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RECOGNITION OF FACES BY ADULTS

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Recognition of faces by adults was investigated with photographs of faces varying in treatments—full upper, lower-and varying in expressions- neutral, smile and pout. There were two blocks, depending on the fillers either with non-sense syllables or with other faces The errors in recognition of the three factors (part of face, expression and composition) were compared and analyzed. The full face created less errors in all conditions. The data supported that the upper part of the face was more important for recognition than the lower part. The smiling expression helped recognition. Interference effects were significant when the foils were other faces and that noticeably at the lower part.

The human face is one of the most interesting and complex stimuli in the natural world. Psychologists have been interested in the study of faces for two major reasons: (1), their communicative value, and (2), their importance for identification. Faces may carry messages about the emotional states of persons, they sometimes signal intentions and behavioral dispositions and they often communicate evaluative reactions Faces are very important in person perception.

In one of the earliest laboratory studies of face recognition, Howells (1938) discovered that faces were most difficult to recognize when lower parts of the face, in contrast to the upper parts, were covered. Subjects questioned regarding their strategies for remembering faces failed to specify any particular facial features as being most salient The question was again investigated by Goldstein and Mackenberg (1966) using facial photographs. They have shown that various parts of the face differed in their relative contribution to recognition, Upper portions of the face were significantly better cues for identification than the lower portions. These results, which contradict the earlier findings of Howells (1938) have been confirmed by McKelvie (1976).

It has been speculated that the fundamental property of face which distinguishes them from other classes of visual stimuli and which influences what is remembered is their emotional expressions. Several studies support this hypothesis First of all, facial expressions themselves are perceived and stored in memory (Galper & Hochberg, 1971). When photographs of faces were experimentally manipulated so that their expressions are lost or changed on the second viewing relative to the first time they were seen, they become difficult to recognize (Sorce & Campos, 1974).

Photographs of faces, like many other visual stimuli, are difficult to discriminate

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and remember when they are mixed up with photos of other faces. The more the pictures are in the series of inspection, the less likely is the recognition of the target. Effects of target position could be accounted for either on the basis of interference due to the number of foil faces intervening between the original target exposure and the appearance of target in the search series, or on the greater amount of time elapsing when the target appeared in later position, Laughery, Fessler, Lenorowitz and Yoblick (1974) have shown that the important variable in facial recognition is the number and similarity of the faces preceding the target picture in the search series and not the amount of time elapsed. When the similarity is higher, there is disruption in performance.

The present study, was designed to find out, in recognizing human faces, what part of human face is prominent and how the variation of expression affects the recognition and the effects of interference.

METHOD

Subjects

A total number of 216 subjects (113 males and 103 females) ranging from 16-60 years of age took part in the experiment. The mean age of subjects was 23.66 years. The subjects were tested individually and in isolation.

Materials

The stimuli used were colour photographic prints of eight adult human faces (4 males and 4 females) with variation of expressions neutral, smile and pout. The photographs were taken with all details of clothing backed out and all faces placed on a neutral background. Non-sense syllables (cvc) and other different faces served as fillers depending on the block difference. Faces were masked with silver tape, upper or lower, according to the presentation. The materials were arranged in book albums with condition differences (Block 8 with cvc and Block 24) and upper lower, full treatments with expressional variations. In the recognition test, the target faces were presented with three entirely different face foils.

Procedure

The experiment had two conditions depending on the composition of the inspection series. In the first condition, target faces were mingled with non-sense syllables and in the second condition, they were mingled with other faces. The subjects were instructed to look at the faces and non-sense syllables for four seconds for a later recognition test for both. The recognition task followed immediately, the subject being required on each trial to point to which one of the array of four faces he/she felt had been a member of the inspection series. The recognition of non-sense syllables were also tested in block 8 just to complete the procedure. Order of the target faces in the inspection series and in the test were same. Among the total number of 216 experimented subjects, 108 were tested in block differences, and 72 each in part and expression variations.

RESULTS

The total of errors committed in both conditions of face recognition were given below.

Table 1

Block-8 Faces and non sense syllables

	U	L	F	Total
N	28	18	7	53
S	10	16	5	31
P	21	22	19	62
Total	59	56	31	146

Table 2

Block-24 Faces

	U	L	F	Total
N	30	48	23	101
S	25	32	16	73
P	32	44	20	96
Total	87	124	59	270

The error data were analyzed by means of completely randomised block factorial analysis of variance (2×3×3) which yielded to significant main effects in: Block : F, (1, 198) = 41.60, $p < .01$ Part-face : F, (2, 198) = 16 76 $p < 01$ Expression : F, (2, 198) = 7.35, $p < .01$ Block × Face: F, (2. 198) = 4 33, $p < .05$

The data was run to Newman-keuls test for variations of expression and part-face. It was revealed that the smiling face generated fewer errors ($p < .01$) than the neutral or pout expressions which in turn do not differ from each other. Errors to the full face were significantly less ($p < .01$) than those committed to either upper or lower region of the face. In addition to that it was shown that the upper region of the face generated fewer errors than the lower region ($p < .05$).

The error data in Block 8 and block 24 were compared and significant main effects for face-part differences were revealed.

Table 3

	U	L	F
B 8	1,64	1.55	.86
B24	2.42	3.45	1.64

It was shown that Block 8 has generated fewer errors than the Block 24 in all treatments. Analysis of simple effects run separately for each condition revealed part-face difference in Block 8 (F, (2.198) = 3 81, $p < .05$) and in Block 24 (F,(2 198) = 17,36, $p < .01$). Newman-keuls test has shown that within the treatment situation, full face had less errors than upper or lower. Further simple effects revealed that with the Block 8 condition, upper and lower did not differ, but in Block 24, upper and lower differed significantly ($p < 01$).

DISCUSSION

Analysis of the data in the two conditions revealed that the recognition was easier for the full face More errors were committed on the lower part of face than the upper part It could be concluded that the upper part of the face was more helpful for the recognition than the lower part. This conclusion was consistent with other studies. (Goldstein & Mackenberg, 1966; McKevie, 1976: Davies, 1979) This can be explained considering the variety of informational cues in the upper region particularly the forehead, hairline and eyes compared to the lower region It could also be suggested that the lower part of the face has greater similarity and this similarity disrupts the recognition accuracy. It was also found that the smile affect helped recognition considerably than the neutral or pout. This led to another important conclusion of this study that adding a happy expression to the face helped face recognition. Galper and Hochberg (1971) and Sorce and Campos (1974) have indicated that facial expression is an important parameter of facial recognition. The assumption of their studies was that expressional variation does alter aspects of the stimulus pattern which are used in remembering faces. But in reality, these studies had only shown that the smiling state or pleasantness in the face have an advantage in face recognition The results of the present study have confirmed the previous data. However, it could not be concluded definitively that adding any expression creates uniqueness and disrupts similarity, which in turn helps recognition. In this study, not particular effects was found for pout expression. A recent visual field study (Reuter-Lorenz, Givis & Mosovitch, 1983) has shown that open mouth happy faces were more accurately and more rapidly discriminated in either visual field than happy closed mouth or sad. It may be suggested that the perception and memory of a human face are never determined solely by the sensory information hitting the eye, but in addition are influenced by the attributed meanings an observer

gives to a facial percept. Further investigation is needed to find out the exact role of expression in face recognition.

This study also has shown the interference effects for Block 24 since it had created more errors in recognition The recognition accuracy diminished when the fillers were other faces. The contents and the length of the inspection series had significant interference effects. It can be legitimately said that the number of faces to search through and the homogeneity of the stimuli are important variables. An analysis of the interference effects has indicated that in the Block 24, the lower part of the face had significantly affected. The increase of the inspection series have generated interference effects more in the lower region. It should be further clarified whether this effect is due to the similarity of the lower part of the face or because of the length of the inspection series.

The errors in identification made in each stimuli were further examined to find out the high similarity or distinctiveness among stimuli which would be offseting the accuracy; but nothing significant was observed.

Face recognition studies have suffered from a dearth of theories to guide research (Ellis, 1975; Davies, 1979). On the basis of existing evidences, it may be early to decide on a specific model particularly between a gestalt or features model approach. However, the data from different studies have indicated the role of face as a physical stimulus and social object. It is hoped that this study has clarified certain issues on perception and opened up new possible fields for further research.

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