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A cross-cultural examination of selective attention in Canada and Japan: The role of social context

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ABSTRACT

Previous studies have found that East Asian children outperform Western children on executive function tasks; however, cultural differences may depend on the task demands. Particularly, East Asian children may have difficulties in regulating attention within social contexts. Selective attention was tested among four- to seven-year-old Canadian (N = 62) and Japanese (N = 54) children using two Flanker task variants: (a) Social Flanker (i.e., happy/sad faces) and (b) standard Fish Flanker (i.e., right/left) tasks. In the Social Flanker task, Japanese children's performance was more impaired by flanker interference than that of Canadian children. While the interference effect was similar across cultures in the Fish Flanker task, Japanese children had an overall better performance than Canadian children. In both cultures, the older children (ages 6–7) performed better than the younger children (ages 4–5). These results suggest the importance of social contexts in understanding cultural differences in the development of cognitive control.

1. Introduction

Early childhood is marked by remarkable growth in cognitive control (e.g., Best, Miller, & Jones, 2009; Garon, Bryson, & Smith, 2008). Cognitive control requires executive function (EF), which is defined as a set of foundational self-regulatory skills involved in consciously controlling one's attention, thoughts, actions, and emotions (Miyake et al., 2000; Stuss & Knight, 2002). EF is a top-down, neurocognitive process as it involves inhibiting one's prepotent responses, flexibly shifting one's attention, and monitoring and updating information in working memory (Miyake & Friedman, 2012; Miyake et al., 2000; Wiebe, Espy, & Charak, 2008). While the development of cognitive control has been studied extensively, particularly in Western samples, children in non-Western cultures may experience different developmental trajectories, as a result of culturally specific socialization influencing children's attention and cognition (Luria, 1979; Vygotsky, 1978).

Several recent studies have shown that East Asian children perform significantly better than Western children on a number of EF tasks (e.g., Imada, Carlson, & Itakura, 2013; Oh & Lewis, 2008; Sabbagh, Xu, Carlson, Moses, and Lee, 2006); however, other evidence suggests that adults and children from East Asian cultures are less able to selectively control their attention than those from Western cultures, especially on visual selective attention tasks (e.g., Duffy, Toriyama, Itakura, & Kitayama, 2009; Kuwabara & Smith, 2012; Kuwabara and Smith, 2016; Kuwabara, Son, & Smith, 2011). Theoretically, EF and selective attention are closely linked; some models of EF include selective attention as a component (Diamond, 2013). Therefore, these two lines of previous research provide

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contradictory findings, suggesting that the nature of cross-cultural differences in the development of selective attention may vary depending on the source of cognitive demands. In the present study, we explored under what conditions cross-cultural differences in selective attention may emerge between 4- to 7-year-old Canadian and Japanese children, by manipulating the social context within the Flanker paradigm.

A growing body of research has examined cross-cultural differences in the development of EF, specifically comparing children from Western cultures (mainly Americans, Canadians, and Western Europeans) and East Asian cultures (mainly Chinese, Japanese, and Korean). For example, Sabbagh et al. (2006) used a battery of seven EF tasks, and found that Chinese preschoolers performed better than their American counterparts on tasks measuring set-shifting and inhibitory control. Similarly, Oh and Lewis (2008) used a battery of eight tasks and found that 3.5- to 4.5-year-old Korean children performed better than British children on most of the tasks measuring set-shifting, inhibitory control, and working memory, except the dimensional change card sort (DCCS) task. In another study, Imada and her colleagues (Imada et al., 2013) found that Japanese 4- to 9-year-old children performed better than their American counterparts on the DCCS task, but the two groups did not differ in working memory nor impulse-control performance. Although there are some different patterns across studies, these previous findings overall suggest that East Asian children outperform their Western counterparts.

Considering that the link between EF and selective attention, one might expect that, compared to Western children, East Asian children perform better on tasks measuring selective attention. However, a number of cross-cultural studies have demonstrated that both adults and children of Western cultures are more likely to selectively attend to the main, target objects, while East Asians typically attend to both focal and contextual information that may be irrelevant to the task (e.g., Chua, Boland, & Nisbett, 2005; Masuda & Nisbett, 2001, 2006; Senzaki, Masuda, & Ishii, 2014). For example, Duffy and his colleagues (Duffy et al., 2009) found that North American children were more likely to use a selective attention strategy, while Japanese children were more likely to use a divided attention strategy.

The tendency for East Asians to attend to context in perceptual processing may be especially important in social contexts, as they tend to hold an interdependent view of self. East Asians tend to consider the self as a relational entity that is fundamentally connected to a number of significant relationships with others (Markus & Kitayama, 1991; Zhu, Zhang, Fan, & Han, 2007). In contrast, people in Western cultures tend to hold an independent view of self, in which self and others are generally perceived as autonomous individuals who have distinct attributes and personal goals centering around individuality. One possibility is that this greater emphasis on social relationships expected in East Asian cultures than Western cultures may play an important role in understanding cross-cultural differences in selective attention. For example, Masuda and colleagues (Masuda et al., 2008; Masuda, Wang, Ishii, & Ito, 2012; Russell, Masuda, Hioki, & Singhal, 2015) examined context sensitivity in social situations using a face lineup emotion judgement paradigm that is similar to a Flanker task. In this task, participants were presented with a lineup of photographs depicting individuals with happy or sad facial expressions, and were asked to rate the intensity of the emotion portrayed by the central figure. The central figure was flanked by individuals showing the same emotion (i.e., congruent condition) or a different emotion (i.e., incongruent condition). Japanese participants' ratings were more influenced by the emotional valence of the surrounding figures than Canadians' (Masuda et al., 2008), and only Japanese, and not Canadians, exhibited neural incongruity effect (Russell et al., 2015).

In a recent study, Ishii, Rule, and Toriyama, (2017) used the same face lineup emotion judgement task used by Masuda et al. (2008) with 5-year-old children in Canada and Japan, and they found significant cross-cultural differences in children's rating of neutral target faces. When the neutral target face was surrounded by background figures with emotional faces, Canadian children were more likely to show the contrast effect: that is, when the neutral target face was flanked by happy background figures, it was seen as more negative than the neutral target with neutral background figures. Japanese children, on the other hand, were more likely to show an assimilation effect: that is, when the neutral target face was flanked by angry background figures, it was rated as more negative than the neutral target with neutral background figures.

To summarize, on one hand, cross-cultural studies on the development of EF suggest advanced cognitive control for East Asian children over Western children (e.g., Imada et al., 2013; Oh & Lewis, 2008; Sabbagh et al., 2006). On the other hand, cross-cultural studies on the development of visual attention suggest that Western children outperform East Asian children on a selective attention task (e.g., Duffy et al., 2009; Kuwabara & Smith, 2012). What remains less clear is to what extent factors such as social and non-social contexts of the stimuli affect cross-cultural differences in the development of selective attention. In order to better construct a developmental account of cognitive and attentional control across cultures, the purpose of the current research is to investigate the development of selective attention among 4- to 7-year-old Canadian and Japanese children by contrasting their performance on social and non-social Flanker tasks.

Within the mechanism of attention, selective attention is most related to EF, and the Flanker paradigm (Eriksen & Eriksen, 1974) assesses children's controls of visual attention despite distraction (Rueda, Fan et al., 2004); thus, it is ideally suited for the current study. In the current study, we were particularly interested in examining selective attention in a social context. In social variants of the Flanker, stimuli are often faces displaying emotional expressions. For example, Fenske and Eastwood (2003) found evidence that facial expressions modulated the allocation of selective attention: Canadian adults responded more slowly to a positive target face flanked by negative faces than to a negative target face flanked by positive faces. In another study, American adolescents (aged 11–17 years) were also less accurate and slower than adults in the Social Flanker task that used photos of happy and fearful emotional expressions (Grose-Fifer, Rodrigues, Hoover, & Zottoli, 2013). However, to the best of our knowledge, no study has used a Social Flanker paradigm using facial expressions with young children, or with non-Western samples.

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