INFANTS' SENSITIVITY TO VARIABILITY IN FACE CONFIGURATION

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1. INTRODUCTION

Research has demonstrated that by early infancy, infants discriminate faces from scrambled faces and non-faces (Goren et al., 1975; Morton & Johnson, 1991). Further, they are able to discriminate their mother's face from other female faces (Bushnell et al., 1989), and scan all the features of the face (Hainline, 1978).

So unique is the processing of faces in humans, that a specialized cortical area, the fusiform face area, has been suggested to mediate this processing (Kanwisher et al., 1997; cf., Tarr & Gauthier, 2000).

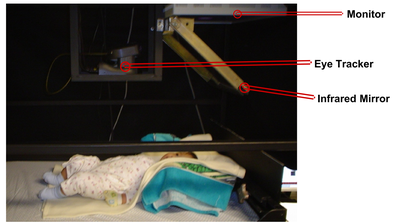
For the recognition and discrimination of individual faces, researchers have suggested that we compare the overall configuration (Moscovitch et al., 1997) and the second-order feature relations (Diamond & Carey, 1986) of faces. In fact, Morton & Johnson (1991) have suggested infants have a similar template matching mechanism that is sensitive to face configuration and feature relations.

Wilson, Loffler, & Wilkinson (2002) used synthetic faces, band-pass filtered to remove high frequency face features such as hair and skin texture, to determine the amount of variability in face configuration necessary to discriminate individual faces. Adults needed approximately 5% variability to discriminate frontal-view faces and 6.2% for side-view faces.

The present study, in order to better understand the development in the processing of face configuration, had two goals.

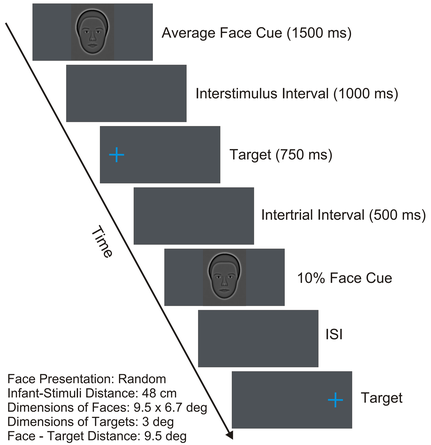
1. To determine the amount of geometric variability needed by 6-month-olds to discriminate individual faces.
2. To determine whether the amount of geometric variability needed differs from frontal-view versus side-view faces.

2. APPARATUS



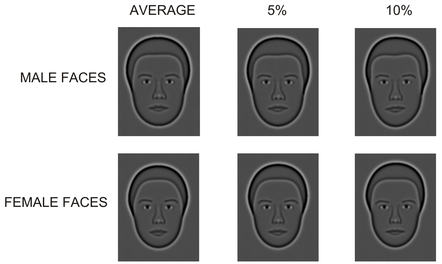
3. GENERAL METHODS

Sample Trial Sequence of the Average vs. 10% Face in theVisual Cueing Expectation Paradigm



Face Presentation: Random
Infant-Stimuli Distance: 48 cm
Dimensions of Faces: 9.5 x 6.7 deg
Dimensions of Targets: 3 deg
Face - Target Distance: 9.5 deg

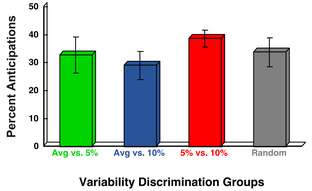
4. Exp. 1: Frontal-View Faces



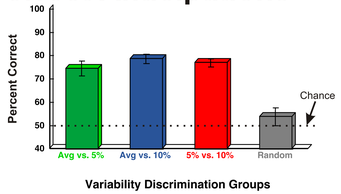
Conditions for each gender block compared **Average vs. 5%**, **Average vs. 10%**, and **5% vs. 10%** faces. In addition, in a Random condition, face cues did not predict target location. There was no effect of gender so reported results were collapsed across gender.

5. Exp. 1 Results: Total Anticipations

Total anticipations did not differ as a function of discrimination group.

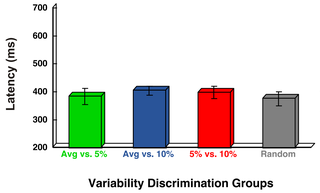


6. Exp. 1 Results: Correct Anticipations



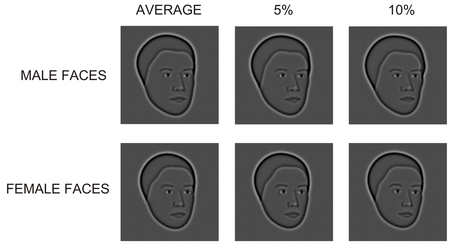
Percent correct anticipations was significantly **greater** than 50% (chance) across all groups, even the **Average vs. 5%** group. The Random group, however, correctly anticipated at only chance level.

7. Exp. 1 Results: Reactive Latencies



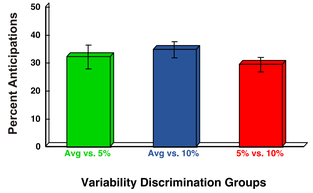
Latency of reactive eye movements did not differ as a function of discrimination group.

8. Exp. 2: Side-View Faces



Procedure was same as in Experiment 1, except there was no Random condition. There was no effect of gender so reported results were collapsed across gender.

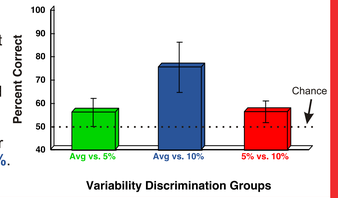
9. Exp. 2 Results: Total Anticipations



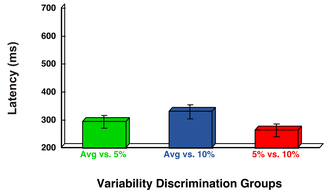
Total anticipations did not differ as a function of discrimination group.

10. Exp. 2 Results: Correct Anticipations

Percent correct anticipations was not different than 50% (chance) for the **Average vs. 5%** and **5% vs. 10%** groups, but was significantly **greater** than 50% for the **Average vs. 10%**.



11. Exp. 2 Results: Reactive Latencies



Again, the latency of reactive eye movements did not differ as a function of discrimination group.

12. CONCLUSIONS

1. For frontal-view faces, infants correctly anticipated the target greater than chance when the face cues differed by only 5% geometric variability.
2. For side-view faces, infants correctly anticipated the target greater than chance when the face cues differed by 10% geometric variability, but not 5%.
3. There was a dissociation between infants' anticipations and reactive eye movements, similar to Adler and Haith (2003).
4. There was no difference in infants' ability to discriminate male or female faces.

Results indicate that, like adults (Wilson et al., 2002), infants only need 5% geometric variability in face configuration to discriminate individual faces.

Also like adults, infants' discrimination of side-view faces was more difficult and required more geometric variation.

Results provide further support for infants' use of configurational processing for discriminating, recognizing, and identifying individual faces.

Finally, that infants performed similarly to adults suggests that the same neural mechanisms might be responsible in both.

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