ACCURACY OF RECOGNITION OF FACIAL EXPRESSIONS IN CHILDREN

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ABSTRACT

This study was done in order to investigate the development of recognition of facial expressions, in children. Children from different age levels (4-8) were compared to see if there was any age-related increase in recognition of the six basic emotions. The task was a nonverbal one. The pictures of the six emotions which were shown to all the children were fear, anger, happiness, sadness, surprise and disgust. Also male and female subjects were compared. The results showed a significant relation between recognition of the basic emotions and age. There was no significant difference between males and females. Happiness was the easiest expression and disgust was the most difficult one to recognize for most subjects.

INTRODUCTION

Recognition of facial expression has an important place in the judgment of emotions. The high reliability of the judgment of emotions among observers supports the idea of a universal, common nonverbal language and means that facial expression is a very important component in person perception (Shaver,1981).

Facial expression and their recognition also has an important place in early development. It is claimed by many investigators that there is a very strong relationship between age and recognition of facial expressions. This relationship may be very helpful in the use of emotion recognition techniques, such that problems in emotional development and social perception can be solved more easily (Izard, 1971).

Facial expression has been used in many studies of recognition of emotion (Frijda, 1969). In such studies, the subject is generally asked to label the emotion verbally. There are, however some investigations in which nonverbal procedures have been used. Dasiell (1927), for example, asked children to match expression photographs to passages

in a story and found evidence of recognition of emotions. Spitz and Wolff(1946), used the smiling response of infants for their studies of the stimulus aspects of the human face that are effective for infants. In another task, Stringer (1966,b) asked the subjects to put expression photographs in a meaningful temporal sequence. They all found evidence of recognition of emotions.

None of these methods have been used widely for the recognition of facial expressions. Also other methods have been developed, which could be adapted to general problems of recognizing facial expressions. One example of the lat ter is Vandenberg andMattson's (1961) study. They had their subjects select from a set of facial expression photographs the one which was similar in meaning to a given key expression.

The aim of the present study is to investigate the development of recognition of facial expressions in children. Children from different age levels(four, five, six, seven, eight) are compared to see if there is an increase in their recognition of the six basic expressions, which are fear,

anger, sadness, surprise, happiness and disgust. Also the difference between male and female subjects is investigated. The task given to the subjects is a nonverbal one. As mentioned, in most of the previous experiments on recognition of facial expressions, verbal tasks have been given. In this study, none of the expressions are named and the subjects are not asked to name any expressions. The subjects are asked to look at the photos placed in front of them carefully, and to place the other photos handed to them on the one that looks most like the one in front of them.

REVIEW OF LITERATURE

Is there a need to study the emotions? Many writers have different opinions regarding the nature and importance of the emotions. Tomkins(1962,1963) and Izard(1971,1972) have claimed that the primary motivational system of human beings is emotion. Many scientists have argued that emotions have an important place in organizing, motivating, and aiding behavior(Izard,1971,72; Leeper,1948; Mowrer, 1960; Rapaport,1942; Schachtel,1959; Tomkins,1962,63). Some scientists have claimed that emotions are activities

Some scientists have claimed that emotions are activities of organs which are controlled by the autonomic nervous system (Wenger, 1956). Other scientists have stressed the externally observable behavior of the face, so the role of the somatic nervous system which is under voluntary control was important for them(Ellsworth, 1972, Ekman and Friesen, 1972, Gellhorn, 1964, 1970, Izard, 1971, 1972, Tomkins, 1962, 1963). Social psychologists have many important contributions in the study of the facial expression of emotions, and there are also many important studies concerning nonverbal communication(Argyle, 1975; Ekman et al, 1972; Mehrebian, 1972).

Darwin(1872) analyzed the communication of emotions in humans and animals using facial expressions in his analysis. Darwin was the first to find empirical evidence to support the hypothesis of inmateness and universality of emotional expressions. Many questions have been raised since Darwin's time since his ideas have seemed important. Some of the questions are: Can observers recognize facial expressions accurately? Are facial expressions hereditary? Can it be demonstrated that they are universally recognizable? Are emotions stored as dimensions or are they unordered sets

of categories? Under all these questions lies the problem of recognizing facial expressions which is the basis for judgment of different emotions(Bassili,1979). In order to investigate this problem, many studies have been done. In these studies, the subjects have been presented with photos of emotional expressions and the relationship between these expressions and judgments of the observers has been analyzed(Ekman, Friesen, and Tomkins,1971; Frijda,1968; Frois and Wittmann,1930; Philipszoon,1963). There are two features of these experiments. One is that judgments have relied on static representations. Another feature gives importance to the description of facial information. This second feature analyzes the face in terms of its position and shape. Izard (1971), has maintained that at one point, emotions can result from face's neuromuscular functions. Ekman and Friesen(1975) constructed an "Atlas of the face" in order to show each universal facial expression in photographs. They photographed models who were instructed to move particular facial muscles listed in a table of the muscles involved for each emotion. The three areas of the face which were capable of independant movement were photographed. Also the validity of the Atlas was supported by four expe-

riments carried out by Ekman and Friesen (1975).

There have been many experiments which have been carried out with still photographs. The analysis of these experiments gives rise to two important questions. How many different emotions do people recognize? Will the judgments made on the basis of spontaneous emotion parallel those made from posed photographs? (Ekman and Friesen 1975; Ekman, 1973; Ekman and Oster, 1979; Izard, 1971) have done many cross-cultural studies and have demonstrated that people can reliably categorize at least six different emotions by observing facial expressions. These six are fear, anger, disgust, sadness (or distress), surprise, and happiness (Ekman and Oster, 1979).

In early studies of emotional expression that have been investigated cross-cultural universals, posed still photographs have been used. But in later research, spontaneous emotion has been evaluated. For example, Ekman (1972) photographed the faces of Japanese and American subjects who were watching either a neutral or a stressful film. Other American and Japanese subjects then tried to judge from the photographs which film the first subject had seen. The

observers were able to distinguish the underlying emotion with little difficulty and were equally accurate when the stimulus person was from their own or the other culture. This sort of research has not yet been conducted for all six of the cultural universals, but the results are like the results of the studies that have used posed photographs (Shaver, 1981).

Are facial expressions of emotion the same for all people around the world, whatever their background may be? A little more than one hundred years ago, Charles Darwin (1872) wrote that facial expressions of emotion were universal, that they were not learned differently in each culture, that they were biologically determined and that they were produced by evolution. But since Darwin's time there have been many disagreements. The work of Klineberg (1938, 1940) for example, was interpreted as anti-Darwinian in nature. According to Klineberg, some underlying processes that go together with emotion are the same for all cultures and races, but the muscular system that underlies the facial expressions is not the same for all races. Also Huber (1931) reached

a similar conclusion based on his anatomical studies. Some other scientists like Vinacke (1949), Vinacke and Fong (1955) and Triandis and Lambert (1958) have supported the Darwinian position though their supports weren't clear. Vinacke and Fong's studies hadn't answered the question of cultural differences in emotional expressions because their stimuli, which were spontaneous poses showing emotions, and which were poses of people who were unaware of their being posers, didn't represent any factor which was culturally determined. Also their subjects were from three national-racial groups in Hawaii who attended school together and knew very well the expressions of the cultures they represented (Izard, 1971). Though there have been many disagreements, recently, scientific investigations have put an end to this question of universality. These investigations have shown that the facial expressions of at least some emotions, the six mentioned above, are indeed universal.

In one experiment, photographs of different expressions were shown to observers in the United States, Japan, Chile Argentina, and Brazil. The observers in these different countries had to choose one of the six primary emotion words for each photograph they saw. The same facial expressions

were judged as showing the same emotions in all these countries, regardless of language or culture. A similar experiment was also carried out at the same time by observers in eight different cultures, and evidence of universality was again found (Ekman and Friesen, 1975).

Woodworth and Schlosberg have also stressed the importance of emotion, and have brought more order and consistency to the problem of judging facial expressions. According to Woodworth (1938) early studies of recognition of emotion couldn't distinguish between errors made on simple judgments and errors made on difficult judgments. For example, a mistake made on "anger" was treated the same as a mistake made on "contemplation". Woodworth introduced a simle method of categorization. The categories were: a) love, happiness, mirth b) surprise c) fear and suffering d) anger and determination e) disgust and f) contempt. With this system an average of eighty percent accuracy was found. Later, Schlosberg (1952) represented Woodworth's scale as a partial cylinder. The dimensions were evaluation (pleasant-unpleasant and involvment (attention-rejection). While these represented the quality of an emotion, a third di-

mension represented the intensity of the emotional experience.

According to some psychologists, the processes of infants are small models of adult processes. So, in order to discover the basic truths concerning adults, infants may be studied. The "early learning" hypothesis is closely related to this idea (cited in Kagan, 1972). This hypothesis asks how early during the first year of a child's life, different experiences start to influence later behavior. This question led Kagan to do a study in Harvard with his research group. They presented infants with pictures of human faces and observed how long they looked, how frequently they smiled, and how they reacted. The subjects were from lower-middle middle, and upper-middle class families. What they assumed was that an event that has high physical contrast for the infant, stimuli that are different from the schema (mental image) the infant has formed, and an event or object that the child has formed associations about, will hold his attention longest. An example of this is television advertisements (Kagan,1972).

In another study done by Kagan (1972) this assumption

was supported. The study was done with 160 first-born Caucasian infants from families with different social class backgrounds. The infants were observed in the laboratory at the ages of 4,8,13,and 27 months. They were shown three dimensional flesh colored clay faces. Infants eye fixation was greatest at 4 months, dropped at 8, and 13 months, and then began to rise at 27 months. At 4 months, the masks are different from the schema the child has formed of the human face. At 8 and 13 months the schema is very well formed, and there isn't much difference for the children. Two masks had eyes, and since eyes had physical contrast for 4 month olds, they watched them longer than they did the masks without eyes. But presence of eyes was less important at 8 and 13 months. The richness of associations also affected the length of time the child studied objects at 27 months old. Fixations were longest to the disarranged face at this age. Support for the conclusion that an event that is different from the child's schema,and that has rich associations,holds his attention the longest, comes from an investigation by Gordon Finley. He showed chromatic paintings of facial stimuli to one, two and three year old middle-class children in Cambridge and to peasant Mayan Indian children, from

South Mexico. At all three ages, American children showed longer fixation times than the Mayan children, and for both groups, at 2 and 3 years the disarranged face held longer attention. Fixation times for the dissaranged faces were longer than they were for the regular faces at older ages.

Through these investigations, it was found that social class differences concerning attentive behavior begin in the first year of life, but the time they appear is dependent on the particular response that is studied. With infants of 4,8,13 months, the relationship between social class and fixation times got stronger as these infants grew older. Also, the association between social class and fixation times was always higher for girls than for boys. A group of infants was tested at 4,8, and 13 months. The stimuli first seen at 4 and 8 months were four human faces. At 13 months the first stimuli presented were four human forms. The relation to social class was low at 4 months, moderate at 8 months for girls, but low for boys and high for both sexes at 13 months, but higher for girls than for boys (Kagan, 1972).

Kagan explains this association between social class and fixation times being stronger for girls in two ways. Maybe he thinks, girls are more homogeneous at birth than boys are, so experiences showing more difference in one's life are more seen in the girls behavior. This means that since girls differ less than boys when they are born,in specific experiences that need attention, girls' behavior of attending must be more consistent. A second explanation assumes that social class has a stronger influence on the way mothers treat their daughters than on the way they treat their sons. Observation of 4 month old babies supported this argument. Middle class mothers talked more to their daughters than did lower-class mothers. This difference wasn't seen in lower and middle-class mothers of sons.

Gender has always had an important place in studies of nonverbal communication. According to scientists who have studied nonverbal communication, the comparison of males and females' performances is above all, theoretically interesting. Therefore, it has a more important place in nonverbal communication than just reporting the data (Hall, 1978).

According to Hall (1978), though it is theoretically important for all scientists to learn about differences between the two sexes in their ability to judge nonverbal communication, there have been many disagreements and uncertainties. Coleman (1949) said that the existing literature showed no major sex differences in recognizing the emotions, but still claimed that women tend to be slightly superior to men in recognizing facial expressions. Weisgerberger (1956) said that the results in the literature were not clear at all, and also for Davitz (1964) in judging the facial expressions, there is a contradiction between studies showing sex differences. Tagiuri (1968) also had the idea that the literature concerning sex differences was a little contradictory.

Maccoby and Jacklin (1974) said that though it is claimed that girls are more sensitive to what others are thinking and feeling than boys are, it is not clear that females are more sensitive to social cues. Also, according to Maccoby and Jacklin neither boys nor girls have greater ability to judge the intentions and reactions of others.

In a study by Judith A. Hall (1978), results of 75 studies

reporting accuracy for males and females at decoding nonverbal communication were summarized. Results showed that more studies showed female advantage than would occur by chance. English and Weitz (1974) had an explanation for this advantage. They suggested that since women had a lower status than did men they would be more sensitive to nonverbal communication. Also, this low status would make them read the wishes of the powerful ones better. But young girls' being better judges than young boys can not be explained by this hypothesis (Hall,1978). Another explanation(Hall,1978, says that females start learning to be sensitive to nonverbal cues when they are born. This is somewhat evolutionary in a sense, since mothers also are sensitive, they would discover their children's sorrow and pain or the happiness easily, and thus would enlarge the chance of the survival of their offsprings' sensitivity.

In another experiment done by Reichenbach and Masters (1983), preschool and third grade children judged happy, sad, angry, or neutral emotional states of other children on the basis of expressive cues, contextual cues and both. The sex of the child did not influence judgments of

emotions very much. In this study, the few sex differences that were found occured only in those categories of emotion (eg.anger) for which there are clear sex differences in socialization in behavioral expression. Boys judged sad expressions as angry more often than girls (Reichenbach and Masters,1983).

Spitz and Wolf (1946) have claimed that emotions have a very important role in both the development of the child and in every human behavior. Human faces have been used as stimuli in many studies. For example studies concerning form perception and studies on attention have used the human face. Also studies about infants have used the human face. If in a baby's life, the human face becomes effective in creating positive emotional responses, like the smile, it remains a most effective stimulus. Wolff (1963) found that the bare human face was always the most effective stimulus in producing the smile. He showed that in the fourth week of a baby's life important changes occur in his attention to faces. But as the infant grows older, he starts seeing the differences between faces and therefore the face by itself does not make him feel any emotions. Later, the

infant starts interpreting emotions of the human faces and responds to them properly. He smiles to a smiling face and is afraid of an angry face. By the age of about two and one half years, children's ability to distinguish facial expressions and to be able to recognize separate emotions can be measured objectively. At an even later age their ability to label emotional expressions appropriately can be demonstrated (Izard, 1971).

In order to show the growth of recognition and labeling of emotion in normal children, Izard did an experiment with children from two and one half to nine years of age. He gave the emotion recognition and emotion labeling tasks to these children who were grouped according to 3 socioeconomic levels and who were from 286 American and 140 French families. The emotion recognition that consisted of 56 cards, each containing three photos each photo representing the expression of a different emotion. He used 9 emotions and asked the subjects "to show the one who is..." He found that in both cultures there was a growth in recognition and labeling.

C. Müller(1954) used a paired comparison technique to

determine children's ability to discriminate facial expressions She found an increase in the number of correct responses from ages three to six. She obtained more correct responses to questions on the fundamental emotions than to questions on more complex feelings such as arrogance and pride.

Gates(1923) selected six facial photographs representing joy, fear, pain, anger, contempt and surprise and administered them to a superior group of 36 adults (college students) and then to 458 children aged 3 to 14. She found a gradual increase in ability to interpret each picture with increasing age, and all the adults in the superior group who were tested understood the pictures.

Research on judgments of facial expressions (Felleman et al, 1983; Izard, 1971) has found that accuracy of recognition declines in the following order: happiness, sadness, anger, and neutrality. In an experiment done by Reichenbach and Masters (1983) this same pattern of recognizability was found for judgments based on contextual information. Reichenbach and Masters say that the thing that influences relative accuracy for emotions is not an aspect of either facial expression or visual cues. They claim that since the same

pattern of recognizability is seen both in adults and in children (Carlson, Gantz, and Masters in press, Zelleman et al, 1983) it does not seem reasonable to conclude that some expressions are less frequent, more difficult to learn or more likely to be understood as age, socialization and experience increase. Since categories of emotion are recognized differently, it can be concluded that there are differences in the way individuals form ideas about emotions. These ideas can be in terms of perceptual cues (expressions) or in terms of contexts and specific behaviors while the person is experiencing the emotion. An example is a highly socialized expression will be least recognized because of expressive or behavioral rules effectiveness. For example happy people don't often disguise their expressions, unless in a funeral Also sadness or anger are disguised more often and because of socialization they may even be felt less frequently. Still, more information is needed on socialization of emotional expression and experience in children. Also more information is needed about children's recognition of emotion in themselves and others (Reichenbach and Masters, 1983).

In the light of all these theories and empirical studies, this study investigated the development of recognition of emotions in children, and also looked at sex differences. In this study, it was hypothesized that the six basic facial expressions would be more accurately recognized by older children than by younger ones; in other words if there was any increase in their recognition of the six facial expressions as they grew older. Also the question of whether the recognition of these expressions was more accurate for females than for males at each age level was investigated.

One reason for doing this study was that a study like this had never been done before in Turkey. Though an emotion recognition study was carried out with Turkish adults by W. A. LeCompte (1983) none had yet been done with children in Turkey. Also the task was completely a nonverbal one, using no label. As mentioned above, only a few nonverbal studies have been done before, concerning recognition of facial expressions. So, this study used a nonverbal task and investigated the development of recognition of facial expressions in children in the Turkish culture.

METHOD

SUBJECTS

A total of 123 subjects participated in the investigation, drawn from three different schools serving a social class level of upper-middle SES families. The schools were:Taksim İlkokulu, Günaydın İlkokulu and Sait Çiftçi İlkokulu. Only normally inteligent and middle-upper SES students were included in the study, since pilot testing suggested that low SES and low IQ students had difficulty in understanding the instructions and in maintaining concentration for the sorting task. The sample was composed of about 50% males and 50% females. The subjects were four, five, six, seven, and eight year old children. No subjects were dropped from the study and all were able to understand and complete the sorting tasks.

MATERIALS

In a similar experiment done in Turkey by W.A.LeCompte in order to show the amount of accuracy in recognition of emotion among Turkish adults, the six basic expressions were presented to the subjects. Only photos with 90 per cent agreement or more were selected for the experiment. These six photos which were; happiness, anger, fear, sadness, surprise, and disgust, by the same poser were used. Also twelve other photos, by

different posers, and having the same expressions were used. These twelve were in two sets, each set containing one picture of each emotion. For the test of understanding the instructions 4 vehicle, 4 fruit, and 4 animal pictures were used.

PROCEDURE

A total of 123 subjects were administered two tasks, one after the other, individually, in a seperate room. The first sorting task was given in order to assure their understanding of the instructions. The subjects were first shown 3 main photos:1 fruit, 1 vehicle, 1 animal. Nine other photos were handed to the subjects one by one, and were asked to place these on the one which was similar to the one they were handed. In the second, main experiment the subjects were first presented the six series photos, and were told to look at them carefully. It was also explained that they all had different expressions, different feelings on their faces. Then, they were shown the other twelve photos one by one and were told to place them on any of the six main expressions that resembled it the most. Each picture was taken from the desk, before the other was handed to the subjects, so that there were only the six basic photos left in front of the subjects each time they were given a picture. The request

was always: "Place this photo on the one that looks the most like it." Recognition, then, was measured by accuracy of matching and placement of the photos with the criterion photos. The actual instructions are included in Appendix A, along with the stimuli used in the study.

On the average, it required about 20 minutes for a student to complete the experiment, from the initial instructions to the placement of the last photo.

METHOD OF DATA RESULTS

First, the mean accuracy scores were calculated for each age level, separately for males and females. The data were analyzed with a two way ANOVA, in order to test the effects of age and sex on accuracy scores. T tests were conducted to determine the significance of the difference between means of the different age groups. Then, to determine the strength of the relationships, omega squares were calculated. Lastly, the percentage accuracy scores were calculated for each primary affect.

ANALYSIS OF RESULTS ON THE TEST OF UNDERSTANDING THE INSTRUCTIONS

As described in the method section, it was desirable to have independant evidence that subjects were able to carry out the requirements for a sorting task. Hence, all subjects were given a simple sorting task involving three categories (fruit, vehicle and animal photos). All of the subjects demonstrated that they were able to cope with this task, and everyone completed it without error.

ANALYSIS OF ACCURACY SCORES BY AGE AND SEX

The results of 2 way ANOVA testing the effect of age and sex on accuracy scores, are displayed in Table1 . The age factor showed increases through ages 4 to 8 significant at the .001 level. $F=67.932$ $df.=4$ $p<.001$. No significant difference between the two sexes was apparent. Also, there was no interaction between the two variables.

TABLE 1

Accuracy Scores by Age and Sex of Subject

Source of variation	Sum of squares	DF	Mean square	F	Significance of F
AGE	468.459	4	117.115	67.932	.001
SEX	.524	1	.524	.304	-----
Age/ Sex	1.250	4	2.812	1.631	.170
Explained	48.254	9	53.473	31.017	.001
Residual	194.811	113	1.724		
Total	676.065	112	5.542		

The same results were seen when an ANOVA was done only with 100 subjects and equal N4s from each age level. In other words, when the last subjects tested were left out and 10 boys and 10 girls remained in each age groupthe age factor showed significant increases at the .001 level and there was no significant difference between the two sexes. These results are displayed in Table 2.

TABLE 2

Accuracy Scores with 100 Cases

Source of variation	Sum of squares	DF	Mean square	F	Significance of F
AGE	346.460	4	86.615	48.328	.001
SEX	.250	1	.250	.139	----
Age/ Sex	9.700	4	2.425	1.353	.256
Explained	356.410	9	39.601	22.096	.001
Residual	161.300	90	1.792		
Total	517.710	99	5.229		

The mean accuracy scores for males and females, for each of the ages are shown in Table 3 and Figure 1.

TABLE 3

Mean Accuracy Scores by Age

	Male	Female
Age 4	3.6	4.3
Age 5	5.0	5.3
Age 6	7.1	5.9
Age 7	8.2	8.7
Age 8	9.0	9.2

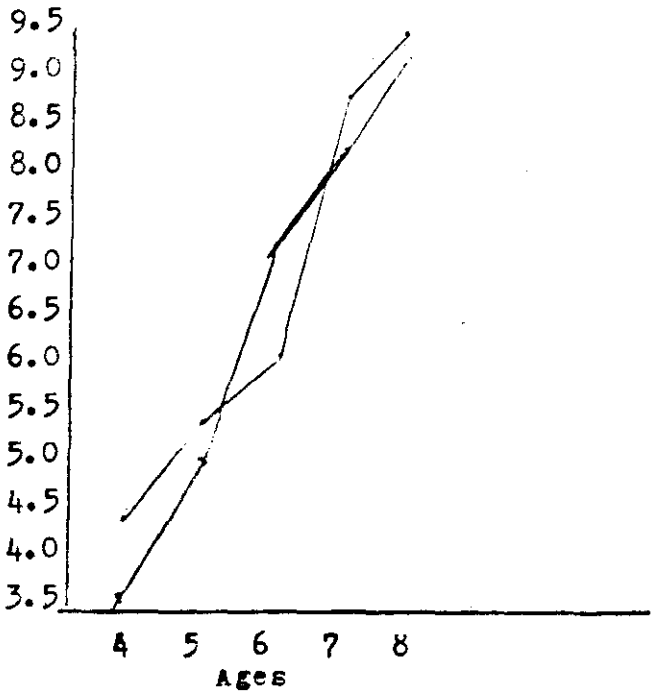

Figure 1

Mean Accuracy Scores for Males and Females by Age

These results displayed in Figure 2 show a clear linear increase from ages 4 to 8 in both males and females taken separately. Females are seen to be slightly better at all age levels except at the 6 year level, where there is a reversal in favor of males. At the 4-year age level the mean accuracy score for males is 3.6, for females it is 4.3. At the 5 year age level the mean accuracy score for males

is 5.0, for females it is 5.3. At the 6 year age level the mean accuracy score for males is 7.1, for females it is 5.9. At the 7 year age level the mean accuracy score is 8.2, for males and 8.7 for females. At the 8 year age level the mean accuracy score is 9.0 for males, 9.2 for females. When both sexes are taken together, a great increase is seen from 5 year to the 6 year age level(a difference of 1.71) and the increase is seen to continue from the 6 year to the 7 year age level (a difference of 1.59). There is not much increase in the mean accuracy scores from the 7 year to the 8 year age level (a difference of only .55)

Again the same results are seen when the calculations are done with 100 subjects and an equal number of children in each group. The same clear linear increase is seen when the mean accuracy scores are calculated with 10 boys and 10 girls at each age level.

The t-tests between means and omega squares are displayed in Table 4..

TABLE 4

Differences Between Accuracy Scores at Each Age Level

	Mean	T-test	Probability level	w^2
Age 4	4.25			
		2.325	.01	9.8%
Age 5	5.25			
		4.100	.0005	28%
Age 6	6.96			
		2.853	.005	15%
Age 7	8.55			
		1.021	.10	0%
Age 8	9.10			
Age 4 to 8		11.151	$<$.0005	75%
Age 4 to 6		5.89	$<$.0005	45%
Age 6 to 8		5.18	$<$.0005	39%

The t-test of the differences between the means show that the greatest difference is between age 5 to 6. Again, according to the t-tests from 4 to 5 year age level and 6 to 7 year age level, the significance is almost the same. From the 7 to 8 year age level there is no significant increase which means that, while accuracy scores show significant increases from ages 4 through 7, there is only a slight insignificant increase seen between ages 7 and 8. Also, a greater increase is found from ages 4 to 6 than from ages 6 to 8. This means that the

younger the subjects, the greater the increase, implying a faster development in younger children.

In order to determine the strength of the relationships, w^2 were calculated, to see the percentage of variance controlled by the independant variable age on accuracy scores. The omega squares displayed in Table 4 show that, as a whole, from ages 4 to 8, 75 % of the variance in accuracy scores is explained by age. The difference from age 4 to age 5 controls 10 % of the variance, from ages 5 to 6, 28 % of the variance is controlled by the independant variable age, and from ages 6 to 7, 15 % of the total variance is cotrolled by age. The variance controlled by the difference between ages 7 and 8 is only .1%.

In summary, the difference from ages 4 to6 controls 45 % of the variance, while ages 6 to 8, only 39 % of the variance is controlled by age.

The percentage accuracy scores were also calculated for the 6 primary affects separately. These are shown in Figure 2.

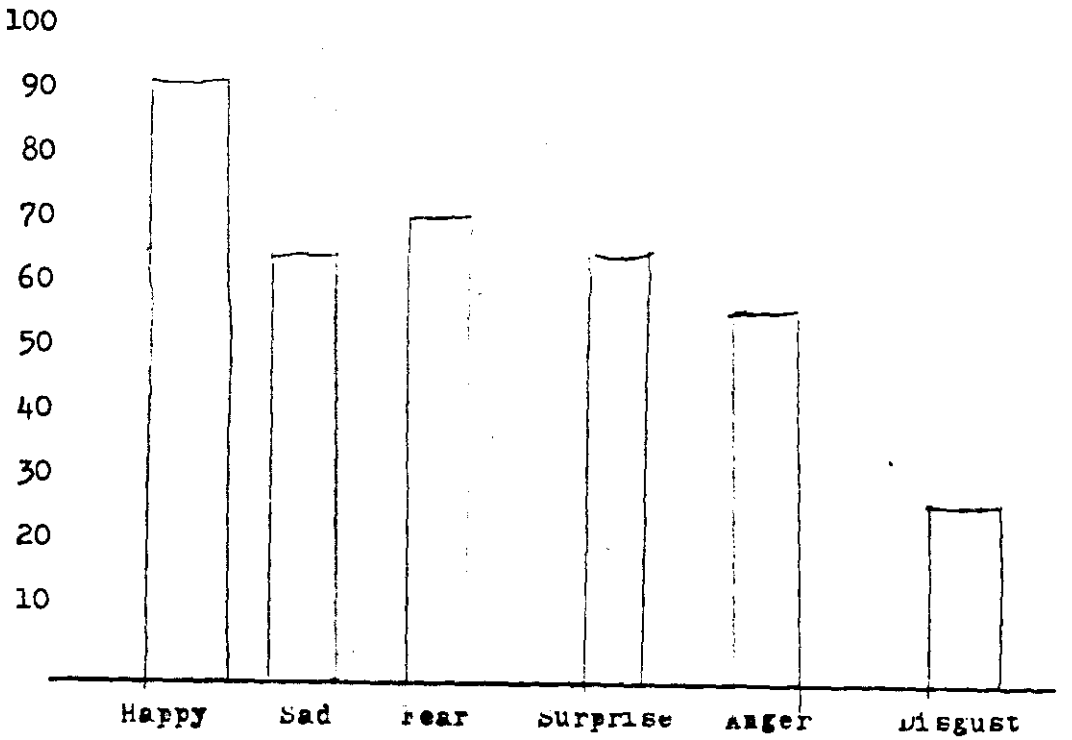

Figure 2

Percentage Accuracy Scores Across the Primary Affects

Here, in Figure 2, it can be clearly seen that happiness is the easiest expression to be recognized. Happiness is recognized on about 90 % of its total trials. Fear is recognized 65 % of the time. Sadness and surprise photos are recognized 61 % of the time and disgust only 22 % of the time that it was displayed. Apparently, while happiness was the most accurately recognized affect, disgust was the least accurately identified facial expression among the subjects.

DISCUSSION

The results indicate that as a child grows older, from 4 to 8 years, accuracy in recognizing facial expressions increases monotonically. This increase is seen in both sexes, with no significant difference between the two sexes, when all subjects are taken as a whole. When they are taken age by age, there seems to be a slight difference in accuracy scores in favor of girls, except at age 6, where the difference is in favor of males. But these differences are statistically insignificant. There is a highly significant increase in accuracy scores from age 5 to age 6, and this significant increase continues from age 6 to age 7 as well. The least increase in accuracy scores, which is statistically insignificant is seen between the ages of 7 and 8.

Happiness, among the six primary affects, was the easiest one to be recognized, while disgust was the most difficult one to be identified by the subjects. The other primary affects occupied intermediate positions.

Since the matching task showed that all subjects understood the instructions, results cannot be attributed to differences in understanding the instructions.

As was shown in the results section, when taken age by age there was a slight difference in accuracy scores in favor of girls at all age levels except age 6. At this stage males scored better than females. This result can perhaps be attributed to 3 very bright boys at this age level. Though subjects were randomply selected, three of the most intelligent ones were in this age level by chance. Also more boys were born in the first few months of the year, while more girls were born in the latter months of the year in this group. This could have also changed the results in favor of boys. At the other age levels, though the increase in accuracy scores was in favor of girls, it was a very slight difference. Perhaps if this had been a labeling task, instead of a nonverbal one, females would have done much better, since while doing the task, more females were observed to murmur the names of the emotions.

The greatest and most highly significant increase was seen between ages 5 and 6. This could be due to a greater development at that age level, as well as due to the 6 year old boys mentioned above doing better at that age level.

The only significant increase was seen from ages 7 to 8.

This may be attributed to recognition of the expressions reaching its ceiling at age 7. The recognition of emotions may either increase slowly after 7 or stop increasing at these age levels. Since 11 out of 12 photos were recognized by most 7 and 8 year students, and these photos are known to have more than 90 % agreement in adults, it can be concluded that only a very slight increase would be possible after 8 years.

This increase in children's recognition of emotions may parallel their cognitive development. According to Piaget (1930) younger children have trouble putting themselves in the place of other people and seeing things from anothers perspective. Also younger children do not take intentions of others into acount and they are more egocentric. It is obvious that as they start putting themselves in the place of others, and taking into account the others' intentions, they will also be able to judge their feelings and recognize the emotions more accurately. So this increase in recognizing the transition expressions from ages 5 through 7 may parallel Piaget's stage of concrete operations when the child starts coming out of his egocentrism.

As to the problem of accuracy among affects, it was seen

that happiness was the most accurately recognized expression. This may be a result of the fact that happiness is the easiest emotion to express. One can very easily make a happy face by just grinning. Also, this result may result from happiness' being the most positive expression among the others.

Happiness appears, as smiling at birth, which is at that time a simple reflex movement. Also, it has been maintained by many philosophers that pleasure is the basic goal of life. For example Freud, has given the pleasure principle a basic place in his theories(Munn,1956). According to Woodworth,1938) though labels given to expressions may differ, there was rarely any confusion between the pleasantness and the unpleasantness of the expression. After examining the data from several earlier studies, woodworth said that emotions could be ordered in a continuum of categories. These categories were a) love, happiness and mirth b) surprise c) fear and suffering d) anger and determination e) disgust, and f)contempt Later Schlosberg (1952) represented Woodworth's scale as a cylinder whose major dimensions were pleasentness-unpleasentness, and attention-rejection. Also a third dimension represented the intensity of the emotional experience. Woodworth

had created these categories in the attempt to distinguish between errors made on simple and difficult judgments. According to him, for example, a confusion of disdain with disgust, was a less serious error than a confusion of happiness with disgust (Shaver,1981).

Fear was confused in this research, with surprise, and their level of accuracy did not reach that of happiness. Whenever a surprise photo was misplaced by the children it was done more on fearful expressions than the others. Also, the photos having fearful expressions were placed more on surprise expressions whenever they were misplaced. This was maybe because the two expressions do in fact resemble one another, as their eyes are wide open, eyebrows lifted and mouth open.

In addition, the incomplete nature of one of the anger expressions affected the results. Whenever an angry pose was misplaced it was usually the photo of one particualar poser.

This study could also be extended to include affect blends. Photos showing two expressions at the same time may be given

to children to match with some criterion photos having the same expressions. Which affects would be recognized more easily when combined? At what age does recognition of the various affect blends develop? These are some of the questions that such a study could answer. Also, we would be able to see at what age the recognition of these expressions reached its ceiling. Since recognition of the affect blends is a more difficult task, than in the case of basic expressions probably it would reach its ceiling at a later age. So, probably this ability would begin to develop later in children.

This test could also be given to low SES students who may have less stimulation than children coming from middle or high SES families. The results then, could be compared to see the difference, if any, between the two SES groups. At each age level the results could be compared separately for the two groups.

Only female targets and only male targets could be used for the matching tasks. Maybe the difference of the sexes in the photos could affect male and female subjects differently. Maybe female subjects could identify female faces more

easily since they could be able to put themselves more in a females' place than in a male's. We could also use photos of children rather than adults'. Maybe children would be able to recognize children's expressions more easily.

Since a relation between age and recognition of emotions have been found in this study, if we could give all these other tests as next steps, we could form more clear ideas about children's recognition of facial expressions of emotion in this culture, and compare their agewise progress with that of children in other cultures.

In this study it has been shown that the relationship between emotion recognition and age is as strong as Izard(1971) has claimed. The children in a Turkish sample were able to recognize emotions more easily as they grew older, like the American and French children in Izard's study. Not much can be said about the different emotions since this was a non-verbal task unlike most of the other tasks done before in other cultures. But it can be said that happiness was also one of the most easily recognizable emotion in all cultures while disgust was the least easily recognizable emotion. Also

recognition of joy, sadness, anger, and fear develops sooner in French and American children tested, then that of contempt and shame. In this research also, these 4 emotions were seen to develop sooner than disgust since they were recognized more easily. Though as the children grow older, the difference between happiness and disgust get smaller, still disgust is the least easily recognizable emotion even in the oldest children.

Since it was shown that the relationship between recognition of emotional expression and age is strong, this suggests that the emotion technique may be also usefull in assesing problems in emotional development and social perception.

The results in this study can be generalized to a larger population of children who come from midlle high SES families. So, Turkish children of middle-high SES level who belong to the same economic and social characteristics, can recognize the facial expressions more easily as they grow older. There is also no significant difference between girls and boys at these ages in this culture.

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APPENDIX A

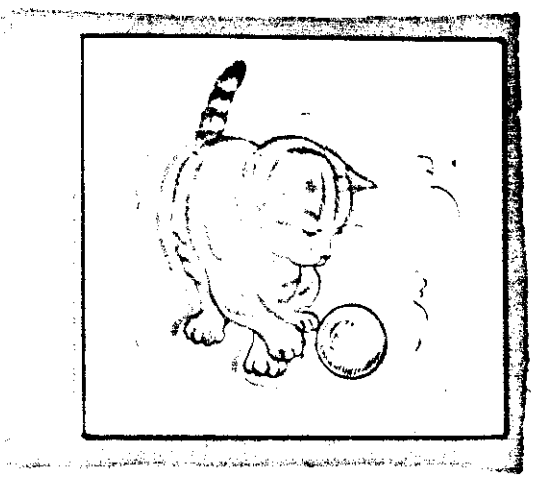
Actual Instructions

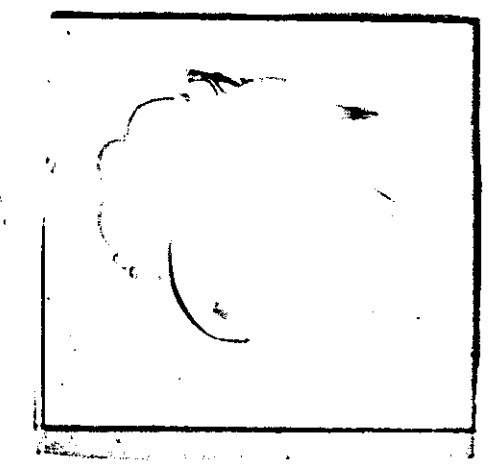
1)Test of Understanding the Instructions

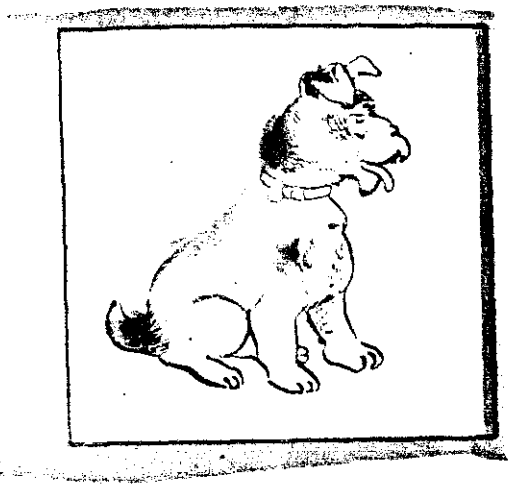
"Görüyorsun, masanın üstünde üç değişik resim var. Dikkatle bak. Şimdi sana başka resimler vereceğim. Bu vereceğim resimleri teker teker en çok benzeyen resmin ustune koyacaksın. Once iyice resme bak, sonra masadakilerden hangisine benziyorsa onun ustune yerleştir."

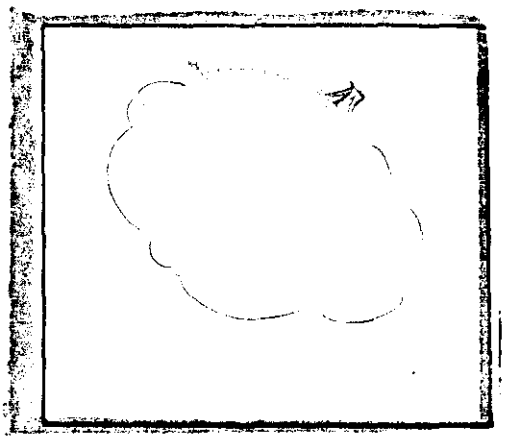
2)Test for the Expressions

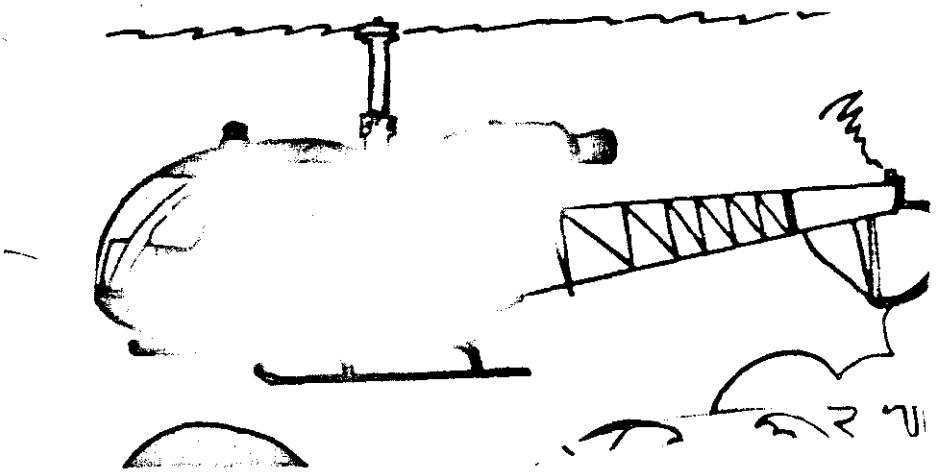
"Şimdi masanın üstüne altı tane değişik ifadeli yüzler yerleştiriyorum. Dikkatle bak, hiç birindeki ifade, hiç birindeki duygu diğerinin aynı değil. Hepsinde farklı ifadeler var değil mi? Şimdi de sana başka resimler vereceğim. Bunu alıp dikkatle bakacaksın, sonra da masadaki resimlerden en çok hangisinin ifadesine, duygusuna benziyorsa elindeki kişinin yüzündeki ifade, yüzündeki duygu, onun üstüne yerleştireceksin."

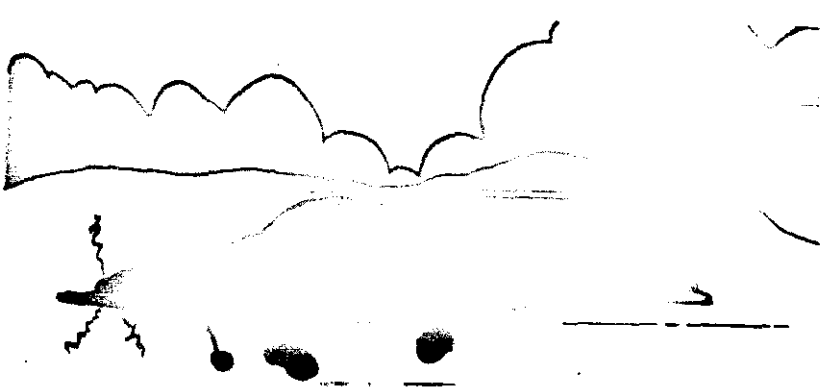


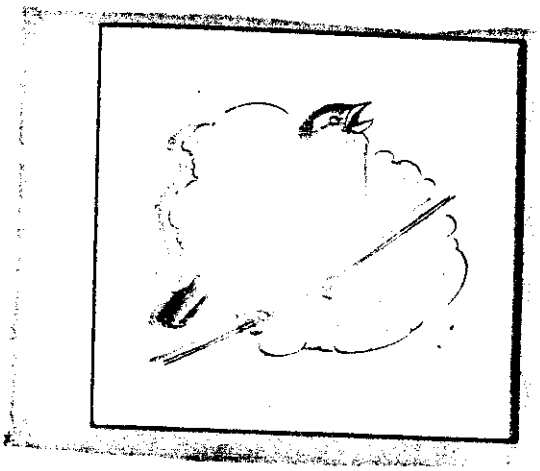


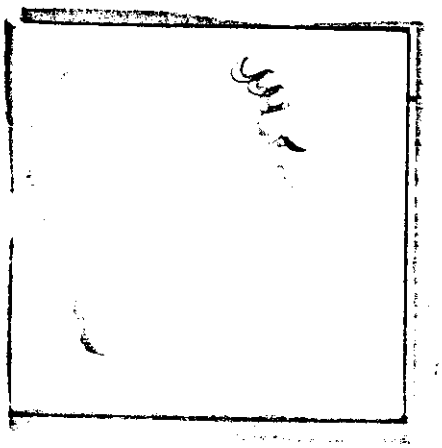


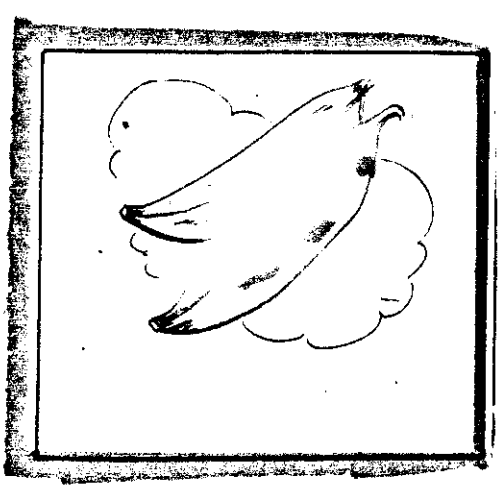


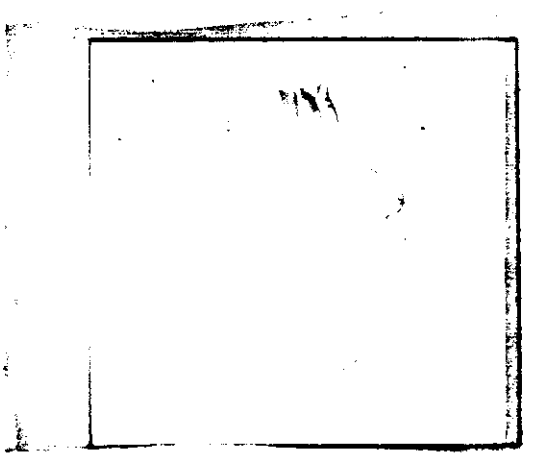












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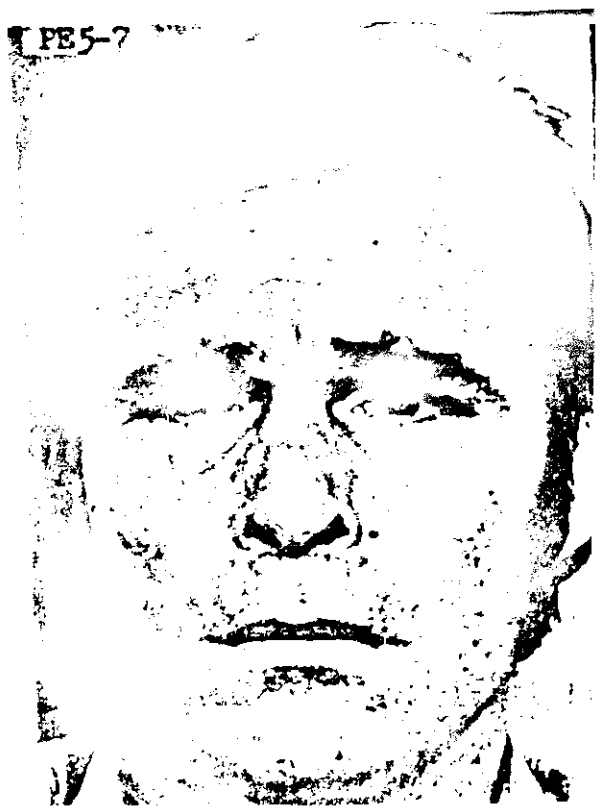

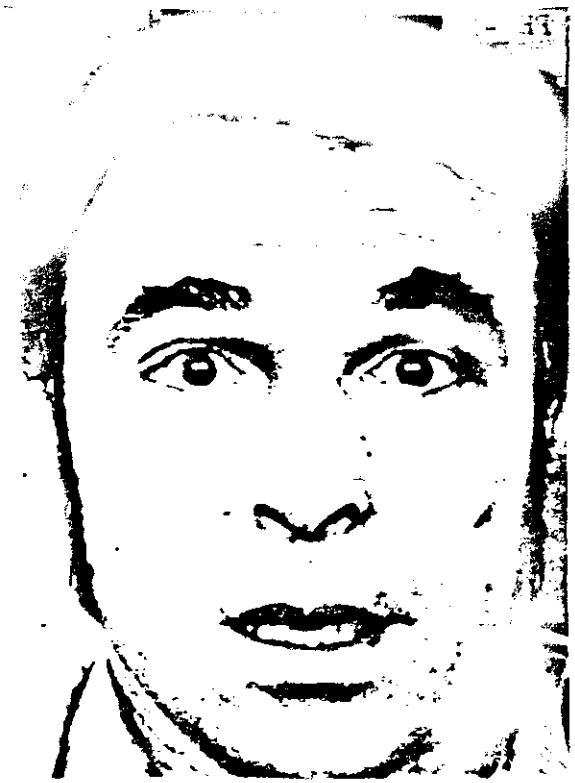

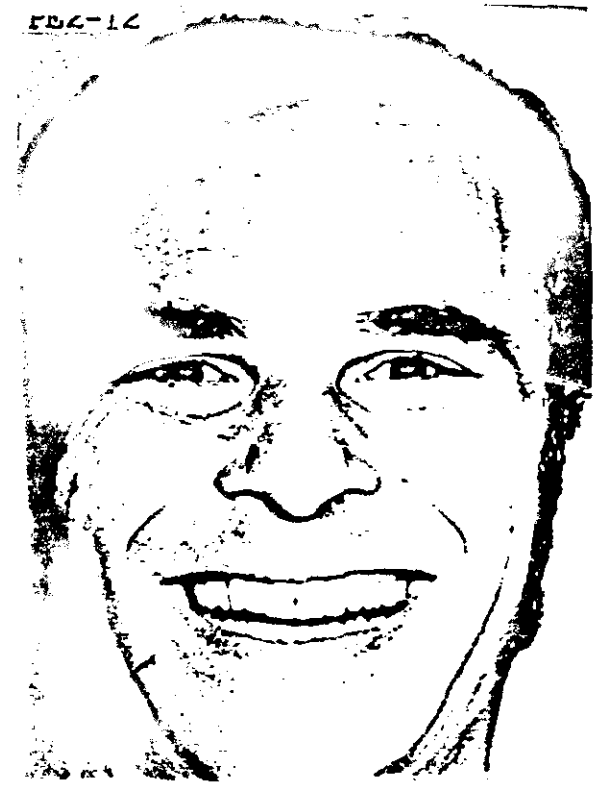

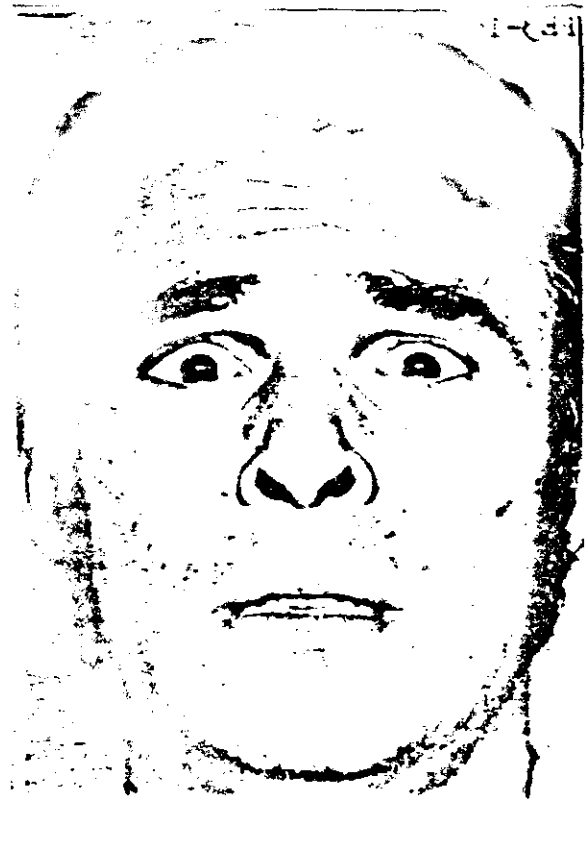

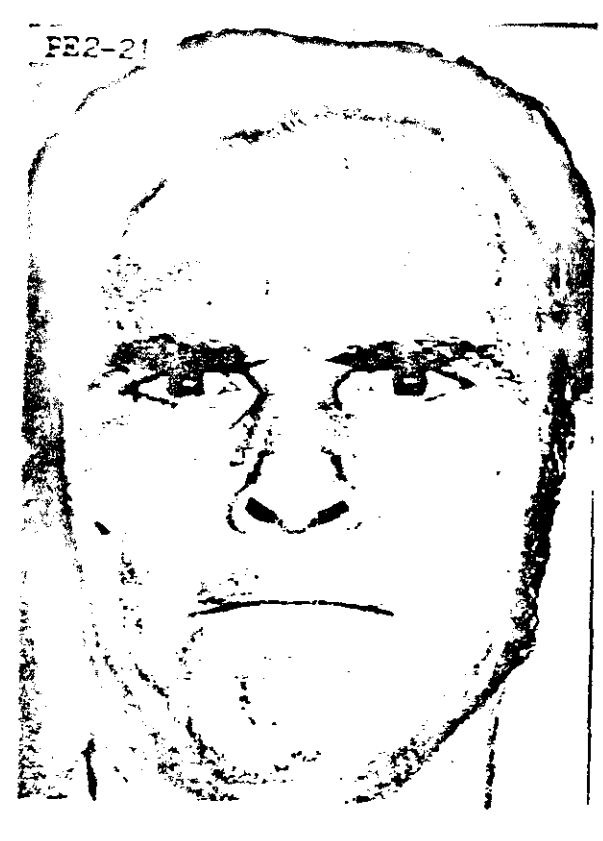
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matched photos