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GERALD, BETTY SUE. Identical Twins: Distinguishing Between Two in a Set. (1971) Directed by: Dr. Helen Canaday. Pp. 46.

The purposes of this study were to determine (1) whether three-year-old identical twin girls dressed alike and photographed in identical positions could be differentiated by the children and teachers in the Nursery School at the University of North Carolina at Greensboro (UNC-G) School of Home Economics, and (2) whether there were specific physical characteristics which children and teachers used to differentiate between the twin girls in identical photographs.

The subjects for the study were 16 three- and four-year-old boys and girls, four teachers, and 11 student teachers involved in the Nursery School in the UNC-G School of Home Economics. Three-year-old identical twin girls were photographed wearing identical clothing and in 10 identical positions. These photographs, presented as colored slides, were paired and presented to each of the subjects in four paired trials. The subjects were asked to identify one of the twins and their responses were recorded as being correct or incorrect.

Data were analyzed by means of a three-factor ANOVA, a two-factor ANOVA, a t test for difference between independent means, and the Scheffé test for least significance difference.

Only 44 per cent of the children and 53 per cent of the teachers made correct responses above the chance figure in differentiating between the identical twins. Therefore, the hypothesis that less than 50 per cent of the teachers and the nursery school children could distinguish between the twin girls was partially supported. The hypothesis that the teachers and nursery school children could distinguish full face photographs of the twins more readily than other photographs was not supported. It was found that full face

photographs were the ones less likely identifiable and that those of the right and left profiles were more readily distinguishable. The photographs of the eyes-nose portion of the face were more readily identified, thus supporting the hypothesis that this facial feature would be more easily identifiable in the photographs than would the two other portions of the face portrayed.

Recommendations for additional research in the area of identical twin differentiation stressed devising techniques for measuring physical and behavioral differences. Questions were raised concerning reactions of children of the same age to identifying identical twin boys, the relationship of IQ to response, the relationship of birth order to response, and the relationship of socio-economic status to response.

IDENTICAL TWINS: DISTINGUISHING BETWEEN TWO IN A SET

by

Betty Sue Gerald

A Thesis Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Master of Science in Home Economics

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1971

Approved by

Helen Canaday
Thesis Adviser

APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

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Special gratitude is expressed to the teachers, student teachers, nursery school children, and the parents of the twin girls whose participation made this study possible.

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CHAPTER I

INTRODUCTION

Many studies involving identical twins have been psychological in nature and have used the children chiefly as instruments for experimental purposes (Carter, 1933; Newman, Freeman, and Holzinger, 1937; Portenier, 1939; Slater, 1953; Jones, 1955). Most scientists have given little heed to the practical and personal problems accompanying twinship. The present investigation, in contrast to the psychological studies, was concerned with identical twins' physical characteristics and how other children and teacher associates perceived these characteristics in order to differentiate between the two in a set. With current emphasis upon the importance of an individual developing a positive self-concept and self-social concept during the preschool years (Hymes, 1968; Leeper, Dales, Skipper, and Witherspoon, 1968; Nimnicht, McAfee, and Meier, 1969; Todd and Heffernan, 1970), a study on the specifics of differentiation between two children who are so very near identical in physical appearance that they are often mistaken for each other, is both timely and justified.

Purposes of the Study

The study was designed to determine (1) whether three-year-old identical twin girls dressed alike and photographed in identical positions can be differentiated by teachers and children in the University of North Carolina at Greensboro (UNC-G) School of Home Economics Nursery

School, and (2) whether there is a specific characteristic identifiable in photographs that is used by the teachers and the children in differentiating between the twin girls.

Basic Assumptions

The basic assumptions made in relation to this study were the following:

1. Identical twins are not readily distinguishable.
2. There are slight appearance differences in identical twins that allow for their being distinguished.
3. Each group of subjects included in the study had relatively comparable amounts of experience with the identical twin girls.
4. The pediatrician's diagnosis that the twins are monozygotic was accurate.

Limitations of the Study

The study was conducted with the one set of identical twin girls and the teachers, student teachers, and the children at the UNC-G School of Home Economics Nursery School. The teachers and student teachers were combined into one group of subjects that will be referred to as teachers throughout the remainder of the text. Because of the group selected for investigation, certain limitations were set on this study: (1) the population of subjects was not a random sample; (2) the children participating were white and were from upper middle class homes; and (3) the study was conducted over a period of six weeks using the same photographs of the identical twins.

Hypotheses

The hypotheses of this study were as follows:

Hypothesis I. Less than 50 per cent of the teachers and the nursery school children will be able to distinguish between the twin girls.

Hypothesis II. The teachers and the nursery school children will be able to distinguish the photographs of the full face more readily than the other photographs.

Hypothesis III. Among the photographs of portions of the face, the teachers and the children will be able to distinguish the photographs of the eyes-nose portion more readily than other portions of the face.

CHAPTER II

REVIEW OF LITERATURE

The selected literature related to the present study is discussed under four topics: frequency of twins and diagnosis of zygosity; physical similarities in identical twins; reactions to and differentiation between identical twins; and use of photographs and the paired comparison technique.

Twins represent a biological rarity in the human species. Years before medicine developed into a full-fledged science, doctors, naturalists, and other scholars turned their attention to twin births in an attempt to find an explanation for this phenomenon. Twinning did not cease to be regarded as a biological whim until the second half of the nineteenth century. It was Sir Francis Galton who proposed the use of twins as a research instrument for scientific procedures. Research studies involving twins have been numerous since that time (Newman, Freeman, and Holzinger, 1937; Rife, 1941; Kent, 1948; Osborn, 1951; Gedda, 1961; Juel-Nielsen, 1965).

Frequency of Twins and Diagnosis of Zygosity

Twins occur about once in every 87 normal births. Identical twins occur once in every three sets of twins (Gunston, 1958; Gedda, 1961).

Zygosity refers to whether the twins derived from a single fertilized ovum, or zygote, or from two ova. Several methods of zygosity determination are used with a variation in accuarcy. The diagnosis of

zygosity in many of the early studies was based upon the summation of evidence from a number of physical features such as general appearance and finger and palm prints (Newman, Freeman, and Holzinger, 1937; Troup, 1938; Newman, 1940; Scheinfeld, 1967).

Blood tests have been used to determine zygosity. Each special type of blood substance is inherited, therefore, all of the blood substances must be exactly the same in identical twins. Also, body chemicals such as haptoglobins, gammaglobulins, and saliva secretions, are always alike, so may be used as a determinant of zygosity (Vandenberg, 1965; Scheinfeld, 1967).

Identical twins have ear formations so very similar that it has been suggested that ear prints may be used in distinguishing the type of twins. The taste test for phenyl-thio-carbamide (PTC) has also been used for diagnostic purposes since identical twins always are alike in taste reaction (it being either bitter or tasteless) to the PTC. Successful skin grafts of flesh from one identical twin onto the other are possible since the two are alike in the heredity make-up of all the tissues of their bodies and in all hereditary blood and chemical substances. This test provides an almost certain diagnosis of zygosity (Vandenberg, 1965; Scheinfeld, 1967).

Physical Similarities in Identical Twins

Human growth is a very regular and organized process. The highly condensed code of the genes contains the potential structure of the adult organism, for the most part. Therefore, identical twins resemble each other very closely in appearance, although they are not absolutely the same. There are many opportunities for slight deviations to occur

during the lengthy and complex process between the primary chemical action of the genes and the completed adult (Tanner, 1970).

With the division of the single egg to give identical twins, it is improbable that exactly equal portions of cytoplasm is distributed to each half. Therefore, it is unlikely that exactly the same concentration of chemical reactants will be formed in the two organisms. These differences could multiply progressively during subsequent development. Intra-uterine environment affects the organisms differently, for their positions in the uterus and their blood supplies are never quite the same. After birth, the children are never identical in their total environment. For example, food habits and illness experiences may vary. Even after all this, monozygotic (MZ) twins do greatly resemble each other (Bakwin, 1930; McGraw, 1935; Newman, Freeman, and Holzinger, 1937; Troup, 1937; Newman, 1940; Osborn, 1951; Juel-Nielsen, 1965; Vandenberg, 1965; Scheinfeld, 1967; Tanner, 1970).

Numerous anatomical studies have been conducted in order to assess the degree of similarity in identical twins. Some twins resemble each other so greatly that it is difficult by any scientific procedure to measure precisely their extraordinary degrees of similarity. Gedda (1961) reported a number of studies dealing with various intra-pair biometric similarities including comparisons of the skeletal system, skin, hair, dermatoglyphics, eye and orbital region, ears, nose, teeth, oral cavity, and reversed asymmetry.

Buschke and Kühne found through their x-ray studies of one-egg pairs that there is virtually complete similarity in configuration and structure of the bones. In addition, Buschke found that the nuclei

of ossification appear at essentially the same time in one-egg twins, while Kühne's x-rays of the spine showed a tendency of intra-pair similarity. Another study showed pelvis x-rays of identical twins to be remarkably similar (Buschke and Kühne, in Gedda, 1961). Maltarello's intra-pair comparison revealed similarity in the ossification processess in 57 out of 58 MZ pairs (Maltarello, in Gedda, 1961).

Schiller and v. Verschuer studied pigmentation of identical twins and found near complete intra-pair similarity. Schiller suggested that dissimilarities may be accounted for when one twin is forced by ill health to remain indoors for any length of time (Schiller and v. Verschuer, in Gedda, 1961). One-egg twins are alike as to the presence or absence of freckles, with freckled twins showing marked intra-pair similarity in the size and other details of the spots as reported by Decking, v. Verschuer, Waardenburg, Gedda, and Siemens (Decking, v. Verschuer, Waardenburg, and Siemens, in Gedda, 1961).

Color, texture, and hair follicles have been the main characteristics regarding the genetic aspects of the hair that have been investigated. Marked intra-pair similarity in one-egg twins was the finding from studies conducted by Dahlberg, v. Verschuer, and Braun. The latter two researchers also found intra-pair similarity in hair texture (Braun, Dahlberg, and v. Verschuer, in Gedda, 1961). Kiil's hairline studies revealed complete intra-pair similarity with some tendency to reversed asymmetry (Kiil, in Gedda, 1961).

Regarding the extent and distribution of subcutaneous fat tissue, Weninger describes lower abdomen dissimilarities in a one-egg pair. Intra-pair differences were noted by Sieder in the ocular region, and

by Ogawa in the volume of fetal fat tissue of the cheek (Weninger, Sieder, and Ogawa, in Gedda, 1961).

Numerous investigators including Wilder, Dahlberg, Montgomery, Wendt, Lotze, and Komai found that the dermatoglyphics (fingers, palms, and feet) of one-egg twins are very similar and far more alike than those of two-egg twins (Wilder, Dahlberg, Montgomery, Wendt, Lotze, and Komai, in Gedda, 1961).

Indications from studies dealing with the eye reveal that there are very few cases of intra-pair dissimilarity in length, relative position, height and shape of the arch, interbrow distance, configuaration, and color in the eyebrows (v. Verschuer and Waardenburg, in Gedda, 1961). Rötth found equal similarity with respect to eyebrows, periocular skin pigmentation, corneal diameter, and color of the iris (Rötth, in Gedda, 1961). Minute intra-pair differences in eyebrows, eyelids, and eyelashes were reported by Sieder and Janke (Sieder and Janke, in Gedda, 1961). Siemens, Dahlberg, v. Verschuer, and Freerksen reported consistent intra-pair similarity in iris structure and color of the iris (Siemens, Dahlberg, v. Verschuer, and Freerksen, in Gedda, 1961).

Volta and Chiarugi agree that the characteristics of the outer ear of one-egg twins are less variable than fingerprints (Volta and Chiarugi, in Gedda, 1961). Studies of Dahlberg and Quelprud demonstrate that intra-similarity and dissimilarity as to the ear lobe, the helia, the antihelix, tragus, antitragus, and the pinna correspond with the zygosity type of twins. Dahlberg used photographs to demonstrate the comparisons (Dahlberg and Quelprud, in Gedda, 1961).

Leicher found complete intra-pair similarity in 31 of 39 pairs of MZ twins in regards to the length, breadth, position, shape, and point of the nose, the form and appearance of the nostrils, and the shape and configuration of the septum (Leicher, in Gedda, 1961). No intra-pair differences in nasal characteristics were detectable in 162 pairs and minor differences in 29 pairs from the total of 191 MZ pairs studied by v. Verschuer (v. Verschuer, in Gedda, 1961). Siemens reported that the nose of one-egg twins may remain similar in shape, despite certain differences in profile and cranial diameters (Siemens, in Gedda, 1961).

A study conducted by v. Verschuer of the outline of the lips in 190 MZ pairs reveals no significant differences in 162 pairs and minor differences in 28 pairs (v. Verschuer, in Gedda, 1961). Other investigators found only minor intra-pair differences in regard to shape, arrangement, size, and enamel color of teeth in MZ twins (Bergfors, Siemens and Hunold, Schroeter, and Goldberg, in Gedda, 1961).

Specularity (mirror image or reversed asymmetry) is another important aspect of twin studies. Twin partners may show signs of reversed laterality just as the image of an object reflected by a mirror reverses the two sides of the object. Asymmetrical (occurring only on one side of a person) as well as symmetrical (occurring on both sides) characteristics may be involved in specularity. The given characteristics will either be found only on the opposite sides of each of two twins or, when distinguished by definite differences on the two sides of an individual, will show reversed differences of this kind in twin partners. The overall problem of reversed asymmetry in twins has not yet been adequately explained (Gedda, 1961; Scheinfeld, 1967).

There is a phenomenon that explains what may be the temporary intra-pair dissimilarity with respect to certain of these twin characteristics. Asynchronism is the temporary lack of synchronism in the development (acceleration or retardation) of a gene-specific trait in one-egg twins and may be interpreted as a difference in the time of determination of the phenotype. It has been suggested that this may be explained by the effect of environmental circumstances in only one member of a pair (Gedda, 1961).

Reactions to and Differentiation Between Identical Twins

Regardless of the environmental conditions, the gene-specific traits usually continue to be near identical in one-egg twins. Therefore, there is the extreme similarity in the two individuals that is perplexing to those people with whom they come in contact. The children's parents are often at a loss to tell their MZ twins apart and in some cases must resort to natural or artificial identification marks (Troup, 1938; Kent, 1948; Burlingham, 1952; Gedda, 1961).

Burlingham (1952) discussed the impression which twins make on young children. She indicated that young children's first contact with twins is usually characterized by astonishment and fascination and their comments often regard the fact that there are two instead of one. In interaction situations she suggested that it was not uncommon to hear such remarks as "the two Ronnies" or "the other Ronnie."

Even dogs, according to Guttmacher, despite their highly developed sense of smell, get confused about who their master is if he happens to have an identical twin (Guttmacher, in Gedda, 1961).

If the twins look so near alike that they can hardly be told apart, it is inevitable that they will have many experiences and encounter many situations different from other children. It may be difficult for parents, teachers, and peers to react to them as individuals, evidenced by the fact that they often refer to them as "the twins" or "Mary and Maggie." Obviously, young twins are quite often confused about their names, since one twin often comes when the other's name is called (Scheinfeld, 1967).

Use of Photographs and the Paired-Comparison Technique

Photographs of children's faces and specific facial features have been used in research studies in which the subjects were nursery school children between the ages of three and five years. Many of these studies involved the subject's having to identify inverted and normally oriented faces (Brooks and Goldstein, 1963; Goldstein and Chance, 1964; Goldstein, 1965). In the Goldstein and Chance study (1964), unfamiliar children's pictures were shown to three groups of subjects, including a kindergarten group. In each of three spaced sessions, the subjects learned eight critical pictures from each group during three five-second exposures. The subjects then tried to select critical faces from among five background faces of the same age. The results indicate that the ability to recognize faces improves with chronological age.

Black and white photographs have been used as a sociometric technique with preschool children (Kutchei, 1967). It was necessary for the children to identify the photographs in order to make a specified choice. A similar technique was used by Dilley (1968) for different purposes. The researcher used pairs of pictures with nursery school

children as stimulus and response items in a paired-associate learning study.

Summary

Occurrence of twins is about one in every 87 normal births, while identical twins occur only about once in every three sets of twins. Methods of determining zygosity of twins include evidence of likeness in physical features, blood tests, body chemical tests, taste test for PTC, and skin graft tests.

The degree of similarity in identical twins varies among sets. Biometric similarities within identical twin sets are usually found in the skeletal system, skin, hair, dermatoglyphics, eye and orbital region, ears, nose, teeth, oral cavity, and reversed asymmetry.

People who come in contact with identical twins are many times perplexed by the degree of similarity between the two. The confusion of identity is often almost as frustrating to the twins.

Photographs have been used with both children and adults for purposes of identifying familar faces. In paired-associate learning studies pairs of pictures have been used with young children. The use of photographs has been accepted as a useful technique for use in studies involving identification procedures.

CHAPTER III

DESIGN AND PROCEDURE

The purposes of this study were to determine (1) whether teachers and children in the UNC-G School of Home Economics Nursery School could differentiate the three-year-old identical twin girls dressed alike and photographed in identical positions, and (2) whether there were specific physical characteristics which children and teachers used to differentiate between the twin girls in identical photographs. The paired-comparison technique was used to accomplish the purposes.

Subjects

Availability of a set of identical twin girls in the Nursery School made this study feasible. Sixteen other children (eight boys and eight girls) enrolled in the morning program at the preschool facility served as a portion of the subjects used in the study. Five additional children in the program were deleted from the study because of absenteeism. Another child, being a sibling of the twins, was also deleted. The children ranged in age from three years, two months to four years, 11 months. They were from homes of upper-middle socio-economic white families living in Greensboro, North Carolina. The other subjects were four professionally trained staff members classified as lead teachers and 11 student teachers, all of whom were involved in the morning session in the program at the Nursery School.

Instrument

An experienced photographer was engaged to photograph the twin girls separately but in identical positions. Ten poses were taken of each of the two girls. These were a front bust not smiling, a back bust, a right profile, a left profile, forehead and eyes, nose and eyes, mouth and chin, full body clothed in a dress, full body clothed in a coat and bonnet, and in a horizontal position on a rest pad. Teachers and children regularly saw the twins in these 10 positions. Other pictures of the twins together and with three different adults were taken to be used for habituation purposes. The photographs were used in the form of colored slides. With the use of two slide projectors, the 10 paired identical poses (see Appendix A) were projected simultaneously side by side on a wall in front of the subjects. The wall was used rather than two screens because this arrangement made it possible to project the two photographs very near each other and also at a lower level in order to accommodate the children. Also, the use of two screens would have been distracting because of the complexity of the apparatus.

Procedure

The director of the Nursery School and the parents of the identical twins granted permission for the study to be conducted. Cooperation of the teachers was secured. The testing procedure was made as pleasant as possible, and the children soon looked forward to participating.

For habituation purposes, all of the slides were shown to the subjects as a group during a 10 minute rest period on the day preceding the first test session.

Four two-day testing sessions were conducted during a six weeks period of time. The two-day session was allowed to provide adequate time for testing all subjects. The first two trial sessions were during consecutive weeks. There was no testing the following two weeks due to holidays observed by the university. The two weeks immediately following the holidays were used for testing. Each session was preceded by a minimum of three days interaction by the subjects with the twin girls.

Each child subject was presented the paired slides with the investigator as the only other person in the testing room. The teachers were divided into two groups. The subjects in each group viewed the slides together during the testing sessions. Upon presentation of the first pair of slides to the subjects, the investigator said, "You know Kristy and Kelly. One picture is Kristy; one picture is Kelly." The subjects were told the name of one of the twins and were asked to identify the picture of her in each pair presented. The name of the twin to be identified was alternated at each of the four sessions. The teachers were allowed 30 seconds for viewing each pair of slides, while the children were allowed self-pacing, but were encouraged to guess if they took more than 30 seconds to answer. The invesigator interjected questions such as "How do you know that is Kristy's mouth?" and "How can you tell that is Kelly?" in order to try to determine the method by which each individual identified the child. The investigator recorded the children's choices and comments on a data collection sheet, while the teachers recorded their choices and comments on separate sheets (see Appendix B). During each of the four sessions the paired slides were presented twice for a total of eight trials. For each of the four sessions, the pictures

were randomly rearranged, so they were never presented in the same order.

Analysis of Data

To form a base line for analysis purposes, 29 mothers, who were members of three parent education discussion groups and who were not familiar with the identical twin girls, were presented photographs of the twins together. Each twin was identified and the groups allowed approximately one minute to study each slide. Afterwards, the 10 paired slides were presented and the group members were asked to identify a specific twin. The mothers were asked to identify the same twin when slides were shown a second time immediately following the first testing. Choices and comments were recorded by individuals on the same data collection sheet used by the teacher subjects.

The raw data was blocked in groups of eight trials for each of the two groups of subjects. A one (1) was recorded for each correct response and a zero (0) was recorded for each incorrect response. The correct responses in each trial were summed for each subject and for each stimuli (see Appendix C).

A three-factor mixed-design analysis of variance (ANOVA) was used to determine the relationship between the two groups, the 10 stimuli, and the eight trials. A two-factor ANOVA was used to determine the relationship between the age and sex of the subjects in Group I and the responses to the stimuli. The t test for a difference between two independent means was computed to determine the relationship between the base-line group and the teachers, as well as between the base-line group and the children. A Scheffé test was computed to find a critical difference

figure to use in comparing groups in regard to individual stimuli. These parametric tests were selected because the total variance of the statistical situation could be broken down into component sources of variances. Although the data was dichotomous in nature, the study remained within the conditions stipulated necessary for use of the ANOVA with a dichotomous dependent variable (Lunney, 1970). Bruning and Kintz (1968) was used as a guide for the treatment of the data.

CHAPTER IV

RESULTS AND DISCUSSION

The primary purposes of this study were to determine (1) whether three-year-old identical twin girls dressed alike and photographed in identical positions could be differentiated by the children and teachers in the Nursery School at the University of North Carolina at Greensboro School of Home Economics, and (2) whether there were specific physical characteristics which children and teachers used to differentiate between the twin girls in identical photographs.

Each of 31 subjects made 80 responses to the 10 stimuli (photographs). By chance each subject could have made 40 correct responses. As shown in Figure 1, the total correct responses made by the children ranged from 34 to 47; the range of total correct responses made by the teachers was from 28 to 73 (see Figure 2). Forty-four per cent of the children and 53 per cent of the teachers made a total number of correct responses above chance.

Several of the children responded to the stimuli in a particular pattern at trial sessions. This often took the form of identifying alternate pictures as each pair of slides was presented. The possibility of guessing had been expected if a subject could neither easily nor readily distinguish between the twins. However, those subjects exhibiting patterned responses were not omitted from the study because it could be only the speculation of the investigator as to whether a child was guessing or pretending to guess.

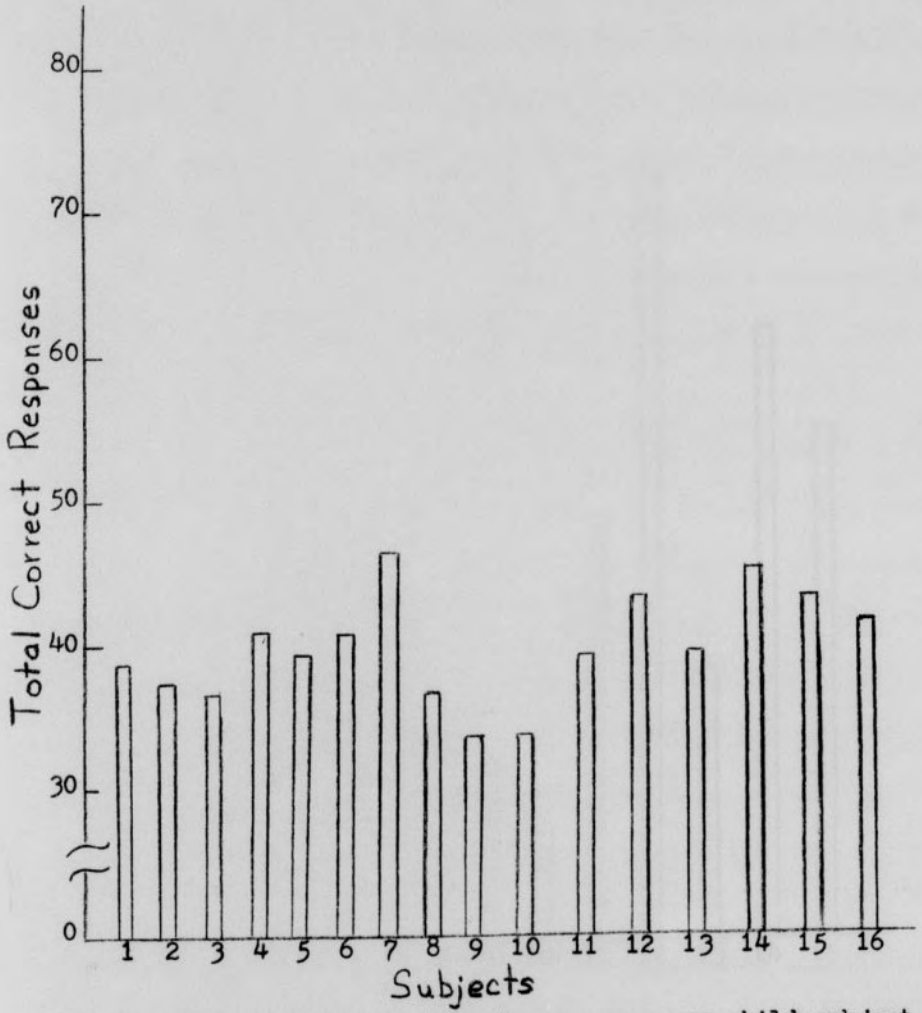

Fig. 1. Total number of correct responses per child-subject.

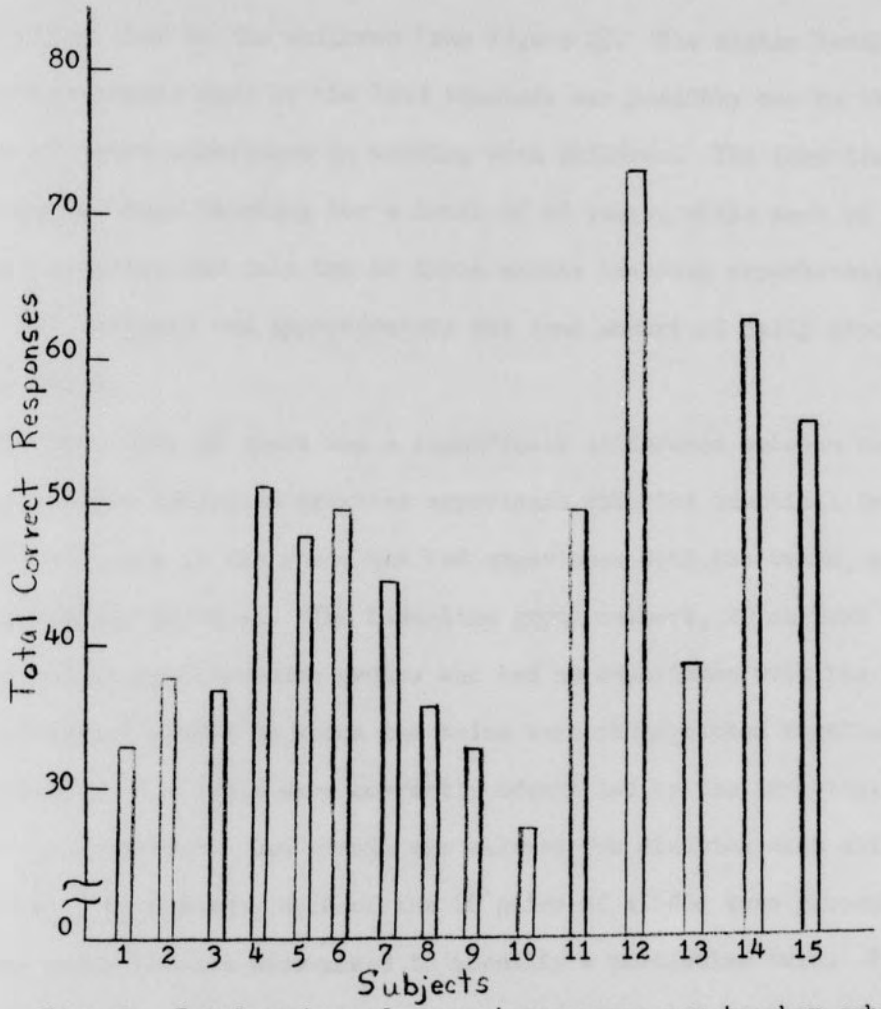

Fig. 2. Total number of correct responses per teacher-subject.

The high correct response level of three of the four lead teachers was partially responsible for the teachers' mean response score being higher than that of the children (see Figure 2). The higher level of correct responses made by the lead teachers was possibly due to the number of years experience in working with children. The four lead teachers had been teaching for a total of 60 years, while each of the student teachers had only two or three months teaching experience; however, all teachers had approximately the same amount of daily exposure to the twins.

To determine if there was a significant difference between responses of individuals having no previous experience with the identical twins and the subjects in the study who had experience with the twins, a base-line group was utilized. The base-line group members, 29 mothers in parent education discussion groups who had no experience with the twins, were presented slides in which the twins were photographed together and with adults. The twins were correctly identified by the investigator and/or an assistant. One minute was allowed for studying each slide presented. Afterwards, each of the 10 pairs of slides were presented and the group members were asked to identify a particular twin. The mean correct response scores of the base-line group were compared by means of a t test with the mean correct response scores of the two groups of subjects. No significant difference was found between the base-line group and either the child-subject group ($t = 1.06$) or the teacher-subject group ($t = 1.82$). It was expected that the base-line group would have fewer correct responses than would the other groups. The results could possibly indicate that the base-line group's short training in

identification of the identical twins replaced the experience which the subjects had had with the twins.

A 2 X 8 X 10 analysis of variance (ANOVA) for repeated measures on two factors (Bruning and Kintz, 1968) was performed on the correct response data to evaluate the effect of stimuli, trials, and groups. The analysis is summarized in Table 1.

Table 1

Three-Factor ANOVA

Source	df	MS	F
Total	1323		
Between subjects	30		
Groups	1	2.49	2.51
$Error_b$	29	.993	
Within subjects	1293		
Trials	7	.487	2.59*
Stimuli	9	1.68	4.69**
Groups X Trials	7	.419	2.23*
Groups X Stimuli	9	1.499	4.18**
Trials X Stimuli	63	.239	1.14
Groups X Trials X Stimuli	63	.336	1.60**
$Error_1$	203	.188	
$Error_2$	261	.359	
$Error_3$	1827	.210	

*$p < .05$
**$p < .01$

The results of the ANOVA disclosed that there was no significant difference between the two groups. Neither group learned to distinguish the stimuli across all trials. However, the data indicates that if the testing sessions had been extended beyond eight trials, the teachers would possibly have shown significant learning of the stimuli. There was no indication that the children would have shown significant learning (see Figure Figure 3). This is in agreement with Goldstein's

(1965) findings indicating that children's level of learning photographed faces is below that of adults'. Although the data does not support this entirely, there is implication for its occurrence.

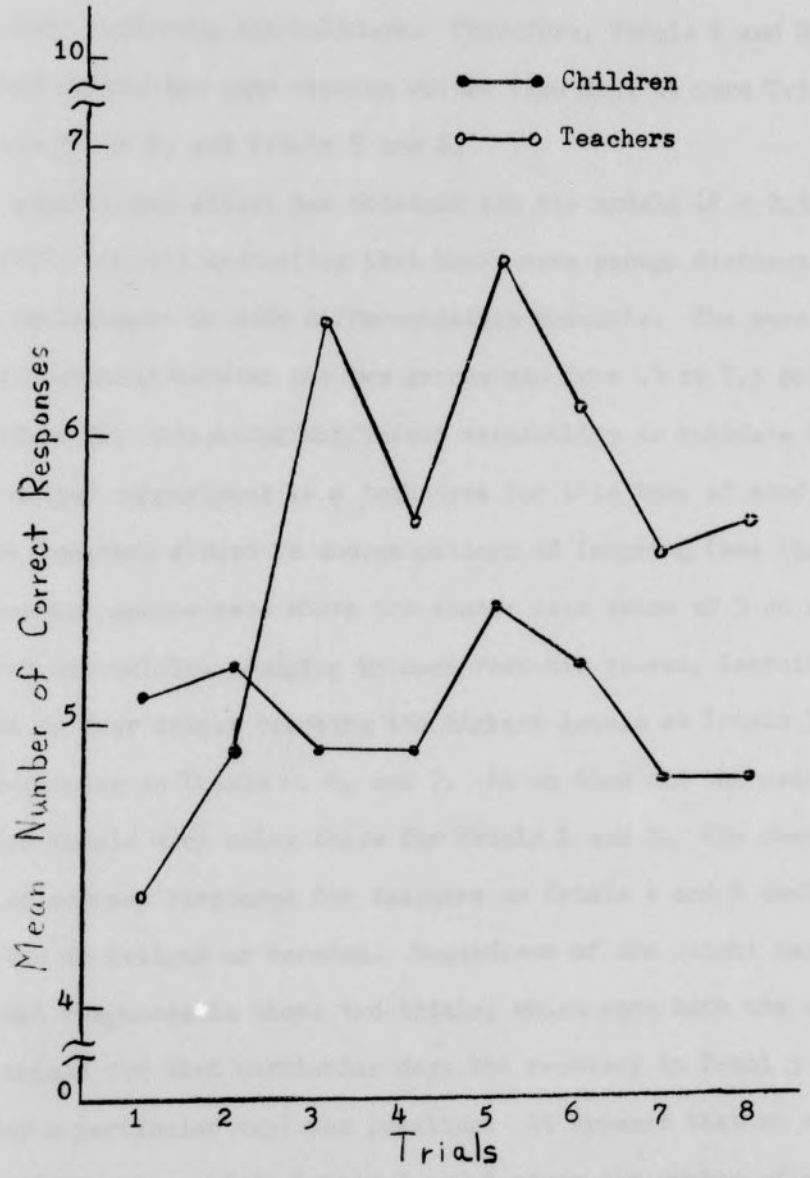

Fig. 3. Mean number of correct responses by trials for both children and teachers.

Four two-day testing sessions were conducted during a six weeks period of time. The first two sessions were during consecutive weeks. There was no testing during the following two weeks due to holidays observed by the university. Testing was resumed during the two weeks immediately following the holidays. Therefore, Trials 1 and 2 were conducted during the same session on the same day, as were Trials 3 and 4, Trials 5 and 6, and Trials 7 and 8.

A significant effect was obtained for the trials ($F = 2.59$, $df = 7/203$, $p < .05$) indicating that there were enough distinct features in the photographs to make differentiation possible. The mean response score differences between the two groups was from .3 to 1.5 points (see Figure 3), indicating sufficient variability to validate the use of paired comparisons as a technique for this type of study.

The teachers showed an uneven pattern of learning (see Figure 3). Mean response scores were above the chance mean score of 5 on all but the first two trials. Judging by mean response scores, learning occurred on four trials reaching the highest levels at Trials 3 and 5 and declining on Trials 4, 6, and 7. At no time did the mean response score for trials drop below those for Trials 1 and 2. The decrease in number of correct responses for teachers on Trials 4 and 6 could possibly be due to fatigue or boredom. Regardless of the slight decrease in correct responses in these two trials, which were both the second of two trials for that particular day, the recovery in Trial 5 (the first trial for a particular day) was puzzling. It appears that no additional group learning occurred in Trials 7 and 8 since the number of correct responses declined .5 mean points from Trial 6. However, the rapid

increase on the fifth trial followed by a decline could be due to reminiscence. Perhaps the depressed effect appeared after several trials and would disappear if more trials were added (Kimble and Garmezy, 1963). The investigator recommends that in future studies, only one trial be planned for any one day.

Initially there appeared to be little or no learning from trial to trial displayed by the children (see Figure 3). After a decline in correct responses in Trials 3 and 4, there was an increment in Trials 5 and 6. On these two trials and on Trials 1 and 2, the subjects reached a response level slightly above chance (score of 5). As with the teachers, there was a peak score at Trial 5. This was the first trial after a two-week holiday period which could indicate that prior to the holiday the task had become mundane and the subjects had tired of the task. After Trial 5 there was a gradual decline in mean scores until Trial 8 where the children reached a level slightly below that which they scored on the first trial.

The ANOVA indicated that there was a significant effect for stimuli ($F = 2.59$, $df = 9/261$, $p < .05$) within subjects (see Figure 4, p. 27). The teachers identified six of the 10 stimuli at or above the chance mean score (4), while the children identified five of the stimuli above that chance score. The teachers identified the left profile photograph, while the children identified the right profile more readily than all other photographs. Both profile photographs portray the shape of the head therefore, it could be that is one physical characteristic used to identify the twins. Both groups had mean response scores at approximately the chance mean score for Stimuli 1, 2,

and 4, which were the photographs in which the full face was in view. The only photograph identified more often by the children than by the teachers was that of the twin lying on the rest pad (Stimulus 3). The mean score for the children was exactly at the chance mean score (4), while for the teachers the mean score was 2.5. This result could be due to the children having more opportunity to actually have an eye-level view of a twin lying on a rest pad while the teachers do not. The teachers mean score of 5.5 for Stimulus 5 (back of head) was well above the children's mean score for the same stimulus (3.8). This could possibly be accounted for because of the teachers' expressed awareness of a difference in the hair at the neck-line. Of the photographs of the three portions of the face (forehead-eyes, eyes-nose, and mouth-chin), the one of the eyes-nose was the one most readily identified by both the children and the teachers. Perhaps this gives some indication that both the children and the teachers focus on the eyes-nose portion of the face when viewing the twins face-on. In order to identify significant differences between the two groups for specific stimulus, the Scheffé test (Edwards, 1960) was computed for the least significant difference value. A significant difference (LSD .05 = 1.9) was found between the two groups for Stimulus 7 (left profile) only. The difference between group means for Stimulus 5 (back of head) and Stimulus 6 (right profile) lacked only .3 mean score of reaching a significant value. The teachers possibly identified the photographs of the profiles and the back of the head more readily because these are the features they see most often when not at eye-level with a child. These results corresponded with the comments made by the teachers during the trials. They indicated

most often that they made identifications by looking at the shape of the head, the cheek-eye area, and the hair-line on the neck. The children, being at eye-level with the twins, possibly see these features differently; they were unable to verbalize how they made identifications.

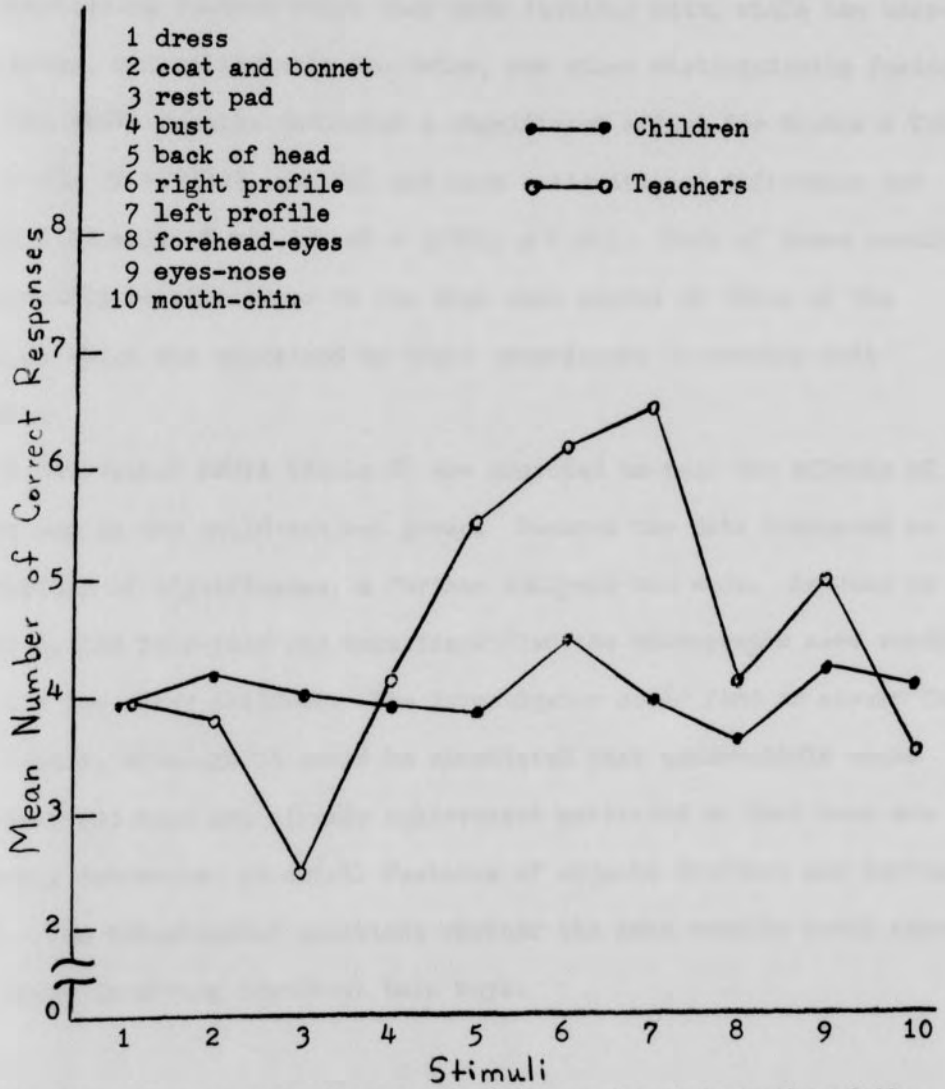

Fig. 4. Mean number of correct responses to photographs of the identical twins made by children and teachers.

The photographs identified most readily by the base-line group were those of the bust, the mouth-chin portion of the face, and the child on the rest pad. Since these do not correspond with those photographs most readily identified by the children and the teachers, one could speculate that perhaps these two groups were looking for a specific differentiating feature which they were familiar with, while the base-line group, unfamiliar with the twins, saw other distinguishing features.

The ANOVA results indicated a significant effect for Groups X Trials ($F = 2.23$, $df = 7/203$, $p < .05$) and also a significant difference for Groups X Stimuli ($F = 4.18$, $df = 9/261$, $p < .01$). Both of these results can probably be attributed to the high mean scores of three of the teachers which was explained by their experiences in working with children.

A two-factor ANOVA (Table 2) was computed to test the effects of age by sex in the child-subject group. Because the data indicated an interaction of significance, a further analysis was made. As seen in Figure 5, the four-year-old boys identified the photographs more readily than did the other children. The investigator could find no answer for this result, although it could be speculated that upper-middle class four-year-old boys are already achievement motivated or that boys are extremely interested in detail features of objects (Hoffman and Hoffman, 1966). The investigator questions whether the same results would appear in a study involving identical twin boys.

Table 2

Two-Factor ANOVA

Source	df	MS	F
Total	15		
Age	1	1	.12
Sex	1	56	7.15 *
Age X Sex	1	65	8.43 *
Error	12	7.83	

*p < .025

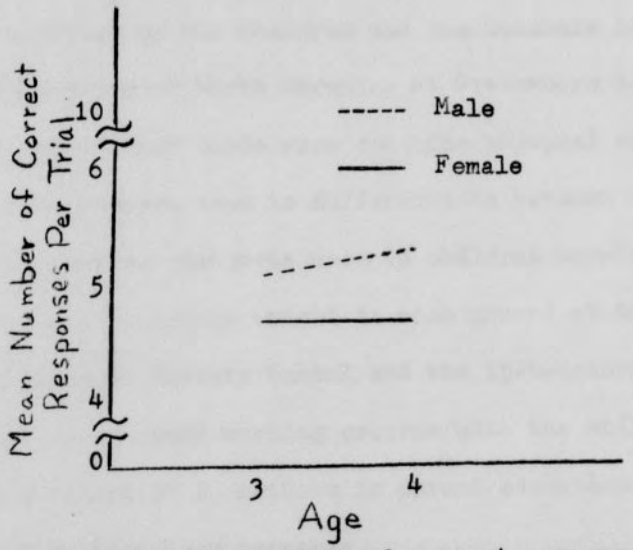

Fig. 5. Mean number of correct responses per trial comparing sex by age in the child-subject group.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Differentiation between identical twins has been an age-old problem, although little has been done to alleviate the problem and the frustrations which are caused by the situation. Identical twins' emotional and social development are at stake when misidentifications occur. If for no other reason, this would justify study of differentiation between identical twins.

This study was undertaken to determine whether three-year-old identical twin girls dressed alike and photographed in identical positions could be differentiated by the children and the teachers in the Nursery School at the University of North Carolina at Greensboro School of Home Economics, and whether there were specific physical characteristics which children and teachers used to differentiate between the twin girls in identical photographs. Subjects were 16 children enrolled in the three- and four-year-old groups (eight in each group) at the UNC-G School of Home Economics Nursery School and the 15 teachers and student teachers involved in the same morning program with the children. A base-line group composed of 29 mothers in parent education discussion groups was used for comparison purposes.

Ten photographs of the twin girls dressed alike and in identical positions were taken. The photographs in form of colored slides were then paired. Each subject was told the name of the twin to be identified as each of the 10 pairs of colored slides was presented during four

paired trials over a six weeks period of time. Correct response scores were determined for groups for trials and stimuli. Subjects' comments concerning the way by which they differentiated between the twins were recorded. Analyses of the data were made by 2 X 8 X 10 and 2 X 2 ANOVA, a *t* test between means, and the Scheffé test.

Conclusions

The conclusions were:

1. The hypothesis that less than 50 per cent of the teachers and the nursery school children can distinguish between the twin girls was partially supported. Forty-four per cent of the children and 53 per cent of the teachers made correct responses above chance. An uneven pattern of learning occurred within the teacher-subject group, while there was little or no learning beyond chance exhibited by the children.

2. The hypothesis that the teachers and nursery school children can distinguish the photographs of the full face (bust, full view in dress, and full view in coat and bonnet) more readily than other photographs was not supported. It also was found that full face photographs were the ones less likely identifiable and that those of the right and left profiles were more readily distinguishable.

3. The hypothesis that the eyes-nose portion of the face would be more easily identifiable in the photographs than would the other portions of the face portrayed was supported. The eyes-nose portion of the face was more readily identified than the forehead-eyes and mouth-chin portions by both the children and the teachers.

Recommendations for Further Study

The investigator recommends that more emphasis be placed on the study of differentiation between identical twins with stress on the devising of techniques for measuring physical and behavioral differences as a means of distinguishing identical twins. A comparison should be made between individuals trained to differentiate a set of identical twins without personal contact with the twins and those individuals working directly with the identical twins. Results could possibly give some indication as to whether one method is more successful than the other for learning to make differentiations.

Replication of this study when the twins are four years old would allow for useful comparisons. Based on the results of this study, the investigator recommends that only one trial be planned for one day. The use of the paired-comparison technique with colored slides should be considered in other research involving preschool children.

A study designed to discover why boys identified the twins more readily than did the girls would be justified. It would be interesting to see if the same results would occur if identical twin boys were used instead of identical twin girls. Other questions that deserve investigation are: (1) Is there a correlation between a child's IQ and the number of correct responses made? (2) Does birth order of the child have an effect on the number of correct responses made? (3) Would the same results occur if the study was conducted with a lower socio-economic group?

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APPENDIX A

Paired Photographs

STIMULUS 1

Kristy

Kelly

STIMULUS 2

Kristy

Kelly

STIMULUS 3

Kristy

Kelly

STIMULUS 4

Kristy

Kelly

STIMULUS 5

Kristy

Kelly

STIMULUS 6

Kristy

Kelly

STIMULUS 7

Kristy

Kelly

STIMULUS 8

Kristy

Kelly

STIMULUS 9

Kristy

Kelly

STIMULUS 10

Kristy

Kelly

APPENDIX B

Data Recording Sheets

Data Recording Sheet for Child-Subjects

Testing Session _____

Date _____

Twin Identified _____

Child Participant	Stimuli 1	2	3	4	5	6	7	8	9	10	Comments
Beth											
Kelly											
Andrew											
Sarah											
Cindy											
Jay											
Richard											
Michael											
Ann											
Ted											
Tamara											
Stuart											
Pamela											
Wyke											
Graham											
Stephanie											
Patrick											
Jerome											
Larry											
Lynne											
Jon											

Data Recording Sheet for Teacher-Subjects

Participant's Name _____
Testing Session _____
Date _____
Twin Identified _____

Stimuli	Presentations at Testing Session I Slide Chosen	Score	II Slide Chosen	Score	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

APPENDIX C

Subjects' Responses to Photographs

Correct Responses for Child-Subjects

Subject	Trials 1	2	3	4	5	6	7	8	Total
1	5	4	3	8	5	6	3	5	39
2	4	4	4	4	6	6	5	5	38
3	4	3	5	6	4	4	6	5	37
4	3	6	7	5	6	5	5	4	41
5	8	4	4	5	5	5	3	6	40
6	8	5	4	4	6	5	4	5	41
7	5	7	6	6	5	4	7	7	47
8	6	6	5	3	5	4	4	4	37
9	2	5	5	5	5	5	3	4	34
10	3	4	5	4	4	5	5	4	34
11	5	5	4	4	6	6	5	5	40
12	5	5	6	6	6	6	5	5	44
13	6	8	2	2	6	6	6	4	40
14	7	5	6	6	6	6	5	5	46
15	5	8	6	4	6	5	5	5	44
16	5	4	7	6	6	5	6	3	42
Total	81	83	79	78	87	83	77	76	644

Correct Responses for Teacher-Subjects

Subject	Trials 1	2	3	4	5	6	7	8	Total
1	4	6	7	6	2	3	3	2	33
2	2	2	7	6	5	5	7	4	38
3	3	3	4	4	9	6	4	4	37
4	4	3	7	6	9	7	7	8	51
5	4	6	7	7	5	7	7	5	48
6	7	5	8	7	6	6	5	6	50
7	2	4	9	8	7	7	3	5	45
8	5	5	4	5	6	3	4	4	36
9	3	5	4	1	7	6	3	4	33
10	4	3	3	2	5	4	4	3	28
11	5	5	6	7	7	7	6	7	50
12	10	10	10	10	8	7	9	9	73
13	4	4	5	3	6	6	5	6	39
14	4	8	8	8	9	8	9	9	63
15	5	4	7	6	8	9	8	9	56
Total	66	73	96	86	99	91	84	85	680