Domain Assignment in Face Perception

Domain Specificity in Face Perception
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Nature America 2000

Can a Nonspecific Bias Toward Top-Heavy Patterns Explain Newborns’ Face Preference?
Cassia Viola Macchi et. al
Psychological Science 2004
Conclusions

• Specific mechanisms (face perception)

• Double dissociation (face & objects)
Evidence for Face Specific Mechanisms

- Holistic and Inversion sensitive
- Prosopagnosic’s
- Patient CK
  - DD for face and object recognition
- fMRI studies
  - activation of Fusiform Gyrus
  - compared to non-face stimuli
- EEG & MEG recordings
  - selective response to faces
• Note, however, that the question of the domain specificity of face-processing mechanisms is independent from the question of the innateness of such mechanisms, which is not the focus of the present discussion.
  - Kanwisher
Conclusions

• Experiment 1
  – Prefers face
• Experiment 2/3:
  – Horizontal asymmetrical bias
• Top-heavy
• Domain General mechanism
Details of Experiment

• Experiment 1
  – 20 healthy, full-term infants 25 to 73 hr old.
  – high-quality black-and-white photograph of a 22-year-old woman’s face
  – Eye tracking
  – 2 T-tests: one for number of discrete looks and the other for total fixation time

• Experiment 2
  – 20 healthy, full-term infants 24 to 79 hr old.
  – two scrambled faces differing exclusively in the up-down positioning of the inner features

• Experiment 3
  – 20 infants 24 to 82 hr old participated in the study.
  – the natural upright face presented in Experiment 1 and the nonfacelike top-heavy configuration shown in Experiment 2
EXPERIMENT 1

Experiment 1 tested whether face preference can be observed in newborns using photographs of real faces. Demonstrating a preference for an upright over an upside-down real face image would extend the face-preference phenomenon to more ecologically valid stimulus materials than have been used previously, thus supporting the conclusion that the preference demonstrated in previous studies was not a by-product of the use of high-contrast, schematic configurations.

Method

Participants

The participants were 20 healthy, full-term infants 25 to 73 hr old. Fourteen additional infants were tested, but they were excluded from the final sample because of position bias, fussiness, or experimenter error.

Stimuli

A high-quality black-and-white photograph of a 22-year-old woman's face was digitally modified so as to create an upright and an upside-down version of the face (Fig. 2). The two stimuli were identical except for the inner region of the face, which was preserved in its canonical orientation in the upright face and rotated 180° in the upside-down face, as in previous studies with schematic faces (see Fig. 1a; Johnson & Morton, 1991; Valenza et al., 1996). The model was photographed in a frontal pose with a neutral expression. The face was cropped right below the neck, and the hair was removed. Both stimuli measured 15 cm wide/20 cm tall and were projected bilaterally on a black screen at a distance of approximately 8 cm (15°) from a central fixation point.

Apparatus and Procedure

Each infant was placed on the experimenter's lap, 30 cm from a screen. The infant's eyes were aligned with a red flickering LED at the center of the screen, which was used to attract the infant's gaze at the start of each trial and to check that the infant's sight was level with the horizontal midline of the screen during the testing session. All infants were submitted to two trials in which the two stimuli were shown bilaterally, one on the left and one on the right of the central LED. Left/right position of the stimuli was counterbalanced between the trials. Each trial lasted until the infant shifted his or her gaze from the display for more than 10 s. At this time, the experimenter turned off the stimuli, and the central LED started flickering again. The duration of each fixation was coded on-line by one of the experimenters, who could not see the display and was blind with respect to the specific position of the stimuli in each trial. Videotapes of eye movements were recorded and subsequently analyzed frame by frame by a second coder. Intercoder agreement (Pearson) was .99 for total fixation time and .91 for discrete number of looks. Both experimenters were undergraduate students who had been previously trained in the context of a different study and were unaware of the hypotheses being tested.

Results

Two t tests for dependent samples were performed, one for number of discrete looks and the other for total fixation time. Newborns oriented more frequently to the upright face (M = 16.20) than to the upside-down face (M = 12.25), t(19) = 2.75, p < .02. Total fixation time followed the same trend, in that the upright face was fixated longer (M = 101.34 s) than the upside-down face (M = 70.79 s), t(19) = 2.5, p < .03 (Fig. 2). These results show that the image of a real face is preferred over a scrambled image in which the geometry of the face has been disrupted by 180° rotation of the inner features. The results extend the evidence gathered with schematic configurations (Johnson & Morton, 1991; Valenza et al., 1996) to more veridical stimuli, showing that the structural information that defines the face geometry is detectable by newborns.
Significance

• True DD?

• Domain Specific or General?

• Are all DD’s clear cut?