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East vs. West – Developmentally Early Differences in Attention

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Abstract

Growing evidence indicates a suite of generalized differences in the attentional and cognitive processes of adults from Eastern and Western cultures (Nisbett, 2003). Cognition in Eastern adults is characterized as more relational and in Western adults as more object focused (Nisbett & Miyamoto, 2005). This chapter will present evidence on the early emergence of these differences in preschoolers from Japan and the U.S. and will also present initial findings on transmission of these cultural differences being very early.

Introduction

Many discussions of East-West cultural differences begin with differences in how the two sets of cultures conceptualize the role of the individual in society, with Eastern cultures characterized as valuing harmony and community and Western cultures as valuing individual responsibility (Markus & Kitayama, 1991). Within this framework, a now expansive literature suggests that these cultural differences in social judgments and values about how societies are organized have analogues – or perhaps consequences – for more fundamental cognitive processes including how they process visual information (see Nisbett, 2003): Western adults are more analytic, focused on decontextualized and individual objects; Eastern adults are more holistic, sensitive to the relational structure in scenes (Nisbett & Miyamoto, 2005). These differences have been shown through a variety of measures in adults including visual search, categorization, scan patterns, and memory for visual materials (Chua, Boland, & Nisbett, 2005; Kelly, Miell, & Caldara, 2010; Kitayama, Duffy, Kawamura, & Larsen, 2003; Masuda, Ellsworth, Mesquita, Leu, Tanida, & de Veerdonk, 2008; Masuda & Nisbett, 2001; Masuda & Nisbett, 2006; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005; Nisbett, Peng, Choi, & Norenzayan, 2001). Potentially related differences have also been reported in brain imaging studies as well (Han & Northoff, 2008; Hedden, Ketay, Aron, Markus, & Gabrieli, 2008).

The origins of these differences in visual processing are not known. However, some have suggested direct connections to the differing systems of social values. For this to be so, the focus on individual responsibility in the social values of Western societies

must penetrate low level visual processes, and scanning patterns and the emphasis in an Eastern collective society must encourage attention to context in arbitrary scenes.

One study that linked these differences in social values to attentional styles examined the role of surrounding context on adults' judgments of the degree of happiness or sadness indicated in a cartoon face (Masuda *et al.*, 2008). More specifically, Masuda and his colleagues (2008) asked adults from the United States and Japan to judge a target person's emotion. Participants were shown the target person with other people surrounding her/him. The surrounding cartoon people had facial expressions that were either congruent or incongruent with the facial expression of the target. Japanese adults' judgments were strongly influenced in an assimilatory manner by the surrounding people's facial expressions and were influenced much more so than the participants from the United States. For example, if the target person was surrounded by "happier" people, the target person was judged by Japanese participants to be happier than when the target person was surrounded by "sad" people.

In a related study, Masuda and Nisbett (2001) used nonsocial scenes and found comparable differences. In this study, adults from the United States and from Japan were asked to describe an aquarium. Adults from the United States described the focal object – the large fish in the center. Adults from Japan also described the large fish but did so in relation to peripheral components (water color, plants, small fish, *etc.*); further, whereas the U.S. participants' memories for the scene depended only on the properties of the large fish and were unaffected by changes in peripheral elements, Japanese participants' memories were dependent on the supporting context (Masuda & Nisbett, 2001). Thus, the differences in both social and nonsocial perceptual contexts appear similar: Westerners attend to the focal individual or object whereas Easterners attend to the relations and the context and interpret the focal individual and object with respect to that context.

These cultural differences in visual processing, well-documented in adults, could be the end-product of long developmental histories, including training with cultural artifacts, such as landscape structure – that directly connect social values to visual information - or schooling, such as textbooks (Imada, 2012; Miyamoto, Nisbett, & Masuda, 2006). However, recent evidence suggests that visual processing differences similar to those found in adults are evident in children as young as 3 years of age, with Western children being more advanced in tasks requiring selective attention to individual elements and Eastern children being more advanced in tasks requiring attention to relational patterns (Duffy, Toriyama, Itakura, & Kitayama, 2009; Kuwabara & Smith, 2012; Kuwabara, Son, & Smith, 2011; Moriguchi Evans, Hiraki, Itakura, & Lee, 2011; Senzaki, Masuda, & Nand, 2014). This developmental evidence provides strong constraints on explanations of the origins of cross-cultural differences in visual processing and raises important theoretical questions both about the universality and flexibility in human

cognitive development. In this section of the chapter, we first review the developmental results concerning cross-cultural differences with an emphasis on differences in visual processing. We then broaden the review to consider the potentially supporting role of language and parenting styles, and conclude with thoughts on the broader theoretical question of the origins and universality of what would seem to be foundational cognitive processes.

Early differences in visual processing

Figure 1 summarizes task contexts in which early cross-cultural differences between Eastern and Western children have been documented in visual information processing tasks, tasks that one would not think of as culturally-laden but as tapping more basic processes on which forms of cognition are dependent.

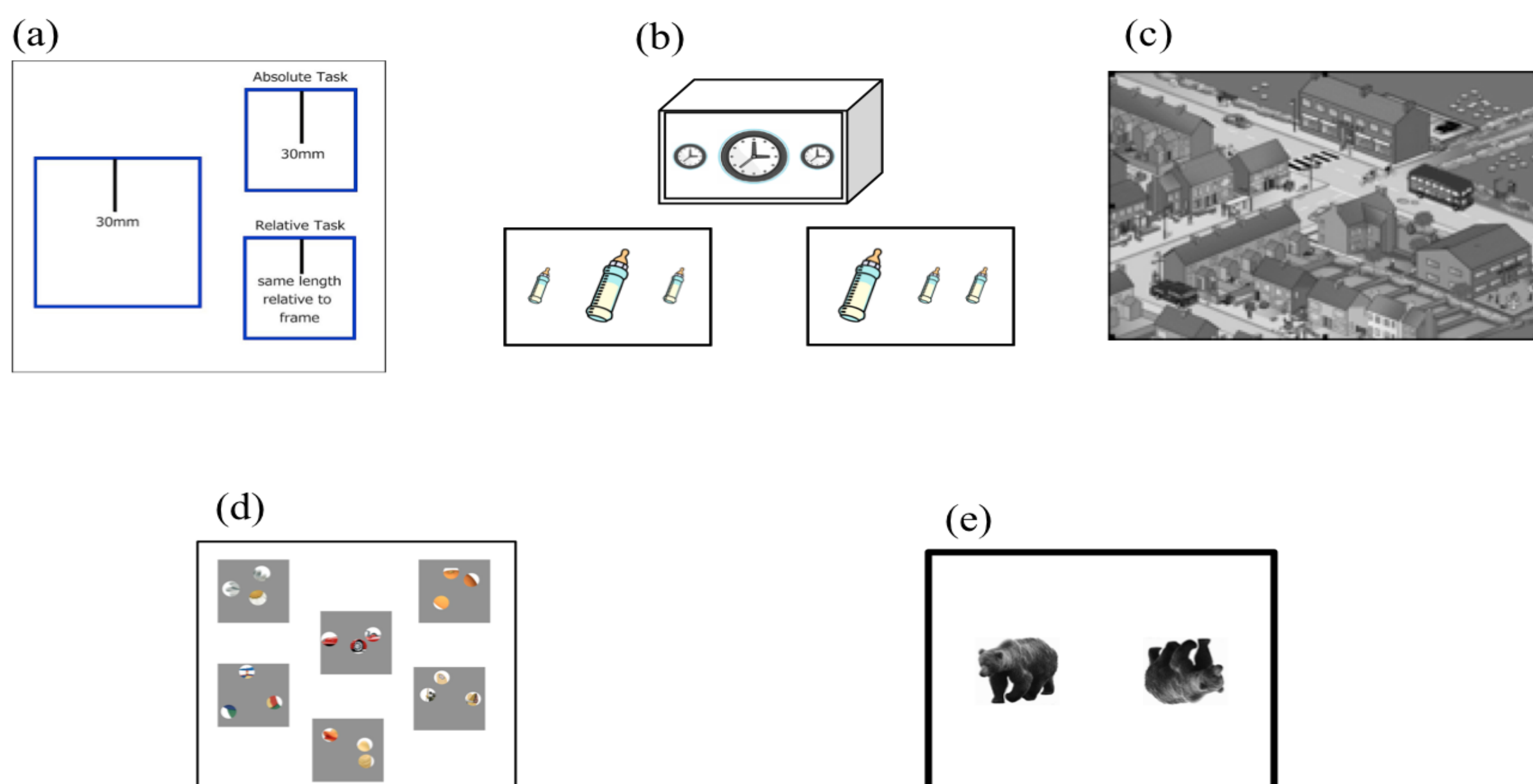


Figure 1

Variety of non-culturally laden tasks used to investigate the early cross-cultural differences between Eastern and Western children in visual information processing tasks.

(a) Rod-and-Frame task used in Duff and his colleagues. (2009). In this task, children were asked to either draw a line that match in absolute length (ignore the box size) or match in relative length (consider the relation between the line and box size).

(b) Relational-Match to standard task used in Kuwabara & Smith (2012). In this task, children were asked to pick one of the choice card that is “more like” the target.

(c) Visual search task used in Kuwabara & Smith (2012). In this task, children were asked to find the target object (e.g. bicycle) as quickly as they could.

(d) Picture search task used in Kuwabara & Smith (submitted). In this task, children were asked to point to the target object (e.g. duck) from these 3-fragmented pictures.

(e) Inversion task used in Kuwabara & Smith (2012). In this task, children were shown the picture of two objects, then asked whether the pictures they saw were same or different.

One of the earliest reported findings of cross-cultural differences used the rod-and-frame task in school-aged children (Duffy, Toriyama, Itakura, & Kitayama, 2009) and

showed that young Japanese children performed better in tasks requiring a proportional match (line length proportional to the square area) whereas U.S. children performed better than Japanese children in a task when the goal was to ignore the frame but match the exact line length. Another study assessed children's ability to match arrays by their relational structure. This is a highly studied domain in cognitive development generally, and one that has been linked to success in mathematics and in analogical reasoning and problem solving. Kuwabara and Smith (2012), using a series of matching tasks of increasing difficulty, showed that Japanese preschoolers readily solved these problems whereas U.S. children performed at chance with objects of any complexity (such as those shown in the Figure 1).

In the same series of experiments, Kuwabara and Smith (2012) showed that it was not the case that Japanese children simply perform better than U.S. children in general. They also used visual search tasks in which the goal was to locate an individual target while ignoring the background scenes. In these selective attention tasks, tasks in which the context was irrelevant, U.S. preschoolers outperformed their Japanese counterparts. In another study, Kuwabara and Smith (2014, submitted) showed that these cultural differences resulted in different strengths and profiles in visual object recognition tasks in the two cultures: U.S. 3 years old recognized basic level objects from diagnostic piecemeal features (consistent with one route to visual object recognition in adults, *e.g.* Ullman, 1996; Ullman & Bart, 2004; Ullman, Vidal-Naquet & Sali, 2002) whereas Japanese children performed more poorly in recognition from isolated but diagnostic features; in contrast, Japanese children showed the more advanced signature effects of configural processing – inversion effects – while U.S. children did not.

Human visual object recognition is central across domains of human psychology; and by 3 years of age, children developing in different cultures show different developmental patterns. Culture thus seems to influence more than the context in which development occurs but also may be embedded in the very processes - visual attention, visual processing – that drives developmental change. The early emergence of these differences in such foundational cognitive processes raises two questions with far-reaching theoretical implications. First, what kinds of experiences could create these kinds of differences and do so by 3 years of age? Second, what do these differences mean for the universality of developmental process and for the abilities that underlie human cognition?

Transmission vectors

Where do these differences come from? – what are the transmission vectors of these differences in basic cognitive processes? Theorists (*e.g.*, Markus & Kitayama, 1991) of culture have noted that the many components that comprise a culture – from language, to myths, to artifacts, to parenting styles, and societal values – are all mutually constraining. Thus, there are multiple possible lines of transmission, and all might play a mutually reinforcing role in the observed differences. In particular, Eastern parents

encourage children to notice and attend to the larger context and to the contextual appropriateness of their behavior whereas Western parents focus on the individual and discourage excuses based on context (Fernald & Morikawa, 1993; Friedlmeier & Trommsdorff, 1999; Okagaki & Sternberg, 1993). Attentional styles in social contexts – that encourage scanning the collective context versus focusing on the responsible individual – may spill over to less socially-laden attentional tasks (*e.g.*, Masuda, *et al.*, 2008).

A second possible transmission vector is language because there are systematic differences in the frequency of object names versus relational terms in Western and Eastern languages in general (Brown, 1998; Brown, 2008; Gopnik & Choi, 1990; Tardif, 1996; Tardif, 2006) and in English and Japanese in particular (Fernald & Morikawa, 1993; Ogura, Dale, Yamashita, Murase, & Mahieu, 2006). Asian and Western caretakers have been shown to talk about events to children differently, with Korean, Japanese, and Cantonese caretakers using more action-oriented words and verbs (Fernald & Morikawa, 1993; Gopnik, Choi, & Baumberger, 1996; Ogura, Dale, Yamashita, & Murase, 2006; Tardif, Gelman, & Xu, 1999), whereas English-speaking caretakers using more nouns and verbs (such as “see this”) that direct attention to objects (*e.g.*, Goldfield, 1993; Gopnik *et al.*, 1996). These differences in language structure have been shown to be related to more systematic attention to objects in children who learn English and to more systematic attention to relations between objects in children who learn Japanese (Imai, Haryu, Okada, Lianjian, & Shigematsu, 2006; Yoshida & Smith, 2001; Yoshida & Smith, 2003; Yoshida & Smith, 2005). Thus, language –which reflects and supports cultural values – is a likely strong force behind the observed early differences.

A third possible transmission vector is cultural artifacts. There are only a few studies investigating how these differences may reflect “cultural products” such as newspaper articles (Morris & Peng, 1994), advertisements (Kim & Markus, 1999), TV commercials (Cho, Kwon, Gentry, Jun, & Kropp, 1999), and elementary school textbooks (Imada, 2012). A meta-analysis of previous such studies found that indeed Western (mostly the U.S.) cultural products were more individualistic than East Asia (such as China, Korea, and Japan) whose texts seem to be more collectivistic (Morling & Lamoreaux, 2008).

There has been very little systematic study investigating how these differences are transmitted to young children’s daily life that differentiate the developmental pathways in each culture. However, early stories and picture books directed at very young children could play an important role in the observed developmental differences. If the images in these early books differentially depict stories about individual responsibility versus stories about collective harmony, they might well have visual properties that entrain more selective versus more relational visual processing.

It is also possible the observed pervasive and early differences in visual processing are pervasive and early because of differences in the ways in which parents interact with their children. We offer one example here. In this study (Kuwabara & Smith, in preparation), parent toy play with their one-year old infants was studied. Parents were present-

ed with 6 different animals (lion, cheetah, rhino, panda, giraffe, and elephant) and asked to use them to engage their infant. The goal of this minimalist play set was to measure what the parents brought to – what structure they imposed on – play, a one mundane activity that parents do quite often. Parental play by Japanese and U.S. parents was dramatically different. Both sets of parents showed the infant the objects, one at a time, and showed the infant what the object could do (*e.g.*, walk, tickle the baby). But the syntactic structure of the play, as captured in the two networks shown in Figure 2, was very different. U.S. parents tended to select one object, leaving the others aside in a haphazard and unrelated pile, and then applied multiple actions to that one object. Then, they moved to the next object and did the same. It was as if each animal had its own unique narrative that was completed before that animal was cast aside, and the parent moved on to the next animal and its own story. Japanese parents, in marked contrast, formed a play narrative that was about the group, with the animals remaining as a group and taking turns – one after the other – in engaging in an action. The difference in the patterns of play fits the larger ideas of individualism (each animal is the hero of its own segment) versus social harmony (an organized group in which everyone plays a role and no one is left out). These different narratives – and the actions and movements of the parent and animals – entrain different patterns in perceptual information provided to infants: on a single object or back and forth between multiple objects. This is just one play task, one opportunity for differences that reflect cultural values. Daily life, from birth, is filled with many of these. From this perspective, it seems unlikely that any one source of the observed cultural differences, quite literally, may intrude throughout daily life in quite mundane tasks and contexts.

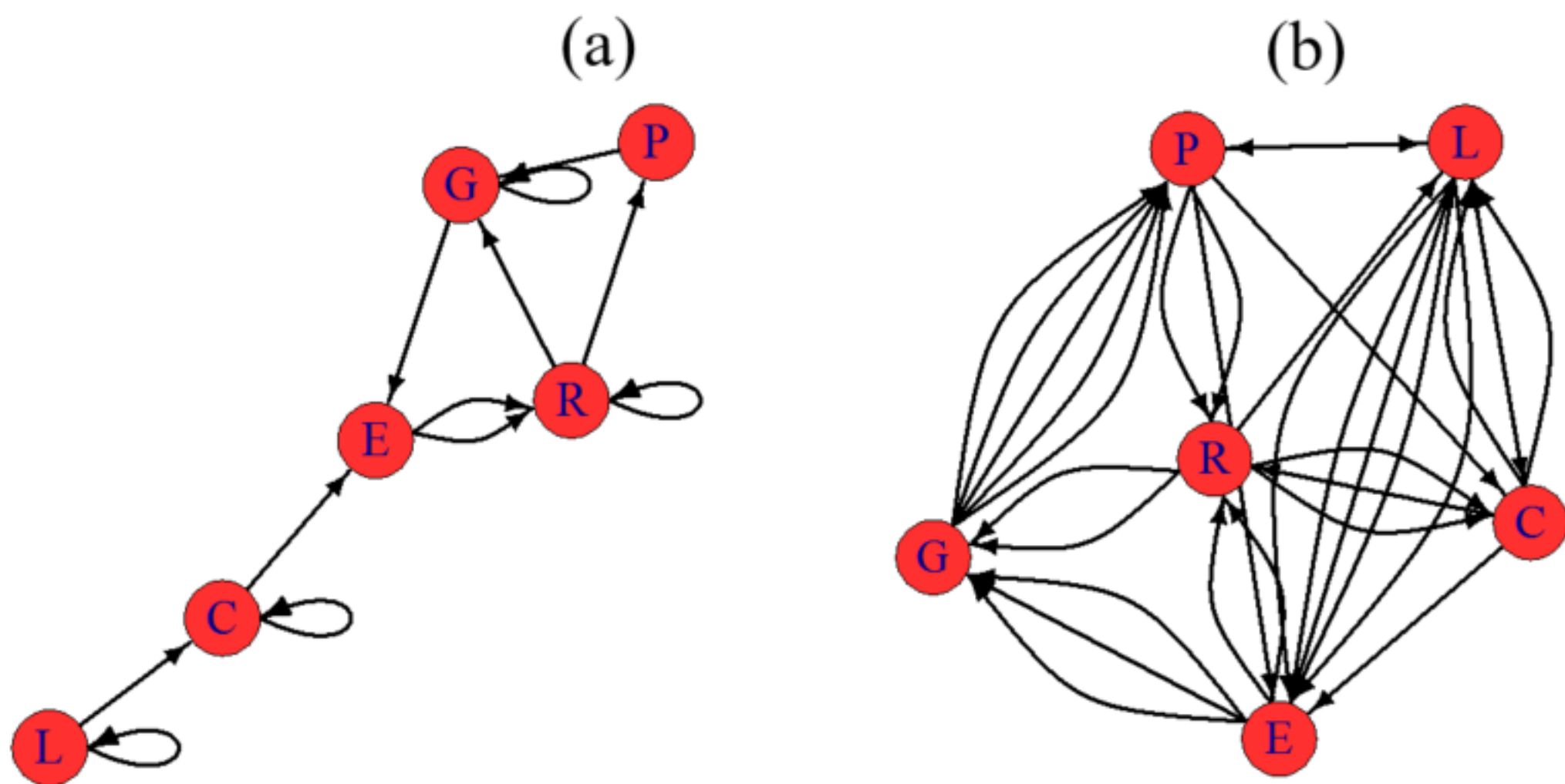


Figure 2

Each node represents an animal. Nodes are connected by the order in which parents played.

(a) Example play structure from the U.S. parent.

(b) Example play structure from Japanese parent.

As seen, U.S. network contains more self-loop back to the node suggesting that they did play with one animal before moving to the other whereas Japanese network contains more interaction among the animals.

The Question of Universals

The evidence suggests that different kinds of experiences – and different kinds of visual information – favor some information over the other. Cross-cultural studies – by aggregating over groups of individuals with similar experiences – may be more sensitive to the stimulus and experiential variation characteristic within cultural groups and thus provide insight into the *universal* properties of human visual processing and into the adaptive and experience-dependent nature of human cognition more generally.

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