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Face and body recognition show similar improvement during childhood

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ABSTRACT

Adults are proficient in extracting identity cues from faces. This proficiency develops slowly during childhood, with performance not reaching adult levels until adolescence. Bodies are similar to faces in that they convey identity cues and rely on specialized perceptual mechanisms. However, it is currently unclear whether body recognition mirrors the slow development of face recognition during childhood. Recent evidence suggests that body recognition develops faster than face recognition. Here we measured body and face recognition in 6- and 10-year-old children and adults to determine whether these two skills show different amounts of improvement during childhood. We found no evidence that they do. Face and body recognition showed similar improvement with age, and children, like adults, were better at recognizing faces than bodies. These results suggest that the mechanisms of face and body memory mature at a similar rate or that improvement of more general cognitive and perceptual skills underlies improvement of both face and body recognition.

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Introduction

Successful social interaction depends on our ability to accurately identify others. Faces are a rich source of identity information, and adults can readily determine a person's identity from his or her

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face (Adolphs, 2003; Bruce & Young, 1986; McKone, Crookes, Jeffery, & Dilks, 2012). Given that all faces are highly similar visual patterns, this is an impressive skill that is supported by face-specific perceptual and neural mechanisms (e.g., Kanwisher, McDermott, & Chun, 1997; Maurer, Le Grand, & Mondloch, 2002; Rhodes, 2013; Rhodes & Leopold, 2011; Tong, Nakayama, Moscovitch, Weinrib, & Kanwisher, 2000).

There has been considerable interest in how face recognition skills develop and the role of experience during childhood in refining face-specific mechanisms. It is well established that performance on face recognition tasks improves from 6 years of age to adulthood (e.g., Bruce et al., 2000; Carey, Diamond, & Woods, 1980; Chung & Thomson, 1995; Mondloch, Geldart, Maurer, & Le Grand, 2003). These findings have led researchers to argue that the perceptual and neural mechanisms of face recognition develop during childhood as experience with faces accumulates (e.g., Diamond & Carey, 1977; Golarai et al., 2007; Mondloch, Le Grand, & Maurer, 2002; see also McKone et al., 2012, for a review).

Bodies also convey identity cues, and like faces the similarity of bodies presents a challenge to the visual system. Relatively little is known about body recognition skills. In adults, there is some evidence that body perception relies on perceptual mechanisms similar to those used for faces (Reed, Stone, Grubb, & McGoldrick, 2006; Rhodes, Jeffery, Boeing, & Calder, 2013; Robbins & Coltheart, 2012a, 2012b). These similarities between the mechanisms of face and body recognition in adults, and the fact that experience with bodies also accumulates during childhood, suggest that body recognition may also show prolonged development.

Recognition of whole-person stimuli (face and body together) improves between 4 and 10 years of age (Seitz, 2003). However, this improvement could simply reflect the well-established improvement in face recognition. Body-only recognition in children has been examined in only three studies, but all three suggested that body-only recognition improves with age. Seitz (2002) found that body recognition (whole-person stimuli were used, but the faces were held constant) improved between 8 and 10 years of age, and the amount of improvement did not differ from that found for faces only. The author did not test younger children. Peelen, Glaser, Vuilleumier, and Eliez (2009) showed that a group of children (7–17 years of age) were less accurate but no slower than a group of adults at performing a one-back image matching task using body-only stimuli (no heads shown). However, the authors did not present any analyses examining whether performance may have varied with age among their child sample. Weigelt and colleagues (2014) used old–new recognition tasks to test recognition for bodies, faces, cars, and scenes in 5- to 10-year-old children and adults. Body recognition improved with age; interestingly, however, the improvement in body recognition between 5 and 10 years was smaller than the improvement in face recognition over this age range. Furthermore, the age-related changes in body recognition were comparable to those found for cars and scenes. These results suggest that body and face recognition skills may develop at different rates between 5 and 10 years of age. Moreover, inspection of Weigelt and colleagues' results suggests that body recognition performance reached adult levels at around 7 or 8 years of age, whereas face recognition performance did not approach adult levels until 10 years of age. Therefore, it is possible that body recognition skills mature earlier in development than face recognition skills. Interestingly, the unique developmental trajectory seen for faces in this study was restricted to face *memory*. Weigelt and colleagues found similar age-related improvement for faces, bodies, cars, and scenes on tests of face *perception* (discrimination task) that had minimal memory demands.

However, there are several limitations in Weigelt and colleagues' (2014) study that complicate the interpretation of their results as evidence that body and face recognition improve at different rates during development. First, stimuli were identical at study and test, raising the possibility that image memory, rather than object memory, may have contributed substantially to the tasks. Second, face stimuli were derived from photographs but the body stimuli were computer-generated images, raising questions about how well the latter tapped body recognition skills and how comparable the face and body tasks were. Third, participants always studied two sets of objects (e.g., faces and cars) prior to the memory test, so that any age differences in interest in, or attention to, one category over the other could have influenced recognition performance. Indeed, there is evidence that children find cars more interesting than faces (Ewing, Pellicano, & Rhodes, 2013).

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