1983

The Relationship between Perceived Attractiveness and Infant Facial Features of Premature and Full-Term Infants

Richard A. Maier
Loyola University Chicago

THE RELATIONSHIP BETWEEN PERCEIVED ATTRACTIVENESS AND INFANT FACIAL FEATURES OF PREMATURE AND FULL-TERM INFANTS

by

Richard A. Maier, Jr.

A Thesis Submitted to the Faculty of the Graduate School of Loyola University of Chicago in Partial Fulfillment of the Requirements for the Degree of Master of Arts

May

1983

ACKNOWLEDGMENTS

The author is indebted to Dr. Deborah Holmes, the director of the thesis, and Dr. Jill Nagy, also on the thesis committee, for their expert consultation and support. Dr. Frank Slaymaker is greatly thanked for his consultation on the statistical analyses. The nursing staff and the following people from Evanston Hospital are thanked for their cooperation, without whom the data could not have been collected, Ms. Janet Emmerman, Director of the Office of Research, Ms. Sue Bethea, Nurse Coordinator of the Infant Special Care Unit, and Ms. Katie Olive, Head nurse of the newborn Nursery. The author thanks the artistic talent of Ms. Maria Bidny, who drew the four figures based on precise calculations. Dr. John Carroll and Mr. George Mulvaney were kind enough to lend me their cameras. The author appreciates the advice obtained from Mr. Michael Bresolin regarding the word processing system at Loyola University. Finally, my wife, Mrs. Senaida Guerrero-Maier, and my nephew, Mr. Steven Pearson, are acknowledged for their assistance in the calculations of the facial measurements.

VITA

The author, Richard Ali Maier, Jr., is the son of Dr. Richard Ali Maier and Barbara (Mock) Maier. He was born November 8, 1957 in Atlanta, Georgia. He was married to Senaida Guerrero on December 18, 1983.

He graduated from Glenbrook South High School in June, 1975. He attended Loyola University of Chicago from September, 1975, including one academic year in their branch in Rome, Italy, until he received his B.S. in psychology in May, 1980 where he graduated cum laude. In August, 1980 he received a graduate assistantship in the applied social psychology program.

In 1978, he was elected as a member of the honorary Blue Key Hall of Fame. In 1980 he was also granted a membership in the Jesuit honorary society--Alpha Sigma Nu. He was a member of the Theta Xi fraternity, the Loyola University Tennis Club (he was captain in 1978 and in 1980), and the Psychology Club (he was president in 1978 and in 1980).

He has two publications, including:

Maier, R.A., Jr., Prinz, S.M., Nagy, J.N., Holmes, D.L., Slaymaker, F., and Pasternak, J. A methodological note on the use of a priori cluster scores for the Brazelton Neonatal Behavioral Assessment Scale (BNBAS). _Infant Behavior and Development_. In press.

Metalis, S., and Maier, R.A., Jr. Does the Law of Initial Values Apply Equally to Three Psychophysiological Indexes? _Psychophysiology_, 1982, _19_, 576.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figure | Page

INTRODUCTION

Ethological theory suggests that certain stimuli, labeled sign stimuli, serve to trigger specific behavior. It has been further purported that human infants innately evoke nurturant responses from human adults. While not direct, the three experiments reported here test this notion by gauging reactions to facial drawings of infants, which varied in the degree (based on actual measurements) to which they possessed these theoretical sign stimuli. The first experiment empirically tested for differences in the proportional facial characteristics (all measurements were made when the length of the head was a standard size), including the shape of the head, between premature and full-term infants. Several studies (i.e., Hildebrandt & Fitzgerald, 1979) have found certain facial features (e.g., a large forehead, which can be implied to be a sign stimulus) to be positively related to perceived cuteness. It was hypothesized that full-term infants would possess these critical attractive features to a significantly greater degree than would premature infants. In addition, conceptionally older premature infants were expected to possess these critical characteristics to a significantly greater degree than were conceptionally younger premature infants.

Based on pictures of infants, three drawings were made of the typical infant born at term, one month early, and two months premature. College students were then asked to rate these composite drawings in terms of specific items evaluating overall impressions, perceived functional evaluations, and judged behavioral inclinations.

It was hypothesized that the drawing of full-term infants would elicit more favorable responses than would the two drawings of premature infants. Furthermore, it was also expected that subjects would rate the composite drawing of conceptionally older premature infants more positively than they would a composite drawing of conceptionally younger premature infants. This prediction was based on the theoretical assumption that full-term infants tended to possess the critical attractive features (or sign stimuli) to a reliably greater extent than did premature infants.

CHAPTER I

REVIEW OF THE LITERATURE

Ethological Theory and the Effects of Sign Stimuli

Ethologists purport that certain stimuli in an environment serve to trigger specific innate behavior on the part of an organism. They propose that there exists a number of innate releasing mechanisms which neurologically stimulate the organism to behave in a specific manner when certain stimuli (sign stimuli), and only these stimuli, are encountered (Eibl-Eibesfeldt, 1970; Hess, 1967). Four criteria must be met before it can be considered that an innate releasing mechanism has triggered a response: 1) the behavior involved in a response must occur in exactly the same way each time a sign stimulus is presented; (2) the response must occur at the first encounter of the sign stimulus, before learning can take place; (3) the response must occur in all members of a species; and (4) the response must occur in individuals raised in isolation from species members (Hess, 1967).

Following these four criteria, innate releasing mechanisms have been observed in many species. In such cases, the animal usually behaves in the same fashion during each encounter with the sign stimulus, while focusing on only one characteristic of an object--the sign stimulus (Eibl-Eibesfeldt, 1970; Hess 1967). For example, a male turkey will attempt to copulate not only with a sexually responsive female turkey, but he also will make sexual advances towards a stick depicting the head of a female turkey (Schoettle & Schein, 1959). Likewise, a territory-holding male robin will attack a tuft of red feathers but will ignore a completely mounted model that has a brown breast (Lack, 1943). Thus, the female turkey's head and the robin's red feathers are the sign stimuli that effectively elicit specific behaviors.

Lorenz (1943) has proposed that such a sign stimulus serves to trigger innate behaviors in humans as well as in non-humans. One such releaser has been labeled "babyishness." Ethologists claim that humans innately respond nuturantly to infants, especially human infants, and that this response is released by "babyish" features of the infant. Correspondingly, differences are apparent when infants and adults are compared for body and facial features. Limbs are heavier and shorter in proportion to the torso in infants than in adults. Also, the infant's head is proportionally much larger in relation to the body than it is for adults (Hess, 1967). In contrast to adults, infants tend to possess high and protruding foreheads, large eyes placed in the middle of the face, a small nose and mouth, and fat cheeks (Brooks & Hochberg,1960; Gardner & Wallach, 1965; Hildebrandt & Fitzgerald, 1979; Lorenz, 1943; Sternglanz, Gray & Murakami, 1977). Lorenz (1943) suggests that these differences between infants and adults might serve as sign stimuli, thereby eliciting nuturant responses from adults.

Pictures of Infants are Preferred over those of Adults

Several researchers have investigated the notion that infant facial features serve as sign stimuli for adults. Specifically, adults should behave in a certain manner, i.e., smile, when first viewing the face of an infant. Accordingly, pictures of infants should be more attractive than should pictures of adults. Thus, as a first step, several studies have compared the attractiveness of pictures of infants and adults (humans and non-humans).

Cann (1953), being the first to test this hypothesis, gauged ratings of attraction from men and women (single and married, parent and childless) who viewed 53 pairs (each pair consisting of one infant and one adult of the same species) of pictures of infants and adults of several animal species. Subjects preferred significantly more pictures of infants than they did pictures of adults.

Fullard and Reiling (1976) also obtained similar results by employing pictures of both humans and non-humans. Ten pairs of matched human infant/human adult and ten pairs of matched non-human infant/non-human adult pictures, all showing full-face frontal views, were judged for attractiveness. The pictures of human and non-human infants were preferred over pictures of adults.

Similar results have also been obtained in studies employing stylized representations of faces. Huckstedt (1965) systematically manipulated four variations of the forehead height and curvature for the average human adult and infant. The shape of the forehead normally found for infants was preferred over the shape generally found for adults. Moreover, representations that exaggerated the infantile shape were favored over the average infant figure.

These studies indicate that faces of infants of several species, including man, are more attractive than are faces of adults. These findings correspond favorably with Lorenz's theory of "babyishness."

The Effects of Supernormal Sign Stimuli

Huckstedt (1965) found that exagerrated sign stimuli (i.e., an extra large forehead), labeled supernormal sign stimuli, are preferred over normally occurring events. Non-humans also respond to supernormal sign stimuli. For example, when given a choice, some species of seabirds and shorebirds incubate an oversized egg rather than one of their own, or a clutch with more eggs rather than the natural number, or artificial eggs with larger and darker spots than those of the natural coloration (Tinbergen, 1951; 1953). It seems that the further along a particular dimension the model exhibits supernormal stimuli, such as the brighter the color of the egg, the stronger the response (Verplanck, 1957).

Humans also tend to prefer supernormal sign stimuli. The data suggests that infants possessing larger features than average, such as fatter cheeks or larger eyes, are perceived to be more attractive than is the average infant. Certainly, film caricatures and advertised portrayals of infants are depicted with supernormal features (Gardner & Wallach, 1965).

Gardner and Wallach (1965) further tested the effects of supernormal stimuli for humans. Profiles of heads were obtained from six men and six infants (all less than one year old). They then constructed stylizations which gradually differentiated the profiles of the infants from the profiles of the adults. In contrast with the adult's head, the infant had: a wider head, a larger proportion of the head devoted to the brain, and a smaller chin.

The geometric proportions of the head were varied by using ratios of infant and adult values. Four "superbabies" were constructed that increasingly exaggerated the features of the shape of the infantile head. Likewise, three "superadults" progressively exaggerated the difference between the head of the adult and the head of the infant--in the reverse direction from the "superbabies." Four "control" heads were also constructed which used the median value for infants in the set of measures that differentiated infants from adults. The stimuli therefore consisted of the following: the average adult head, three "superadults"--differing in their extent of exaggeration, the average infant head, four "superbabies"--differing in the extent of exaggeration, four "control" heads, and one head that consisted of the median values for all babies (hereby called the median head). From a series of paired stylizations, subjects indicated the drawing which appeared more "babyish."

The data supported the hypothesis. For example the portrayals of superbabies were seen as more babyish than the control heads, and the control heads were judged to be more babyish than all of the superadults. In addition, the most preferred control head was chosen less often than was the least exaggerated infant head, and the least preferred control head was chosen more often than was the average adult head. Subjects reliably preferred the less exaggerated pair of superadults, but they did not differentiate among the superbabies. Not surprisingly, when a form of the adult head was paired with some portrayal of an infant's head, the infant's head was almost always preferred.

These results demonstrate that supernormal sign stimuli can be more effective in eliciting positive responses than can normally occurring sign stimuli. Overall, there is extensive evidence that subjects prefer pictures and stylizations of infants over those of adults.

Studies Investigating the Optimal Infant Facial Features

Several studies have investigated the most attractive facial features for infants. In the first such study, Brooks and Hochberg (1960) manipulated eye position in a simple line drawing. Eye position was varied up and down in five equidistant steps, providing both a profile and full-face view. The eyes were also varied forward and back in five equidistant steps, depicting a profile. Subjects rated the cuteness of the drawings. The highest cuteness rating was obtained when the eyes were vertically placed in the center of the faces.

In a later study, Sternglanz, Gray and Murakami (1977) attempted to analyze the global stimulus of the infant face by systematically dividing the face into its component parts. The varied characteristics included the following: vertical position of the features of the face, eye width, eye height, eye width and height varied simultaneously, and iris size. Only one component was manipulated at one time and between five and ten equidistant steps were used for each feature. They displayed black and white line drawings to subjects, who rated them for perceived attraction.

Statistical analysis indicated a quadratic trend for all five variables, meaning that the intermediate values of the variables were favored over the smallest and largest ones. In addition to the quadratic trends, linear trends were found for three variables--vertical position, eye height, and eye height and width varied combined--indicating that the largest values of these variables were the ones most favored. These two results indicated that the smallest values of these variables were definitely not preferred. The linear trends found in eye height and width varied together showed that large eyes were preferred over small eyes. A preference was also found for faces with small chins and large foreheads; of course, the size of the chin and forehead was confounded, as a small chin was necessarily accompanied by a large forehead--and conversely.

However, the impact of the quadratic trends was reduced by the fact that these researchers employed values which extended beyond the normal range found for infant faces (as found by Hildebrandt and Fitzgerald, 1979). This means that the largest values of these variables rarely exist. The three variables which displayed a linear trend (vertical position of the features of the face, eye height and eye height and width varied together) demonstrated a similar pattern found by

Gardner and Wallach (1965), in that the exaggeration of these variables were preferred over their normally occurring values.

This study demonstrates that facial features can be successfully manipulated. Overall, the highest attractiveness ratings occur with a composite face characterized by a relatively large forehead and large eyes.

In yet another study, Hildebrandt and Fitzgerald (1979) attempted to relate actual infant facial features to adults' perceptions of attractiveness. Sixty chromatic photographs of infant faces (consisting of five male and five female infants from the ages of three, five, seven, nine, eleven, and thirteen months) were transformed into slides. Each slide was then projected onto a flat vertical surface so that the face was upright and the distance from the top of the head to the bottom of the chin was forty centimeters. Each slide was measured for fifteen facial features to the nearest millimeter (or degree, in the case of the variable CHEEKS). The facial features included the following: HEAD WIDTH 1 (width of the forehead halfway between the upper part of the ears and the top of the head), HEAD WIDTH 2 (width of the head at the level of the upper part of the ears), HEAD WIDTH 3 (width of the head level halfway between the lower part of the nose and the upper part of the lips), FOREHEAD (length from the upper tip of the nose to the hairline), EYE HEIGHT (average height of the eyes), EYE WIDTH (average width of the eyes), IRIS SIZE (average width of the iris'), PUPIL SIZE (average width of the pupils), NOSE LENGTH (length of the nose), NOSE WIDTH (width of the nose), MOUTH HEIGHT (distance between the upper and lower portions of the mouth minus its opening), MOUTH WIDTH (width of the mouth), CHEEKS (the magnitude of the presence of cheeks--measured in degrees--with the upper tip of the nose used as a focal point), EAR HEIGHT (average height of the ears), and EAR WIDTH (average width of the ears).

Moreover, head shape was further expressed by two derived measurements. The relative width of the upper part of the head was labeled HEAD HIGH and was equal to HEAD WIDTH 1 divided by HEAD WIDTH 2. Similarily, the relative width of the lower part of the head was labeled HEAD LOW and was equal to HEAD WIDTH 3 divided by HEAD WIDTH 2. This resulted in a total of fourteen facial measurements.

After the respective measurements were made, 196 college students (98 males, 98 females) rated the pictures, using a five point Likert style scale measuring perceived cuteness. Since results indicated a linear relationship between facial feature variables and cuteness ratings, a linear model (multiple regression) was employed.

Approximately one half of the variation in cuteness ratings were accounted for by the fourteen facial variables--with the variables FOREHEAD and PUPIL SIZE correlating positively with perceived cuteness and the variables HEAD LOW, NOSE LENGTH, NOSE WIDTH, MOUTH HEIGHT, and EAR HEIGHT correlating negatively with perceived cuteness. In addition, high intercorrelations among some of the variables led to the formation of several conceptual and statistically meaningful combinations of measurements, resulting in the derivation of three relatively independent, additive combinations which incorporated ten of the fourteen measurements. The first derived variable, VERTICAL PLACEMENT, was equal to FOREHEAD minus MOUTH HEIGHT and was designed to reflect the vertical placement of the eyes on the face. The measurements NOSE LENGTH and EAR HEIGHT were averaged to form a variable labeled FEATURE LENGTH. In addition, the measurements EYE WIDTH, IRIS SIZE, NOSE WIDTH, MOUTH WIDTH, CHEEKS, and HEAD LOW were combined to form a general WIDTH variable. The measurements PUPIL SIZE, EYE

HEIGHT, EAR WIDTH and HEAD HIGH were not strongly correlated with any of these variable combinations or with one another and henceforth remained as unique variables.

A forward stepwise multiple regression procedure was conducted to determine how well these seven variables predicted perceived cuteness (i.e., in the first step, all seven variables were tested for their predictive power; when this combination significantly predicted perceived cuteness, then the best predicting variable was not used in the next step and only the remaining six variables were tested and this process continued until the remaining variables could no longer adequately predict perceived cuteness); the multiple correlation was significant at each step, meaning that these variables strongly predicted perceived cuteness. Provided according to their respective magnitude of effect, the variables FEATURE LENGTH (negative correlation), PUPIL SIZE (positive correlation), WIDTH (negative correlation), VERTICAL PLACEMENT (positive correlation), and HEAD HIGH (positive correlation) were significant predicters of perceived cuteness.

Accordingly, a cute infant is likely to have short and narrow features, fat cheeks, large pupils and a large forehead. On the other hand, wide features below the forehead (except the eyes) are negatively correlated with preceived cuteness. However, feature sizes do not vary independently with one another in actual faces. For example, an infant possessing generally a narrow face also tends to have narrow facial features.

Studies Investigating Head Shape as a Criterion Variable

The aforementioned studies have found several facial characteristics which are significantly related with perceived cuteness. In conjunction with facial configuration, head shape is also associated with "babyishness." Consistent with Lorenz's theory, infantile shaped heads should be seen as cuter than silhouttes of adult heads.

The first experiment to test this specific hypothesis confounded size with shape such that the more infantile heads were also larger in size (see Huckstedt, 1965, Figures 1 and 2, Alley, 1979). Alley (1981) conducted three experiments to reanalyze this topic.

By employing a digital computer, Alley transformed three line drawings of human heads to create three series of drawings varying in babyishness of cephalic shape. One of the three original line drawings was the "idealized" infantile face found by Sternglanz et al. (1977) which was derived from five pooled facial feature variations found to have the highest attractiveness ratings. The other two stimuli were based on profiles traced from lateral cephalograms of four year old boys, which altered the perceived age level of human heads (Pittenger, Shaw & Mark, 1979; Todd, Mark, Shaw & Pittenger, 1980). This transformation was applied to create a series of five drawings from each of the original three drawings--totalling fifteen drawings--each containing the following: the original drawing, two "babyish" drawings and two more aged drawings. Thus, the cardioidal transformations systematically varied the cephalic shape in a biologically natural manner.

In Experiments 1 and 3, 25 subjects rank ordered, from least cute to most cute, randomized sets of the five drawings. Experiment 1 depicted five frontal views based on the "idealized" infantile face, while Experiment 3 utilized two series of five drawings, based on the two series of lateral cephalograms taken from the four year old boys. In Experiment 2, the subjects selected the cuter profile of two drawings for twenty trials.

All three experiments supported the hypothesis. Drawings were rank ordered according to babyishness of cephalic shape for all three series used in Experiments 1 and 3. In Experiment 2, tests based on binomial probabilities showed that subjects selected the more infantile profile far greater than chance.

Based on all of the previously mentioned studies, infants are seen as cuter than adults. Furthermore, certain facial features appear to be critical determinants in the perception of cuteness.

<u>The Effects of Premature Infants on their Parents</u>

Premature infants evoke different responses from adults than do full-term infants. One reason may be that there are a number of differences found between premature and full-term infants. Compared to full-term infants, premature infants are smaller in size (Corter, Trehub, Boukydis, Ford, Celhoffer & Minde, 1978); possess a more distorted head-to-body ratio (Lamb, 1978); have a riskier medical status (Corter et al., 1978); possess a higher-pitched cry (Lamb, 1978); are unable to smile for a good deal longer (Lamb, 1978); and as a group, have an increased statistical risk for impaired cognitive development (Caputo & Mandell, 1970).

Thus, premature infants may not be as appealing to parents as are full-term infants. First, initial interactions with the infant tend to be hindered by the infant's relatively long hospital stay. Next, they appear and sound differently than do full-term infants. Finally, the parents of these infants do not obtain the benefit of a smile until later in the interaction process than do parents of full-term children. Therefore, the premature infant tends to start life at a disadvantage.

To examine the perceived attractiveness of premature infants, Corter, Trehub, Boukydis, Ford, Celhoffer and Minde (1978) conducted two experiments. In Experiment 1, twenty nurses experienced in caring for premature infants and twenty nurses experienced only in caring for full-term infants were asked to give absolute and relative ratings of five photographs of premature infants. The infants possessed the following criterion: postnatal age between three and four weeks, weight between 1300 and 1600 grams at the time of selection, a good medical prognosis and no obvious physical anomalies. A frontal picture of the baby's head and shoulders and one frontal shot of the baby's whole body were taken.

Both nursing groups agreed significantly on both absolute and relative ratings of the pictures. There was unanimous agreement in designating the most attractive infant, and concordance among at least half of the nurses in the relative and absolute ratings for each of the other four infants. The most attractive infant had the most hair, the most rounded buccal pads (cheeks), and the least splotchy skin color. In addition, nurses experienced with premature infants rated the pictures higher (absolute rating only) than nurses with little experience with premature infants.

Since experience in caring for a premature infant seemed to influence absolute attractiveness ratings, Experiment 2 investigated whether a nurse's experience with a particular infant would increase the infant's perceived attractiveness. Ratings of a photograph of an infant were obtained from twenty nurses who had recently cared for the target infant and from twenty matched nurses who had not cared for the target infant.

The results were consistent with those found in Experiment 1, in that there was high agreement in the perceptions of attractiveness. Furthermore, nurses who had recently cared for the target infant gave higher ratings than did the control group.

The study indicated that physical attractiveness as a trait was reliably agreed upon for premature infants. It also suggested that experience with a particular infant tends to increase the nurse's ratings of its attractiveness. A number of notions borrowed from social psychological theories might explain these results, such as "overvaluing what one has invested energy in" or "getting used to the baby."

Parents also perceive a difference in attraction between their own premature and full-term infants. Nagy, Holmes, Danko, and Slaymaker (1983) administered the Parent Perception Questionnaire to parents of four groups of infants, including the following: premature infants; full-term infants whose hospitalization extended past the normal time due to an illness; full-term healthy infants who were hospitalized for a prolonged period because their mothers were ill, and who also remained in the hospital; and healthy full-term infants who were discharged a few days after birth. At two, four, and six months after birth, parents compared their child to a perceived "average" child on a number of dimensions: sleeping patterns, excitability, strength, crying habits, eating habits, activity level, size, difference from "normal," happiness, and a general cause for worry.

In comparing infants, almost all parents rated their infants better than the "average" child at all tested ages. However, at two months, some of the ratings of premature infants were significantly closer to the ratings of the "average" infant than were ratings of the other three groups. Moreover, at four months, some of the ratings of premature and full-term sick infants were significantly closer to the rating of the "average" infant than were ratings for the other two groups. Most group differences dissapated, however, at six months. Specifically, premature infants were perceived to be smaller than the "average" infant at two and four months--but no differences were found at six months-- and they were also believed to sleep better than the others at four and six months.

Not only do premature infants appear less appealing relative to full-term infants (as judged even by biased parents), but adults also tend to react differently to them than they do to full-term infants. Frodi, Lamb, Leavitt, Donovan, Neff and Sherry (1978) conducted an experiment to determine whether the auditory and visual characteristics of premature infants were perceived as aversive and whether these effects were additive.

Thirty-two couples, each having a five month old infant, first viewed a videotape. The film showed a scenario, each lasting two minutes, in which a baby was quiescent, cried, and then was quiescent again.

Four videotapes served as the stimuli, with one-fourth of the parents viewing each one. Two tapes depicted the same full-term infant throughout the sequence. On one tape, parents were exposed to the cry of a healthy, full-term infant--while on the other tape, the cry of a premature infant was played. The other two tapes exhibited a premature infant. Again, on one tape, subjects heard the cry of a healthy, full-term infant--whereas on the other tape, subjects listened to the cry of a premature infant. None of the cries were actually emitted by the filmed infants, as the soundtracks were dubbed onto the four tapes. The normal and premature faces were of the same size on the screen. All audiotapes and videotapes were made of the infants' discharge from the hospital. within thirty-six hours.

The physiological indices of diastolic blood pressure (DBP), skin conductance (SC), and heart rate (HR) served as dependent measures, since several studies (e.g., Geen, Stonner & Shape, 1975; Weerts & Roberts, 1975) have shown that increases in DBP are related to feelings of anger, aversion, and/or disposition to aggress, and that SC is a more general measure of autonomic arousal. Moreover, HR generally discriminates between attentive (orienting) and defensive reactions (Lacey, 1967). The first and last thirty seconds from each sequence was analyzed. After the film, parents completed a mood adjective checklist, which referred to each of the tape segments; they rated on a scale from "1" (not at all) to "5" (very much) how much ten adjectives--happy, annoyed, irritated, disturbed, indifferent, distressed, alert, frightened, and sympathetic--applied to them.

The three film segments produced the anticipated effects. Subjects experienced the most autonomic arousal during the crying segment and the HR data suggested that this arousal persisted even after the infant quieted again. Moreover, significant effects were found when analyzing the mood adjective checklist questionnaire--subjects felt significantly more irritated, annoyed, disturbed, distressed, frightened, alert, sympathetic, and less happy while the baby was crying than when the infant was quiescent.

Inspecting the cry segment, the premature infant's cry elicited significantly greater autonomic arousal, as shown by all three measures, than did the full-term's cry. The parents felt significantly more irritated, annoyed, disturbed and less indifferent while hearing the premature infant's cry than when hearing the normal infant's cry. Considering behavioral inclinations, subjects found the full-term baby to be more pleasant and indicated that they would rather interact with that infant than with the premature child. Moreover, the arousal was even more pronounced, as measured by the SC, when the viewed infant was premature.

Overall data indicate that hearing a crying infant elicits autonomic arousal as well as being subjectively irritating and aversive. On the other hand, smiling and cooing infants evoke minimal physiological changes and positive emotions (Frodi, Lamb, Leavitt, and Donovan, 1978). The cry of the premature infant was perceived to be quite aversive, but the annoyance was increased with the concomitant appearance of a premature infant. The parents also reported that they were less eager to interact with the premature infant. Previous research (Frodi, Lamb, Leavitt, and Donovan, 1978) found that simply labeling a normal infant as premature increased physiological arousal to its cry and also reduced the amount of sympathy it received.

Aversiveness may be supplemented by expectations regarding premature infants, substantiated by the aforementioned differences between premature and full-term infants. This study depicted infants who were scheduled to be released within thirty-six hours, who, presumably, were in stable medical condition. If the relatively healthy premature infant is perceived to be a frustrating and aversive stimulus, then the child may be placed in care of unsuspecting parents (cf. Klaus and Kennell, 1976), who may not anticipate such a relatively unpleasant child.

These facts may have important implications for the understanding of child abuse. More specifically, Berkowitz (1974) has noted that impulsive aggression occurs when an aroused or frustrated person is confronted by an aversive cue. A premature child, who may be perceived to be relatively unattractive--especially while crying, may be seen as such an aversive stimulus (Lamb, 1978). It is possible that this perception of an unattractive and frustrating infant may persist even after the initially aversive characteristics have been outgrown. These notions may account for the fact that prematurely born children are more likely to be abused than those born at term (Elmer & Gregg, 1967; Fontana, 1973; Klein and Stern., 1971).

Premature infants, especially with their piercing cry, can be perceived by their caretakers to be quite frustrating, aversive stimuli. Since cute infants are generally looked at longer than less attractive infants

(Hildebrandt & Fitzgerald, 1978), one may infer that premature infants tend to receive less attention than do full-term infants (assuming that premature infants are seen as less attractive than full-term infants). This inference is supported by the fact that very small, sick premature infants tend to be touched less often than are their larger, healthier cohorts (Minde, Trehub, Corter, Boukydis, Celhoffer & Marton, 1978).

Corter et al.(1978) found that absolute ratings of attractiveness were higher for nurses who had previously cared for premature infants than for nurses who had no experience in caring for premies. This suggests that parents should rate their premature infants higher after a certain amount of exposure to the child. However, repeated exposure to an aversive stimulus is not likely to significantly alter one's perception; in fact, the continued exposure may lead to increased feelings of annoyance and irritation. Nagy et al. (1983) found that parent's perceptions of their premature infant did not significantly change between two and four months of age.

Several studies (Corter et al., 1978; Minde et al., 1978) have suggested that adults highly agree on ratings of physical attractiveness for premature infants. Other studies (Nagy et al., 1982; Frodi, Lamb, Leavitt, Donovan, Neff & Sherry, 1978) have suggested that premature infants are less attractive than full-term infants. Head shape, facial characteristics, skin color, the amount and color of hair present seem to influence ratings of attractiveness (Alley, 1981; Brooks & Hochberg, 1960; Corter et al., 1978; Gardner & Wallach, 1965; Hildebrandt & Fitzgerald, 1977; Sternglanz et al., 1977). The present study empirically tests whether premature and full-term infants facially appear different from each other (in proportionate terms since it is well known that premature infants are smaller in size) If these results are found, then a further study will investigate whether or not the infants (or composite drawings of infants) are differentially perceived by adults.

Three experiments were conducted. Experiment 1 analyzed proportional differences in facial characteristics between premature and full-term infants. Experiment 2 was a pilot test to discover the most discriminating and and reliable ratings of composite line drawings of premature and full-term infants, while Experiment 3 determined whether the drawings of full-term infants evoked more favorable responses than did the drawings of premature infants.

<u>Hypotheses for Experiment 1</u>

It was hypothesized that premature infants appear differently than full-term infants. By using proportional measurements, faces of premature infants should possess the critical attractive facial features (those which have been found to be positively related to perceived cuteness: a large forehead and large values for the derived variables VERTICAL PLACEMENT and HEAD HIGH) to a significantly lesser degree than full-term infants. Moreover, the degree to which infants possess the attractive features are predicted to vary with conceptional age (i.e., full-term infants are expected to possess these attractive features to a greater degree than infants between the conceptional ages of 35 and 37 weeks, who in turn are anticipated to possess these features to a greater extent than infants born between the conceptional ages of 31 and 34 weeks).

CHAPTER II

EXPERIMENT 1

METHOD

Subjects

Pictures were taken of 29 infants (14 males and 15 females): 1) 9 infants at 31-34 weeks conceptional age (four males and five females, including 1 of 31 weeks, 3 of 32 weeks, 4 of 33 weeks, and 1 of 34 weeks) and labeled YPTs, 2) 10 infants at 35-37 weeks conceptional age (five males and five females, including 3 of 35 weeks, 3 of 36 weeks, and 4 of 37 weeks) and labeled OPTs, and 3) 10 infants 40 weeks conceptional age (five males and five females) and labeled FTs. These conceptional ages were determined by physicians on the basis of the mothers' last reported menstrual period and by rating on the Dubowitz Assessment Test. There were no discrepancies between these two measures for the photographed infants.

Infants also met the additional following criteria: 1) weight appropriate for their conceptional ages, 2) no gross physical or neurological defects, 3) stable medical condition, and 4) Caucasian. All infants were photographed as temporally close to birth as possible given the above criteria (ranging from one day to fourteen days). On the average, YPTs weighed 1598.8 grams at birth and 1533.8 grams at time of the picture, OPTs respectively weighed 2074.1 and 2050.0 grams, while FTs weighed 3386.0 grams at time of birth (since they were photographed one or two days after birth, the second weight was not obtained). The mean one minute Apgar score--with a possible range from 0 to 10, with 10 being the optimal score--was 5.00 for YPTs (ranging from 2 to 8), 4.56 for OPTs (ranging from 1 to 8), and 8.70 for FTs (ranging from 7 to 9). The respective five minute Apgar scores were 7.5 (ranging from 6 to 9), 7.22 (ranging from 4 to 9), and 9.2 (ranging from 8 to 10).

Apparatus

Pictures, employing slide film, were taken with a 35 millimeter camera, attached with an electronic flash cube.

Procedure

Before any pictures were taken, written consent was obtained from at least one of the parents.

Pictures of premature infants were taken in the transitional side of the Infant Special Care Unit at Evanston Hospital, while full-term infants were photographed in their mother's hospital room. Either a nurse or a parent positioned the infant so that all facial features were clearly visible to the camera. Figure 1 portrays the ideal orientation of the infants' upright face towards the camera lens (see Figure 1).

Pictures, from 4.5 meters away, were taken of each infant. Slide film was employed, and after the film was developed, each slide was projected onto a flat vertical surface such that the distance from the top of the forehead to the bottom of the chin was 40 centimeters.

Using the model employed by Hildebrandt and Fitzgerald (1979), ten facial features were measured to the nearest millimeter (see Figure 1 for an illustration of the measures). These features included the following: FOREHEAD (length from the top of the nose to the hairline), HEAD WIDTH 1 (width of the forehead halfway between the top of the forehead to the upper tip of the

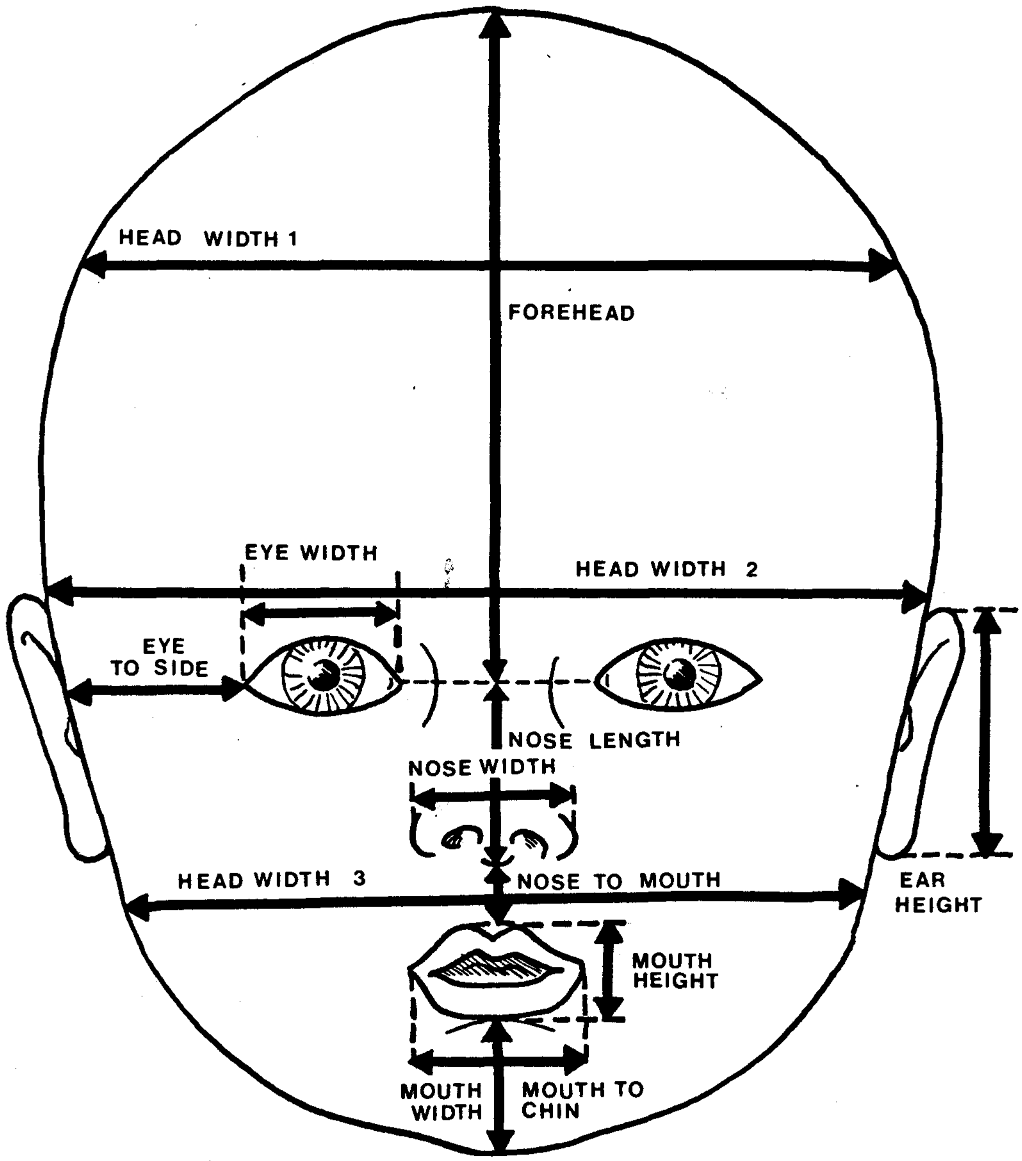

Figure 1. Measured infant facial features, adapted from Hildebrandt and Fitzgerald. (1979)

nose), HEAD WIDTH 2 (width of the head at the upper tip of the nose), HEAD WIDTH 3 (width of the head halfway between the lower tip of the nose and the upper part of the upper lip), EYE WIDTH (average width of the eyes), NOSE LENGTH (length of the nose), NOSE WIDTH (width of the nose), MOUTH HEIGHT (distance between the upper and lower portion of the mouth minus its opening), MOUTH WIDTH (width of the mouth), and EAR HEIGHT (the average length of the ears). In addition, three further measurements were made, thereby totalling thirteen measurements, which included the following: NOSE TO MOUTH (distance between the lower portion of the nose and the upper tip of the upper lip), MOUTH TO CHIN (distance between the lower tip of the lower lip to the bottom tip of the chin), and EYE TO SIDE (the average distance between the outer edge of each eye to the side of the face).

Besides the specific facial measurements, Hildebrandt and Fitzgerald's (1979) derived variables were also included in the analysis. The approximate shape of the infant's head was assessed via two combined measures. The relative width of the upper portion of the head was labeled HEAD HIGH and equalled HEAD WIDTH 1 divided by HEAD WIDTH 2; on the other hand, the relative width of the lower portion of the head was labeled HEAD

LOW and equalled HEAD WIDTH 3 divided by HEAD WIDTH 2. In addition, the variable VERTICAL PLACEMENT, which equalled FOREHEAD minus MOUTH HEIGHT, attempted to reflect the vertical placement of the eyes on the face. Moreover, NOSE LENGTH and EAR HEIGHT were combined to form a variable labeled FEATURE LENGTH. Finally, the relative width of the face was approximated by two derived variables: FEATURE WIDTH (which included the summation of the variables EYE WIDTH, NOSE WIDTH, MOUTH WIDTH but did not contain--as in the Hildebrandt and Fitzgerald study--the variables IRIS SIZE and CHEEKS), and WIDTH (the multiplication of the variables FEATURE WIDTH and HEAD LOW).

Multiple analyses of variances, with the three conceptional ages serving as the independent variables and the thirteen facial measurements and the six derived variables (the facial measurements and the derived variables were analyzed separately) serving as the dependent variables, were conducted to determine differences among the three groups. In addition, the following contrasts between age groups were performed: premature infants versus full-term infants, and YPTs versus OPTs.

RESULTS

Reliability of Facial Measures

At least two calculations, conducted at separate times, were made of all measurements. Moreover, facial features were recalculated a third time for all measurements in which a test-retest reliability score fell below 0.90 (measurements for 4 infants were recalculated an extra time due to a change in the uppermost feature, which was from the top of the head to the hairline--and thus the first calculations were disregarded). The average value was employed in the final analyses. The overall test-retest reliability score was 0.96, ranging from 0.91 to 0.98 for each infant, and from 0.67 to 1.00 for each specific facial measurement; only 5 percent of the features had to be analyzed a third time and none of them were the critical features (there were 28 instances in which there was a third calculation, the following provides a list of the variables and their respective number of extra calculations: 7 for MOUTH HEIGHT, 6 for MOUTH TO CHIN, 5 for NOSE TO MOUTH, 3 for EYE TO SIDE, 3 for MOUTH WIDTH, 2 for NOSE WIDTH, and 2 for EYE HEIGHT).

<u>The Proportional Sizes of the Facial Features</u>

For nine of the thirteen measurements, the full-term infants possessed proportionally larger features than did the premature infants (see Table 1). Moreover, a linear progression was found for seven of the thirteen features. Specifically, the head and eye measurements discriminated the most between the three groups. For example, the means for the forehead measured (in terms of centimeters when the distance from the bottom of the chin to the hairline was 400 centimeters) 186.4 for YPTs, 198.5 for OPTs, and 212.1 for FTs. Furthermore, the respective mean values for: HEAD WIDTH 1 were 256.3, 292.5, and 308.3; HEAD WIDTH 2 were 281.7, 301.5, and 321.7; HEAD WIDTH 3 were 268.4, 282.3, and 306.5; and EYE WIDTH were 70.1, 73.4, and 82.0. Thus, full-term infants possessed much proportionally wider heads at all three tested levels, accompanied by proportionally larger foreheads and wider eyes, than did premature infants.

The multiple analyses of variances, for the thirteen measurements, indicated a main effect for conceptional age (see Table 2). A significant main effect was found in the contrast between premature and full-term infants, (F (13,11)=2.46, p <.05, L = .235),

TABLE 1

Means and Standard Deviations for the 13 Measurements

Facial Measurements	YPTs Means	YPTs S.D.	OPTs Means	OPTs S.D.	FTs Means	FTs S.D.
Forehead	186.4	(14.9)	198.5	(18.3)	212.1	(20.8)
Head Width 1	256.3	(31.2)	292.5	(25.3)	308.3	(20.1)
Head Width 2	281.7	(12.2)	301.5	(34.0)	321.7	(28.5)
Head Width 3	268.4	(32.2)	282.3	(36.3)	306.5	(42.1)
Eye Width	70.1	(08.1)	73.4	(12.7)	82.0	(11.4)
Nose Length	64.2	(08.0)	67.9	(07.3)	69.0	(07.2)
Nose Width	80.4	(08.1)	84.7	(09.1)	81.4	(09.3)
Mouth Height	35.9	(1[illegible].2)	30.0	(05.4)	36.6	(09.0)
Mouth Width	104.8	(11.0)	102.3	(18.8)	105.7	(13.1)
Ear Height	107.4	(14.7)	114.4	(13.9)	109.8	(14.4)
Nose to Mouth	28.1	(04.5)	27.9	(06.8)	23.8	(06.4)
Mouth to Chin	49.3	(13.9)	56.3	(18.4)	52.6	(17.0)
Eye to Side	37.4	(03.3)	41.8	(07.9)	43.1	(08.7)

Means are the number of centimeters when the distance from the bottom of the chin to the hairline was 400 cms.

and a trend was found in the contrast between the two premature infant groups, (F (13,11)=2.46, $p < .10$, L = .256). Sex of the infant did not have an appreciative effect, nor did the interactions between gender and conceptional age (although a trend occurred in the interaction between gender and conceptional age).

Table 3 to Table 15 depict the analyses of variances for each of the thirteen measurements. As suggested by the relatively large discriminatory means, significant results were found for the head and eye measures. For example, the contrast of premature infants against full-term infants yielded five significant main effects--for the variables: FOREHEAD (F (1,23) = 7.65, $p < .01$), HEAD WIDTH 1 (F (1,23) = 12.56, $p < .01$), HEAD WIDTH 2 (F (1,23) = 7.62, $p < .01$), HEAD WIDTH 3 (F (1,23) = 4.11, $p < .05$), and EYE WIDTH (F (1,23) = 5.26, $p < .05$). See Table 3 to Table 7 for these results. In addition, the contrast between YPTs and OPTs yielded only one significant result--that of HEAD WIDTH 1, F (1,23) = 10.81, $p < .01$. All other results were insignificant (see Table 3 to Table 15).

In addition, univariate analyses, with sex and the interactions between sex and conceptional age included with the error term, were conducted for each of the

TABLE 2

Overall ANOVA Table for the Thirteen Measurements

Source	Lambda	F Value	DF(H)	DF(E)	Sig.
Conceptional Age					
Term	.235	2.76	13	11	.050 *
YPTs vs. OPTs	.256	2.46	13	11	.071
Sex	.390	1.32	13	11	.325
Age by Sex					
Sex by Term	.263	2.37	13	11	.080
Sex by YPTs vs. OPTs	.749	0.28	13	11	.983

* $\underline{p} < .05$

** $\underline{p} < .01$

TABLE 3

ANOVA Table for the variable FOREHEAD

Source	M.S.	Value of F	Sig. of F
Conceptional Age	3308.50		
Term	2563.21	7.65	.011 **
YPTs vs. OPTs	735.29	2.19	.153
Sex	860.67	2.56	.123
Age by Sex	62.37		
Sex by Term	4.72	0.01	.907
Sex by YPTs vs. OPTs	57.65	0.17	.683
Error	336.30		

* $p < .05$

** $p < .01$

TABLE 4

ANOVA Table for the variable HEAD WIDTH 1

Source	M.S.	Value of F	Sig. of F
Conceptional Age	14733.39		
Term	7920.20	12.56	.002 **
YPTs vs. OPTs	6813.19	10.81	.003 **
Sex	1325.19	2.10	.161
Age by Sex	1547.51		
Sex by Term	696.20	1.10	.304
Sex by YPTs vs. OPTs	851.31	1.35	.257
Error	630.53		

* $\underline{p} < .05$

** $\underline{p} < .01$

TABLE 5

ANOVA Table for the variable HEAD WIDTH 2

Source	M.S.	Value of F	Sig. of F
Conceptional Age	8081.92		
Term	6080.08	7.62	.011 **
YPTs vs. OPTs	2001.84	2.51	.127
Sex	59.86	0.07	.787
Age by Sex	117.65		
Sex by Term	19.15	0.02	.878
Sex by YPTs vs. OPTs	98.50	0.07	.798
Error	797.93		

* $\underline{p} < .05$

** $\underline{p} < .01$

TABLE 6

ANOVA Table for the variable HEAD WIDTH 3

Source	M.S.	Value of F	Sig. of F
Conceptional Age	6766.79		
Term	6040.29	4.11	.054 *
YPTs vs. OPTs	726.50	0.50	.489
Sex	889.78	0.61	.444
Age by Sex	1585.08		
Sex by Term	1486.58	1.01	.325
Sex by YPTs vs. OPTs	98.50	0.07	.798
Error	1467.13		

* $p < .05$

** $p < .01$

TABLE 7

ANOVA Table for the variable EYE WIDTH

Source	M.S.	Value of F	Sig. of F
Conceptional Age	754.72		
Term	697.89	5.26	.031 *
YPTs vs. OPTs	56.83	0.43	.519
Sex	19.60	0.15	.704
Age by Sex	86.92		
Sex by Term	36.45	0.27	.605
Sex by YPTs vs. OPTs	50.47	0.38	.544
Error	132.75		

* $p < .05$

** $p < .01$

TABLE 8

ANOVA Table for the variable NOSE LENGTH

Source	M.S.	Value of F	Sig. of F
Conceptional Age	111.98		
Term	53.51	0.94	.343
YPTs vs. OPTs	58.47	1.03	.322
Sex	110.45	1.94	.177
Age by Sex	25.89		
Sex by Term	8.45	0.14	.704
Sex by YPTs vs. OPTs	17.44	0.31	.585
Error	56.97		

* $p < .05$

** $p < .01$

TABLE 9

ANOVA Table for the variable NOSE WIDTH

Source	M.S.	Value of F	Sig. of F
Conceptional Age	101.61		
Term	7.37	0.09	.768
YPTs vs. OPTs	94.24	1.14	.297
Sex	3.70	0.04	.834
Age by Sex	146.60		
Sex by Term	146.57	1.77	.196
Sex by YPTs vs. OPTs	0.03	0.00	.986
Error	82.59		

* $p < .05$

** $p < .01$

TABLE 10

ANOVA Table for the variable MOUTH HEIGHT

Source	M.S.	Value of F	Sig. of F
Conceptional Age	252.42		
Term	85.82	1.13	.299
YPTs vs. OPTs	166.60	2.20	.152
Sex	0.97	0.01	.911
Age by Sex	79.93		
Sex by Term	70.04	0.92	.347
Sex by YPTs vs. OPTs	9.89	0.13	.721
Error	75.85		

* $p < .05$

** $p < .01$

TABLE 11

ANOVA Table for the variable MOUTH WIDTH

Source	M.S.	Value of F	Sig. of F
Conceptional Age	59.60		
Term	30.19	0.13	.724
YPTs vs. OPTs	29.41	0.12	.728
Sex	12.80	0.05	.818
Age by Sex	236.67		
Sex by Term	215.92	0.91	.350
Sex by YPTs vs. OPTs	20.75	0.09	.770
Error	236.78		

* $p < .05$

** $p < .01$

TABLE 12

ANOVA Table for the variable EAR HEIGHT

Source	M.S.	Value of F	Sig. of F
Conceptional Age	200.51		
Term	13.73	0.07	.796
YPTs vs. OPTs	186.78	0.93	.346
Sex	76.83	0.38	.543
Age by Sex	628.90		
Sex by Term	608.15	3.02	.096
Sex by YPTs vs. OPTs	20.75	0.10	.751
Error	201.56		

* p < .05

** p < .01

TABLE 13

ANOVA Table for the variable NOSE TO MOUTH

Source	M.S.	Value of F	Sig. of F
Conceptional Age	116.13		
Term	115.89	3.20	.087
YPTs vs. OPTs	0.24	0.01	.936
Sex	62.66	1.73	.201
Age by Sex	50.75		
Sex by Term	3.32	0.09	.765
Sex by YPTs vs. OPTs	47.43	1.31	.264
Error	36.19		

* $p < .05$

** $p < .01$

TABLE 14

ANOVA Table for the variable MOUTH TO CHIN

Source	M.S.	Value of F	Sig. of F
Conceptional Age	179.19		
Term	2.65	0.01	.921
YPTs vs. OPTs	176.54	0.68	.419
Sex	786.26	3.01	.096
Age by Sex	407.25		
Sex by Term	130.05	0.50	.488
Sex by YPTs vs. OPTs	277.20	1.06	.314
Error	261.22		

* $p < .05$

** $p < .01$

TABLE 15

ANOVA Table for the variable EYE TO SIDE

Source	M.S.	Value of F	Sig. of F
Conceptional Age	184.22		
Term	84.64	1.59	.220
YPTs vs. OPTs	99.58	1.87	.185
Sex	5.41	0.10	.753
Age by Sex	99.01		
Sex by Term	94.30	1.77	.197
Sex by YPTs vs. OPTs	4.71	0.09	.769
Error	53.36		

* $p < .05$

** $p < .01$

thirteen measurements. As can be seen from Table 16 and corresponding to previous results, the variables FOREHEAD, HEAD WIDTH 1, and HEAD WIDTH 2 significantly discriminated among the three groups. Whereas the variables HEAD WIDTH 3 and EYE WIDTH discriminated among the three groups beforehand, they only exhibited a trend toward differentiating the groups when sex and its subsequent interactions were included in the error term.

A test of discriminability among the three groups was conducted. One set of function weights significantly discriminated among the three groups, ($\underline{L}$ (26) = .132, $\underline{p}$ < .05), and after this function was partialled out, the second function did not successfully make the discrimination, ($\underline{L}$ (12) = .53, $\underline{p}$ = .40)--thereby showing that only the first set of weights clearly differentiated the groups; the canonical correlation between conceptional age and the thirteen dependent variables was 0.867 (see Table 17). These function weights were presented in Table 18, along with the group means, or centroids (see Table 19), in which 89.6 percent of the infants were correctly classified according to their respective group based on these function weights (see Table 20).

Accordingly, due to large intercorrelations among

TABLE 16

Univariate ANOVA--Using the Three Age Groups

Variable	Value of F	Significance of F
FOREHEAD	4.69	.018 *
HEAD WIDTH 1	10.07	.000 **
HEAD WIDTH 2	5.22	.012 **
HEAD WIDTH 3	2.56	.097
EYE WIDTH	2.99	.068
NOSE LENGTH	1.05	.365
NOSE WIDTH	0.61	.545
MOUTH HEIGHT	1.85	.178
MOUTH WIDTH	0.14	.870
EAR HEIGHT	0.59	.563
NOSE TO MOUTH	1.58	.225
MOUTH TO CHIN	0.42	.663
EYE TO SIDE	1.60	.220

* $p < .05$

** $p < .01$

TABLE 17

Test of Discriminability for the Three Groups

Function	Eigenvalue	Percent of Variance	Cumulative Percent	Canonical Correlation
1	3.03	77.57	77.57	0.867
2	0.88	22.43	100.00	0.683

After Function	Wilks' Lambda	Chi-Squared	Degrees of Freedom	Significance
0	0.13	40.45	26	.035 *
1	0.53	12.58	12	.400

* $\underline{p} < .05$

** $\underline{p} < .01$

TABLE 18

Standardized Discriminant Weights for the 3 Groups

Variables	Function Weights
FOREHEAD	0.692
HEAD WIDTH 1	-1.339
HEAD WIDTH 2	0.646
HEAD WIDTH 3	-1.398
EYE WIDTH	-1.031
NOSE LENGTH	0.159
NOSE WIDTH	1.144
MOUTH HEIGHT	1.151
MOUTH WIDTH	0.483
EAR HEIGHT	0.079
NOSE TO MOUTH	1.040
MOUTH TO CHIN	0.227
EYE TO SIDE	-0.543

TAPLE 19

Three Group Centroid Weights

Group	Group Function Weight
1	2.190
2	-0.086
3	-1.885

TABLE 20

N. of Infants Correctly Classified According to Weights

Actual Group	Number of Cases	Predicted Group Membership 1	2	3
Group 1	09	8	1	0
		88.9%	11.1%	0.0%
Group 2	10	0	10	0
		0.0%	100.0%	0.0%
Group 3	10	0	2	8
		0.0%	20.0%	80.0%

Percent of "Grouped" Cases Correctly Classified: 89.66%

many of the variables, and in the context of the other variables, the following variables were positively related to infants being classified as YPTs: FOREHEAD, HEAD WIDTH 2, NOSE WIDTH, MOUTH HEIGHT, and NOSE TO MOUTH. In addition, the variables NOSE LENGTH, MOUTH WIDTH, EAR HEIGHT, and MOUTH TO CHIN were highly related to the classification of OPTs. Moreover, the following variables were positively related to the classification of FTs: HEAD WIDTH 1, HEAD WIDTH 3, EYE WIDTH, EYE TO SIDE. Although the aforementioned results (from Table 1, Table 3, and Table 5) showed that full-term infants possessed significantly larger values for the variables FOREHEAD and HEAD WIDTH 2, these results demonstrated that, in the context of all of the other variables, a large measurement of these two variables was positively associated with the classification of YPTs and not FTs.

To further investigate this issue, a factor analysis was conducted. Not surprisingly, the variables FOREHEAD and HEAD WIDTH 2 possessed the largest amount of communality with the other measures (see Table 21). For instance, 87 percent of the variance of the variable FOREHEAD was explained by the presence of the other measurements. Thus, these large intercorrelations probably accounted for most of the positive relationship between FTs and large values for these two variables.

Therefore, the remaining variance might be inversely related between large values of these two variables and the classification of infants as YPTs.

Furthermore, four factors emerged (see Table 22). The first factor, accounting for nearly 50 percent of the variance, consisted mostly of variables expressing width, and included the following variables: HEAD WIDTH 1, HEAD WIDTH 2, HEAD WIDTH 3, EYE WIDTH, NOSE LENGTH, NOSE WIDTH, MOUTH WIDTH, and EYE TO SIDE. The variables FOREHEAD and NOSE TO MOUTH comprised the second factor. Moreover, the third factor constituted a mixture of horizontal and vertical variables, and included the following: EYE WIDTH, EAR HEIGHT, NOSE TO MOUTH, MOUTH TO CHIN, and EYE TO SIDE. MOUTH HEIGHT comprised the fourth factor. See Table 22 also for the specific weights.

In addition, a varimax rotated factor analysis was also conducted. Again, four factors emerged (see Table 23). Most of the width variables formed the first factor: HEAD WIDTH 1, HEAD WIDTH 2, HEAD WIDTH 3, EYE WIDTH, NOSE LENGTH, NOSE WIDTH, and MOUTH WIDTH. The other width variable, EYE TO SIDE, along with the variables EAR HEIGHT and MOUTH TO CHIN, comprised the second factor. As beforehand, the variables FOREHEAD and NOSE TO MOUTH

TABLE 21

Intercorrelations with all of the Other Variables

Variable	Estimated Intercorrelations (Squared) with all of the Other Variables Combined
FOREHEAD	0.867
HEAD WIDTH 1	0.747
HEAD WIDTH 2	0.880
HEAD WIDTH 3	0.851
EYE WIDTH	0.753
NOSE LENGTH	0.714
NOSE WIDTH	0.729
MOUTH HEIGHT	0.729
MOUTH WIDTH	0.446
EAR HEIGHT	0.410
NOSE TO MOUTH	0.773
MOUTH TO CHIN	0.554
EYE TO SIDE	0.558

TABLE 22

The Four Significant Factors and their Weights

Variable	Factor 1	Factor 2	Factor 3	Factor 4
FOREHEAD	-0.17	0.93	0.26	0.18
HEAD WIDTH 1	0.64	0.40	0.02	0.20
HEAD WIDTH 2	0.91	0.23	0.21	0.04
HEAD WIDTH 3	0.87	-0.04	0.07	-0.08
EYE WIDTH	0.50	0.35	-0.46	0.16
NOSE LENGTH	0.71	-0.05	-0.36	0.00
NOSE WIDTH	0.66	-0.19	-0.08	0.21
MOUTH HEIGHT	0.33	0.17	-0.42	-0.70
MOUTH WIDTH	0.57	-0.23	0.12	0.13
EAR HEIGHT	0.22	-0.27	0.30	-0.14
NOSE TO MOUTH	0.10	-0.51	-0.40	0.31
MOUTH TO CHIN	0.29	-0.34	0.58	0.03
EYE TO SIDE	0.43	0.02	0.43	-0.28

TABLE 23

The Four Rotated Factors and their Weights

Variable	Factor 1	Factor 2	Factor 3	Factor 4
FOREHEAD	0.10	-0.32	-0.91	-0.21
HEAD WIDTH 1	0.73	0.03	-0.26	0.00
HEAD WIDTH 2	0.85	0.40	-0.20	0.09
HEAD WIDTH 3	0.72	0.43	0.08	0.22
EYE WIDTH	0.67	-0.35	0.00	0.18
NOSE LENGTH	0.68	0.02	0.29	0.29
NOSE WIDTH	0.62	0.21	0.29	-0.03
MOUTH HEIGHT	0.19	-0.05	-0.02	0.87
MOUTH WIDTH	0.47	0.37	0.22	-0.07
EAR HEIGHT	0.03	0.47	0.09	0.03
NOSE TO MOUTH	0.13	-0.14	0.68	-0.15
MOUTH TO CHIN	0.08	0.69	0.05	-0.23
EYE TO SIDE	0.23	0.57	-0.22	0.17

constituted another factor, this time the third one. Once again, the variable MOUTH HEIGHT clearly established a separate, the fourth, factor.

Moreover, both premature groups were combined, and a test of discriminability was made between the premature and full-term infants. First, the univariate analysis of variance, with sex and its interactions included in the error term, exhibited five features which reliably differentiated the two groups, including the following: FOREHEAD, HEAD WIDTH 1, HEAD WIDTH 2, HEAD WIDTH 3, and EYE WIDTH (see Table 24). These results corroborated those found in Table 3 to Table 7.

The one function significantly discriminated between the two groups ($\underline{L}$ (13) = .337, $\underline{p}$ < .05) and the canonical correlation between conceptional age and the thirteen dependent variables was 0.81 (which was slightly lower than in the first discriminant analysis)--see Table 25. The group centroids clearly distinguished between the two groups (see Table 26), in which 96.55 percent of the infants were correctly classified based on the function weights (see Table 27)--a better predicter than beforehand. The function weights (see Table 28) exhibited a pattern similar to the previous discrimination test. Specifically, the variables

TABLE 24

Univariate ANOVA--Combining YPTs and OPTs

Variables	Value of F	Significance of F
FOREHEAD	7.04	.013 **
HEAD WIDTH 1	8.21	.008 **
HEAD WIDTH 2	7.46	.011 **
HEAD WIDTH 3	4.52	.043 *
EYE WIDTH	5.68	.024 *
NOSE LENGTH	0.94	.340
NOSE WIDTH	0.14	.715
MOUTH HEIGHT	1.29	.266
MOUTH WIDTH	0.15	.700
EAR HEIGHT	0.05	.817
NOSE TO MOUTH	3.28	.081
MOUTH TO CHIN	0.00	.951
EYE TO SIDE	1.41	.245

* $p < .05$

** $p < .01$

FOREHEAD, HEAD WIDTH 2, NOSE LENGTH, MOUTH HEIGHT, EAR HEIGHT, and NOSE TO MOUTH were positively related, the variables HEAD WIDTH 1, HEAD WIDTH 3, EYE WIDTH, and EYE TO SIDE were negatively related, and the variables MOUTH WIDTH and MOUTH TO CHIN were insignificantly related to the classification of infants as premature.

Inspecting the six derived variables, adopted from Hildebrandt and Fitzgerald (1979), overall multiple analysis of variance indicated no significant main effects or interactions (see Table 29). Furthermore, none of the six derived variables were individually significant (although three trends appeared--see Table 30 to Table 35).

TABLE 25

Test of Discriminability for the Two Groups

Function	Eigenvalue	Percent of Variance	Cumulative Percent	Canonical Correlation
1	1.97	100.00	100.00	0.814

After Function	Wilks' Lambda	Chi-Squared	Degrees of Freedom	Significance
0	0.34	22.30	13	.050 *

* $p < .05$

** $p < .01$

TABLE 26

Two Group Centroid Weights

Group	Group Function Weight
1 & 2	0.982
3	-1.866

TABLE 27

N. of Infants Correctly Classified According to Weights

Actual Group	Number of Cases	Predicted Group Membership 1 & 2	3
Groups 1 & 2	19	19	0
		100.0%	0.0%
Group 3	10	1	9
		10.0%	90.0%

Percent of "Grouped" Cases Correctly Classified: 96.55%

TABLE 28

Standardized Discriminant Weights for the 2 Groups

Variables	Function Weights
FOREHEAD	0.938
HEAD WIDTH 1	-1.023
HEAD WIDTH 2	0.403
HEAD WIDTH 3	-1.548
EYE WIDTH	-1.225
NOSE LENGTH	0.535
NOSE WIDTH	1.616
MOUTH HEIGHT	0.710
MOUTH WIDTH	0.055
EAR HEIGHT	0.543
NOSE TO MOUTH	1.113
MOUTH TO CHIN	0.121
EYE TO SIDE	-0.283

TABLE 29

Overall ANOVA Table for the Six Derived Measures

Sources	Lambda	F Value	DF(H)	DF(E)	Sig.
Age					
Term	.716	1.19	6	18	.354
YPTs vs. OPTs	.608	1.93	6	18	.130
Sex	.652	1.60	6	18	.203
Age by Sex					
Sex by Term	.618	1.85	6	18	.145
Sex by YPTs vs. OPTs	.702	1.27	6	18	.319

* $p < .05$

** $p < .01$

TABLE 30

ANOVA Table for the variable HEAD HIGH

Source	M.S.	Value of F	Sig.
Conceptional Age	.026		
Term	.003	0.43	.520
YPTs vs. OPTs	.023	3.11	.091
Sex	.011	1.51	.231
Age by Sex	.008		
Sex by Term	.008	1.02	.323
Sex by YPTs vs. OPTs	.007	0.10	.753
Error	.007		

* $p < .05$

** $p < .01$

TABLE 31

ANOVA Table for the variable HEAD LOW

Source	M.S.	Value of F	Sig.
Conceptional Age	.003		
Term	.000	0.01	.918
YPTs vs. OPTs	.003	0.59	.449
Sex	.019	3.50	.074
Age by Sex	.037		
Sex by Term	.024	4.44	.046 *
Sex by YPTs vs. OPTs	.013	2.50	.127
Error	.005		

* $p < .05$

** $p < .01$

TABLE 32

ANOVA Table for the variable VERTICAL PLACEMENT

Source	M.S.	Value of F	Sig.
Conceptional Age	3321.08		
Term	1719.19	3.47	.075
YPTs vs. OPTs	1601.89	3.23	.085
Sex	919.37	1.85	.186
Age by Sex	226.43		
Sex by Term	111.12	0.22	.640
Sex by YPTs vs. OPTs	115.31	0.23	.634
Error	495.77		

* $p < .05$

** $p < .01$

TABLE 33

ANOVA Table for the variable FEATURE LENGTH

Source	M.S.	Value of F	Sig.
Conceptional Age	467.29		
Term	13.03	0.05	.823
YPTs vs. OPTs	454.26	1.98	.195
Sex	371.52	1.46	.239
Age by Sex	760.11		
Sex by Term	759.97	2.99	.097
Sex by YPTs vs. OPTs	0.14	0.00	.981
Error	254.59		

* $\underline{p} < .05$

** $\underline{p} < .01$

TABLE 34

ANOVA Table for the variable FEATURE WIDTH

Source	M.S.	Value of F	Sig.
Conceptional Age	992.22		
Term	852.44	1.17	.291
YPTs vs. OPTs	139.78	0.19	.666
Sex	98.57	0.13	.716
Age by Sex	214.17		
Sex by Term	74.39	0.10	.752
Sex by YPTs vs. OPTs	139.78	0.19	.666
Error	729.02		

* $p < .05$

** $p < .01$

TABLE 35

ANOVA Table for the variable WIDTH

Source	M.S.	Value of F	Sig.
Conceptional Age	852.01		
Term	827.90	0.62	.439
YPTs vs. OPTs	24.11	0.02	.894
Sex	559.36	0.42	.524
Age by Sex	2296.84		
Sex by Term	2014.74	1.51	.232
Sex by YPTs vs. OPTs	282.10	0.21	.650
Error			

* $p < .05$

** $p < .01$

DISCUSSION

The results indicated that the faces of premature infants are proportionally different than those of full-term infants. More specifically, premature infants had significantly smaller facial features than did full-term infants for the following features: size of the forehead, the width of the head at all three tested points, and the width of the eyes. Except for one variable (HEAD WIDTH 1), YPTs did not reliably possess smaller features than did OPTs.

These results were in the anticipated direction. It was predicted, and subsequently found, that premature infants would possess a proportionally smaller forehead, corroborating earlier research (Hildebrandt & Fitzgerald, 1979; Sternglanz et al., 1977). However, the size of the forehead was inversely related to the classification of full-term infants. For example, suppose that, given the facial features of an infant except for the upper portion of the head, people could accurately predict the size of the forehead. Moreover, being provided the conceptional age of the infant would further enhance the predictability. These results indicate that when the facial features (minus the forehead) of a full-term infant would be shown, people would provide a smaller forehead than they would when just given the other facial features and not the conceptional age. In contrast, when the facial features of a premature infant would be be provided, people would suggest a larger forehead than they would just knowing the other facial characteristics.

Instead of possessing a relatively wide head only at the upper portion of the head, as was predicted, full-term infants had a significantly wider head at all three tested points. This means that, relative to premature infants, full-term infants possessed a much wider, rounder head. Moreover, the variable HEAD WIDTH 2 exhibited the same inverse relation of value and the classification of infants as full-term as did the variable FOREHEAD.

These results generally are in concordance with other studies which have analyzed the relationship between eye shape and perceived attractiveness. Hildebrandt and Fitzgerald (1979) found that while the size of the pupil correlated positively with perceived cuteness, the width of the eyes was somewhat negatively correlated with judged attractiveness. On the other hand, other studies (Brooks & Hochberg, 1960; Sternglanz et al., 1977) found large eyes to be positively related with perceived cuteness. The size of the eyes, especially that of the pupil, seems to be positively related with perceived attractiveness. Since most infants in this study did not open their eyes--unlike the infants in Hildebrandt and Fitzgerald's study--width was the only measure of the relative size of the eyes. Hence, this result, that FTs had the largest eyes, is consistent with previous findings.

While the facial measurements differed for the groups, the derived variables, taken from Hildebrandt and Fitzgerald (1979), did not differentiate among the three groups, or between premature and full-term infants. However, a linear trend was found for the derived variable VERTICAL PLACEMENT, which assessed the vertical placement of the eyes on the face, and this result was due mostly to the significant different sizes of the forehead. The lack of significant results for the derived variables may have occurred because Hildebrandt and Fitzgerald (1979) utilized these variables based on their data and their derivations may not have been appropriate for the data in the present study.

On the whole, premature infants, besides their smaller size, appear proportionally different than full-term infants (at least with respect to facial characteristics), Not only do premature infants appear differently, but previous studies (Nagy, et al., 1983; Frodi, Lamb, Leavitt, Donovan, Neff & Sherry, 1978) suggest that they are perceived by adults to be less attractive than are full-term infants.

CHAPTER III

EXPERIMENT 2

As full-term infants tend to possess the critical attractive features (large forehead and eyes) to a greater degree than premature infants, a composite drawing of full-term infant facial features should be rated as more attractive than a composite drawing of a premature infant. More specifically, subjects should evaluate the composite drawing of full-term facial features more favorably (including perceptions, attributions, and behavioral inclinations) than a composite drawing of premature facial features. In addition, a composite drawing of the facial features of a premature infant with a conceptional age between 35 and 37 weeks should evoke more favorable responses than should a composite drawing of the facial features of a premature infant with a conceptional age between 31 and 34 weeks. Thus, conceptional age is predicted to affect perceived attractiveness.

METHOD

Subjects

Thirty-three college students from Loyola University of Chicago (15 males, 18 females and ranging in age from 19 to 30) partook in the second experiment--the pilot study.

Procedure

All subjects were handed the series of 30 pilot questions and the three composite drawings, which represented the typical infant facial features for each of the three conceptional ages. The purpose and instructions were provided both orally and in written form (on the questionnaire) to the subjects. The instructions consisted of the following:

> Attached you will find line drawings of three infants, labeled C, M, and R. Below you will find a comparison chart of antonyms. Please place the three labels (C, M, and R) at the point between the two antonyms which you think best describes each drawing. Ties are allowed, such that two or three labels may be placed at the same location. There are no right or wrong answers. Please do not put your name on the sheet, so that your answers will remain anonymous. This task should take from five to ten minutes. You may discontinue at any time. Your responses will increase scientific knowledge and your cooperation is greatly appreciated.
>
> As an example, if you think that C is very fat, M is neither fat nor skinny, and R is extremely skinny,

then mark in the following manner:

```
FAT    :    : C :    : M :    :    : R :    SKINNY
    --- --- --- --- --- --- ---
```

On the other hand, if you think that R is extremely fat, and both C and M are moderately skinny, then mark in the following fashion:

```
                              C
FAT    : R :    :    :    : M :    :    :    SKINNY
    --- --- --- --- --- --- ---
```

The subjects were also instructed to view the three drawings (see Figures 2, 3, and 4 for the composite drawings, which are slightly smaller than those seen by the subjects) in the same order as they were given. There were six possible orders, accounting for all possible combinations (C,M,R; C,R,M; M,C,R; M,R,C; R,C,M; and R,M,C). When judging the drawings, subjects spread out the drawings in front of them, so that comparative ratings could be made (the drawing of the YPTs was labeled C, the OPTs was M, and the FTs was R).

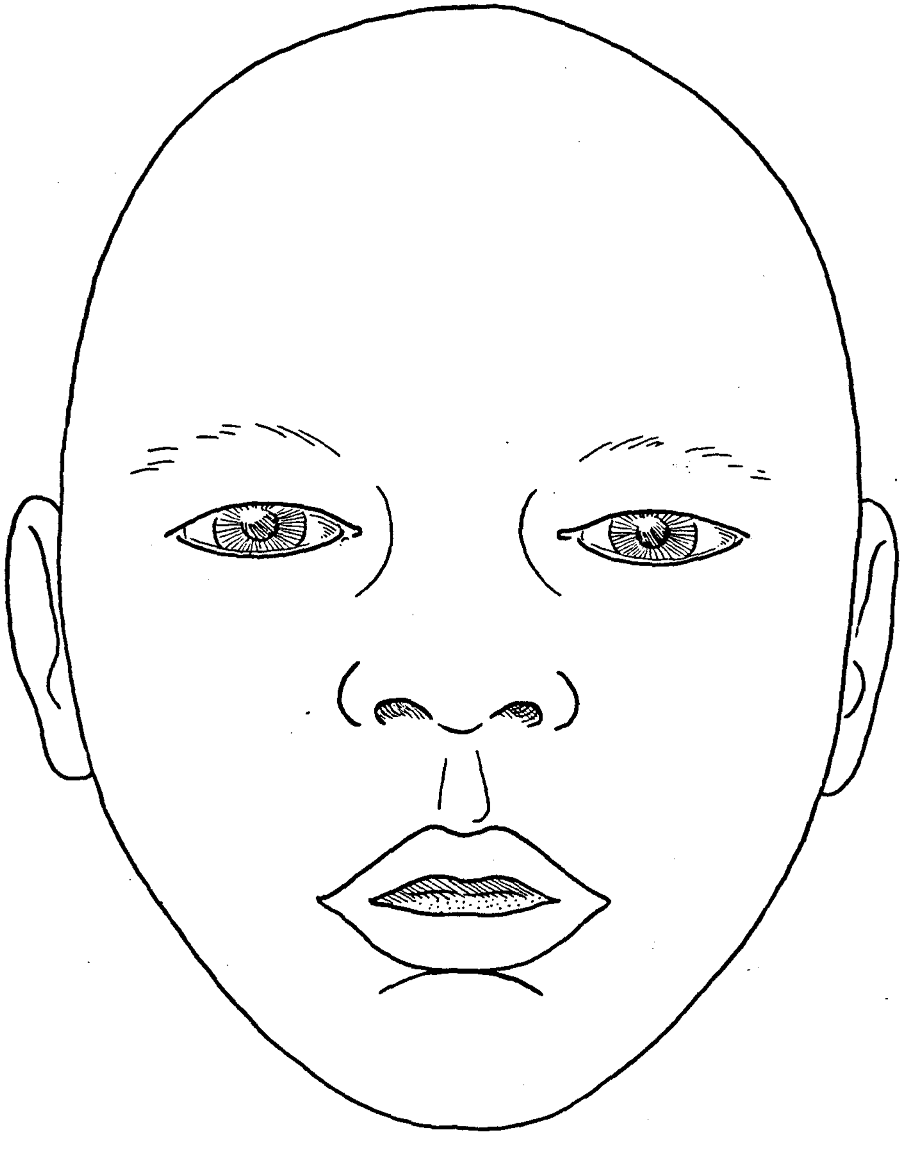

Figure 2. Composite drawing of infants conceptionally aged between 31-34 weeks.

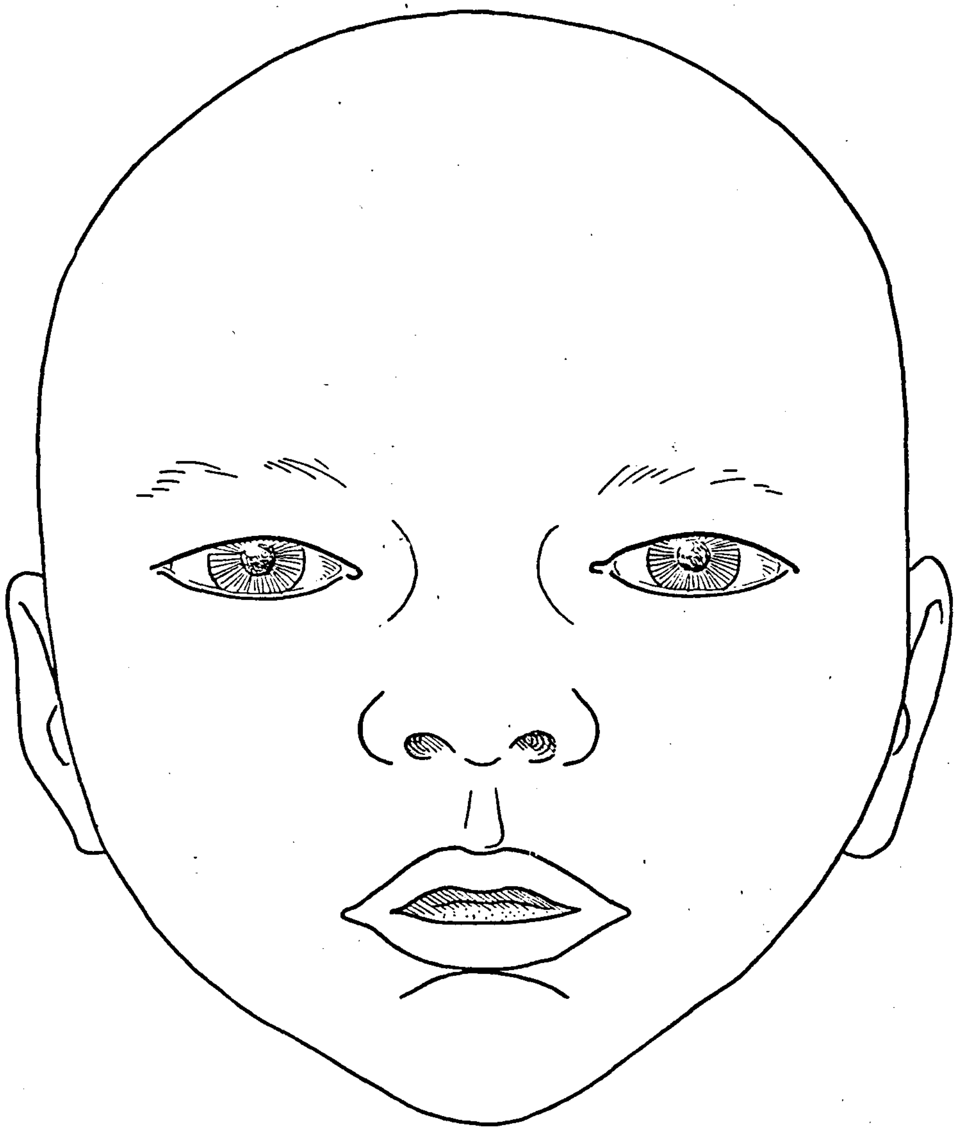

Figure 3. Composite drawing of infants conceptionally aged between 35-37 weeks.

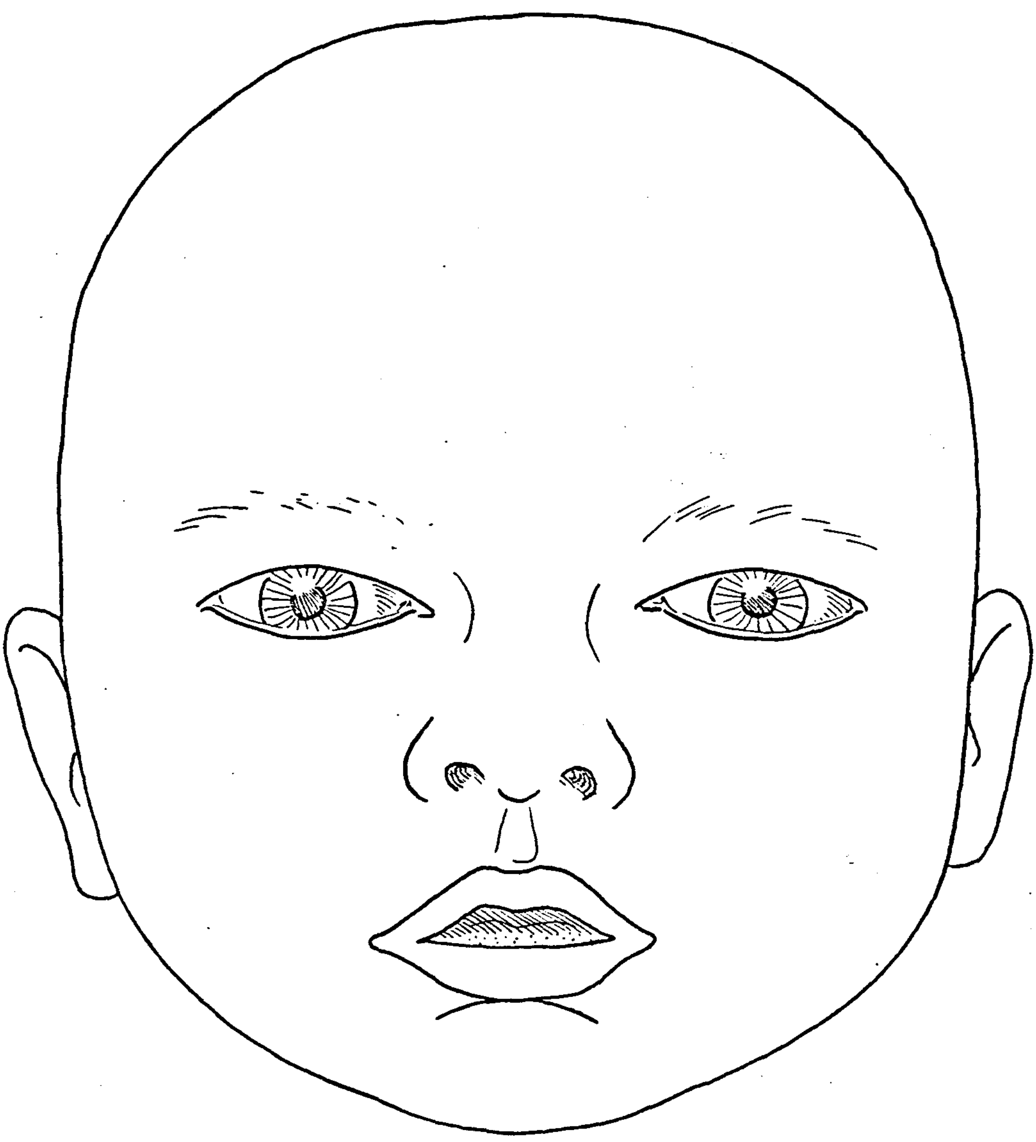

Figure 4. Composite drawing of infants conceptionally aged 40 weeks.

RESULTS AND DISCUSSION

The 30 questions were categorized into 3 apriori scales, 11 items measuring an overall evaluation (i.e., likeable--unlikeable and labeled EVAL), 10 items measuring a functional evaluation (i.e., would sleep well--would sleep poorly and labeled FUNCT), and 9 items measuring a behavioral inclination (i.e., would like to take home--would not like to take home and labeled BEH). The items are listed in Table 36. Based on their ability to discriminate among the three drawings (see Table 37) and their high reliability (listed in Table 38), four items from each scale were chosen for the third study.

Except for two items (EVAL11--would be active or passive and FUNCT10--would or would not be fussy), the ratings were in the predicted direction: that the drawing of the full-term infants received the most favorable marks and that the drawing of the two month premature infant elicited the least favorable scores. The 13 items chosen for Experiment 3 discriminated among the three drawings to a greater extent than did the other items. For example, the three scores (based on a seven point scale with the higher values indicating the more favorable response) for EVAL1--likeable or unlikeable--was 2.61 for the drawing of the YPTs, 4.92 for the drawing of the OPTs, and 5.91 for the drawing of the FTs, while the respective values for the unchosen EVAL6--good or bad--was 3.76, 4.76, and 5.12.

Moreover, the four chosen items within each scale all intercorrelated highly with each other, whereas the unchosen items often did not correlate as highly. In addition, one item (FUNCT2: would eat well--would eat poorly) was included for the third study due to its high discriminability. This was so even though it did not correlate highly with either of the three scales (it was later included in the EVAL scale for determination of the reliability alphas after the reduction in the number of items from 30 to 13).

TABLE 36

List of the Pretest Items

Item		Favorable Response	Unfavorable Resp.
EVAL1	*	Likeable	Unlikeable
EVAL2	*	Attractive	Unattractive
EVAL3		Happy	Sad
EVAL4	*	Cute	Ugly
EVAL5	*	Normal	Different
EVAL6		Good	Bad
EVAL7		Warm	Cold
EVAL8		Healthy	Sick
EVAL9		Large	Small
EVAL10		Strong	Weak
EVAL11		Would be active	Would be passive
BEH1	*	Would like to take home	Would not like not take home
BEH2		Would like to play with	Would not like to play with
BEH3	*	Would like to babysit for	Would not like to babysit for
BEH4		Would like to buy toys for	Would not like to buy toys for
BEH5		Would like to hold	Would not like to hold
BEH6		Would like to feed	Would not like to feed

* the items chosen for Experiment 3

List of the Pretest Items (2)

Item		Favorable Response	Unfavorable Response
BEH7		Would like to soothe	Would not like to soothe
BEH8	*	Would want to take care of	Would not want to take care of
BEH9	*	Would want to be close to	Would not want to be close to
FUNCT1		Would sleep well	Would sleep poorly
FUNCT2	*	Would eat well	Would eat poorly
FUNCT3	*	Would cause parents little worry	Would cause parents much worry
FUNCT4		Would not make me angry	Would make me angry
FUNCT5	*	Would not be irritating	Would be irritating
FUNCT6	*	Would be fun to be with	Would not be fun to be with
FUNCT7		Would not cry often	Would cry a lot
FUNCT8	*	Would make me happy	Would not make me happy
FUNCT9		Would cause parents little trouble	Would cause parents much trouble
FUNCT10		Would be fussy	Would not be fussy

* the items chosen for Experiment 3

TABLE 37

Mean values for the 30 items used in Experiment 2

Item	Drawing of YPTs	Drawing of OPTs	Drawing of FTs	
EVAL1	2.61 (1.37)	4.82 (1.49)	5.91 (1.18)	*
EVAL2	2.39 (1.52)	4.24 (1.84)	5.39 (1.58)	*
EVAL3	3.39 (1.50)	4.36 (1.50)	5.12 (1.62)	
EVAL4	2.91 (1.38)	4.61 (1.60)	5.42 (1.68)	*
EVAL5	3.21 (1.92)	4.97 (1.53)	5.61 (1.62)	*
EVAL6	3.76 (1.85)	4.76 (1.23)	5.12 (1.43)	
EVAL7	3.67 (1.63)	4.48 (1.50)	5.36 (1.58)	
EVAL8	3.67 (1.83)	4.64 (1.48)	5.42 (1.60)	
EVAL9	3.79 (2.09)	4.03 (1.59)	5.58 (1.68)	
EVAL10	3.82 (1.81)	3.97 (1.51)	4.61 (1.75)	
EVAL11	4.33 (1.88)	4.24 (1.58)	4.24 (2.15)	
BEH1	2.82 (1.67)	4.45 (1.84)	5.42 (1.64)	*
BEH2	3.64 (2.04)	4.76 (1.66)	5.09 (1.94)	
BEH3	3.30 (1.93)	4.33 (1.95)	5.00 (2.03)	*
BEH4	4.24 (1.90)	5.21 (1.54)	5.45 (1.58)	

Numbers in parentheses () are standard deviations

* indicates the items used in Experiment 3

Based on a 7 point scale with the higher values indicating the more favorable response

Mean values for the 30 items used in Experiment 2 (2)

Item	Drawing of YPTs	Drawing of OPTs	Drawing of FTs	
BEH5	3.84 (2.24)	4.85 (1.84)	5.39 (1.78)	
BEH6	3.61 (2.01)	4.52 (1.79)	4.72 (1.75)	
BEH7	3.73 (1.89)	4.55 (1.50)	5.03 (1.67)	
BEH8	3.52 (2.05)	4.36 (1.83)	4.91 (1.93)	*
BEH9	3.42 (1.87)	4.30 (1.67)	5.06 (1.95)	*
FUNCT1	3.76 (1.75)	4.30 (1.55)	4.39 (2.14)	
FUNCT2	3.61 (1.75)	4.58 (1.49)	6.21 (0.99)	*
FUNCT3	2.76 (1.41)	4.24 (1.48)	5.06 (1.56)	*
FUNCT4	3.55 (1.97)	4.82 (1.57)	5.03 (1.53)	
FUNCT5	3.09 (1.59)	4.36 (1.59)	4.79 (1.47)	*
FUNCT6	3.18 (1.88)	4.27 (1.77)	5.03 (1.94)	*
FUNCT7	3.70 (1.59)	4.09 (1.59)	4.12 (1.67)	
FUNCT8	3.58 (1.79)	4.85 (1.39)	5.36 (1.60)	*
FUNCT9	3.24 (1.71)	4.33 (1.43)	5.00 (1.41)	
FUNCT10	4.03 (1.55)	3.85 (1.58)	4.00 (1.70)	

Numbers in parentheses () are standard deviations

* indicates the items used in Experiment 3

Based on a 7 point scale with the higher values indicating the more favorable response

TABLE 38

Reliability Alphas for Experiments 2 and 3

Term	Scale	Reliability Alphas using all all 30 items	Rel. Alphas for the 13 items in Experiment 2	Rel. A. for Ex. 3
OPTs	EVAL	0.59	0.75	0.81
YPTs	EVAL	0.67	0.83	0.78
FTs	EVAL	0.76	0.76	0.80
OPTs	FUNCT	0.78	0.82	0.69
YPTs	FUNCT	0.70	0.67	0.66
FTs	FUNCT	0.66	0.73	0.71
OPTs	BEH	0.91	0.88	0.77
YPTs	BEH	0.87	0.90	0.76
FTs	BEH	0.88	0.85	0.73

CHAPTER IV

EXPERIMENT 3

METHOD

Subjects

The sample consisted of 148 college students (34 males and 114 females, and ranging in age from 17 to 23) from Loyola University of Chicago. One female student claimed that she could not make any judgments from the drawings and hence her data was disregarded, thereby leaving a total of 147 subjects. All students were completing a requirement for introductory psychology by participating in the study.

Procedure

Subjects, a maximum of six at a time, were seated in a room where they were handed facedown a dark blue posterboard containing the three drawings (see Figures 2, 3, and 4); each board consisted of one of the six possible orderings (C,M,R; C,R,M; M,C,R; M,R,C; R,C,M; and R,M,C). They were then told that the study was designed to measure people's perceptions of infants.

Next, they were asked to read the instructions written at the top of the questionnaire, which was the same set employed for Experiment 2, see Procedure section in Experiment 2. After everyone had finished reading them, and the experimenter was certain that everyone had understood them, then the subjects were allowed to turn over their posterboards and commence rating the drawings. After everybody performed this task, the nature of the experiment was explained, along with a request not to divulge any of the specifics of the study until the entire project had been completed. Sex and order was balanced such that the proportion of females and males that received each of the six combinations of drawings was approximately equal.

The questionnaire consisted of 13 items. Four items measured an overall evaluation, four items a behavioral inclination, and four items a perceived functional evaluation. In addition, one item (EVAL5: would eat well or poorly was included, even though it did not correlate highly with any of the items).

RESULTS

Effect of Term on the Ratings of Attractiveness

Means for the three drawings (see Table 39 for a list of the items and Table 40 for the actual overall means) indicate that for all thirteen items the drawing of the FTs substantially evoked the most positive responses, while the drawing of the YPTs greatly elicited the least favorable responses. Specifically, for eight of the thirteen items (EVAL1, EVAL2, EVAL3, EVAL5, BEH1, BEH3, FUNCT2, and FUNCT4) the difference between the mean for the drawing of the YPTs and that of the FTs was at least two entire points (out of seven); furthermore, the corresponding difference was nearly four points for the perception of eating. Moreover, a wider gap existed between the drawings of the YPTs and OPTs than between the drawings of the OPTs and FTs. For instance, the difference was at least one point for eleven items contrasting the drawings of the YPTs and OPTs, as compared to only three items when differentiating the drawings of the OPTs and FTs. These trends were also evident in the means for the three scales and in the overall means, as the differences among the three drawings was great, and a larger discrepancy existed between the drawings of the YPTs and the OPTs than for those of the OPTs and FTs.

Table 41 provides analysis of variance values for the thirteen individual items, the three scales, and for all thirteen items analyzed together. Term played an extremely important role, as the ANOVA scores were all over 18, with accompanying probability levels well beyond the .001 range. Term played an extraordinary major role for the following variables: EVAL5: would eat well or poorly (F (2,144) = 270.24, p < .001), EVAL3: cute or ugly (F (2,144) = 79.22, p < .001), FUNCT4: would or would not make me happy (F (2,144) = 52.22, p < .001), BEH1: would or would not like to take home (F (2,144) = 52.19, p < .001), and EVAL2: attractive or unattractive (F (2,144) = 51.14, p < .001). Comparing the three scales, the F value was greatest for the evaluative scale, (F (2,144) = 74.00, p < .001), compared to value for the behavioral inclination scale, (F (2,144) = 60.50, p < .001), and for the perceived functional scale, (F (2,144) = 62.86, p < .001). In addition, the overall multiple analyses of variance score for all items combined was extremely large, (F (2,144) = 104.11, p < .001).

TABLE 39

List of the 13 items Used for Experiment 3

Item	Most Favorable Response	Least Favorable Resp.
EVAL1	Likeable	Unlikeable
EVAL2	Attractive	Unattractive
EVAL3	Cute	Ugly
EVAL4	Normal	Different
EVAL5	Would eat well	Would eat poorly
BEH1	Would like to take home	Would not like to take home
BEH2	Would like to babysit for	Would not like to babysit for
BEH3	Would want to be close to	Would not want to be close to
BEH4	Would want to take care of	Would not want to take care of
FUNCT1	Would cause parents little worry	Would cause parents much worry
FUNCT2	Would be fun to be with	Would not be fun to be with
FUNCT3	Would be irritating	Would not be irritating
FUNCT4	Would make me happy	Would not make me happy

TABLE 40

Means for the Three Drawings for Experiment 3

Item	Mean for YPTs	Mean for OPTs	Mean for FTs
EVAL1	3.48 (1.79)	4.61 (1.67)	5.61 (1.65)
EVAL2	2.82 (1.87)	4.38 (1.84)	5.20 (1.93)
EVAL3	3.13 (1.94)	4.80 (1.74)	5.76 (1.57)
EVAL4	3.32 (2.24)	4.76 (1.95)	5.07 (2.07)
EVAL5	2.53 (1.58)	4.67 (1.42)	6.51 (1.02)
BEH1	3.26 (1.93)	4.37 (1.97)	5.49 (1.85)
BEH2	3.41 (1.97)	4.35 (1.87)	5.01 (2.03)
BEH3	3.58 (1.81)	4.78 (1.60)	5.59 (1.61)
BEH4	3.74 (2.00)	4.87 (1.77)	5.33 (1.85)
FUNCT1	3.26 (1.96)	4.22 (1.76)	4.81 (1.95)
FUNCT2	3.73 (1.90)	4.78 (1.66)	5.73 (1.58)
FUNCT3	3.22 (1.88)	4.19 (1.74)	4.93 (1.84)
FUNCT4	3.41 (1.90)	4.85 (1.78)	5.41 (1.63)
EVAL scale	3.20 (1.48)	4.55 (1.31)	5.29 (1.37)
BEH scale	3.50 (1.48)	4.59 (1.39)	5.35 (1.37)
FUNCT scale	3.46 (1.49)	4.61 (1.33)	5.36 (1.35)
All items	3.30 (1.30)	4.59 (1.17)	5.42 (1.10)

Numbers in parentheses () are standard deviations

Based on a 7 point scale with the higher values indicating the more favorable response

TABLE 41

Analysis of Variance Values

	p < .001		
	df = (2,144)	df = (1,145)	df = (2,144)
Item	Effect of Term	Effect of Sex	Term by Sex Inter.
EVAL1	F= 49.45	F= 2.30, p=.131	F=0.61, p=.545
EVAL2	F= 51.14	F= 1.82, p=.180	F=0.58, p=.562
EVAL3	F= 79.22	F=11.58, p=.061	F=0.17, p=.845
EVAL4	F= 28.39	F= 0.10, p=.754	F=1.41, p=.248
EVAL5	F=270.24	F= 0.35, p=.558	F=0.06, p=.945
BEH1	F= 52.19	F= 3.29, p=.072	F=1.89, p=.307
BEH2	F= 22.46	F=20.32, p<.001 **	F=1.83, p=.164
BEH3	F= 48.61	F= 5.30, p=.023 *	F=2.93, p=.056
BEH4	F= 26.35	F= 3.93, p=.049 *	F=1.28, p=.281
FUNCT1	F= 18.65	F= 0.38, p=.538	F=0.79, p=.456
FUNCT2	F= 48.96	F= 4.06, p=.046 *	F=0.73, p=.484
FUNCT3	F= 25.37	F= 6.22, p=.014 **	F=1.60, p=.205
FUNCT4	F= 52.22	F= 1.85, p=.176	F=0.39, p=.675
EVAL Scale	F= 74.00	F= 2.35, p=.127	F=0.99, p=.374
BEH Scale	F= 60.50	F=12.66, p=.001 **	F=2.10, p=.127
FUNCT Sc.	F= 62.86	F= 6.61, p=.011 **	F=1.12, p=.330
All Items	F=104.11	F= 8.31, p=.005 **	F=1.42, p=.246

* p < .05

** p < .01

Effect of Subject Sex on Ratings of Attractiveness

Table 42 indicates that females typically rated the drawings more positively than did males. For example, of the 39 ratings (subjects gauged three drawings for the thirteen items), females generally marked 33 items higher than did males. The greatest differences occurred for the behavioral inclination scale.

Sex of rater was a reliable factor for five of the thirteen items (see Table 41). Specifically, three out of the four items in the behavioral inclination scale reliably discriminated between the male and female ratings, including BEH2: would or would not like to babysit for (F (1,145) = 20.32, p < .001), BEH3: would or would not want to be close to (F (1,145) = 5.30, p = 0.23), and BEH4: would or would not want to take care of (F (1,145) = 3.93, p = .049). Furthermore, sex played a major role for two items in the functional evaluation scale, including FUNCT2: would or would be fun to be with (F (1,145) = 4.06, p = .046), and FUNCT3: would or would not be irritating (F (1,145) = 6.22, p = .014). While sex did not reliably discriminate the ratings for the overall evaluation scale (F (1,145) = 2.35, p = .127), gender was a major factor in the functional evaluation scale (F (1,145) = 6.61, p = .011), and for the behavioral

TABLE 42

Means for 13 items Categorized by Sex

	Drawing of OPTs		Drawing of YPTs		Drawing of FTs	
Item	Male	Female	Male	Female	Male	Female
EVAL1	3.38	3.50	4.18	4.73	5.44	5.65
EVAL2	2.59	2.89	3.97	4.50	5.24	5.19
EVAL3	2.76	3.24	4.44	4.90	5.59	5.81
EVAL4	3.50	3.27	4.32	4.89	5.15	5.05
EVAL5	2.50	2.54	4.62	4.69	6.38	6.55
BEH1	2.76	3.41	3.82	4.54	5.50	5.49
BEH2	2.65	3.65	3.21	4.70	4.50	5.16 *
BEH3	3.68	3.55	4.06	4.99	5.15	5.72 *
BEH4	3.41	3.84	4.24	5.06	5.15	5.39 *
FUNCT1	3.18	3.28	3.88	4.33	4.97	4.76
FUNCT2	3.59	3.77	4.26	4.94	5.38	5.84 *
FUNCT3	2.91	3.32	3.47	4.41	4.79	4.96 *
FUNCT4	3.26	3.46	4.44	4.97	5.24	5.47
EVAL Scale	3.08	3.24	4.15	4.67	5.28	5.29
BEH Scale	3.13	3.61	3.83	4.82	5.07	5.44 *
FUNCT Scale	3.45	3.52	4.06	4.77	5.14	5.42 *
All Items	3.09	3.36	4.07	4.74	5.27	5.46

* sex significantly affected the item rating

The higher the values (1-7) the more favorable the response inclination scale (F (1,145) = 12.66, p = .001). Moreover, considering the thirteen items overall, sex was a significant factor (F (1,145) = 8.31, p = .005).

Effect of the Interaction of Term and Sex on the Ratings

The interaction between term and sex yielded mostly insignificant results. The only exception was that a trend was found for BEH3: would or would not want to be close to, (F (2,144) = 2.93, p = .056). The interaction was not significant for either of the three scales or for the thirteen items combined, (F (2,144) = 1.42, p = .246).

Reliability Alphas

The reliability alphas for the three scales, for each of the three term groups, are listed in Table 38. The overall evaluation scale had higher intercorrelations among the ratings than did the other two scales. The overall alphas for OPTs, YPTs, and FTs were 0.80, 0.80, and 0.72 respectively.

DISCUSSION

The results indicate that perceptions of attraction are greatly influenced by facial characteristics associated with conceptional age. Full-term infants are evaluated more positively--they are seen as more likeable, attractive, cute, and normal--than are premature infants. They are also believed to "function" better--they are believed to cause parents less worry, to be more fun to be with, to be less irritating, and to make people happier--than infants born prematurely. In addition, people are more likely to want to interact--they would rather take home, babysit for, be close to, and take care of--with a full-term infant than they are a premature infant. In addition, people strongly believe that full-term infants will eat much better than will premature infants. Similarly, infants born one month prematurely are perceived to possess these positive qualities to a greater degree than are infants born two months prematurely. As the only significant difference between the premature infant groups was the top portion of the head, perhaps the shape of the head played a major role in the differential ratings of these infants.

These findings are consistent with other studies related to attraction. Other researchers (Berscheid & Walster, 1974; Miller, 1970) found that relatively attractive adults are judged to be: more competent as spouses, be happier as individuals and in their marriages and careers, have more professional occupations, and generally possess "pro-social" personalities to a greater degree than those believed to less attractive. Similarly, relatively attractive children are believed to cause a transgression less likely in the future than are less attractive children; furthermore, this same act is judged to be less serious and is attributed to the child having a "bad day", rather than to the child's basic dispositional character, when the act is ostensibly committed by an attractive child than by an unattractive child (Dion, 1972). In the same vein, this study indicates that adults also make inferential judgments about infants based on attraction.

Another finding of this study was that females generally rated the drawings more positively than did males. Specifically, females reliably differentiated among the three drawings for three behavioral inclination items--would or would not like to babysit for, would or would not want to be close to, and would or would not want to take care of--and two functional evaluation items: would or would not be fun to be with and would or would not be irritating. In addition, women rated the great majority of items more favorable than did men.

Although there is no direct evidence that female hormones play a major role in maternal behavior (Maccoby & Jacklin, 1974), it may be assumed that biological differences, which dictate specific roles to play in the early child-rearing process, might affect one's perceptions of infants--for it is females who give birth and nurse. Further, females start to exhibit a greater preferance for infants than males at the onset of puberty, between the grades of six and eight (Fullard & Reiling, 1976).

Yet, the social environment may also influence perceptions of infants. For instance, males demonstrated an increase in preference for photographs of infant animals over pictures of adult animals as their status changed from single to married to becoming fathers (Cann, 1953). Furthermore, a higher preference for pictures of infant non-human primates over pictures of adult non-human primates was reported by both male and female adults when pictures were viewed in same-sex groups, as compared with mixed-sex groups (Berman, Cooper, Mansfield, Shields & Abplanalp, 1975). Most likely, there is a combination of hormonal and social factors, as well as experience, that account for the results.

CHAPTER V

CONCLUSIONS

It has been demonstrated that premature infants appear differently, in both absolute and proportionate terms, than do full-term infants. Not only do full-term infants possess a larger forehead and eyes (measured by width) than do premature infants, but they also have much wider, rounder heads (which have been found by Hildebrandt and Fitzgerald (1979) and Alley (1981) to be positively related to perceived cuteness). Thus, facial characteristics--in addition to overall size, head-body ratio, pitch and occurrence of their cry, sleep-awake states, and medical status--is another variable in which infants born prematurely differ from infants born at term.

Not only do premature infants look differently than do full-term infants, but they also evoke less favorable responses. Full-term infants are evaluated more positively overall and are also believed to "function" better than do premature infants. This corroborates several studies (Berscheid & Walster, 1972; Bersceid &

Walster, 1974; Dion, 1974; and Miller, 1970) which have displayed the importance of attractiveness in the perception of others. Relatively attractive individuals, now including infants, are believed to possess "pro-social" characteristics to a much greater degree than those seen as less attractive, even though their actual dispositions are unknown.

Not only did subjects rate the premature infants unfavorably, but they also indicated that they would be less willing to interact with a premature infant than with a full-term infant. Therefore, perceived attraction seemed to affect one's possible behavioral inclinations. This is consistent with other researchers findings that both college students and mothers of toddler-aged children look longer at photographs of infants they consider cute than they do at pictures of less appealing infants (Hildebrandt & Fitzgerald, 1978). Moreover, the premature infants' relatively unattractive facial features, especially those born two months prematurely--coupled with the infants' piercing cry, small size, and poor health--may help account for the fact that premature infants are more likely to be abused than are full-term infants (Elmer & Gregg, 1967; Fontana, 1973; Klein & Stern, 1971).

In addition, physical attractiveness may affect the amount of nonmedical attention nurses pay to infants while in the hospital. Physical attractiveness has been shown to be an important variable in interpersonal relations, especially during the early stages of interaction (Berscheid & Walster, 1974). While in the hospital, infant-nurse interactions may remain in these early stages, as one study (Minde, Ford, Celhoffer & Boukydis, 1975) found that premature infants were attended to by an average of 71 different nurses during an average stay of 49 days. Of course, behavioral inclinations should be approached with caution, since the present study analyzed attitudes towards possible actions rather than measuring overt behavior.

Assuming that the sign stimuli were the infants' forehead, eyes, and the roundness of the head, this study basically supports ethological theory. Full-term infants, who possessed these critical features to a greater degree than did premature infants, were found to evoke more favorable reactions. Unfortunately, it is not clear from these data which variables subjects used to make their judgments. However, since only the magnitude of the forehead and eyes and the shape of the head significantly discriminated among the three conceptional ages, and it may be inferred that these features were the critical determinants in the subjects' perceptions. Moreover, it may further deduced that the shape of the head played a major role, since this feature was the only significant difference found between the two premature infant groups and large discriminations were made in the ratings of these drawings.

More research is needed to understand the complex interrelationship of factors affecting the parent-child relationship. A number of factors, including facial features, appear to be important. Once a more comprehensive understanding of the involved factors is achieved, then it is possible that parents of future premature infants can be counseled about realistic expectations and coping strategies for their new child.

CHAPTER VI

SUMMARY

Ethological theory posits that certain stimuli, labeled sign stimuli, innately elicit specific reactions. More specifically, it has been argued that human infants (with their relatively large foreheads and eyes) evoke nurturant behaviors from adults. The study empirically tests whether or not conceptional age impacted on facial features (including the shape of the head and the other assumed sign stimuli) and on adult perceptions of the infants (at least composite drawings). Three experiments were conducted which indirectly tested these notions.

Pictures (full frontal views of the face) were taken of 29 infants as temporally close to birth as possible: 10 born at term, 10 born one month early, and 9 born two months prematurely. All facial features were measured (proportionally, so that the length from the chin to the hairline was standard when measurements were made) from which three composite drawings (one for each length of gestation) were made. Using a 7 point Likert-style scale, college-aged subjects then rated the

drawings on the basis of overall impressions (i.e., likeable--unlikeable), perceived functional evaluations (i.e., would or would not be irritating), and judged behavioral inclinations (i.e., would or would not want to be close to).

Results indicated that full-term infants possessed proportionally larger foreheads, wider eyes, and rounder heads (these features were assumed to be sign stimuli) to a greater degree than did premature infants. The only reliable difference between the two premature groups was that the conceptionally older premature infants possessed proportionally wider heads than did the conceptionally younger neonates. Drawings of the full-term infants evoked much more favorable responses, for all 13 items, than did the two drawings of the premature infants. Moreover, the drawing of the infants born one month early elicited more favorable responses than did the drawing of the infants born two months prematurely. These findings generally support the ethological theory.

REFERENCES

Alley, T.R. An ecological investigation of the perception of babyishness. Unpublished masters thesis, University of Connecticut, 1979.

Alley, T.R. Head shape and the perception of cuteness. Developmental Psychology, 1981, 17(5), 650-654.

Berkowitz, L. Some determinants of impulsive aggression: Role of mediated associations with reinforcements for aggression. Psychological Review, 1974, 81, 165-176.

Berman, P.W., Cooper, P., Mansfield, P., Shields, S., & Abplanalp, J. Sex differences in attraction to infants--when do they occur. Sex Roles, 1975, 1, 311-318.

Bernick, N. The development of childrens' preferences for social objects as evidenced by their responses. Ph.D. thesis, University of Chicago, 1966.

Berscheid, E., & Walster, E. Physical attractiveness. In L. Berkowitz (Ed.), Advances in experimental social psychology. (Vol. 7). New York: Academic Press, 1974.

Brooks, V., & Hochberg, J. A psychophysical study of "cuteness." Perceptual and Motor Skills, 1960, 11, 205.

Cann, M.A. An investigation of a component of parental behavior in humans. Unpublished master's thesis, University of Chicago, 1953.

Caputo, D.V., & Mandell, W. Consequence of low birth wieght. Developmental Psychology, 1970, 3, 363-383.

Corter, C., Trehub, S., Boukydis, C., Ford, L., Celhoffer, L., & Minde, K. Nurses' judgments of the attractiveness of premature infants. Infant Behavior and Development, 1978, 1, 373-380.

Dion, K.K. Physical attractiveness and evaluations of children's transgressions. Journal of Personality and Social Psychology, 1972, 24, 207-213.

Dion, K.K. Children's physical attractiveness and sex as determinants of adult punitiveness. Developmental Psychology, 1974, 772-778.

Eibl-Eibesfeldt, I. Ethology, the biology of behavior. New York: Holt, Rinehart, & Winston, 1970.

Elmer, E., & Gregg, G.S. Developmental characteristics of abused children. Pediatrics, 1967, 40, 596-602.

Fontana, V.J. Further reflections on maltreatment of children. Pediatrics, 1973, 51, 780-782.

Frodi, A.M., Lamb, M.E., Leavitt, L.A., & Donovan, W.L. Fathers' and mothers' responses to infant smiles and cries. Infant Behavior and Development, 1978, 1, 187-198.

Frodi, A.M., Lamb, M.E., Leavitt, L.A., Donovan, W.L., Neff, C., & Sherry, D. Fathers' and mothers' responses to the faces and cries of normal and premature infants. Developmental Psychology, 1978, 14 (5), 490-498.

Fullard, W., & Reiling, A.M. An investigation of Lorenz's "babyness." Child Development, 1976, 47, 1191-1193.

Gardner, B.T., & Wallach, L. Shapes of figures identified as a baby's head. Perceptual and Motor Skills, 1965, 20, 135-142.

Geen, R.G., Stonner, D., & Shope, G.L. The facilitation of aggression: Evidence against the catharsis hypothesis. Journal of Personality and Social Psychology, 1975, 31, 221-226.

Hess, E.H. Attitude and pupil size. Scientific American, 1965, 212(4), 46-54.

Hess, E.H. Ethology and developmental psychology. In Carmichael's Manual of Child Psychology, Vol. 1, 3rd edition (Ed. by P. Mussen). New York: John Wiley and Sons, Inc., 1970.

Hess, E.H., & Polt, J.M. Pupil size as related to interest value of visual stimuli. Science, 1960, 132, 349-350.

Hildebrandt, K.A., & Fitzgerald, H.E. Adults' responses to infants varying in perceived cuteness. Behavioural Processes, 1978, 3, 159-172.

Hildebrandt, K.A., & Fitzgerald, H.E. Facial feature determinants of infant attractiveness. Infant Behavior and Development, 1979, 2, 329-339.

Hildebrandt, K.A., & Fitzgerald, H.E. Mothers' responses to infant physical appearance. Infant Mental Health Journal, in press.

Huckstedt, B. Experimentelle untersuchungen zum 'Kindchenschema.' Zeitschrift fur Experimentelle und Angewandte Psychologie, 1965, 12, 421-450.

Klause, M.H., & Kennell, J.H. Maternal-infant bonding. St. Louis, Mo.: Mosby, 1976.

Klein, M., & Stern, L. Low birth weight and the battered child syndrome. American Journal of Diseases of Childhood, 1971, 122, 15-18.

Lacey, J. Somatic response patterning and stress: Some revisions of activation theory. In M. Appley, & R. Trumbell (Eds.), Psychological stress: Issues in research. New York: Appleton-Century-Crofts, 1967.

Lack, D. The Life of the robin. London: Witherby, 1943.

Lamb, M.E. Influence of the child on marital quality and family interaction during the prenatal, perinatal, and infancy periods. In Lerner, R.M., & Spanier, G.B. (Eds.), Child influences on marital and family interaction: A life span perspective. New York: Academic Press, 1978.

Lorenz, K. Die angeboren formen moglicher erfahrung. Zeitschrift fur Tierpsychologie, 1943, 5, 245-409.

Maccoby, E.M., & Jacklin, C.N. The psychology of sex differences. Stanford: Stanford University Press, 1974.

Miller, A.G. Role of physical attractiveness in impression formation. Psychonomic Science, 1970, 19, 241-243.

Minde, K., Trehub, S., Corter, C., Boukydis, C., Celhoffer, L, & Marton, P. Mother-child relationships in the premature nursery: An observational study. Pediatrics, 1978, 61(3), 373-379.

Nagy, J.N., Holmes, D.L., Danko, M., Slaymaker, F. The effects of perinatal events, timed and developmental progress on maternal perceptions of their infants. Submitted for publication.

Pittenger, J.B., Shaw, R.E., & Mark, L.S. Perceptual information for the age level of faces as a higher order invariant of growth. Journal of Experimental Psychology: Human Perception and Performance, 1979, 5, 478-493.

Schoettle, H.E.T., & Schein, M. Sexual reactions of male turkeys to deviations from a normal head model. Anatomical Record, 1959, 134, 635.

Sternglanz, S.H., Gray, J.L., & Murakami, M. Adult preferences for infantile facial features: An ethological approach. Animal Behavior, 1977, 25, 108-115.

Tinbergen, N. The study of instinct. Oxford: Clarendon Press, 1951.

Tinbergen, N. The Herring Gull's world: A study of the social behavior of birds. London: Collins, 1953.

Todd, J.T., Mark, L., Shaw, R., & Pittenger, J. The perception of growth. Scientific American, 1980, 242(2), 132-144.

Weerts, T.C., & Roberts, R. The psychological effects of imagining anger-provoking and fear-provoking scenes. Paper presented to the Society for Psychophysiological Research, Toronto, October 1975.

APPROVAL SHEET

The thesis submitted by Richard Ali Maier Jr. has been read and approved by the following committee:

Dr. Deborah Holmes, Director
Associate Professor, Psychology, Loyola University

Dr. Jill Nagy
Assistant Professor, Psychology, Loyola University

The final copies have been examined by the director of this thesis and the signature which appears below verifies the fact that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

April 13, 1983 — Deborah L. Holmes, PhD

Date — Director's Signature