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Recognition by Children of Impossible Human Faces

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Introduction

Although a large amount of research has been done about inverted effects of face recognition, most of the research used real human photos, or distorted human photos, scrambled faces, distorted eyes, noses, mouths (Searcy & Bartlett, 1996). The present researchers created two impossible human face figures drawn by pencil which are similar to but much simpler than Picasso's imaginative paintings of human faces in which more than one face can be recognized. One figure (F1) contains two vertically overlapped faces, one upright and the other upside-down, sharing the same pair of eyes in the middle. The second figure (F2) contains 6 faces, 2 of them are frontal faces same as in F1, the other 4 are profile faces defined by the left and right face outlines: one left upright, one right upright, one left upside-down, and one right upside-down. All of these 6 faces share the same pair of eyes. Obviously, they are "impossible"as real faces just like the impossible triangle it does not exist as a real object.

According to two current hypotheses, the holistic view and the dual-mode view (Searcy & Bartlett, 1996), subjects would recognize the upright face(s) but would experience difficulty to see the inverted face(s), assuming that the inverted orientation will disrupt the spatial-relational information process. However, according to the present researchers' point of view, a perceiver's inferential abilities or cognitive skills may play a role, resulting in the final percept. Different aged children may actually perceive different faces due to their different cognitive ability in adjusting their viewing positions in their mental world.

The present research predicted that 5-6 years old children might have more difficulty to see the inverted face in comparison to the upright face and the profile faces in comparison to the frontal faces, than 11-13 years old children. And the older children might experience difficulty to shift from frontal face to profile face although they are all upright orientated.

Method and Results

Thirty-two children (16 girls and 16 boys) were randomly selected from an elementary school and a day care center. Half of them were 5-6 years old (G1) and the other half were 11-13 years old (G2). Half of each group were allowed to look at F1 and other half looked at F2. Each child was allowed to look at only one impossible human face figure (and other figures which will not be discussed here for the limitation of space). During the viewing process, the researcher asked 2 questions : (1) What do you see F1 or F2? (2) Face? Head? How many faces do you see? When a child was answering the questions, he or she was looking at the figure from a normal reading position only. Each child's answers were recorded. The viewing process lasted less than 5 minutes.

In viewing the F1 condition, 7 G1 children perceived the upright face and one saw the upside-down face; 4 G2 children perceived the upright face and the other 4 saw both upright and upside-down faces. The inverted effect invoked by F1 was statistically significant and greater in the G1 children group than in G2 children group, $\chi^2(1, \underline{N} = 16) = 5.33, \underline{p} < .05$. In viewing the F2 condition, 5 G1 children saw one upright frontal face, 3 saw both upright and upside-down frontal faces, none of them saw all 6 faces. Two G2 children saw both upright and upside-down frontal faces, the rest of 6 saw all of the 6 faces. The difference between the two age groups is statistically significant, $\chi^2(2, \underline{N} = 16) = 30.65, \underline{p} < .001$.

An additional finding was that those 6 G2 children, who perceived all of 6 faces in F2, saw the upright frontal face first, then the upside-down frontal face, then the profile faces. In other words, they did not shift their view mentally from the frontal upright face to the profile face directly although those faces share an upright orientation which is often considered as the favorable viewing direction.

In summary, the results confirmed that G1 children had strong inverted effects in F1 and equally strong profile effects in F2. G2 children showed moderate inverted effects in F1, very small inverted effects, and moderate profile effects in F2.

Discussion

The advantage of using impossible human faces as the stimuli is clearly demonstrated because it can hold the componential information and the spatial-relational information constant while presenting different viewing directions which must be selected by the perceiver. In other words, the figure itself does not entirely determine the sequence in which information is processed or the final percept. In the future, a new hypotheses should address this very fundamental point in order to explain the nature of either inverted or profile effects.

References

Searcy, J. H., & Barlett. J. C. (1996). Inversion and processing of component and spatial-relational information in faces. *Journal of Experimental Psychology: Human Perception and Performance, 22,* 904-915.