itakura, & Kitayama, 2009; Kuwabara & Smith, 2012, 2016; Kuwabara, Son, & Smith, 2011). However, when the tasks involve advanced-level cognitive abilities that require memory, judgment, and verbal descriptions, the effect of culture is only weakly observable at age 6 (Ishii, Rule, & Toriyama, 2017), gradually emerging around age 8–9 (Imada et al., 2013; Masuda, Nand, et al., 2017; Senzaki et al., 2016). Finally, when the cognitive tasks involve advanced reasoning skills such as social inference and causal explanation, cultural variations in attention are observable only after age 10 (Ji, 2008; Miller, 1984).

We speculate that children's social interaction becomes more advanced and their social cognition more developed around 9 or 10 years of age. For example, children at that age would create more complex social networks with peers, understand the social hierarchy, and become more attentive to how their behaviors are seen and evaluated by others. We maintain that such development is key to children's recognition of dominant social norms shared by people in their culture. Such sensitivity to social norms would also facilitate their further internalization of culturally dominant (normatively acceptable) modes of psychological processes, including the mode of attention.

Under the rubrics of scaffolding processes (Wood et al., 1976), guided participation (Rogoff, 2003), zone of proximal development (Cole, 1996; Greenfield & Bruner, 1969; Luria, 1976; Vygotsky, 1930/1978), joint attention (Tomasello, 1999), and cultural transmission (Mesoudi, 2011; Richerson & Boyd, 2005), cultural psychologists have also examined *how* parental guidance directly influences children's patterns of attention during tasks (Fernald & Morikawa, 1993; Ishii, Miyamoto, Rule, & Toriyama, 2014; Lee et al., 2017; Senzaki et al., 2016). These studies demonstrated that caregivers directed their children's attention in culturally dominant ways: North American mothers tended to direct infants to attend to focal objects, whereas Japanese mothers tended to direct infants to attend to the

relationships between focal and background objects. These studies have potential to elucidate the underlying mechanisms of cultural transmission processes related to attention.

For example, we speculate that, as children become more sensitive to social norms, they might be able to model their caregivers' mode of attention more carefully, and by internalizing it, they could make judgments, construct narratives, and remember information consistent with a given culture's dominant thinking style. To test this possibility, future research may design experiments to measure children's pattern of attention before, during, and after having a joint session with their caregivers, teachers, peers, or elder siblings, and then analyze to what extent the children's patterns of attention changed after the joint session, as well as what aspect of their responses (e.g., narrative style, judgment style, or type of information memorized) is influenced by such changes. Future research is needed to further elucidate such underlying mechanisms of cultural transmission processes related to attention.

2.4 | Research on cultural neuroscience

In addition to research on culture ➔ human psychological processes that emphasize the importance of cultural influences on patterns of behavior, recent advances in cultural neuroscience further elucidate how deeply cultural factors influence brain functioning (e.g., Chiao, 2009; Han et al., 2013; Kitayama & Tompson, 2010; Kitayama & Uskul, 2011). Recent evidence in neuroscience indeed demonstrates that the human brain is malleably influenced by experiences and by the mastering of skills (Maguire et al., 2000; Scholz, Klein, Behrens, & Johansen-Berg, 2009).

Thanks to advances in technology such as fMRI, ERP, and functional near-infrared spectroscopy (fNIRS) methodology, this new research field has provided cultural psychologists with useful tools to demonstrate that culture affects our neural patterns. For example, cultural neuroscientists have used ERP methods to investigate cultural variations in various early attention processes, and their findings correspond to those of behavioral research (e.g., Goto et al., 2010; Ishii, Kobayashi, & Kitayama, 2010; Kitayama & Murata, 2013; Kitayama & Park, 2014; Lewis, Goto, & Kong, 2008; Masuda et al., 2014; Na & Kitayama, 2011; Russell et al., 2015; Varnum, Na, Murata, & Kitayama, 2012). With fMRI methods, researchers have investigated how holistic versus analytic thinkers process foreground versus background information (e.g., Goh et al., 2007; Gutchess, Welsh, Boduroglu, & Park, 2006; Hedden, Ketay, Aron, Markus, & Gabrieli, 2008). Similarly, fNIRS methods have shown that Asian Americans have increased activation in the parietal regions during a task that requires an analytic mode of attention, whereas European Americans showed increased activation in the same regions during a task requiring a holistic mode of attention, suggesting that extra attentional control was needed when the nature of the task did not align with the participants' dominant attention patterns (Murata, Park, Kovelman, Xiaosu, & Kitayama, 2015). As such, cultural neuroscience is a wonderful tool for enabling attention researchers to better understand the mechanisms underlying cultural differences in modes of attention.

There are many implications in cultural neuroscience. For example, while many findings indicate cultural differences in neural responses (e.g., Russell et al., 2015), some findings indicate that only neural responses are culturally variant, while behavioral patterns are similar across cultures (e.g., Hedden et al., 2008). That is, according to these findings, only neural data have the potential to further identify substantial cultural variations in psychological mechanisms, and without such data, researchers could be blind to the substantial differences in mechanisms due to superficial similarities in behavioral data. Furthermore, some recent findings suggest that the majority of behavioral data obtained using a battery of cognitive tasks do not correlate with participants' self-reports on values (e.g., individualism vs. collectivism) or social orientation (e.g., independent vs. interdependent social orientation). However, there is substantial evidence that neural responses fairly associate with these cultural variables (e.g., Masuda et al., 2014; Russell et al., 2015). These findings suggest that only neural data may be directly associated with one's values and beliefs represented at the conscious level, as well as the potential mechanism behind the relationship. In other words, behavioral data might entail many confounding and uncontrollable factors that could obscure the association between one's conscious preferences, values, and beliefs, and one's psychological mechanism (Kitayama & Uskul, 2011; Masuda, Russell, et al., 2017). Furthermore, there is great potential for cultural neuroscience to allow researchers to elucidate individual differences that mediate cultural beliefs, and to examine how such differences clarify the relationship between behavioral and

neural patterns (e.g., Goto et al., 2010; Hedden et al., 2008; Ishii et al., 2010; Na & Kitayama, 2011; Russell et al., 2015). None of these possibilities have been comprehensively tested. Therefore, we believe that cultural neuroscience would be a powerful tool for enabling a better understanding of the attention processes involved in cultural differences.

3 | CONCLUSION

Research on culture and attention has provided abundant evidence that there are substantial cultural variations between people's mode of attention. This paper overviewed both past and recent empirical findings and maintains that five new research directions will further advance research on culture and attention.

ACKNOWLEDGMENTS

This paper is supported by Social Sciences and Humanities Research Council of Canada. I thank members of the Culture and Cognition Lab, Department of Psychology, University of Alberta, Ms. Laurie Rendon and Ms. Karyn Stecyk.

ORCID

Takahiko Masuda http://orcid.org/0000-0002-3023-4858

REFERENCES

Berque, A. (1986). *Le sauvage et l'artifice: Les Japonais devant la nature*. Paris, France: Gallimard.

Boduroğlu, A., Shah, P., & Nisbett, R. E. (2009). Cultural differences in allocation of attention in visual information processing. *Journal of Cross-Cultural Psychology*, *40*, 349–360.

Bruner, J. S. (1957). On perceptual readiness. *Psychological Review*, *64*(2), 123–152.

Bruner, J. S. (1990). *Acts of meaning*. Cambridge, MA: Harvard University Press.

Bruner, J. S., & Goodman, C. C. (1947). Value and need as organizing factors in perception. *Journal of Abnormal and Social Psychology*, *42*, 22–44.

Carroll, J. M., & Russell, J. A. (1996). Do facial expressions signal specific emotions? Judging emotion from the face in context. *Journal of Personality and Social Psychology*, *70*, 205–218.

Chiao, J. Y. (2009). Cultural neuroscience: A once and future discipline. *Progress in Brain Research*, *178*, 287–304.

Chiu, L.-H. (1972). A cross-cultural comparison of cognitive styles in Chinese and American children. *International Journal of Psychology*, *8*, 235–242.

Choi, I., Dalal, R., Kim-Prieto, C., & Park, H. (2003). Culture and judgment of causal relevance. *Journal of Personality and Social Psychology*, *84*, 46–59.

Chua, F., Boland, J., & Nisbett, R. E. (2005). Cultural variation in eye movements during scene perception. *Proceedings of the National Academy of Sciences of the United States of America*, *102*, 12629–12633.

Chun, M. M., & Wolfe, J. M. (2001). Visual attention. In E. B. Goldstein (Ed.), *Blackwell's handbook of perception* (pp. 272–310). Oxford, England: Blackwell.

Cohen, A. B., & Rozin, P. (2001). Religion and the morality of mentality. *Journal of Personality and Social Psychology*, *81*, 697–710.

Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Harvard University Press.

Darwin, C. (1965). *The expression of the emotions in man and animals*. Chicago: University of Chicago Press. (Original work published 1872)

Doherty, M. J., Tsuji, H., & Phillips, W. A. (2008). The context sensitivity of visual size perception varies across cultures. *Perception*, *37*, 1426–1433.

Duffy, S., Toriyama, R., Itakura, S., & Kitayama, S. (2009). The development of culturally-contingent attention strategies in young children in the U.S. and Japan. *Journal of Experimental Child Psychology*, *102*, 351–359.

Ekman, P. (1971). Universal and cultural differences in facial expressions of emotions. In J. K. Cole (Ed.), *Nebraska symposium on motivation* (pp. 207–283). Lincoln: University of Nebraska Press.

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, *17*, 124–129.

Ekman, P., Friesen, W. V., & Ellsworth, P. (1972). *Emotion in the human face: Guidelines for research and a review of the findings*. Elmsford, NY: Pergamon Press.

Fazio, R. H. (2001). On the automatic activation of associated evaluations: An overview. *Cognition & Emotion*, *15*, 115–141.

Fernald, A., & Morikawa, H. (1993). Common themes and cultural variations in Japanese and American mothers' speech to infants. *Child Development*, *64*, 637–656.

Fodor, J. A. (2008). *LOT 2: The language of thought revisited*. Oxford, England: Clarendon Press.

Fong, M. C., Goto, S. G., Moore, C., Zhao, T., Shudson, Z., & Lewis, R. S. (2014). Switching between Mii and Wii: The effects of cultural priming on the social affective N400. *Culture and Brain*, *2*, 52–71.

French, C. (1978). *Through closed doors: Western influence on Japanese art 1639–1853*. Rochester, MI: Oakland University, Meadow Brook Art Gallery.

Geertz, C. (1973). *The interpretation of cultures*. New York, NY: Basic Books.

Gelfand, M. J., Nishii, L. H., & Raver, J. L. (2006). On the nature and importance of cultural tightness–looseness. *Journal of Applied Psychology*, *91*, 1225–1244.

Giedion, S. (1964). *Space, time and architecture, the growth of a new tradition* (4th ed.). Cambridge, MA: Harvard University Press.

Goh, J. O., Chee, M. W., Tan, J. C., Venkatraman, V., Hebrank, A., Leshikar, E. D., … Park, D. C. (2007). Age and culture modulate object processing and object-scene binding in the ventral visual area. *Cognitive, Affective & Behavioral Neuroscience*, *7*, 44–52.

Gombrich, E. H. (1995). *Shadows: The depiction of cast shadows in Western art*. London, England: National Gallery Publications.

Goto, S. G., Ando, Y., Huang, C., Yee, A., & Lewis, R. S. (2010). Cultural differences in the visual processing of meaning: Detecting incongruities between background and foreground objects using the N400. *Social Cognitive and Affective Neuroscience*, *5*, 242–253.

Greenfield, P. M., & Bruner, J. S. (1969). Culture and cognitive growth. In D. A. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 633–660). Chicago, IL: Rand McNally.

Grossmann, I., & Varnum, M. E. W. (2011). Social class, culture, and cognition. *Social Psychological and Personality Science*, *2*, 81–89.

Grossmann, I., Ellsworth, P. C., & Hong, Y-Y. (2012). Culture, attention, and emotion. *Journal of Experimental Psychology: General*, *141*(1), 31–36.

Gutchess, A. H., Welsh, R. C., Boduroglu, A., & Park, D. C. (2006). Cross-cultural differences in the neural correlates of picture encoding. *Cognitive, Affective, & Behavioral Neuroscience*, *6*, 102–109.

Han, S., Northoff, G., Vogeley, K., Wexler, B. E., Kitayama, S., & Varnum, M. E. W. (2013). A cultural neuroscience approach to the biosocial nature of the human brain. *Annual Review of Psychology*, *64*, 335–359.

Hedden, T., Ketay, S., Aron, A., Markus, H. R., & Gabrieli, J. D. E. (2008). Cultural influences on neural substrates of attentional control. *Psychological Science*, *19*, 12–17.

Huang, C. M., & Park, D. (2013). Cultural influences on Facebook photographs. *International Journal of Psychology*, *48*(3), 334–343.

Imada, T. (2012). Cultural narratives of individualism and collectivism: A content analysis of textbook stories in the United States and Japan. *Journal of Cross-Cultural Psychology*, *43*(4), 576–591.

Imada, T., Carlson, S. M., & Itakura, S. (2013). East-West differences in context-sensitivity are evident in early childhood. *Developmental Science*, *16*, 198–208.

Imada, T., & Yussen, S. R. (2012). Reproduction of cultural values: A cross-cultural examination of stories people create and transmit. *Personality and Social Psychology Bulletin*, *38*, 114–128.

Imai, M., & Masuda, T. (2013). The role of language and culture in universality and diversity of human concepts. In M. Gelfand, C.-Y. Chiu, & Y.-Y. Hong (Eds.), *Advances in culture and psychology* (pp. 1–61). New York, NY: Oxford University Press.

Ishii, K., & Kitayama, S. (2002). Processing of emotional utterances: Is vocal tone really more significant than verbal content in Japanese? *Cognitive Studies*, *9*, 67–76.

Ishii, K., Kobayashi, Y., & Kitayama, S. (2010). Interdependence modulates the brain response to word-voice incongruity. *Social Cognitive and Affective Neuroscience*, *5*, 307–317.

Ishii, K., Miyamoto, Y., Rule, N. O., & Toriyama, R. (2014). Physical objects as vehicles of cultural transmission: Maintaining harmony and uniqueness through colored geometric patterns. *Personality and Social Psychology Bulletin*, *40*, 175–188.

Ishii, K., Reyes, J. A., & Kitayama, S. (2003). Spontaneous attention to word content versus emotional tone: Differences among three cultures. *Psychological Science*, *14*, 39–46.

Ishii, K., Rule, N. O., & Toriyama, R. (2017). Context sensitivity in Canadian and Japanese children's judgments of emotion. *Current Psychology*, *36*(3), 577–584.

Ito, K., Masuda, T., & Hioki, K. (2012). Affective information in context and judgment of facial expression: Cultural similarities and variations in context effects between North Americans and East Asians. *Journal of Cross-Cultural Psychology*, *43*, 429–445.

Ito, K., Masuda, T., & Li, L. M. W. (2013). Agency and facial emotion judgment in context. *Personality and Social Psychology Bulletin*, *39*, 763–776.

Izard, C. E. (1971). *The face of emotion*. New York, NY: Appleton-Century-Crofts.

Izard, C. E. (1994). Innate and universal facial expressions: Evidence from development and cross-cultural research. *Psychological Bulletin*, *115*, 288–299.

Ji, L. (2008). The leopard cannot change his spots, or can he? Culture and the development of lay theories of change. *Personality and Social Psychology Bulletin*, *34*, 613–622.

Ji, L. J., Peng, K., & Nisbett, R. E. (2000). Culture, control, and perception of relationships in the environment. *Journal of Personality and Social Psychology*, *78*, 943–955.

Kim, H. S., & Markus, H. R. (1999). Deviance or uniqueness, harmony or conformity? A cultural analysis. *Journal of Personality and Social Psychology*, *77*, 785–800.

Kitayama, S., Duffy, S., Kawamura, T., & Larsen, J. T. (2003). Perceiving an object and its context in different cultures: A cultural look at New Look. *Psychological Science*, *14*, 201–206.

Kitayama, S., & Ishii, K. (2002). Word and voice: Spontaneous attention to emotional utterances in two languages. *Cognition & Emotion*, *16*, 29–59.

Kitayama, S., Ishii, K., Imada, T., Takemura, K., & Ramaswamy, J. (2006). Voluntary settlement and the spirit of independence: Evidence from Japan's "Northern frontier". *Journal of Personality and Social Psychology*, *91*, 369–384.

Kitayama, S., & Murata, A. (2013). Culture modulates perceptual attention: An event-related potential study. *Social Cognition*, *31*, 758–769.

Kitayama, S., & Park, J. (2014). Error-related brain activity reveals self-centric motivation: Culture matters. *Journal of Experimental Psychology: General*, *143*(1), 62–70.

Kitayama, S., & Tompson, S. (2010). Envisioning the future of cultural neuroscience. *Asian Journal of Social Psychology*, *13*, 92–101.

Kitayama, S., & Uskul, A. K. (2011). Culture, mind, and the brain: Current evidence and future directions. *Annual Review of Psychology*, *62*, 419–449.

Ko, S. G., Lee, T. H., Yoon, H. Y., Kwon, J. H., & Mather, M. (2011). How does context affect assessments of facial emotion? The role of culture and age. *Psychology and Aging*, *26*, 48–59.

Kubovy, M. (1986). *The psychology of perspective and Renaissance art*. New York, NY: Cambridge University Press.

Kuwabara, M., & Smith, L. B. (2012). Cross-cultural differences in cognitive development: Attention to relations and objects. *Journal of Experimental Child Psychology*, *113*, 20–35.

Kuwabara, M., & Smith, L. B. (2016). Cultural differences in visual object recognition in 3-year-old children. *Journal of Experimental Child Psychology*, *147*, 22–38.

Kuwabara, M., Son, J., & Smith, L. B. (2011). Attention to context: U.S. and Japanese children's emotion judgment. *Journal of Cognition and Development*, *12*, 502–517.

Lee, H., Nand, K., Shimizu, Y., Takada, A., Kodama, M., & Masuda, T. (2017). Culture and emotion judgment styles: Comparing Canadian and Japanese children's and caregivers' context sensitivity. Manuscript submitted for publication. University of Alberta.

Lewis, R. S., Goto, S. G., & Kong, L. (2008). Culture and context: East Asian, American and European American differences in p3 event-related potentials. *Personality and Social Psychology Bulletin*, *34*, 623–634.

Li, L. M. W., Masuda, T., & Russell, M. J. (2015). Culture and decision making: Investigating cultural variation in the East Asian and North American online decision-making process. *Asian Journal of Social Psychology*, *18*(3), 183–191.

Luria, A. R. (1976). *Cognitive development: Its cultural and social foundations*. Cambridge, MA: Harvard University Press.

Maguire, E. A., Gadian, D. G., Johnsrude, I. S., Good, C. D., Ashburner, J., Frackowiak, R. S., & Frith, C. D. (2000). Navigation-related structural change in the hippocampi of taxi drivers. *Proceedings of the National Academy of Sciences of the United States of America*, *97*(8), 4398–4403.

Markus, H., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*, 224–253.

Markus, H. R., & Kitayama, S. (2010). Cultures and selves: A cycle of mutual constitution. *Perspectives on Psychological Science*, *5*, 420–430.

Markus, H. R., Uchida, Y., Omoregie, H., Townsend, S. S. M., & Kitayama, S. (2006). Going for the gold: Models of agency in Japanese and American contexts. *Psychological Science*, *17*, 103–112.

Masuda, T., Akase, M., Radford, M. H. B., & Wang, H. (2008). Jokyo youin ga gankyu undo pattern ni oyobosu eikyo: Nihonjin to Seiyojin no syuken jyoho heno binkansa no kikaku kenkyu [Cross-cultural research on the pattern of eye-movement: Comparing the level of concentration between Japanese and Western participants]. *Japanese Journal of Psychology*, *79*, 35–43.

Masuda, T., Ellsworth, P. C., Mesquita, B., Leu, J., Tanida, S., & van de Veerdonk, E. (2008). Placing the face in context: Cultural differences in the perception of facial emotion. *Journal of Personality and Social Psychology*, *94*, 365–381.

Masuda, T., Gonzalez, R., Kwan, L., & Nisbett, R. E. (2008). Culture and aesthetic preference: Comparing the attention to context of East Asians and Americans. *Personality and Social Psychology Bulletin*, *34*, 1236–1248.

Masuda, T., Ishii, K., & Kimura, J. (2016). When does the culturally dominant mode of attention appear or disappear? Comparing patterns of eye movement during the visual flicker task between European Canadians and Japanese. *Journal of Cross-Cultural Psychology*, *47*, 997–1014.

Masuda, T., Nand, K., Lee, H., Li, M. W. L., Shimizu, Y., Takada, A., … Kodama, M. (2017). Culture and face recognition: Comparing the context sensitivity of Japanese and Canadian school age children. Manuscript submitted for publication, University of Alberta.

Masuda, T., & Nisbett, R. E. (2001). Attending holistically vs. analytically: Comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology*, *81*, 922–934.

Masuda, T., & Nisbett, R. E. (2006). Culture and change blindness. *Cognitive Science*, *30*, 381–399.

Masuda, T., Russell, M. J., Chen, Y. Y., Hioki, K., & Caplan, J. B. (2014). N400 incongruity effect in an episodic memory task reveals different strategies for handling irrelevant contextual information for Japanese than European Canadians. *Cognitive Neuroscience*, *5*, 17–25.

Masuda, T., Russell, M. J., Li, L. M. W., & Lee, H. (2017). Perception and cognition. In S. Kitayama, & D. Cohen (Eds.), *Handbook of cultural psychology*. New York: Guilford Press.

Masuda, T., Wang, H., Ishii, K., & Ito, K. (2012). Do surrounding figures' emotions affect judgment of the target figure's emotion? Comparing the eye-movement patterns of European Canadians, Asian Canadians, Asian international students, and Japanese. *Frontiers in Integrative Neuroscience*, *6*, 72. https://doi.org/10.3389/fnint.2012.00072

Masuda, T., Wang, H., Ito, K., & Senzaki, S. (2012). Culture and cognition: Implications for art, design, and advertisement. In S. Okazaki (Ed.), *Handbook of research in international advertising* (pp. 109–132). Cheltenham, England: Edward Elgar.

Matsumoto, D., Kwang, H. S., & Yamada, H. (2010). Cultural differences in the relative contributions of face and context to judgments of emotions. *Journal of Cross-Cultural Psychology*, *43*, 198–218.

Mesoudi, A. (2011). *Cultural evolution: How Darwinian theory can explain human culture and synthesize the social sciences*. Chicago, IL: University of Chicago Press.

Miller, J. G. (1984). Culture and the development of everyday social explanation. *Journal of Personality and Social Psychology*, *46*, 961–978.

Miller, J. G. (1999). Cultural psychology: Implications for basic psychological theory. *Psychological Science*, *10*, 85–91.

Miyamoto, Y. (2013). Culture and analytic versus holistic cognition: Toward multilevel analyses of cultural influences. *Advances in Experimental Social Psychology*, *47*, 131–188.

Miyamoto, Y., Nisbett, R. E., & Masuda, T. (2006). Culture and the physical environment: Holistic versus analytic perceptual affordances. *Psychological Science*, *17*, 113–119.

Miyamoto, Y., Yoshikawa, S., & Kitayama, S. (2011). Feature and configuration in face processing: Japanese are more configural than Americans. *Cognitive Science*, *35*, 563–574.

Morling, B., & Lamoureaux, M. (2008). Measuring culture outside the head: A meta-analysis of individualism–collectivism in cultural products. *Personality and Social Psychology Review*, *12*, 199–221.

Murata, A., Park, J., Kovelman, I., Xiaosu, H., & Kitayama, S. (2015). Culturally non-preferred cognitive tasks require compensatory attention: A functional near infrared spectroscopy (fNIRS) investigation. *Culture and Brain*, *3*(1), 53–67.

Na, J., Grossmann, I, Varnum, M. E. W, Kitayama, S., Gonzalez, R., & Nisbett, R. E. (2010). Cultural differences are not always reducible to individual differences. *Proceedings of the National Academy of Sciences of the United States of America*, *107*, 6192–6197.

Na, J., & Kitayama, S. (2011). Spontaneous trait inference is culture-specific behavioral and neural evidence. *Psychological Science*, *22*, 1025–1032.

Nand, K. L., Masuda, T., Senzaki, S., & Ishii, K. (2014). Examining cultural drifts in artworks through development and history: Cultural comparisons between Japanese and Western landscape paintings and drawings. *Frontiers in Psychology: Cultural Psychology*, *5*, 1041.

Nisbett, R. E. (2003). *The geography of thought*. New York, NY: Free Press.

Nisbett, R. E., & Cohen, D. (1996). *Culture of honor: The psychology of violence in the South*. Boulder, CO: Westview Press.

Nisbett, R. E., & Masuda, T. (2003). Culture and point of view. *Proceedings of the National Academy of Sciences of the United States of America*, *100*, 11163–11175.

Nisbett, R. E., & Miyamoto, Y. (2005). The influence of culture: Holistic versus analytic perception. *Trends in Cognitive Sciences*, *9*, 467–473.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic vs. analytic cognition. *Psychological Review*, *108*, 291–310.

Oishi, S. (2010). The psychology of residential mobility implications for the self, social relationships, and well-being. *Perspectives on Psychological Science*, *5*, 5–21.

Oishi, S., Schug, J., Yuki, M., & Axt, J. (2015). The psychology of residential and relational mobilities. In M. J. Gelfand, C.-Y. Chiu, & Y.-Y. Hong (Eds.), *Handbook of advances in culture and psychology* (Vol. 5) (pp. 221–272).

Paine, R. T., & Soper, A. (1955). *The art and architecture of Japan*. Baltimore, MD: Penguin.

Pinker, S. (1994). *The language instinct*. New York, NY: Morrow.

Pinker, S. (1997). *How the mind works*. New York, NY: W.W. Norton.

Pinker, S. (2007). *The stuff of thought: Language as a window into human nature*. New York, NY: Viking.

Posner, M. I. (1980). Orienting of attention. *Quarterly Journal of Experimental Psychology*, *32*(1), 3–25.

Putnam, R., Leonardi, R., & Nanetti, R. Y. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton, NJ: Princeton University Press.

Pylyshyn, Z. W. (1999). Is vision continuous with cognition? The case for cognitive impenetrability of visual perception. *Behavioral and Brain Sciences*, *22*(3), 341–423.

Richerson, P. J., & Boyd, R. (2005). *Not by genes alone: How culture transformed human evolution*. Chicago, IL: University of Chicago Press.

Rogoff, B. (2003). *The cultural nature of human development*. New York, NY: Oxford University Press.

Russell, J. A. (1991). The contempt expression and the relativity thesis. *Motivation and Emotion*, *15*, 149–168.

Russell, J. A., & Fehr, B. (1987). Relativity in the perception of emotion in facial expressions. *Journal of Experimental Psychology: General*, *116*, 223–237.

Russell, M. J., Masuda, T., Hioki, K., & Singhal, A. (2015). Culture and social judgments: The importance of culture in Japanese and European Canadians' N400 and LPC processing of face lineup emotion judgments. *Culture and Brain*, *3*(2), 131–147.

Savani, K., & Markus, H. R. (2012). A processing advantage associated with analytic perceptual tendencies: European Americans outperform Asians on multiple object tracking. *Journal of Experimental Social Psychology*, *48*, 766–769.

Scholz, J., Klein, M. C., Behrens, T. E. J., & Johansen-Berg, H. (2009). Training induces changes in white-matter architecture. *Nature Neuroscience*, *12*, 1370–1371.

Senzaki, S., Masuda, T., & Ishii, K. (2014). When is perception top-down and when is it not? Culture, narrative, and attention. *Cognitive Science*, *38*, 1493–1506.

Senzaki, S., Masuda, T., & Nand, K. (2014). Holistic vs. analytic expressions in artworks: Cross-cultural differences and similarities in drawings and collages by Canadian and Japanese school-age children. *Journal of Cross-Cultural Psychology*, *45*(8), 1297–1316.

Senzaki, S., Masuda, T., Takada, A., & Okada, H. (2016). The communication of culturally dominant modes of attention from parents to children: A comparison of Canadian and Japanese parent-child conversations during a joint scene description task. *PLoS One*, *11*. e0147199

Shweder, R. A. (1991). Cultural psychology: What is it? In R. Shweder (Ed.), *Thinking through culture* (pp. 73–110). Cambridge, MA: Harvard University Press.

Snibbe, A. C., & Markus, H. R. (2005). You can't always get what you want: Educational attainment, agency, and choice. *Journal of Personality and Social Psychology*, *88*, 703–720.

Stanley, J. T., Zhang, X., Fung, H. H., & Isaacowitz, D. M. (2013). Cultural differences in gaze and emotion recognition: Americans contrast more than Chinese. *Emotion*, *13*, 36–46.

Stephens, N. M., Markus, H. R., & Townsend, S. S. (2007). Choice as an act of meaning: The case of social class. *Journal of Personality and Social Psychology*, *93*, 814–830.

Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard University Press.

Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 19–136). New York, NY: Oxford University Press.

Tsai, J. L., Louie, J. Y., Chen, E. E., & Uchida, Y. (2007). Learning what feelings to desire: Socialization of ideal affect through children's storybooks. *Personality and Social Psychology Bulletin*, *33*(1), 17–30.

Tsivilis, D., Otten, L. J., & Rugg, M. D. (2001). Context effects on the neural correlates of recognition memory: An electrophysiological study. *Neuron*, *31*, 497–505.

Ueda, Y., & Komiya, A. (2012). Cultural adaptation of visual attention: Calibration of the oculomotor control system in accordance with cultural scenes. *PLoS One*, *7*(11), e50282.

Uskul, A. K., Kitayama, S., & Nisbett, R. E. (2008). Ecocultural basis of cognition: Farmers and fishermen are more holistic than herders. *Proceedings of the National Academy of Sciences*, *105*, 8552–8556.

Varnum, M. E. W., & Grossman, I. (in press). Cultural change: The how and the why. *Perspectives on Psychological Science*.

Varnum, M. E. W., Grossmann, I., Kitayama, S., & Nisbett, R. E. (2010). The origin of cultural differences in cognition: The social orientation hypothesis. *Current Directions in Psychological Science*, *19*, 9–13.

Varnum, M. E. W., Na, J., Murata, A., & Kitayama, S. (2012). Social class differences in N400 indicate differences in spontaneous trait inference. *Journal of Experimental Psychology: General*, *141*, 518–526.

Vygotsky, L. (1978). *Mind in society*. Cambridge, MA: Harvard University Press. (Original work published 1930)

Wang, H., Masuda, T., Ito, K., & Rashid, M. (2012). How much information? East Asian and North American cultural products and information search performance. *Personality and Social Psychology Bulletin*, *38*, 1539–1551.

Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry*, *17*, 89–100.

Zhang, B., & Seo, H. S. (2015). Visual attention toward food-item images can vary as a function of background saliency and culture: An eye-tracking study. *Food Quality and Preference*, *41*, 172–179.

Dr. Takahiko Masuda was born in Tokyo, Japan. He studied at Hokkaido University, Kyoto University, and received his PhD in Culture and Cognition in 2003 from the University of Michigan. Dr. Masuda's research has mainly focused on cultural similarities and differences in cognition and perception, notably attention processes. He won the Japanese Psychological Association Award for International Contributions to Psychology in 2010, and his textbook "Cultural Psychology (in Japanese)" was awarded the Best Book of the Year by the Japanese Society of Social Psychology in 2011. Currently, Dr. Masuda is an associate professor at the University of Alberta and an affiliate researcher at the Center for Experiment Research in Social Sciences at Hokkaido University. He is recently investigating cultural variations in perception of foreground–background consistency using event-related potential methodology.

How to cite this article: Masuda T. Culture and attention: Recent empirical findings and new directions in cultural psychology. *Soc Personal Psychol Compass*. 2017;11:e12363. https://doi.org/10.1111/spc3.12363