Face Recognition in Preschool-Aged Children

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Abstract

The current literature on children's recognition of faces typically uses static faces as opposed to dynamic, moving faces (e.g., Brace, Hole, Kemp, Pike, Van Duuren, & Norgate, 2001; Freire & Lee, 2001). The present study explored whether 3- to 4-year-old children could differentiate between two faces when presented in a dynamic, unimodal (visual) display. Twenty-five preschoolers were familiarized to a series of female faces silently speaking a nursery rhyme. Test trials were pairs of novel and familiar faces in a forced-choice format. Results suggest significant improvement between the ages of three and four years in the ability to recognize moving faces, both in accuracy and reaction time.

Introduction

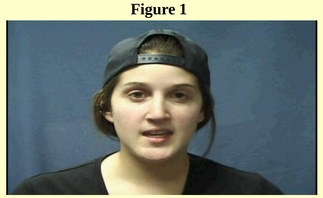
Infant face discrimination and recognition have been extensively researched. Infants demonstrate impressive capabilities such as newborn recognition of the mother's face (e.g., Bushnell, 2001) and 6-month-olds' memory for an unfamiliar face after a 24-hour delay (Pascalis, de Haan, Nelson, & de Schonen, 1998). Presently, limited research exists on face recognition in young children, particularly during the preschool period. Brace et al. (2001) demonstrated that 2- to 4-year-old children recognized static faces, both upright and inverted, when embedded in a storybook format. Freire and Lee (2001) found that 4- to 7- year-old children recognized static faces using configural and featural cues, and are sensitive to paraphernalia, such as glasses, clothing, or hairstyle. Newell and Strauss (submitted) demonstrated a significant improvement in accuracy between ages 3 and 4 in gender categorization of dynamic faces. Together, this research indicates that young children recognize static faces under a variety of conditions and that face perception skills improve significantly during early childhood. Moreover, research with infants and adults indicates that moving faces promote better recognition, learning, and memory than static faces (Bahrick, Moss, & Fadil, 1996; Knight & Johnston, 1997; Lander & Bruce, 2003; Pike, Kemp, Towell, & Phillips, 1997). Despite these findings, and the fact that faces are typically dynamic, research on face recognition in children has primarily focused on discrimination of static images.

Bahrick and Lickliter (2000) proposed the intersensory redundancy hypothesis (IRH) which states that in early development the detection of modality-specific properties (e.g., pattern, configuration, color) is facilitated when perceived in only one sense modality (e.g., unimodal visual), but is attenuated when perceived in more than one sense modality (e.g., bimodal audiovisual). Thus, face perception, which depends on modality-specific properties such as facial features and their configuration, should be facilitated in unimodal visual stimulation. The present study assessed face recognition in 3- and 4-year-old children to determine 1) if preschoolers would show recognition for dynamic, unimodal-visual faces, and 2) whether improvement in face recognition would be evident across this period. We used dynamic, unimodal-visual faces to maximize discrimination among faces and to address the gap in the literature on children's discrimination of dynamic faces.

Method

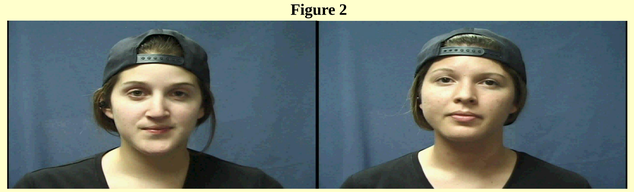
Children aged 3- (N = 12, M = 38.2 mo, SD = 2.25) and 4-years (N = 13, M = 45.5 mo, SD = 1.90) participated. After establishing rapport, preschoolers were told that they were going to hear a story about a birthday party. The story included practice, familiarization, and recognition test trials for 6 faces. The video clips associated with the story were presented on Microsoft PowerPoint.

Figure 1



Familiarization Trial

Figure 2



Test Trial

Practice: To ensure understanding of the procedure, a practice trial was given in which participants were shown a unimodal-visual moving display of a toy (dog, horse, or robot; counterbalanced across subjects). Subsequently, the experimenter showed two of the toys side by side (one novel and one familiar), and asked the subject to point to which of the toys had been previously shown. Participants were given two attempts to correctly identify the object in order for their data to be included in the study.

Familiarization: The experimenter explained that 6 of her friends had attended her party, but she had forgotten to give them party favors before they left. Participants were asked to help find the friends who came to the party. Participants were then introduced to six female faces ("party guests": see Figure 1 for one example), three in a series presented sequentially (four seconds each), silently speaking a nursery rhyme.

Test: Immediately following the three familiarization trials, participants received three test trials of two female faces speaking silently (one novel and one familiar), and were asked to point to the person who attended the party (see Figure 2). The familiarization and test series was repeated once more, with three additional female faces presented during familiarization and three more forced-choice test trials. An observer recorded the participant's responses and reaction times. Whether a face was novel or familiar during test and the lateral position of each face was counterbalanced across participants.

Results

Percent accuracy and reaction time served as the dependent variables. A single sample t-test compared percent accuracy against chance (50%) for each age group. Results indicated that the 4-year-olds showed significant face recognition ($t(12) = 2.80$, $p < .05$), whereas the 3-year-olds failed to show recognition ($t(11) = -0.55$, $p > .10$; see Figure 3). Further, a comparison of accuracy between the older and younger groups indicated that the older children were marginally significantly more accurate than the younger children ($F(1, 23) = 3.99$, $p = .06$). In addition, an independent samples t-test comparing overall reaction time of younger versus older children indicated that the older group was significantly faster to respond ($t(23) = 2.76$, $p < 0.01$; see Figure 4).

Figure 3
Mean Percent (and SD) of Correct Responses

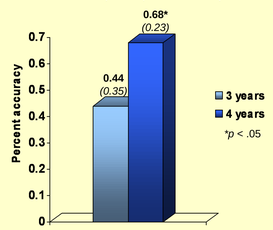
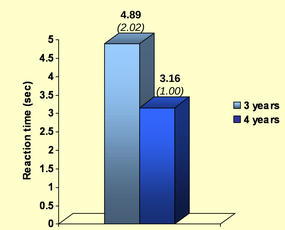


Figure 4
Mean Reaction Time (and SD) for All Responses



Conclusions

The present study found significant evidence of face recognition in 4-year-old, but not 3-year-old children, and improvements in both speed and accuracy across age for recognition of dynamic, unimodal-visual faces. These findings highlight that significant improvements in face recognition occur across the preschool years. The present study contributes to the limited research on face recognition in preschool-aged children and extends prior research on static faces to the recognition of dynamic faces. Future studies should further explore the transition in face perception during the preschool years and compare face recognition in the context of unimodal visual stimulation with that of more naturalistic multimodal stimulation (e.g., audiovisual speech).

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