INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

Bell & Howell Information and Learning
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
800-521-0600

Running Head: Mutual Gaze Behavior

Here's Looking at You, Kid!

Sex Differences, Sex-Typing, and Mutual Gaze Behavior in Young Infants

Rebecca T. Leeb, MA

Department of Educational and Counselling Psychology

McGill University, Montreal

July 1999

Thesis submitted in partial fulfillment of the requirement for the degree of

PhD in Educational Psychology

Specialization in Applied Developmental Psychology

Table of Contents

List of Tables

Appendix D

List of Figures

Abstract

The presence of a sex difference in mutual eye-to-eye contact in dyadic interaction is well documented from late infancy through adulthood with females making more mutual eye contact than males. Only one study (Hittelman & Dickes, 1979) found evidence for this behavior pattern in newborns, but no research has been done to follow-up these findings. Systematic examination of the development of sex differences in mutual gaze behavior can aid in unraveling the differential effects of biological and social influences on the development of gendered social behavior.

This project was a longitudinal, within participants replication and extension of Hittelman and Dickes study: Seventy neonates (32 female, 38 male) age 13-112 hours postpartum and their parents participated in the Time 1 data collection, and 23 (9 female, 14 male) infants and their parents were seen a second time at 13-18 weeks postpartum (Time 2). Mutual gaze between the infant and two interacters (1 female, 1 male) was measured, and parents completed the Parental Sex-Typing of Newborns (Paston) Rating Scale to measure their sex-typed perceptions of newborns and young infants.

Results indicated: (a) No empirical evidence for sex differences at Time 1; (b) Strong evidence for sex differences in mutual gaze behavior at Time 2 indicating development of this sex-typed pattern in early infancy; (c) The emergence of sex differences in mutual gaze behavior from Time 1 to Time 2 is entirely accounted for by a radical change in female infants' gaze behavior; and (d) Empirical evidence linking mothers' sex-typed beliefs about their infants and infants' sex-typed gaze behavior.

Results are discussed within the theoretical contexts of the social learning and biological perspectives. This study demonstrates that infants' sex-typed behavior and mothers' gender-typed perceptions begin early in life. It is concluded that sex differences in mutual gaze behavior are a complex interplay of biological or social forces acting in

concert. Subsequent research in this area should focus on the specific forces involved in bringing sex differences in mutual gaze behavior to fruition.

Résumé

L'existence d'une différence sexo-spécifique dans les échanges de regards et contacts visuels dans le cadre d'une interaction dyadique, est bien documentée chez les enfants et les adultes, les femmes établissant plus de contacts visuels que les hommes. Une seule étude (Hittelman et Dickes, 1979) donne la preuve de l'existence de ce comportement chez les nouveau-nés mais ces résultats n'ont fait l'objet d'aucun suivi. L'examen systématique du développement des différences sexuelles dans ce type de comportement pourrait permettre d'élucider les effets différentiels des influences biologiques et sociales sur le développement des comportements sociaux sexo-spécifiques.

Ce projet prolonge et reprend l'étude d'Hittelman et Dickes. Il s'agit d'une recherche longitudinale portant dans un premier temps sur soixante-dix nouveau-nés (32 de sexe féminin et 38 de sexe masculin) âgés de 13 à 112 heures et leurs parents et, dans un deuxième temps, sur 23 nourrissons (9 de sexe féminin et 14 de sexe masculin) et leurs parents, 13 à 18 semaines après la naissance. Les contacts visuels réciproques entre les nourrissons et les deux parents (1 homme, 1 femme) ont été mesurés et les parents ont rempli l'échelle d'évaluation Paston pour mesurer la perception qu'ils avaient des nouveau-nés et des nourrissons, en fonction de leur sexe.

Résultats : (a) aucune preuve empirique de différences sexo-spécifiques dans le premier volet de l'étude; (b) preuve marquée de différences sexo-spécifiques dans le comportement visuel dans la deuxième partie de l'étude indiquant l'apparition d'un comportement sexo-spécifique au début de l'enfance; (c) l'émergence de différences sexo-spécifiques dans le comportement visuel entre la 1ère et la 2e partie de l'étude s'explique exclusivement par un changement radical dans le comportement des nourrissons de sexe féminin; et (d) preuves empiriques établissant un lien entre les croyances sexo-spécifiques des mères sur leur bébé et le comportement visuel sexo-spécifique des nourrissons.

Les résultats font ensuite l'objet d'une analyse dans le contexte théorique de l'apprentissage social et des perspectives biologiques. Cette étude démontre que le comportement sexo-spécifique des nourrissons et les perceptions sexo-spécifiques des mères surviennent très tôt. Les différences observées dans le comportement visuel des hommes et des femmes font intervenir un ensemble complexe d'éléments biologiques et sociaux qui agissent de concert. Les recherches qui seront entreprises sur la question devront être axées sur les forces spécifiques qui conduisent à l'apparition de comportements visuels sexo-spécifiques.

Acknowledgments

Many, many people were involved in helping me navigate the very long road from initial idea to completed dissertation, and to each of them I am deeply indebted and eternally grateful.

Above all, I would like to thank my supervisor, Dr. Gill Rejskind who came into this project in the middle and has been a mentor, a resource for information and inspiration (and at times a much needed kick in the pants), and most importantly an invaluable source of support and encouragement. Gill's calm presence and assistance has been instrumental in helping me bring this project to fruition.

In addition, I would like to thank the other members of my thesis committee, Dr. Maria Ramsay and Dr. Bruce Shore, both of whom provided invaluable suggestions and commentary on the numerous iterations of this manuscript. My heartfelt thanks to Bruce for wearing many hats for me--departmental chair, mentor, thesis committee member, supporter and friend--over the last seven years. And to Maria for providing her knowledge and expertise in neonatology, as well as guidance through the literature on mothers and infants.

Thanks also to Dr. Joyce Benenson with whom I collaborated on the initial stages of this project; to Dr. Bill Bukowski for providing helpful suggestions and commentary on the very early stages of this manuscript; to Dr. Marcy Delcourt for providing me with her insight and expertise on measurement development; and to Dr. Robert Platt for taking time out of his busy schedule to provide me with invaluable statistical expertise and editorial input on the analyses of my data.

The data collection would not have been possible without the help of John Lewis, M.Eng. and my many research assistants including: Rob Ayoup, Laurence Beaumier-Grant, Tracey Camacho, Sandra Carroll, Pierre Chaves, Ellen Sook-Hee Hong, Dina Leftakis, Shawn Mendel, François Nols, Tracy Nugent, Mark Ohashi, Uri Pizarro-Chong,

and Priya Sehgal. I am grateful to John for his friendship, encouragement, and computer programming knowledge. Without his help there would have been no program to record the data. Special thanks to my RA's Rob, Laurence, Tracey C., Pierre, François, and Priya for their support and friendship which kept me sane through the lengthy, labor-intensive, and sometimes dirty process of collecting data from newborns and young infants. And to Tracey C. and Priya for sticking with me from the very beginning when the protocol required the ability to recite prose and tap dance as well as hold and look at infants. Words cannot express my gratitude.

I am grateful for the generous support, cooperation, and assistance of the nursing and administrative staff of the postpartum unit of the S.M.B.D.-Jewish General Hospital. many of whom went above and beyond the call of duty to give me a hand in collecting my data.

In addition, I extend my gratitude to the mothers and fathers who agreed to take time out of the busy first days and months of parenthood to participate in this study.

Financial support was provided, in part, by a grant from the Social Sciences Grants Sub-Committee of McGill University.

Finally, I would like to thank my friends and family, in particular my parents Susan and Joel Leeb and my soulmate Eric Coufal, for their encouragement, support, assistance, and love (not to mention coffee and a forum in which to vent my stress) throughout this long process. Thank you.

Introduction

> Open your eyes. Oh, come on now, open up your eyes . . . If you open your eyes, I will know you are alive. (Mother to her newborn in Klaus, Kennell, Plumb, & Zuehlke, 1970, p. 190)

Eye-to-eye contact with another person, or mutual eye contact, is one of the most salient nonverbal behaviors in human interaction. It is believed to provide a number of important social cues including interest, attention, affiliation and intimacy, approval, dominance and aggression, and openness to personal involvement (Argyle & Ingham, 1972; Brooks, Church, & Fraser, 1986; Exline, 1963; Knackstedt & Kleinke, 1991; for a comprehensive synopsis of the literature see Appendix A). The presence and importance of this behavior in healthy social interactions has been documented by a number of researchers in neonates and infants; preschoolers; school age children; university students and adults; and elderly populations (see Appendix A, Tables A1 to A4; Argyle & Ingham, 1972; Benenson, 1993; Exline, 1963; Hittelman & Dickes, 1979; Levine & Sutton-Smith, 1973; Muirhead & Goldman, 1979; Mulac, Studley, Wiemann, & Bradac, 1987; Robson, Pedersen, & Moss, 1969; Tannen, 1990a; for reviews see Capella, 1981; Henley, 1977; and Kleinke, 1986). Conversely, a lack of eye contact has been found to be present in a variety of psychopathological conditions such as infantile prepsychotic states, childhood autism, mental retardation, and adult neuroses and psychoses (Massie, 1977, 1978; Persson-Blennow, Binett, & McNeil, 1988; Wolff & Chess, 1964).

One of the most striking findings related to mutual eye contact is the presence of sex differences in the duration and frequency of this behavior. In studies using same-age dyads, sex differences have been found in most age groups from young children to adults (Exline, 1963; Kleinke, 1985; Levine & Sutton-Smith, 1979; for further detail see Appendix A). These studies have demonstrated that, in general, females are more likely

than males to engage in mutual eye contact with another person and for longer periods of time, particularly if that person is female (Ashear & Snortum, 1971; Exline, 1963; Exline, Gray, & Schuette, 1965, Mulac, Studley, Wiemann, & Bradac, 1989). In fact, in a dyadic situation involving two males it is likely that both partners will go out of their way to avoid mutual eye contact (Tannen, 1990b).

While sex differences in mutual gaze behavior have been documented in middle to late infancy (e.g., Lasky & Klein, 1979; Robson, Pedersen, & Moss, 1969; Stern, 1974) and early childhood (e.g., Abromovitch & Daly, 1978; Benenson, 1993; Kleinke, Desautels, & Knapp, 1977; Podrouzek & Furrow, 1988; Post & Heatherington, 1974; Thayer, 1977; Vlietstra & Manske, 1981) almost no research has focused on this behavior in early infancy. A single study found evidence this behavior pattern in very young infants (Hittelman & Dickes, 1979), but this piece of research has been virtually ignored, and no research has focused on the genesis of this fundamental behavior pattern. Instead the empirical literature has focused on the salience of mutual gaze behavior in the mother-infant dyad without regard to the potential for sex differences in infant behavior.

In studies of mothers and their young infants researchers have noted that mutual visual regard (i.e., mutual eye-to-eye contact) is one of the earliest channels of communication available to the mother-infant dyad (Greenman, 1963; Haith, Bergman, & Moore, 1977; Moss & Robson, 1968). It is the only communicative channel within their social repertoire over which newborns and young infants have control, and may be at the foundation of human sociability and attachment (Klaus & Kennell, 1976; Klaus, Kennell, Plumb, & Zuehlke, 1970; Rhinegold, 1961; Robson, 1967; Stern, 1974). Most importantly, however, mothers' perception of eye-to-eye contact between herself and her newborn or young infant plays an essential role in the establishment of the mother-infant bond and has been found to be a very pleasurable and reinforcing experience for mothers (Arco, Self, & Gutrecht, 1979; Greenman, 1963; Wolff, 1963).

Given the importance of mutual eye contact in human interaction and the presence of sex differences in this behavior from late infancy onward the question of its origins becomes paramount. Research on the development of sex- and gender-typed behavior has seen a recent resurgence due to the current focus on determining the relative influence of biological and social variables on the development of gendered behavior patterns, and tracing the development of specific gendered behaviors is instrumental in untangling the differential effects of the many forces which influence these behaviors. If, as it has been suggested by numerous researchers, mutual eye contact plays an essential role in the establishment and maintenance of a positive emotional relationship within the adult-infant dyad then the presence of sex differences in mutual gaze behavior early in life is likely to have long-term ramifications for later social behavior.

A crucial area that has been largely ignored in the literature on mutual gaze is: Are gender differences in mutual gaze behavior present at birth and how do biological bases and postnatal social forces interact to produce and reinforce these differences? Study of the development of sex differences in mutual gaze behavior is needed because it can aid in unraveling the differential effects of biological and social influences on the development of gendered social behavior in general, through the systematic examination of a specific and fundamental social behavior: mutual eye contact.

Numerous issues are involved in the study of the origins of any social behavior, and mutual eye contact is no exception. Before the question of whether sex differences in mutual eye contact are present at birth can be addressed empirically, it is necessary to explore the various topics which may have a direct impact on this phenomenon, its importance, and designing a research project to investigate it. Each of the sections in the review of the literature to follow will focus on a specific relevant topic: definition of important terms; the importance of mutual gaze behavior in the mother-infant dyad; infant visual perception; theoretical interpretations of mutual gaze in dyadic interaction; and

methodological considerations in designing a study to investigate mutual gaze in very young infants.

CHAPTER I Review of the Literature

Definition of Important Terms

In the literature on the development of differences in boys and girls the terms sex and gender are often used interchangeably to the great confusion of the reader. They do not, however, mean the same thing. The term "sex" is generally considered to be a biological construct: male or female. It is defined at the chromosomal, hormonal, and most commonly, the genital level, and determination of sex is usually based on primary sex characteristics at birth, that is, external genitalia, and primary and secondary sex characteristics from puberty onward.

Gender on the other hand is a behavioral and social construct: masculinity, femininity, androgyny (neutral) and can be applied to an individual regardless of (biological) sex. According to Money and Ehrhardt (1972), there are two components of gender: gender identity--the understanding of oneself as either male or female; and gender role--one's public expression (behavior) designed to express one's gender identity (the term gender role is often used interchangeably with the term sex role and are assumed to share the same definition). The terms sex-typing and gender-typing may conform to the definitions sex and gender described above but are almost always used interchangeably. All of these terms are relatively clear when applied to children. Children have both sex--they are either biologically male or female, and gender--they can, and do, behave in masculine, feminine, and gender-neutral ways. Subsequently, children can be both sex-typed, that is, categorized according to their biological sex, and gender-typed; categorized according to their masculine or feminine behavior.

These terms become less clear, however, when applied to infants, especially very young infants. Very young infants are judged solely on their sex as they are assumed to

have no repertoire of gendered behaviors. Nevertheless parents and other adults may have gender-typed beliefs and expectations of infants based on an infant's sex.

In light of the myriad of permutations of the terms sex and gender as well as the terms sex-typing and gender-typing I have chosen to use the terms as follows: "sex" refers only to the biological construction of male and female, "gender" refers to the social construction of masculinity and femininity, "sex-typing" refers to categorizations made based on biological maleness and femaleness, and "gender-typing" refers to categorizations made based on masculinity and femininity. In the case of very young infants, the terms sex-typing and gender-typing may be used interchangeably.

The Importance of Mutual Eye Contact in the Mother-Infant Dyad

> Vision affords the sighted child an elementary form of initiative in human partnership long before there can be intention. From the responses of the mother of a baby under 2 months of age, we can say that the baby woos his mother with his eyes. (Fraiberg, 1974, p. 221)

The role of eye-to-eye contact in the mother-infant dyad has received much attention in the empirical literature. It is the first dyadic system of communication over which infants have control and thus, is the earliest channel of dyadic exchange between an infant and its mother. The role of mutual gaze is so fundamentally important that numerous researchers believe that mutual eye contact plays an essential role in the establishment and maintenance of a positive emotional relationship between a mother and her infant.

Adults, and new mothers in particular, report an intense interest in and desire to see the eyes of infants and to have infants look at them. This intense interest is reported by both primiparous and multiparous mothers, mothers of both full- and pre-term infants, as well as nonparents and even children (Klaus, Kennell, Plumb, & Zuehlke, 1970; Schölmerich, Leyendecker, & Keller, 1995). Stern (1974; replicated and extended by Messer & Vietze, 1984) has shown that gaze behavior within the mother-infant dyad works to maintain an optimal level of social exchange between partners. Mothers contribute to the maintenance of mutual gaze by altering their behavior based on changes in their infant's visual attention and state. Furthermore, according to Fraiberg (1974) the mother's perception of infant "looking" releases strong positive feelings relating to being recognized in a personal and intimate way, and mothers find sustained visual regard (i.e., eye contact) by their infant so salient that they believe their infants know or recognize them long before the infant is actually capable of doing so. Indeed, new mothers report intense feelings of pleasure when their infant focuses on their eyes and begins to "see" them (Moss & Robson, 1968;

Robson, 1967). Many researchers believe that the role of eye-to-eye contact is so vital that is should be added to Bowlby's (1958) list of behaviors deemed to be innate "releasers" of maternal caretaking responses (i.e., crying, smiling, following, clinging, and sucking) (Arco, Self, & Gutrecht, 1979; Fraiberg, 1974; Klaus, & Kennell, 1976; Klaus, Kennell, Plumb, & Zuehlke, 1970; Rhinegold, 1961; Robson, 1967; Stern, 1974; van Wulften Palthe & Hopkins, 1984).

Research in the area of blindness highlights the salient ways in which, for sighted individuals, the eyes unite human partners. Fraiberg (1974) describes an "eye language" that is present in sighted infants at birth and provides a nonverbal vocabulary of signs and signals that give a vital sense of discourse to the mother-infant exchange. Sighted infants "woo" their mothers with their eyes and provide signals to the mother which connote greeting, acknowledgment, discrimination, recognition, preference, and valuation.

Blind infants, however, lack this fundamental eye language repertoire to initiate social exchange with the mother and other adults. Even for researchers and clinicians who have worked closely with blind children for extended periods of time there is a "sense of something vital missing in the social exchange [with blind children]" (Fraiberg, 1974, p. 217). The eyes of blind infants do not engage others and new mothers often feel rebuffed by their blind infant and perplexed by their infant's unresponsiveness. As a result, mothers of blind infants believe that their baby has no interest in them and is not friendly; feelings which are likely to have long-term consequences in the mother-infant bond.

It is apparent from the research with both sighted and vision impaired infants that mothers, and other adults, find mutual gaze with a young infant highly rewarding and essential to the development of human partnership. This raises the question of whether newborns and young infants are physically capable of acting in concert with adults to produce true mutual visual regard.

Perceptual Development: What do newborns really see? and Does it matter?

An important issue raised in the study of mutual gaze behavior in newborns and very young infants is the question of prenatal and neonatal perceptual development. There has been much debate regarding newborns' visual abilities, but in general, researchers agree that the visual system lacks maturity at birth and there is rapid development of this system during the first year of life (Aslin, 1987; Banks & Bennett, 1991; Dodwell, Humphrey, & Muir, 1987; Hickney & Peduzzi, 1987; Maurer & Maurer, 1988; Slater & Morison, 1991). There is little consensus, however, regarding newborns' specific visual capabilities, and none of the available research has considered the possibility of differential perceptual development based on the sex of the infant.

Vision is controlled by the visual cortex in the brain and by a variety of motor mechanisms located in the eye itself. The combination of the visual cortex and motor responses of the eye are responsible for accurate visual functioning. There are several areas in which the structure of a newborn's eye and that of a fully developed eye differ. First, in newborns the distance from the cornea (front of the eye) to the retina (back of the eye) is significantly shorter (16-17 mm) than that of the fully developed eye (23-25 mm). The result of a shorter eye is a shorter, or smaller, retinal image, which translates functionally into decreased acuity (Banks & Shannon, 1993; Banks & Bennett, 1991). Depending on the study, the newborn's visual acuity is between 1/3 and 1/10 that of an adult (Aslin, 1987; Banks & Shannon, 1993; Banks & Bennett, 1991; Maurer & Maurer, 1988). Nevertheless, according to Banks and Shannon (1993), the ability of the eye to form a sharp retinal image is assumed to be adult-like.

A second difference is seen in the development of the foveal portion of the retina. Located on the fovea are the rods and cones. These mechanisms are responsible in part for visual acuity and almost entirely for color perception. According to Banks and Shannon (1993), at birth, the nerve cells, that is, the rods and cones, are present but inefficient.

These cells are immature, lacking both the myelin necessary to facilitate neural transmissions, as well as the physical structure to effectively transmit visual information to the cortex of the brain. In addition, these cells have yet to differentiate and the spacing on the cone lattice and between rods is greater than is seen in an adult-like eye. It is believed by some researchers that cell immaturity and greater spacing on the fovea have deleterious consequences in newborns' visual perception (Banks & Bennett, 1991; Banks & Shannon, 1993; Hickney & Peduzzi, 1987). Based on these structural differences many researchers, including Banks and his colleagues (Banks & Bennett, 1991; Banks & Shannon, 1993), conclude that contrast sensitivity, visual acuity, and chromatic discrimination are all significantly reduced in newborns and young infants relative to adult-like visual capacity.

Another important aspect of visual perception is the ability to scan stimuli efficiently and gather necessary visual information from the environment. There is little agreement between researchers in this area as to the degree to which young infants are able to effectively scan complex stimuli containing internal detail. Various researchers have investigated young infants' ability to scan complex patterns, such as faces, in order to determine those aspects of patterns to which infants are responsive (Easterbrook & Amendola, 1998; Ganon & Swartz, 1980; Johnson, Dziurawiec, Ellis, & Morton, 1991; Kleiner, 1987, 1990; Kleiner & Banks, 1987; Lewis, Mondloch, Budreau, Maurer, Dannemiller, Stephens, Kleiner, 1998; Maurer, & Young, 1983; Morton, Johnson, & Maurer, 1990; Thomas, 1973; Valenza, Simion, Cassia, Umiltà, 1996). An enclosure, or externality, effect has been found in which young infants (0-2 months of age) appear to visually scan only the external borders of experimental stimuli while older infants scan both external borders and internal features of stimuli (Salapatek, 1975). As a result, it was believed that prior to two months of age infants do not respond to inner features of complex stimuli within a larger frame (e.g., the eyes within a face). For example, Maurer and Barrera (1981; replicated by Johnson, Dziurawiec, Ellis & Morton, 1991) found that when shown schematic drawings of a human face arranged naturally, symmetrically but

scrambled, and asymmetrically 1-month old infants showed no preference for the natural arrangement of facial features. The authors concluded that these results are due to the fact that young infants limited their visual inspection to the frame in which the features were contained, however this hypothesis was not specifically examined in Maurer and Barrera's (1981) study (Dodwell, Humphrey, & Muir, 1987). Similarly, based on research also using "natural" and distorted drawings of faces, Maurer and Maurer (1988) concluded that although a newborn is able to focus on an object eight to 12 inches away " . . . [the newborn] sees only elements of scenes, one element at a time . . . He will study doggedly your hairline or chin, but he will rarely glance at your nose or mouth, or stare into your eyes" (p. 122).

According to the research cited above, over the first few months the infant's visual world clarifies, deepens, and expands. At approximately two months of age infants begin to attend to internal details, and by 3 to 4 months infants are trichromatic, able to accommodate accurately, and, most importantly, no longer subject to the enclosure effect. According to Dodwell, Humphrey, and Muir (1987) by 12 to 16 weeks postpartum, infants are able to respond to the configuration of elements that define complex stimuli such as faces and are scanning internal and external facial features with concentration on the eyes.

More recent research, using better controlled methodology, has demonstrated that the enclosure effect seen in previous studies may be the result of imperfect methodology rather than limitations in infant visual capacity. In three studies using schematic depictions of faces, Valenza and her colleagues (Valenza, Simion, Cassia, & Umiltà, 1996) clearly demonstrated that neonates prefer to look at a facelike pattern rather than a non-facelike pattern. Further, they showed that when given the choice between a facelike stimulus and a non-facelike stimulus with high perceptual salience, newborns preferred and spent significantly more time looking at the facelike pattern, thus proving that very young infants attend not only to the general form of a stimulus but also to the structural organization of the internal features of that stimulus. Hence, more recent researchers suggest that young

infants may be predisposed to attend to certain social stimuli such as faces, and the eyes may, in fact, have salience to neonates and be an area on which neonates concentrate their visual attention.

Unfortunately, most of the research investigating vision and visual scanning ability in newborns and young infants has used either abstract, simple two-dimensional patterns, photographs or drawings of objects rather than potentially meaningful stimuli in natural contexts. It is possible that newborns' visual capabilities differ markedly for static or rigid, versus non-rigid or biological, features. For instance, when live stimuli (i.e., real faces as opposed to schematic drawings or photographs of faces) are used and/or movement of the stimulus is introduced, young infants are able to detect changes in internal detail with some accuracy (Bower, 1989; Dodwell, Humphrey, & Muir, 1987; Easterbrook & Amendola, 1998; Hains & Muir, 1996; Johnson, Dziurawiec, Ellis, & Morton, 1991; Maurer & Young, 1983). As Muir and his colleagues point out, "static pictures or schematic faces may appear to be 'mindless' to the young infant as they do not engage the infants in communicative behavior and thus understate their perceptual capabilities" (Hains & Muir, 1996, p. 1949). It appears likely that static internal details lack salience for young infants, and that the animation that characterizes a live person is of high attention value for infants (Dodwell, Humphrey, & Muir, 1987). This was further supported in a study in which one-month old infants were habituated to salient compound figures, and were able to detect changes in salient internal details of the stimuli (Ganon & Swartz, 1980).

Further, several studies using live faces as stimuli have demonstrated that neonates and young infants are responsive to the eyes of adults (Arco, Self, & Gutrecht, 1979; Hains & Muir, 1996; Haith, Bergman, & Moore, 1977; Muir, Hains & Symons, 1994). For example, when mothers were instructed to increase the amount of time spent looking into their newborn's eyes during a routine feeding session, it was found that the newborns responded by increasing their visual regard of the mother and consequently mutual eye contact within the dyad was increased (Arco, Self, & Gutrecht, 1979). In addition, Haith,

Bergman, and Moore (1977), using live adult female faces (mother's and an unfamiliar female) as the stimuli, found that three-week old infants spent almost 1/3 (29.8%) of the experimental time looking into the eyes of the stimuli. While this is significantly less time than nine-week old infants, who spent approximately half (50%) of the experimental time looking at the stimuli's eyes, it is nevertheless a distinct portion of the experimental period and demonstrates that the eyes are a salient aspect of the live human face even for young infants. Unfortunately, Haith and his colleagues did not analyze their data for sex differences in gaze behavior. Nevertheless, based on these findings, it would appear that infants younger than two months of age are responsive to the salient internal configurational aspects of figures, such as a live face, and that eye contact, as well as sex differences in eye contact, between a newborn and an adult are possible.

Inasmuch as differences in eye structure and visual scanning ability are important, it is in some ways a moot issue given that it is almost impossible to determine exactly what neonates and young infants actually see. Furthermore, the research in this area has failed to even consider the possibility for sex differences in visual behavior and consequently no empirical data are available regarding the possible timing of the emergence of such differences. Most importantly, however, adults, both parents and non-parents, seek to attract infants' visual attention, perceive infants as making eye contact, and find infant eye contact (regardless of where the infant is physiologically looking) highly rewarding. Thus, if male and female newborns appear to be making differential amounts of eye contact, then it is likely that this will elicit differential patterns of interaction with adults, and hence, differential modes of socialization for males and females beginning shortly after birth.

Theoretical Interpretations of Sex Differences in Eye Contact: Past Research and Theoretical Explanations

Researchers in the area of gender have offered a variety of theories to explain the relationship between sex, gender, and eye contact. The majority of the research in this area has focused on populations of preschoolers through adults and has relied on two theoretical perspectives, social learning and psychobiological theories, to explain the differences and their origins. The use of these theories has shifted over time to reflect the current zeitgeist in the field. This section and the section to follow will each focus on one of these theoretical approaches.

Most researchers, unfortunately, provide explanations that are simply descriptive of the phenomenon and give little insight into the reason for the sex differences. For instance, in a study exploring developmental changes in gaze duration Ashear and Snortum (1971) found that there were both significant age and sex differences in eye contact such that, in general, females and younger children maintained greater duration of eye contact with the interviewer. Unfortunately, in their discussion the authors make no attempt to explicate the genesis of this behavior pattern and simply state that their results support the hypothesis of differential patterns of eye contact for boys and girls. While this is true, it does little to enlighten the reader about the origins of this interesting behavior pattern.

Social Learning Theory

One theory that has been widely applied to the development of sex differences in various behaviors is social learning theory. As conceptualized by Bandura (Bussey & Bandura, 1984), a pioneer in research in this area, social learning theory holds that the development of sex differences, like development overall, is "promoted through a vast system of social influences" (p. 1293), in which all social behavior is the result of powerful forces, for example adults, structuring the environment such that culturally appropriate sex-typed behaviors predominate. Young children learn behaviors appropriate for their sex

through direct, personal experiences such as mimicking behavior performed by others receiving positive reinforcement (e.g., praise) or negative reinforcement, as well as through vicarious experiences: observed consequences to others performing similar behavior.

The majority of research related to the development of sex differentiated behavior and activities has focused on the effects of parents and other adults on infants and toddlers (Bell & Carver, 1980; Fagot, 1978; Fagot & Hagan, 1991; Korner, 1974a, 1974b; Maccoby & Jacklin, 1974; Maccoby & Rothbart, 1966; Meyer & Sobieszek, 1972; Seavey, Katz, & Zalk, 1975; Sidorowicz & Sparks-Lunney, 1980; Smith & Lloyd, 1978; Snow, Jacklin, & Maccoby, 1983; Will, Self, & Datan, 1975). In an extreme use of the social learning approach genotypic male infants were socialized as females. In this case, a team of pediatric specialists created a parent counseling program designed to help parents socialize 46-XY (male) neonates born with abnormal and ambiguous genital development (pseudohermaphrodites). These infants were assigned to the female sex and socialized to become girls/women with normal female gender identity (Slijper, Drop, Molenaar, & Scholtmeijer, 1994). The belief behind the reassignment of sex from chromosomal male to physiological female was that gender identity and gender roles are learned phenomena and are therefore plastic and subject to alteration through appropriate socialization. Unfortunately, at the one year follow-up of these children no judgments regarding gender identity could be made because the girls were still too young. However, in a later study investigating the long-term psychological outcomes of intersex children (including the participants from the 1994 study; Slijper, Drop, Molenaar, & de Muinck Keizer-Schrama, 1998) numerous judgments were made and conclusions drawn regarding the success of socializing normal gender identity development in children whose sex was reassigned at birth. The results of this study will be discussed later.

However, earlier research on sex reassignment in hermaphroditic babies appeared to demonstrate that genotypically male infants reassigned to the female sex (with surgically corrected female genitalia) could be expected to "differentiate a female gender identity, in

agreement with [the] sex of rearing" (Money & Ehrhardt, 1972, p. 123). Money and Ehrhardt described a case of sex reassignment of one twin from boy to girl at 17 months of age (due to the accidental burning of his penis at 7 months of age). The parents were given both medical and psychological support and guidance, and during the six years of follow-up reported that both children had developed gender-typed behaviors and attitudes in accordance with their phenotypic appearance (Money & Ehrhardt, 1972; Money & Tucker, 1975). Results of continued follow-up of this case history will be discussed later.

Gender Labeling

The Baby X study (Seavey, Katz, & Zalk, 1975) brought the social learning approach into the popular literature. This study, and its replication (Sidorowicz & Sparks-Lunney, 1980), demonstrated that labeling the same 3-month old infant as either a girl or a boy elicited both male and female adults to interact with the baby using sex-stereotyped toys appropriate for the experimental gender of the baby. Stereotyped behavior was elicited despite all adults claiming to believe that few, if any, differences between the sexes exist, and that they personally would not treat male and female infants differently. It was also found that when given no gender information about the infant and asked to guess the baby's sex all adults relied on and justified their answers using stereotyped behavioral or physical cues like fragility and strength.

The authors concluded that the results of their study suggest that gender labels and expectations associated with these labels are "deeply ingrained, even in individuals who try hard to be liberated" (p. 108). Further, it was concluded that differences, if any, in infant behavior are less important at early developmental levels than adults' differential expectations of infants' behavior in determining interactions.

Like the Baby X study, the majority of research on social learning theory and infants focuses on the effects of gender on toy preference using infants aged three-months and older as either subjects or stimuli, thus providing little information on the effects of gender stereotyped expectations on younger infants and adults in their environment.

However, two studies have shown that parents begin to differentially label their infants as a function of the infant's sex shortly after birth (Reid, 1994; Rubin, Provenzano, & Luria, 1974; Leeb & Rejskind, 1997, 1998). Using parents and their own newborn, Rubin et al. demonstrated that both mothers and fathers within the first 24 hours postpartum were already significantly more likely to describe their newborn along sex-stereotyped lines with daughters described as little, beautiful, pretty or cute, and resembling mother, and sons described as big, strong, and hardy.

Similarly, in a more recent study of maternal sex-stereotyping of newborns, Reid (1994) found that despite the cultural focus on, and efforts to, reduce sex-stereotyping since Rubin and his colleagues did their study, mothers of male newborns described their infants as "tall and large," athletic looking, and "phlegmatic," where as mothers of female newborns describe their infants as "small," looking unathletic, and "emotive." She concluded that sex-stereotyping of newborns is still a prevalent practice:

> . . . infants are born into a world where they are prejudged on at least four characteristics judged either present or absent purely as a function of gender. These four gender-discriminating characteristics seem reflective of the more firmly entrenched, most popular sex-stereotypes of today's male and female. (p. 1450)

Social Learning Theory and Eye Contact

While the research on children's toy preference as well as the expectations and perceptions of adults is extremely thorough, little research concerning the socialization of other gendered behaviors, such as mutual eye contact, has been done. Among the researchers who have studied sex differences in eye contact, the majority have used a social learning theory explanation in which eye contact is a component of the feminine role acquired by girls through either cultural forces, peer relationships, or within the nuclear family (Kleinke, Desautels, & Knapp, 1977; Levine & Sutton-Smith, 1973; Pilkonis, 1977; Podoruzek & Furrow, 1988; Post & Heatherington, 1974; Russo, 1975; Tannen, 1990a; Vlietstra & Manske, 1981). A good example of the use of social learning theory in

this context was provided by Pilkonis (1977) in his study investigating the behavioral consequences of shyness in university students. The study involved an unstructured conversation with a confederate of the opposite sex, and a structured interaction in which the participant was required to prepare and deliver a short speech.

Both gender and degree of shyness affected eye contact in such a way that shy males had the lowest frequency of mutual eye contact with the confederate while "not shy" males had the greatest frequency of mutual eye contact. This would appear to contradict other findings that females are more likely than males to engage in eye contact (Ashear & Snortum, 1971; Exline, 1963; Exline, Gray, & Schuette, 1965; Tannen, 1990a). However, in this study, eye contact was confounded by sex of the confederate: all interactions were with a confederate of the opposite sex. Research has found that in cross-sex interactions males and females may not conform to the same mutual gaze patterns seen in same-sex interactions (Argyle & Ingham, 1972; Mulac, Studley, Wiemann, & Bradac, 1987). In addition, it appears that duration rather than frequency best discriminated between males and females and, in fact, Pilkonis found that regardless of level of shyness, overall, females sustained longer durations of mutual eye contact with the confederate than males. Pilkonis explained his results by saying that shyness was expressed differently by adult males and females because of the normative roles each sex is "required" to play. Unfortunately, he ignored the fact that sex differences in the duration of eye contact appear to be independent of the degree of shyness, thus causing one to question his social learning interpretation (for details regarding other studies using a similar perspective, not discussed in the preceding section, see Appendix A).

Attempting a Departure From Social Learning Theory: Developmental Theories

Other researchers have used either younger children as subjects or have taken a developmental perspective in the study of sex differences in mutual gaze behavior (Kleinke, Desautels, & Knapp, 1977; Levine & Sutton-Smith, 1973; Post & Heatherington, 1974; Tannen, 1990a; see Appendix A, Tables A2 and A3). The assumption behind using young

children as research participants is that there will have been less time for socialization to occur and as a result degree of mutual eye contact will be less tainted by social mores. In the developmental perspective it is believed that the effects of socialization are cumulative and will increase in strength with age, thus allowing researchers to see the longitudinal effects of socialization and isolate socialization from other determining influences on gaze behavior. Many researchers have used these approaches to investigate eye contact and the following studies provide a representative sample of the empirical research that is available in this area.

In her research on physical alignment and topical cohesion, Tannen (1990a, see Appendix A, Table A3) used a developmental approach in examining videotapes of eight pairs of friends (N = 16), two pair at each of four age levels, engaged in a 20-minute conversation. Participants were instructed to discuss "something serious or intimate" and were seated in chairs placed at right angles to one another in the experimenter's office.

Although Tannen did not approach this study with the intention of examining gender differences or mutual eye contact, the degree to which the sex differences in eye contact were manifested made a striking impression on her. She found that while all participants sat in the chairs to talk they did not necessarily orient themselves according the constraints of the chairs. Females, at all ages, were more likely to turn their bodies (but not the chairs) to face each other, while males were more likely to align themselves so they did not face one another. In an extreme case a pair of boys (age 15) aligned themselves in such a way that they were both facing straight ahead as if they were riding in a car. Related to this, Tannen found that female subjects anchored their gaze on their partner's face and although the females would look away, their gaze always returned to their partner. Males, on the other hand, anchored their gaze elsewhere in the room and only occasionally looked their partner in the eye.

Like Pilkonis (1977), Tannen uses social learning theory to explain her results. She agrees with Pilkonis' belief that females learn an affiliative sex role and defined the

feminine sex role as a drive for intimacy and connection with others (Tannen, 1990b). Conversely, she defined the masculine sex role as a pursuance of power and status in a hierarchical friendship network. Tannen, unlike Pilkonis and many other researchers, provided a thorough explanation of the genesis of the striking sex difference. She proposed a cross-cultural view of gender differences based on a model of cross-cultural communication provided by Gumperz (1982, in Tannen 1990a). According to Tannen, Gumperz demonstrated that individuals from different cultural backgrounds use different conversational and contextual cues. Because individuals in cross-cultural interaction are unfamiliar with the other's cultural cues, these cues are likely to be misinterpreted or missed entirely (Tannen, 1990a, 1990b).

Although this is not a new theory, Tannen's application in the context of sex differences is unique. She proposed that males and females learn their interaction patterns from their parents, and more importantly, from their peers in the context of their peer group. This is consistent with Maccoby's (1990) belief that the influence of peers on sex-typed behavior patterns, such as mutual eye contact, is much stronger than the influence of parents and other adults. In support of this assertion, it has been found that although boys and girls sometimes play together, they spend most of their time playing in self-segregated same-sex groups (Maccoby, 1988; Martin, 1999; Tannen, 1990a, 1990b). Not only are these groups defined in relation to gender but also in relation to structure. Boys tend to play in large groups that are hierarchical in nature such that there is a constant jockeying for position and status within the group. On the other hand, girls play in dyads or triads that are focused on intimacy and best friendship with little concern for status or position within the group (Benenson, 1990; Tannen, 1990b). This sex difference in play networks has been documented in children as young as age 5 (Benenson, 1995).

According to Tannen (1990a, 1990b), because males and females spend most of their time in same-sex interactions they learn patterns of social interaction that are unique to their same-sex peer-group. As a result males and females evolve different habits for

signaling intentions and understanding, and develop separate norms for establishing and displaying conversational involvement. Thus, Tannen believed that the sex-segregated peer-groups should be considered different cultural environments in which the conversations of male and females are guided by different norms: intimacy and involvement for females (as displayed by direct physical alignment, physical proximity, and mutual eye contact) and power and status for males (as displayed by the lack of physical alignment and physical proximity, as well as little mutual eye contact).

Although Tannen's explanation was thorough, it is difficult to support such an overarching conclusion based on such a small sample. Additionally, the fact that the subjects were friends may have confounded the outcome of her study. Tannen's results could be related to the structure of these particular friendships rather than to generalized interaction patterns. Further, because the participants were instructed to discuss something serious it is difficult to extend the sex-segregated behavior pattern seen in this context to all other contexts. It is possible that the sex-difference is dependent, not only on the level of friendship within the dyads, but also on the task in which the participants were involved.

Unlike Tannen (1990a), Levine and Sutton-Smith (1973, see Appendix A, Table A3) did explore the differential effects of task, as well as age and sex on the participants' behavior during dyadic interaction with an unfamiliar peer. These authors published an excellent study, also using a developmental perspective, in which they investigated several correlates of gaze behavior in a group of participants in same-sex dyads ($\underline{N} = 96$) ranging in age from four years to adult. Four age groups, each containing 24 individuals, were chosen to correspond to periods of development that might be related to gaze behavior. In order to control for degree of familiarity between participants, individuals were randomly assigned to same-sex, same-age dyads, and all participants were acquainted but not friends.

Like Pilkonis (1977), Levine and her colleague used two content conditions. The first condition was an unstructured conversation in which participants were told to get to know one another better. These instructions did not limit the conversation to serious or

intimate topics as was done in Tannen's study. The second condition was a joint construction task where the participants were given blocks and instructed to "build anything you want together."

In general, the results supported previous findings: Female subjects made more eye contact overall and while speaking (but not while listening) than male subjects. In addition, in the conversation task there was a significant increase in mutual eye contact with age for both males and females. Interestingly, the authors found mutual eye contact to be highly dependent on task with significantly more eye contact occurring during the conversation task than during the building task. In fact, it was found that although females of all ages made significantly more eye contact during conversation than males, their gazing behavior did not differ significantly from males during the construction task.

The authors concluded that the amount of mutual eye contact between peers is age-dependent, because duration of mutual eye contact increased with age for both males and females, and that many factors influence gaze behavior at all ages, but the influence and potency of these factors varies with age. Because of the situational specificity displayed by task, Levine and Sutton-Smith proposed that the influence of task on gazing indicates that task prevails over gender-typed norms. While it may be true that mutual gaze is somewhat task dependent, it would appear, nevertheless, that although mutual eye contact decreases during the construction task there is still a trend for female subjects to participate in more mutual eye contact than males at all ages except 10 (males, age 4, $\underline{M} = 1.15$ sec., females, age 4, $\underline{M} = 2.6$ sec.; males, age 7, $\underline{M} = 0.3$ sec., females, age 7, $\underline{M} = 3.9$ sec.; males and females, age 10, $\underline{M} = 0.2$ sec.; adult males, $\underline{M} = 0.9$ sec., adult females, $\underline{M} = 2.1$ sec.). It is possible that the degree of influence of task over gender is weaker than Levine and Sutton-Smith asserted. Additional research is needed to clarify the influences of gender-typing and task.

Other Theories

Other theories that have been put forth to explain the relationship between sex and mutual gaze behavior appear on the surface to provide an explanation that is not dependent on socialization and normative gender roles. For example, various researchers support an intimacy-affiliation theory in which females are simply more affiliative than males and thus more often use cues for affiliation, such as mutual eye contact (Argyle & Ingham, 1972; Benenson, 1993; Daly, 1978; Knackstedt & Kleinke, 1991; Mulac, Studley, Wiemann, & Bradac, 1987; Muirhead & Goldman, 1979; Vlietstra & Manske, 1981). Several other authors cite a sex difference in emotional intensity as the basis for sex differences in mutual eye contact (Brooks, Church, & Fraser, 1986; Kimble, Forte, & Yoshikawa, 1981; Vlietstra & Manske, 1981). These researchers believe that mutual eye contact indexes the intensity of the emotions being displayed in an interaction between two people. Different interaction contexts elicit differential patterns of response for males and females, such that females show more emotional intensity, that is increased mutual eye contact, in intimate interactions, while males show more emotional intensity in an aggressive or power related interaction. A third group of researchers support a model in which girls have accelerated perceptual development and surpass their same-age male peers in displaying certain sex-typed behavior (Abromovitch & Daly, 1978; Hittelman & Dickes, 1979; Robson, Pedersen, & Moss, 1969; Thayer, 1977).

Regrettably, none of these theories sufficiently explicates the genesis of the sex differences, and in fact, each of the theories can be traced back to a social learning model in which males and females learn dichotomous gender typed behavior patterns from individuals in their environment. It would appear that despite researchers' attempts to establish a causal link between mutual gaze behavior and the factors supposedly free from the influences of socialization, none has been able to do so.

Theoretical Interpretations of Sex Differences in Eye Contact: Recent Research and Psychobiological Explanations

Several previous studies relating to the successful development of accordant gender identity in individuals whose sex was reassigned at birth were discussed in the previous section (Money & Ehrhardt, 1972; Money & Tucker, 1975; Slijper, Drop, Molenaar, & de Muinck Keizer-Schrama, 1998; Slijper, Drop, Molenaar, & Scholtmeijer, 1994). In these cases it was assumed that raising a child with a physical intersex condition (e.g., pseudohermaphroditism) as a member of the assigned sex, regardless of whether the assigned sex was discordant with the child's genotype (e.g., XY chromosomal configuration reared as a girl), would be sufficient for normal gender identity development to the assigned sex. This assumption was based on the social learning theory belief that one's conceptions of gender identity and gender role were socially learned phenomena. In one well known and oft-cited case a biologically male monozygotic twin was reassigned to the female sex (due to the accidental burning of his penis at seven months of age). At the six-year follow-up of the twins it was reported that both children had developed gender-typed behaviors and attitudes in accordance with their phenotypic appearance (Money & Ehrhardt, 1972; Money & Tucker, 1975). However, although raised as a girl, at puberty the intersex child found that he could not identify with the female sex, and requested sex reassignment to the male sex beginning at age 14 (Diamond, 1982, 1996, 1998; Diamond & Sigmundson, 1997; Zucker, 1996). Similarly, in their long-term psychological outcome follow-up of intersex children (Slijper, Drop, Molenaar, & de Muinck Keizer-Schrama, 1998), Slijper and colleagues found that pseudohermaphroditic individuals are likely to develop gender identity disorder if assigned to the sex not in accordance with their genotype. As such, these researchers and others recommend that sex assignment take into consideration an individual's diagnosis, and assignment to the sex opposite the

chromosomal sex be avoided (Diamond, 1982, 1996, 1998; Diamond & Sigmundson, 1997; Slijper, Drop, Molenaar, & de Muinck Keizer-Schrama, 1998).

From these examples, it is apparent that socialization is not the only force, nor may it be the most important force, by which individuals develop gender role behavior and gender identity. In fact, as these outcomes demonstrate, the burden to develop a gender identity and gender role behavior discordant with pre- and postnatal biological forces produces stress which, in a genetically vulnerable child, results in psychological maladjustment. Thus, biological forces are evidently a powerful influence on the development of sex-typed behaviors.

Biological and Psychobiological Theory

Biological and psychobiological theories related to the development of sexually dimorphic behavior in humans focus on the biological determinants responsible for sexually differentiated patterns of behavior: for example, structural differences in the brain, gonadal hormones, and genetic influences. The cornerstone of this theoretical approach is that the precursors for behavioral differences exist or develop in utero and contribute to the subsequent development of sex and gender differentiated patterns of behavior later in life. Therefore, specific developmental outcomes are hard-wired such that developmental sequela will manifest over time regardless of their overt presence or absence at birth or any attempt to alter their developmental course. This approach was brought to the fore in the early 1970's with the publication of Money and Ehrhardt's (1972) book Man & woman, boy & girl, in which the authors brought together data and concepts from a variety of disciplines including, genetics, embryology, neuroendocrinology, endocrinology, neurosurgery, social, medical, and clinical psychology and social anthropology to form a coherent theory of the ontological development of physical and behavioral sexual differentiation. Unfortunately, due to other theoretical influences this approach received little attention outside the medical research community for the decade succeeding the publication of this pioneering work.

In the early 1980's there was a shift away from the traditional deterministic nurture (as opposed to nature), or social learning, approach to understanding behavior which was popular during the 1960's and 1970's. This shift initially took place in academia and precipitated renewed interest in the earlier work of Money and his colleague. In recent years this shift has also gained momentum in the popular culture: "For their part, those who continue to squeak (sic) that maybe nurture and the prevailing culture exert an enormous effect on human behavior are dismissed as politically correct, scientifically naive, yesterday's news or in a dangerous state of denial" (Angier, 1994, *The New York Times*).

The majority of the early research in biological and psychobiological theory focused on the development of sexually dimorphic behavior in a variety of animal species such as songbirds, primates, and rodents (Arnold & Gorski, 1984; Beatty, 1979; MacLusky & Naftolin, 1981; for brief review see Blum, 1997). This research demonstrated that gonadal hormones play a significant role in the development of sex differences in brain and central nervous system structure and function as well as subsequent sex-typed behaviors in these various species. However, although animal studies reveal the complex ways in which hormones effect behavior, replicating or extending this research to humans is difficult due to the obvious ethical and moral issues involved in genetically altering human beings.

Human genetic disorders, resulting either from naturally occurring genetic mutations or from drug-induced genetic mutations (usually drugs prescribed to pregnant women to prevent miscarriage during pregnancy), provide a unique opportunity to investigate hormonal influences on sex-typed behaviors in humans, thus circumventing the moral and ethical issues involved in replicating animal studies in humans. As was done by Money and Ehrhardt (1972), many contemporary researchers are investigating the effects of the brain, genetics, and hormones on differential patterns of behavior, such as sexual orientation, intelligence, and childhood play behaviors in groups of humans with specific genetic disorders such as congenital adrenal hyperplasia (CAH), androgen insensitivity syndrome, Turner Syndrome, idiopathic hypogonadotropic hypogonadism and infants

exposed to diethylstilbestrol (DES) in utero (Berenbaum, Korman, & Leveroni, 1995; Berenbaum & Snyder, 1995; Blum, 1997; Leveroni, Korman, & Berenbaum, 1996; LeVay, 1991; Meyer-Bahlburg et al., 1995).

Studies of Children with Congenital Adrenal Hyperplasia (CAH)

By far the most widely-studied genetic disorder relative to sex differences in social behavior is congenital adrenal hyperplasia (CAH). The study of this genetic disorder is popular because it is known that these individuals have been exposed to high levels of masculinizing hormones during specific prenatal and perinatal periods considered critical for brain development. Additionally, with optimal postnatal treatment, the hormone levels in individuals with CAH are returned to normal very quickly after birth thus preventing further hormone related changes (Berenbaum, Korman, & Leveroni, 1995). As such, it is possible to pinpoint with some accuracy, though not the same accuracy seen with experimental hormone manipulation in animal studies, the timing of the hormonal effects on specific gendered behavior.

Research in this area has indicated that there may be a genetic predisposition for many of the sex differences that in the past have been seen as sequelae of socialization, for example, play behaviors, activity level, and toy preference. Past research has found that boys have a higher physical activity level than girls, prefer rough-and-tumble play, and enjoy playing with toys that allow for greater gross motor movement (e.g., cars, trucks, toy guns). Girls on the other hand, do not display such behavior and when given a choice, prefer to play quietly with significantly less rough interaction (Huston, 1987; Martin, 1999). However, in an early study of the effects of prenatal androgen Money and Ehrhardt (1972) found evidence of androgen related changes in sex typed behavior: Girls exposed prenatally to high levels of androgen, such as girls with CAH, were found to participate in significantly more male sex typed behavior, and were typically described and described themselves as tomboys.

These findings are supported by several recent studies of children with CAH (Berenbaum & Hines, 1992; Berenbaum & Snyder, 1995; Hines & Kaufman, 1994). In one study, Berenbaum and Hines (1992) investigated the toy preferences of children, ages 3 to 8 years, with CAH and their unaffected same-sex, age-matched relatives. The children were brought to the study individually, presented with a roomful of toys (categorized as female-preferred, male-preferred, and neutral) and told to play with the toys in any manner they wished. While playing, each child was videotaped for 12 minutes. Large differences in toy preferences were found between CAH girls and unaffected female controls, but not between CAH boys and unaffected male controls. CAH girls played more with boy's toys and less with girl's toys than control girls. In fact, the play behavior and toy preferences of the CAH girls was more similar to that of the control boys than it was to that of the control girls. The authors suggest that exposure to high levels of androgen during prenatal development may indirectly affect toy preference in girls through changes to the girls' activity level, motor skills, abilities, or temperament.

In conjunction with Berenbaum and Hines' (1992) study, Hines and Kaufman (1994) investigated rough-and-tumble play behavior and sex of preferred playmate in the same sample of children with CAH and their unaffected same-sex relatives. In this part of the study, children were asked to bring a playmate of their choice to the study and each pair of children (subject and playmate) was videotaped playing together for 12 minutes in a context which, the researchers believed, would encourage active, rough-and-tumble play behavior.

Hines and Kaufman's findings are similar to those of Money and Ehrhardt's (1972) earlier findings concerning androgen related changes in sex-typed behavior in girls, and Berenbaum and Hines' (1992) findings regarding toy preference: Increased exposure to prenatal androgen was related to small, but significant changes in sex-typed behavior in girls. Although surprisingly small, the CAH girls showed a slight but significant increase over normal girls in rough-and-tumble play behavior. Unlike Berenbaum and Hines,

however, changes in sex-typed behavior patterns were also found in boys with CAH. The CAH boys in this study displayed significantly lower levels of rough-and-tumble play behavior than unaffected boys.

In relation to sex of preferred playmate, CAH boys were similar to control boys in the number of same-sex playmates with whom they preferred to play. Conversely, CAH girls indicated that almost half of their most frequent playmates were boys. This result was significantly different than that found for control girls, who reported that only 11% of their most frequent playmates were boys. However, despite this reported difference in preferred playmate the majority of the CAH girls invited a same-sex playmate to participate with them in the study. The authors believe that the discrepancy between preferred playmates for CAH girls and the playmates brought to the study could account for the small findings related to the display of masculine sex-typed behaviors, and suggest that when interacting with same-sex peers the CAH girls conform to the normative style of playing. Further, it is suggested that the CAH girls might have behaved quite differently if they had been instructed to bring a male friend to the study. A more recent study by Berenbaum and Snyder (1995) also found that some girls with CAH report a preference for male playmates: however, most of the CAH girls in this study reported preferring female playmates. The authors suggested that this may be the result of social pressure on girls by both their male and female peers to behave in a female-typical manner contrary to their preferred, less typical (and biologically determined) manner of behavior, thus demonstrating the social malleability of biologically determined behavior.

Other Studies

Other studies have focused on the anatomy of sexual dimorphism in the brain structure of men and women of different sexual orientations (behaviorally based research is also being done in this area by a number of researchers, cf. Bailey & Zucker, 1995; Berenbaum & Snyder, 1995). Sex differences in brain structure have been found in several areas including the preoptic-anterior hypothalamic area. While this area is not directly

involved in gaze behavior it is an area of the brain known to be involved in the regulation of male- and female-typical sexual behavior (Allen, Hines, Shryne, & Gorski, 1989). Recent research by LeVay (1991) has extended the work by Allen et al. (1989) to compare structural differences in the brains of heterosexual women, homosexual men, and heterosexual men. In his 1991 study, LeVay found evidence of a likely biological substrate for sexual orientation in the hypothalamus region of the brain (specifically the interstitial nuclei of the anterior hypothalamus, INAH). While parts of the INAH had previously been shown to be sexually dimorphic (Allen et al., 1989), LeVay found that a small group of INAH neurons (INAH 3) exhibited a different type of dimorphism: INAH 3 was found to be dimorphic with sexual orientation. The volume of this group of neurons was significantly larger in heterosexual men than it was in either heterosexual women or homosexual men. On the other hand, no difference in the size of INAH 3 was found between homosexual men and heterosexual women leading LeVay to conclude that the INAH 3 of men is dimorphic with regard to sexual orientation but not with genotypic sex. Because LeVay's research was done using tissue samples from adult brains it is unclear whether the differences he found existed at birth or if they developed later. However, since homosexual behavior has been shown to be a relatively stable trait LeVay believes it is likely that the structural differences in the brain and the related behavioral pattern are shaped in utero (Nimmons, 1994).

Although the studies described in the preceding sections provide a window into possible biological influences on gendered behavior patterns they are not free from the confounds of socialization. While it is possible that the precursors for the sex-typed behavior patterns studied in children with CAH are present at birth it is difficult to establish empirical evidence for this since this behavior does not manifest itself until the children are significantly older. Additionally, children with CAH are raised by parents who are not blind to the sex of their children and consequently socialize them accordingly, whether consciously or unconsciously. Furthermore, while individuals generally enact only one,

usually congruent, gender role, they are raised in a social environment in which they are exposed to and learn both gender roles regardless of their biological sex. Nevertheless, given the current trend toward empirical research in behavioral genetics (i.e., psychobiology) and the empirical findings described above, it seems that other stable, sex-typed behavior patterns such as mutual eye contact may have as yet undetected biological substrates. This assumption requires, however, that sex differences in mutual gaze behavior be present at birth. If sex differences in gaze behavior are present at birth then the tendency for females to engage in more mutual eye contact than males could be a prewired sex-typed behavior pattern that is the result of prenatal hormonal influences on brain structure.

Evidence for a Possible Biological Basis for Sex Differences in Mutual Gaze Behavior

An important study supporting the possibility that mutual gaze behavior may be a prewired sex-typed pattern resulting from prenatal hormonal influences on brain structure was conducted by Hittelman and Dickes (1979). They investigated sex differences in gaze behavior of infants far too young (24-60 hours postpartum) to have been influenced by social and cultural forces. In their study, sex differences were measured in duration and frequency of neonatal mutual eye contact time with an unfamiliar female adult. Eye contact referred "only to the infant's gaze behavior since the adult was instructed to gaze at the infant continuously in an effort to control adult input" (p. 176). Thus, whenever the infant's eyes met the interacter's eyes the interacter recorded mutual eye contact. At the end of the interaction the interacter was asked to rate the infant as to how attractive, appealing, cuddly, and responsive the infant seemed to be. The interacter was also asked to guess the neonate's sex. Although Hittelman and Dickes did not design their study specifically to address the biological substrates of mutual gaze behavior, their study, nevertheless, provides preliminary evidence for this possibility.

Sex differences were found in mutual eye contact, with females engaging in more eye contact with the interacter than males. Although the distributions of seconds of male and female eye contact time were found to overlap, males' scores tended to fall in the lower end of the distribution with almost half of the males' scores falling below the lowest female score. Further, females' greater amount of eye contact was found to be primarily accounted for by the duration of eye contact and no significant sex differences were found in frequency of eye contact with the interacter. This finding mirrors findings related to mutual gaze behavior in older children and adults.

Unfortunately no research has been done to follow-up the intriguing findings of Hittelman and Dickes, and due to problems inherent in their study, no definitive conclusions can be drawn from their results. Studies using adults have demonstrated that patterns of dyadic interaction vary with the gender composition of the dyad (Brooks,

Church, & Fraser, 1986; Exline, 1963; Knackstedt & Kleinke, 1991). Hittelman and Dickes had infants interact with only one unfamiliar female adult and, as such, it is impossible to discern whether there are differential effects based on the sex of the interacter, or as a result of idiosyncratic bias by this specific interacter. Further, the interacter was asked to rate each baby on attractiveness, appeal, cuddliness, and responsivity, but no rationale was provided, nor were any hypotheses presented for the interacter's ratings. It is possible that the interacter's subjective impressions of the baby affected her interaction with the infant. Finally, the authors did little in the discussion of their findings to explore the potential origins or biological implications of sex differences in mutual gaze in neonates. They simply suggested that the sex difference could be the result of a temporary manifestation of female newborns' greater perceptual development, and the difference, even if it is temporary, could influence socialization of infants by the mother. It is possible in light of what is now known relative to the biological development of other sex-typed behaviors, that the presence of a specific sex-typed behavior pattern in neonates may be an indicator of biological precursors for this specific sex-typed behavior pattern. Further research would help to clarify this possibility.

Methodological Considerations in Studying Young Infants' Mutual Gaze Behavior in a Naturalistic Setting

The measurement of mutual eye-to-eye contact between adults and newborns and young infants poses unique methodological problems which are rarely explored in the literature. While researchers commonly use the terms "eye-to-eye contact," "eye contact," and "mutual gaze" to describe the adult-infant interaction what they are most often measuring is face contact in which one or both partners in the interaction gazes at the face of the other (Cohn & Tronick, 1987; Fogel, Young Dedo, & McEwen, 1992; Moss & Robson, 1968; Peery & Stern, 1976; Rosenthal, 1984; van Wulften Palthe & Hopkins, 1984). Additionally, this literature typically relies on third-person observation of the adult-infant dyad to determine when the infant is gazing at the adult's face. For example, in his research on mother-infant play Stern (1974), using third-person observation of the mother-infant dyad identifies a specific, "special" type of mutual gaze "the long 'loving' mutual looks between mother and infant . . . [which] often has the aura of a very quiet magic moment" (p. 209). Although the observers were able to pick up on the specialness of this mutual gaze it is difficult to say whether mutual eye-to-eye contact has occurred because it is impossible for observers to get close enough to the dyad, without disturbing the interaction, to determine actual eye behavior. As Haith and his colleagues (1977) pointed out, third-person observation can validly determine when the baby looks at the general face area of the adult but not when the baby is looking at the adult's eyes. Indeed, researchers reported that it is easy to obtain high inter-observer reliability correlations for determining when one member of a dyad looks at the face of the other. But, it is eye contact, not face contact, that mothers report as being rewarding and pleasurable.

Haith, Bergman, and Moore (1977) suggested one way to precisely measure eye contact. Using two video cameras, a video mixer, a mirror, and eight illuminators and

lamps the researchers designed a way to determine when the right eye of an infant was looking at the eyes of the mirror image of a female adult (baby's mother and a stranger).

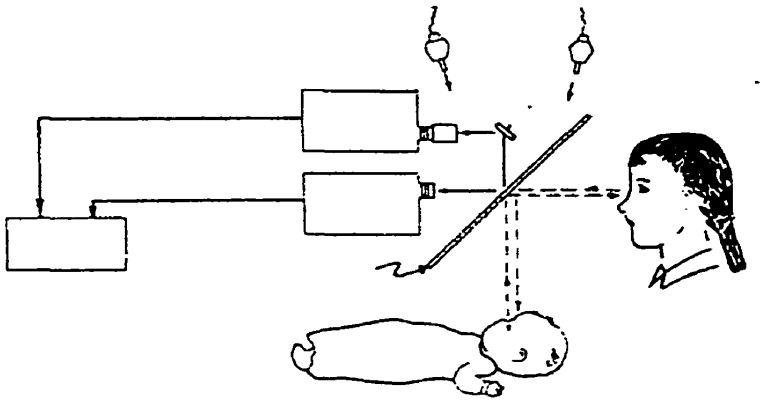

Figure 1. Apparatus used by Haith et al. (1977) to record mutual gaze behavior in an adult-infant dyad

While this is an ingenious piece of apparatus, there are several problems with it. First, it is impractical: The expense in recreating and implementing a set-up such as this is prohibitive. Furthermore, this apparatus requires space, which is often at a premium. Second, this type of apparatus in not viable in light of newborns' visual capabilities. The mirror used to create the mirror image of the adult was placed 40.6 cm (16.25 in.) away from the infant's face. Newborns are unable to focus or fixate on images placed at a distance greater than eight to 10 inches. To put the mirror closer to the infant than Haith et al. did would potentially be distracting to the infant. Third, Haith and his colleagues use this apparatus to track the visual scanning patterns of the infant's right eye only. Because infants have the capability for stereoscopic vision it can be assumed that the left eye is following the right. Nevertheless, the potentially influential element of naturalism is certainly missing. Finally, the literature suggests that there is an important naturalistic, affective component of the adult-infant interaction that is likely to be overlooked using data based on strict experimental methodology (Hains & Muir, 1996; Muir, Hains, & Symons, 1994; Pelàez-Nogueras, Gewirtz, Field, Cigales, Malphurs, Clasky, & Sanchez, 1996). Muir and his colleagues argued that an adult-infant interaction paradigm, which

incorporates both affect and attention is the most appropriate way to examine infant visual behavior in light of its role in communication (Hains & Muir, 1996; Muir, Hains, & Symons, 1994). As such, it is the mother's reported perception of infant eye contact that many researchers must rely on.

Measuring adults' perceptions of eye contact must be done in a naturalistic environment that highlights the role of perceived eye contact and does not rely on third-person observation. A good method to accomplish this would be one similar to that used by Hittelman and Dickes (1979) where in the adult involved in the interaction is responsible for determining when the infant is looking into his or her eyes. This is a practical, less distracting approach to measuring mutual eye contact in adult-infant dyadic interaction. Moreover, this approach incorporates the vital affective component of adult-infant interactions.

Summary and Hypotheses

Eye contact is among the most salient nonverbal behaviors in humans and is believed to provide a number of important social cues including interest, attention, affiliation and intimacy, approval, dominance and aggression, and openness to personal involvement (Argyle & Ingham, 1972; Brooks, Church, & Fraser, 1986; Exline, 1963; Knackstedt & Kleinke, 1991). In addition, it is the earliest channel of postnatal dyadic communication available to the mother-infant dyad and may play an essential role in the establishment of the mother-infant bond (Greenman, 1963; Haith, Bergman, & Moore, 1977; Klaus & Kennell, 1976; Klaus, Kennell, Plumb, & Zuehlke, 1970; Moss & Robson, 1968; Rhinegold, 1961; Robson, 1967; Stern, 1974). Most importantly, mutual gaze with her infant has been found to be an extremely pleasurable and reinforcing experience for mothers (Fraiberg, 1974; Klaus, Kennell, Plumb, & Zuehlke, 1970).

One of the most striking findings related to mutual eye contact is the presence of sex differences in the duration and frequency of mutual gaze. In general, females are more likely than males to engage in mutual eye contact with another person for longer periods of time, particularly if that person is female. This sex difference is well documented in all age groups from late infancy through adulthood (Exline, 1963; Hittelman & Dickes, 1979, Kleinke, 1985; Levine & Sutton-Smith, 1979). The study of early sex differences in mutual gaze behavior has potential to be instrumental in unraveling the differential effects of biological and social influences on the development of gendered social behavior through the systematic examination of a specific, fundamental social behavior.

Given the importance of mutual eye contact in human interaction and the presence of sex differences in this behavior pattern from late infancy onward the question of its origins becomes exigent. In a single study, Hittelman and Dickes (1979) found evidence of this behavior pattern in neonates, but this piece of research has been virtually ignored and no research has focused on the genesis of this important behavior pattern.

Researchers have offered a variety of theories to explain the relationship between sex and gender, and eye contact behavior but most explanations are simply descriptive of the phenomenon and give little insight into the genesis of the sex difference. One theory that has been widely applied to the development of sex differences in mutual gaze behavior is social learning theory, but this theory is inadequate in explicating the findings of Hittelman and Dickes. It appears possible, if the findings of Hittelman and Dickes can be replicated and sex differences in neonates' gaze behavior well documented, that the tendency for females to engage in more mutual eye contact than males could be a biologically prewired sex-typed behavior pattern indicative of a biological substrate for gendered behavior patterns in general.

This research project is an original contribution to understanding the relationship between sex, gender, and mutual gaze behavior that is dependent neither solely on social learning nor biological influences. The research is an extension of Hittelman and Dickes (1979) study and is designed to address whether gender differences in mutual gaze behavior are present at birth and how biological bases and postnatal social forces interact to produce later gender differences. It is surprising, given the information such a study can provide, that Hittelman and Dickes' study received virtually no attention and no attempts were made to replicate it. The current research study is a much needed follow-up and extension of Hittelman and Dickes' original study which allows for a more thorough investigation of mutual gaze behavior in neonates and young infants.

Eye contact behavior between infants at two times (Time 1: 1 to 5 days and Time 2: 13 to 18 weeks postpartum) and two adult interacters (one male, one female) is investigated in order to determine whether the Hittelman and Dickes' findings were spurious or influenced by interacter bias. A longitudinal approach is used to allow for investigation of the cumulative effects of socialization on pre-existing behavior patterns, as well as evidence of trait stability. Infant ages have been chosen in correspondence with periods of rapid perceptual development in order to provide information regarding the stability of differential

gaze patterns, as well as a possible increase in strength of this sex-typed behavior as the perceptual system matures. Finally, a written sex-typing questionnaire, the Paston Rating Scale (Leeb & Rejskind, 1997, 1998), is included and provides unique data on parents' subjective expectations and how these expectations change as a result of their infant and its personality.

Three primary hypotheses are investigated:

1. Based on Hittelman and Dickes' (1979) findings, it is predicted that female infants will make more mutual eye contact with the interacter (regardless of interacter sex) at both Time 1 and Time 2 than male infants;

2. The differential pattern of gaze behavior will increase in strength over time;

3. Measures of sex-typing will be predictive of mutual gaze behavior for all infants such that infants rated higher on masculine traits will make less eye contact than those rated higher on feminine traits, regardless of biological sex.

In addition, an exploratory hypothesis will be investigated:

4. It is predicted that infants' eye contact in same-sex interactions (i.e., male infants with male interacter, and female infants with female interacter) will be greater than in cross-sex interactions.

CHAPTER II **Method**

The project was designed as a longitudinal, within participants experiment.

Participants

Seventy healthy newborns (32 female, 38 male), born at the Sir Mortimer B. Davis-Jewish General Hospital located in Montreal, Quebec, Canada, and their parents volunteered to participate in the study. Treatment of all participants was in accordance with the ethical standards of the American Psychological Association (APA, 1994), McGill University (see Appendix B), and the S.M.B.D.-Jewish General Hospital (see Appendix C). The newborns, ranging in age from 13 to 112.25 hours postpartum ($\underline{M}$ = 52.44 hours), were full term (mean gestational age = 39.42 weeks) and were born without any reported complications. All but three infants had birth weights above 2500 grams ($\underline{M}$ = 3423.1 grams), and all but 2 infants had Apgar scores of 8 or better at five minutes. Two infants received an Apgar score of 7 at five minutes. Inclusion criteria were used to judge the health and eligibility of infants for participation in the study. The three infants with birth weights under 2500 grams and the two infants with Apgar scores of 7 at five minutes were included because they were deemed healthy and met all other inclusion criteria. Sixty percent of the infants ($\underline{n}$ = 42) were delivered by Cesarean section, 28.6% ($\underline{n}$ = 20) were spontaneous vaginal deliveries, and the remaining infants, 11.4% ($\underline{n}$ = 8), were born through forceps or vacuum assisted deliveries. Although most infants are delivered through spontaneous vaginal delivery (SVD), due to the current trend in hospital policy to discharge healthy infants born by uncomplicated SVD within the first 24 hours, few SVD infants were available for participation. The number of infants born by Cesarean section is unusually high because these infants and their mothers remain in the hospital for approximately four days, thus allowing for a greater chance of participation in the study. A number of researchers claim that Cesarean section delivery and the obstetric medications

associated with it have no significant effect on postnatal infant behavior (Davis & Emory, 1995; Gunnar, Porter, Wolf, Rigatuso, & Larson, 1995; Trowell, 1982).

Mothers of the newborns ranged in age from 20 years, 7 months to 40 years, 8 months ($\underline{M}$ = 31.33 years). Forty-one point four percent of the mothers were primiparous, and the multiparous mothers had an average of 2.1 children including the new baby.

The majority of the parents in the sample were Caucasian (77.1% of the mothers and 78.6% of the fathers). All parents spoke English well enough to understand and participate in the study as determined by a short informal interview conducted by the experimenter: 78.6% of the mothers in the sample reported speaking English as the primary language in the home. The remaining portion of the sample reported speaking French (7.1%), Yiddish (4.3%), Chinese, Greek, Portuguese, Spanish, or Tagalog (combined 10%) as the primary language in the home.

Participants represented a broad range of family income. The average annual household income for 20% of the participants was less than $29,999; 20% of the participants reported an annual income in the range of $30,000 to $49,999; 24.3% reported incomes in the $50,000 to $69,999 range; and 17.1% reported an annual household income greater than $70,000. The average annual income for a Canadian economic family is $55,247 (Statistics Canada, 1995). No information regarding annual household income was reported by 18.6% of the sample.

A subset of the newborns participated in a follow-up approximately 3.5 months postpartum: 23 infants (9 female, 14 male). The infants were between 13.14 and 18.14 weeks of age ($\underline{M}$ = 14.91 weeks) at the time of the follow-up.

Experimenters

This author coordinated the procedure and recruited all participants. In addition, a pool of 10 undergraduate students (4 male, 6 female) was recruited to interact with the infants. The students were extensively trained in the proper procedure for holding and carrying newborns, as well as the procedure for the study. Interacters worked in pairs (one

male, one female) and were matched as closely as possible on physical characteristics. The use of multiple interacters decreased the potential for bias due to physical characteristics of individual interacters, or interacter bias.

Procedure: Time 1

Participant recruitment. A list of potential participants was compiled by this experimenter upon arriving at the hospital each day. Potential participants were selected based on meeting seven criteria. Information regarding these criteria was provided either by the nursing staff on duty or was available in the mother's or infant's chart. The criteria were as follows: (a) mother or father can communicate in English; (b) there are no known problems with the parents (e.g., history of domestic violence, history of drug or alcohol abuse, no maternal disease, mother is over the age of 18 and can give consent, the pregnancy is wanted and is not the result of rape or other trauma); (c) infant is between 24 and 120 hours postpartum; (d) infant is full term (38+ weeks gestation); (e) infant is of normal birth weight (2500 grams or more. Three infants had birth weights less than 2500 grams but were included because they fit all other criteria.); (f) infant received an Apgar score of 7 or better at 1 minute and 8 or better at 5 minutes (Two infants received an Apgar score of 7 at five minutes but were included in the study because they fit all other criteria.) ; and (g) infant was born without complications. Potential participant's room and bed numbers were also recorded so that they could be easily approached.

Parents were approached in the mother's room on the postpartum unit of the hospital. In order to generate interest in participation the study was titled "Here's Looking at You, Kid!" and potential participants were given a brief overview, in layperson's terms, of sex differences in gaze behavior and the development thereof. Parents were then told that participation involved allowing two well trained adults (1 male and 1 female) to pick up, hold, and look at their newborn, when the baby was awake and calm, for three minutes each. Parents were told that they could choose the time to participate and told how long the experimenters would be at the hospital that day and whether they would be back the

following day. Further, parents were told that they were welcome to accompany their infant to the study room and to watch the interaction. Finally, parents were told that participation also involved completing a short questionnaire, the Paston Rating Scale (Leeb & Rejskind, 1997, 1998. For information concerning the Paston Rating Scale see Appendix D.) regarding their beliefs about their own newborn as well as newborns in general. This questionnaire, parents were told, should take no more than 15 minutes to complete and could be completed at their leisure, but had to be returned to the experimenter prior to their discharge from the hospital. In cases where the father was not present at the hospital but agreed to complete the questionnaire, mothers were given an addressed, stamped envelope in which the questionnaire could be returned to the experimenter.

After parents agreed to participate, the experimenter gave them the consent form and questionnaires and specific instructions about how to correctly complete each (see Appendix E for sample Here's Looking at You, Kid! consent form). The signed consent form was then collected, and participants were told where the study room could be found and were encouraged to come as soon as their infant was awake and calm. Parents were instructed that their infant must be dressed in a gender-neutral outfit and that the interacters in the study room must remain unaware of their baby's sex throughout the interaction as well as after the interaction was complete. Because parents often had either pink or blue outfits for their newborn many opted to dress their baby in the white outfits provided by the hospital.

After completing the instructions and answering any questions, the experimenter returned to the nurses' station and recorded the sex of the newborn, infant's birth date and time, mother's birthdate, number of siblings, primary language spoken in the home, mother's and father's visible ethnicity, infant's gestational age, Apgar scores at one and five minutes, type of delivery, and infant's birth weight. In cases where information was not available in the charts or was not readily apparent (e.g., additional languages spoken) the experimenter returned to the participant's room and asked for the information directly.

This information was recorded on a demographics form labeled "For office use only" and was identified only by the participant's identification number. (See Appendix F for sample Here's Looking at You, Kid! demographics form.) Three demographics questions (mother's education, father's education, and household income) were given directly to the parents in written form as the first page of the mother's Paston Rating Scale packet. The format of these questions was selected as such because it was felt that parents would be more comfortable responding in written form (see Appendix G for sample page).

Because parents had many demands on their time during the day it was common for them to complete the questionnaires during the evening after the research team had left the hospital. Consequently, questionnaires were often collected the day following their distribution.

Study room. The interaction took place in an unused overflow patient room on the postpartum unit. This room was also used as a base of operations for this experimenter. It was felt that the study should take place in a room other than the mother's room in order to decrease the potential for distraction and interruption during the interaction (e.g., ringing phone, extraneous noise, visitors), as well as to decrease the likelihood that something in the room would provide clues to the interacters as to the sex of the infant. Upon arriving at the hospital each day the interacters arranged the room for the study and remained in the room waiting for participants throughout the course of the day. Once participant recruitment was completed this experimenter joined the interacters in the study room to wait for participants. However, this experimenter periodically checked back with each participant to remind them about the study, see if the questionnaires were complete, or if any clarification was necessary.

The interaction. Because participants generally came to the study room at a time of their own choosing, they were often greeted at the door of the study room by this experimenter (as opposed to being escorted to the room by this experimenter). At that time the hospital identification card on the infant's bassinet was either covered or removed and

placed face down on the shelf below the bassinet (this card was either pink or blue depending on the infant's sex) and the mother or father or both parents (depending on who brought the baby to the study) was introduced to the interacters.

Interacters were seated throughout the procedure and alternated between two roles: (a) interacter with the infant ("looker"); and (b) holder of the infant ("holder"). Use of the male and female interacters was counterbalanced within and across days and it was decided prior to participant arrival who would interact with the infant (i.e., act as looker) first. While the looker attempted to make eye contact with the infant the holder held the infant facing away from himself or herself, and toward the looker, in the full upright position (at an angle of approximately 90 degrees) on his or her lap. the looker sat across from the infant with his or her eyes at the same level as the infant's eyes. The looker was also responsible for recording eye contact with the infant using the event recorder.

To begin the interaction the looker sat with his or her face 8 to 10 inches from the infant's face and introduced him or herself to the infant as follows, "Hi baby. My name is Xxxx, and I'm going to look at you for a little while." The interaction began immediately following the introduction with the looker pressing either spacebar (baby is making eye contact) or "b" (baby is not making eye contact). No other speaking followed the introduction as it has been shown that speech has no effect newborn attention or eye contact (Hittelman & Dickes, 1979). The interaction continued for three minutes while the looker maintained a neutral, pleasant facial expression.

To control the looker's visual input, the interacters were instructed to gaze at the baby's eyes continuously throughout the 3 minute duration of the interaction. Thus, "eye contact" referred only to the infant's gaze behavior and was defined as those times when the interacter perceived that the infant's eyes met his or her eyes. In this way, the lookers had to concentrate only on the infant's gaze behavior and recording this behavior using the event recorder. The computer indicated the end of the three minute interaction period by

beeping. At this point the looker and holder switched roles and the interaction was repeated with the new looker following the same procedure outlined above.

After both interacters had acted as looker the infant was returned to the bassinet and the interacters thanked the parent(s). The interacters were then each given a copy of the OB form of the Paston Rating Scale to complete (see Appendix H for sample interacter questionnaire). Using the rating scale the interacters to described the infant they had just held on the 28 adjective pairs provided. In addition, they were asked to guess the infant's sex as well as provide a rationale for why they chose the sex they did. The interacters were told not to discuss their answers until they had completed the questionnaire and returned it to this experimenter.

This experimenter then accompanied the parent(s) back to the mother's room whereupon she asked if the parent(s) would be willing to be called about participating in a three and a half month follow-up study designed to see how infants' gaze behavior changed over time. It was explained that the follow-up study would take place in the same study room on the postpartum unit, would involve the same interaction with the infant, as well as completion of the same questionnaires by the parents. It was further explained to the parents that agreeing to be called about the follow-up study in no way obligated them to participate in the follow-up.

Parents who agreed to be contacted about the follow-up study were asked to provide their first name only (to protect confidentiality) and a phone number where they could be reached (see Appendix I for sample Here's Looking at You (again), Kid! contact form).

Parents were again thanked for their participation, and if the Paston Rating Scale had not been returned, were reminded to complete and return the questionnaire as soon as possible.

Procedure: Time 2

Participant recruitment. Fifty nine participants (84% of the original sample) agreed to be contacted regarding the 3.5 month follow-up study. In order to give parents sufficient time to plan ahead, participants who had agreed to be contacted were called when their infant was approximately 12 weeks of age.

As is the case in many longitudinal studies attrition was a problem. Thirty six participants (61%) who agreed to be contacted did not take part in the follow-up study. Sixteen participants refused for a variety of reasons: Some lacked transportation to and from the study: some could not find child care for their other children; and some were simply not interested in further participation. Six participants were not available for the period during which their infant would need to be seen (e.g., the family would be on vacation); six agreed to participate but did not come at the appointed time: these individuals were re-contacted and rescheduled for the study but were repeatedly no-shows; four participants could not be contacted (e.g., phone number was incorrect or the family had moved); and three participants did not respond to any of the messages left for them (messages were left at reasonable intervals until it was obvious that the infant would not be scheduled within the period in which the infant would need to be seen). As such the follow-up sample consisted of 23 infants (9 female, 14 male) and their parents.

Parents who agreed to participate in the follow-up study were reminded that participation involved coming to the study room at the hospital with their infant, and allowing their infant to be picked up, held, and looked at by two well trained adults. They were further reminded that they would be asked to complete one form of the Paston Rating Scale (OB Form)--the portion concerning their beliefs about their own infant (see Appendix D6a). Finally, parents were reminded that their infant's sex must remain unknown to the interacters and as such they should dress their baby in something gender-neutral. In order to allow parents to plan their time, they were told that the follow-up study would take approximately 20 minutes. When this was clearly understood the parent was given a

specific date and time (at their convenience) to come for the study and asked if they would like a reminder call the night before their appointment. During the reminder call parents were again told that their baby's sex must remain unknown to the interacters and to dress the infant in gender-neutral clothing.

Study room. The 3.5 month follow-up study took place in the same study room at the hospital as the original interaction. Even though attrition would likely have been reduced by agreeing to conduct the follow-up study at the parents' homes, it was felt that maintaining a constant environment across the two parts of the study would be best. In addition, it would be significantly more difficult to keep the sex of the infant hidden from the interacters at the parents' homes.

The interaction. The interaction followed the identical procedure as was used originally (Time 1) (see Appendix J for sample Here's Looking at You (again), Kid! consent form).

After the interaction with both interacters was complete, and the participants had returned the Paston Rating Scales, this experimenter thanked the parents and asked if they would like a copy of the results when the analyses were complete. If the parents answered in the affirmative they were asked to provide their full name and address on the consent form so that a copy could be mailed to them when available (see Appendix J). If one parent did not come to the study, the parent who did was given a stamped, addressed envelope in which the other parent's questionnaire could be returned to this experimenter.

After the interaction, the interacters completed the OB form of the Paston Rating Scale and guessed the sex of the infant they had just held as they had done in part 1 of the study (see Appendix H).

Apparatus

Event Recorder. In order to record mutual eye contact between the infant and the interacter as a live code, as opposed to using videotapes of each interaction, a 486 Modular AcerNote lap-top computer (Acer Incorporated, 1994) was used as an event recorder. The

event recorder program was written using QuickBasic (version 4.5) (for a copy of the program see Appendix K). The program was created such that the individual recording eye contact behavior (i.e., the interacter) used either the spacebar key (if the infant was making eye contact) or the letter "b" key (if the infant was not making eye contact) to begin the interaction. Using either of these keys cued the program to begin the timer and to record data as it was entered. The spacebar key was then used as an on-off switch to indicate when the infant was making eye contact with the interacter. Research assistants placed their hand in the proper place on the keyboard before beginning the interaction in order to avoid breaking gaze with the infant once the interaction was under way. After 180 seconds the computer beeped to signal the end of the interaction, and stopped recording data. A display was then given containing the following information: starting behavior (either eye contact or no eye contact), total duration (for eye contact and no eye contact), mean duration (for eye contact and no eye contact), and frequency (for eye contact and no eye contact).

Parental Sex-Typing of Newborns (Paston) Rating Scale. All of the parents who participated in the study were asked to complete the Parental Sex-Typing of Newborns (Paston) Rating Scale (Leeb & Rejskind, 1997, 1998). The Paston Rating Scale is a formal, reliable, and valid instrument with two forms (Own Baby and Hypothetical Baby) designed to measure parents' sex-typed beliefs and perceptions of their own newborn, as well as male and female newborns in general. Each form contains the same 28 bipolar adjective pairs and participants are asked to rate their own infant as well as male and female infants in general using a 6-point unlabelled Likert-type scale. Scores are assigned to items as follows: adjective a : 1 : 2 : 3 : 4 : 5 : 6 : adjective b. High scores reflect feminine traits. As such, the following items are reverse scored: 2, 3, 5, 7, 9, 11, 13, 15, 18, 20, 21, 23, 25, 26.

Construct validity of the two forms has been shown to be adequate and the alpha reliability of the forms is excellent with alphas ranging from .83 to .88. For further

information on development and standardization of the Paston Rating Scale (Leeb & Rejskind, 1997, 1998) see Appendix D.

CHAPTER III Results

All data were analyzed using SPSS version 6.12 for the Power Macintosh computer. Data from Time 1 and Time 2 were analyzed separately and an alpha level of .05 was used for all statistical tests. Two measures of mutual gaze behavior were used: mean total duration of mutual eye contact ("total duration") and mean duration of each glance ("mean duration").

Initial descriptive analyses indicated that the distributions of scores for both total and mean duration of mutual eye contact were positively skewed. One of the fundamental assumptions of analysis of variance (ANOVA) is that the data are normally distributed (Tabachnick & Fidell, 1996). However, as has been noted by Tabachnick and her colleague, ANOVA, like other multivariate statistics, is an extremely robust statistic and can often withstand violations of the basic assumptions. Nevertheless, regression analyses were also conducted on this data because regression allows for transformation of variables to reduce skewness.

Hypothesis 1

Analysis of variance (ANOVA) was used to address the question of whether female infants make more mutual eye contact with the interacters, regardless of interacter sex, than male infants at Time 1 (hypothesis 1, part 1). Two 2 x 2 ANOVAs for the effects of infant sex (male, female) and interacter sex on total and mean duration of eye contact at Time 1, respectively, were conducted. No significant main effects for infant sex or interacter sex were found. Effect sizes were calculated for both mean and total duration and were found to be small ($\eta^2 < .10$). Thus, no sex differences were indicated in either total or mean duration of mutual eye contact in the newborn sample.

To investigate the second part of the first hypothesis (i.e., female infants will make more eye contact at Time 2 than male infants), again, two 2 x 2 ANOVAs were conducted to investigate the effects of infant sex and interacter sex on total and mean duration of eye

contact at Time 2, respectively. Significant main effects for infant sex for both measures of eye contact at Time 2 were revealed: F (1, 45) = 15.078, p = .000 (total duration); and F (1, 45) = 11.643, p = .001 (mean duration). In addition, effect sizes were calculated and found to be moderate for both total and mean duration (η^2 = .26 and η^2 = .19 respectively) suggesting that the sex differences found are meaningful as well as statistically significant. Examination of the cell means in Table 1 indicate that the main effects for Infant sex are in the direction predicted with females having longer periods of eye contact with the interacter.

Table 1

Total and Mean Duration of Eye Contact for Male and Female Infants at Time 1 and Time 2

	Mean Duration of Eye Contact		Total Duration of Eye Contact	
	Time 1	Time 2	Time 1	Time 2
Female infants	2.08	9.01**	17.87	85.94***
(SD)	(2.75)	(8.48)	(34.81)	(49.07)
Male infants	3.43	3.41	27.27	36.14
(SD)	(4.84)	(2.97)	(39.64)	(36.59)

** and *** denote a significant change from Time 1 to Time 2 at $p<.01$ and $p<.001$ respectively

Exploratory Hypothesis

The prediction that infants' eye contact in same-sex interactions would be greater than in cross-sex interactions (exploratory hypothesis) was not upheld. No significant infant sex x interacter sex effect was found for total duration of eye contact at Time 1, mean duration of eye contact at Time 1, or total duration of eye contact at Time 2 indicating that infants mutual gaze behavior did not change relative to the sex of the interacter. A significant infant sex x interacter sex interaction effect was found for mean duration of eye contact at Time 2 (F (1, 45) = 4.180, p = .047). However, this effect was not in the direction predicted and is primarily the result of female infants' behavior. As can be seen in Table 2 female infants had a much longer mean gaze duration with the female interacter than did male infants (female infants: M = 12.50 sec., male infants: M = 3.53 sec.). Further,

male infants' gaze behavior did not change relative to the sex of the interacter (with the female interacter: M = 3.53 sec., with the male interacter: M = 3.28 sec.).

Hypothesis 2

Although no significant sex differences were revealed for either total or mean duration of eye contact at Time 1, the existence of significant sex differences for both measures of mutual gaze behavior at Time 2 provides support for the hypothesis that the differential pattern of gaze behavior will increase in strength over time (hypothesis 2). Furthermore, when the cell means in Tables 1, 2 and 3 are examined it becomes evident that the change is largely due to a change in female infants' mutual gaze behavior with the interacter.

Table 2

Mean Duration of Eye Contact in Same- and Cross-Sex Interactions at Times 1 and 2

	Mean duration of Eye Contact			
	Female Interacter		Male Interacter	
	Time 1	Time 2	Time 1	Time 2
Female Infants	2.73	12.50	1.51	5.53
(SD)	(4.05)	(9.88)	(0.52)	(5.27)
Male Infants	4.18	3.53	2.61	3.28
(SD)	(5.23)	(2.75)	(4.45)	(3.28)

Table 3

Total Duration of Eye Contact in Same- and Cross-Sex Interactions at Times 1 and 2

	Total duration of Eye Contact			
	Female Interacter		Male Interacter	
	Time 1	Time 2	Time 1	Time 2
Female Infants (SD)	25.76 (51.21)	94.67 (31.90)	10.94 (7.71)	77.22 (53.51)
Male Infants (SD)	29.60 (34.99)	36.48 (31.90)	24.75 (45.61)	35.79 (41.99)

This is clearly demonstrated in Figures 2 and 3 where the increase in female infants' gaze behavior (both Mean and Total duration) from Time 1 to Time 2 is far more drastic than that of male infants.

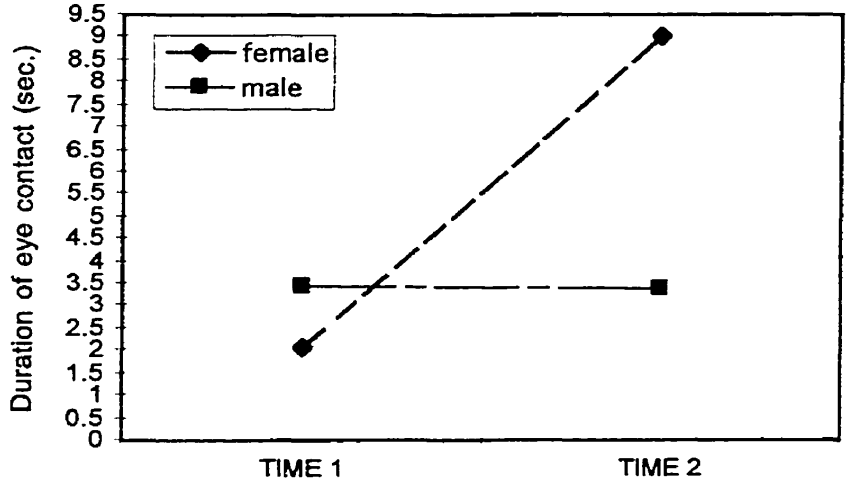

Figure 2. Change in mean duration of eye contact from Time 1 to Time 2

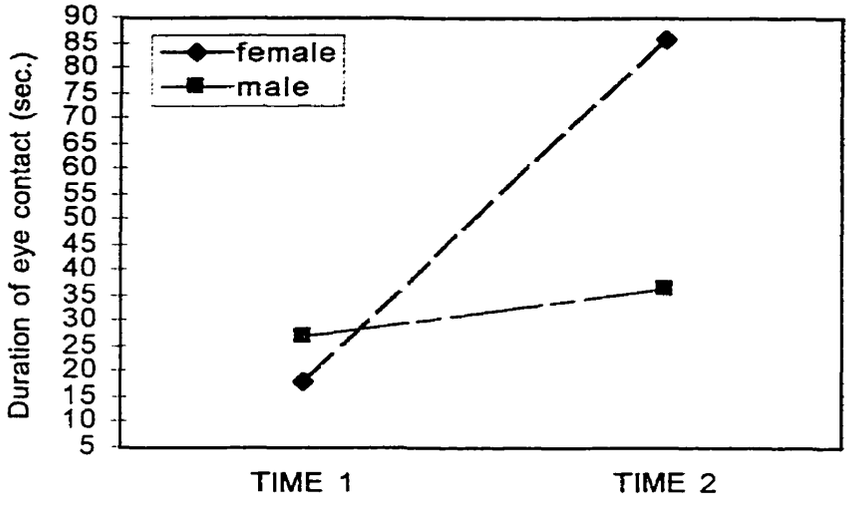

Figure 3. Change in total duration of eye contact from Time 1 to Time 2

One-sample t-tests comparing mean and total duration of eye contact at Times 1 and 2 for male and female infants confirmed the significance of the change in female infant's mutual gaze behavior. A significant change in female infants' mutual gaze behavior with the interacter from Time 1 to Time 2 was corroborated (mean duration of eye contact: $t(17) = 3.47$, $p = .003$; total duration of eye contact: $t(17) = 5.89$, $p = .000$) while no significant change in male infants mutual gaze behavior is evident.

Further exploration of the relationship between gaze behavior at Time 1 and Time 2. Based on the analyses of variance it is evident that infant sex is a useful construct in predicting eye contact behavior at Time 2. However, the exact nature of the relationship between infant sex, eye contact behavior at Time 1 and eye contact behavior at Time 2 has yet to be delineated. In order to determine whether eye contact at Time 1 is a useful predictive measure of eye contact at Time 2 regression analyses were conducted. Because the sample size was small ($n = 23$) it was recommended (R. Platt, personal communication, March 19, 1999) that simple regression models be created using the two measures of eye contact at Time 2 as the dependent variables and infant sex as the predictor variable.

Subsequently, a series of blockwise multiple regression models was created each using one measure of mutual eye contact at Time 2 as the dependent variable and infant sex and one measure of mutual eye contact at Time 1 as the predictor variables (entered sequentially as individual blocks). Thus, four blockwise multiple regression analyses were conducted. If the second predictor had a significant association with measures of eye contact at Time 2 or the addition of a second predictor variable led to a decrease in the beta value for Infant sex (from simple regression model to blockwise multiple regression model), indicating a three-way association (confounding), the model was examined more closely.

For three of these models the association was negligible and confounding was minimal indicating that the change was small and the results did not provide meaningful information concerning the relationship between measures of mutual eye contact at Time 1 and Time 2. The fourth regression model is noteworthy in that it indicates that mean duration of eye contact at Time 1 may be a useful predictor for total duration of eye contact at Time 2. Table 4 displays the unstandardized regression coefficients (B), standard errors of B (SE B) the 95% confidence intervals (95% CI), the standardized regression coefficients (ß), and the p-values for the model.

Table 4

Multiple Regression of Infant Sex and Mean Duration of Eye Contact at Time 1 on Total Duration of Eye Contact at Time 2

Variable	B	SE B	95% CI	ß	p
Infant Sex	44.2190	14.7772	14.2499 - 74.1890	.4547	.0050
logXDEC1	9.6552	18.7424	-28.3562 - 47.6665	.0783	.6906
(Constant)	37.1181	10.7072	15.4029 - 58.8333		.0014

Although the p-value for the transformation of mean duration of eye contact at Time 1 (logXDEC1) is not significant ($p = .6096$) the model is interesting because it indicates that an increase in mean duration of eye contact at Time 1 is associated with an increase in total

duration of eye contact at Time 2. Looking specifically at the unstandardized regression coefficient (B) for mean duration of eye contact at Time 1 (logXDEC1) it can be seen that for every one second increase in mean duration of eye contact at Time 1 there is an approximate 10 second increase in total duration of eye contact at Time 2. Likewise, for every 10 second increase in mean duration of eye contact at Time 1 (approximately 4 standard deviations) there is a 97 second increase (approximately 3 standard deviations) in total duration of eye contact at Time 2.

It is important to note that the non-significant p-value for the transformation of mean duration of eye contact at Time 1 is potentially due to the small sample size used. Further investigation with a larger sample size would be useful to determine if this is the case.

Hypothesis 3

In order to investigate the relationship between measures of gender typing and mutual gaze behavior (hypothesis 3) regression analyses were conducted to determine the predictive value of the Paston scores on mutual eye contact behavior at both Time 1 and Time 2. These regression analyses were conducted in the same manner as described above to accommodate for the small sample of infants for whom complete data were available (n = 23).

To summarize, R. Platt (personal communication, March 19, 1999) recommended that an initial simple regression using infant sex be conducted to determine a baseline standardized regression coefficient (ß) for each measure of mutual gaze behavior at Time 1 and Time 2. Subsequently, a series of blockwise multiple regressions, each using infant sex and a Paston score variable (entered sequentially in individual blocks), be conducted to determine the change in the standardized regression values with each addition of a new independent variable above and beyond infant sex.

Because not all fathers were available to complete the Paston Rating Scale only mothers' ratings were used in these analyses. Four dependent variables (mean and total duration of eye contact at Times 1 and 2), and three predictor variables were used (total score on the Paston Own Baby form at Time 1 [MOB1], total score on the Paston Hypothetical Baby form [only completed at Time 1] [MHB], and total score on the Paston Own Baby form at Time 2 [MOB2]). Thus, four simple regression and 12 blockwise multiple regression models were created.

As was done previously, if the second predictor had a significant association with the measures of eye contact, or the addition of a second predictor variable led to a decrease in the beta value for infant sex, indicating a confounding three-way association, the model was examined more closely. For the majority of these models (10 of 12) the association between the second predictor and the measure of mutual gaze was negligible and confounding was minimal.

An interesting change in the standardized regression coefficient was found for the regression model for Infant sex and the Paston Own Baby form at Time 2 on total duration of eye contact at Time 2 (TDEC2). Table 5 displays the unstandardized regression coefficients (B), standard errors of B (SE B), the 95% confidence intervals (95% CI), the standardized regression coefficients (ß), and the p-values for the model using Total duration of eye contact at Time 2.

Table 5

Multiple Regression of Infant Sex and Total Duration of Eye Contact at Time 2 on Paston MOB2 Form Total Score

Variable	B	SE B	95% CI	ß	p
Infant Sex	44.4926	13.1579	17.9571 - 71.0281	.4561	.0015
MOB2	.7238	.5441	-.3735 - 1.8210	.1794	.1904
(Constant)	-37.8512	56.1684	-151.1255 - 75.4231		.5040

Although the p-value for MOB2 is not significant ($p = .1904$) the model is interesting as it is in the direction predicted and indicates that as the score on the MOB form at Time 2 increases so does the total duration of eye contact at Time 2. Looking specifically at the unstandardized regression coefficient (B) for MOB2 it can be seen that for every one unit increase in the total score on the MOB2 form there is an associated 0.724 second increase in total duration of mutual eye contact at Time 2. Hence, for every 10 point increase in the total score on the Paston MOB2 form (approximately 1 standard deviation in Paston score) there is an associated 7.24 second increase in total mutual eye contact at Time 2.

Again, it should be noted that the small sample size used in this study may have resulted in a non-significant p-value for the MOB2 variable. Further investigation with a larger sample size would be useful to determine if this is the case.

Given that the regression model described above indicates that infants with higher scores on the Paston MOB2 form (i.e., those rated as more feminine at Time 2 regardless

of biological sex) appear to have greater total duration of eye contact (also at Time 2) data were divided into thirds according to Paston MOB2 score and infants in the top third (group: High) were compared to infants in the bottom third (group: Low) using a 1 x 2 ANOVA for the effects of Paston group (High, Low) on total duration of eye contact at Time 2. A trend for infants with higher Paston MOB2 scores to have higher total duration of eye contact at Time 2 was seen (F (1, 29)= 3.2270, p = .083). Interestingly, examination of the raw data reveals that while six of the eight infants with low (more masculine rating) Paston scores are male, five of the eight infants with high (more feminine rating) Paston scores are also male. Further investigation of this trend using a larger sample size would be useful in more clearly delineating this difference.

A similar trend is seen in the regression model for infant sex and the Paston Own Baby Form at Time 2 on the mean duration of eye contact at Time 2 (logXDEC2: transformed logarithmically in order to reduce skewness, reduce the number of outliers, and improve the normality of the distribution of scores). However, in this model the associated increases in mutual eye contact and Paston MOB2 score are much smaller. See Table 6 for the unstandardized regression coefficients (B), standard errors of B (SE B), the 95% confidence intervals (95% CI), the standardized regression coefficients (ß), and the p-values for this model.

Table 6

Multiple Regression of Infant Sex and Mean Duration of Eye Contact at Time 2 on Paston MOB2 Form Total Score

Variable	B	SE B	95% CI	ß	p
Infant Sex	.3769	.1254	.1239 - .6299	.4305	.0045
MOB2	.0034	.0051	-.0070 - .0138	.0950	.5108
(Constant)	.0473	.5310	-1.0244 - 1.1190		.9295

A post-hoc 1 x 2 ANOVA for the effects of Paston group (High vs. Low) on mean duration of eye contact at Time 2 revealed no significant differences between the High and Low Paston MOB2 groups relative to mean duration of eye contact at Time 2.

Summary

Based on the analyses it is evident that while the exploratory hypothesis was not upheld (both male and female infants made more mutual eye contact with the female rather than with the interacter of the same sex), the three primary hypotheses received partial, if not total, support. Hypothesis 1 was partially supported in that although no differential mutual gaze pattern for male and female newborns was revealed a significant sex difference in mutual gaze behavior is evident by early infancy. Furthermore, this gaze pattern is increasing in strength over time from imperceptible at birth to a clearly differentiated pattern wherein females are making more mutual eye contact than males by the fourth month of life thus providing support for Hypothesis 2. Hypothesis 3 also received partial support and a trend for infants rated by their mothers as more feminine at Time 2 (regardless of their biological sex) to have a longer total duration of eye contact at Time 2 was revealed. A larger sample size would be useful in delineating this trend more clearly.

CHAPTER IV Discussion

The present research study makes a number of unique contributions to the literature on mutual gaze behavior and development in early infancy. First, this study was designed to be a new approach to understanding the relationship between sex, gender, and mutual gaze behavior that was neither solely dependent on social learning nor biological influences. Each element of the study (interaction at Time 1, interaction at Time 2, and the Paston Rating Scale) was used to tap into the different avenues by which social development may occur: biology and environment. The use of newborns in research on the development of social behaviors is rare, and this is one of only two studies investigating the origins of mutual gaze behavior, an important gender-typed behavior pattern well documented from late infancy through adulthood (Argyle & Ingham, 1972; Benenson, 1993; Exline, 1963; Hittelman & Dickes, 1979; Levine & Sutton-Smith, 1973; Muirhead & Goldman, 1979; Robson, Pedersen, & Moss, 1969; Tannen, 1990a), in a newborn sample. Further, this project was designed to improve upon methodological inadequacies seen in the study on which it was based (c.f., Hittelman & Dickes, 1979) and has done so through the use of more rigorous methodology, a naturalistic setting which incorporated the affective experience of mutual gaze in a dyadic interaction, and first-person recording of infant behavior rather than third-person observation. The use of both the longitudinal component and the gender-typing questionnaire, the Paston Rating Scale, are unique in research on mutual gaze behavior in a neonate-adult dyad. The former has helped paint a clearer, more cohesive picture of the developmental course of this gender-typed behavior pattern (i.e., sex differences in mutual gaze behavior develop during the first 13 weeks postnatal), while the latter provided much needed formal information on the primary external socializing influence on newborns and young infants, that is the accuracy of mother's gender-typed perceptions of her own infant as well as infants in general.

Second, the lack of empirical evidence for the presence of sex differences in the newborn sample refutes Hittelman and Dickes' (1979) earlier findings that female neonates make more mutual eye contact with an adult than male neonates--the findings on which the current study is founded. It is possible that Hittelman and Dickes' findings were spurious: The earlier results were based on a much smaller sample of neonates ($\underline{N} = 30$ in Hittelman and Dickes' study versus $\underline{N} = 70$ at Time 1 in this study); an interaction with only one female interacter (conversely, a pool of interacters was used in the current study and infants interacted two adults--one of each sex); and used a shorter interaction period (4 minutes versus 6 minutes in the current study). However, the possibility also exists that the large number of infants in the present study delivered by Cesarean section (60% of the research sample) had a confounding effect on the mutual gaze results. Hittelman and Dickes' sample consisted only of infants delivered by uncomplicated spontaneous vaginal delivery (SVD). Current hospital practice is to discharge infants delivered by uncomplicated SVD within 24 hours after birth. Although the majority of infants are delivered through SVD, their quick discharge from the hospital leaves researchers little time to ask for in-hospital participation in research studies. On the other hand, infants delivered through Cesarean section are more readily available as research participants because they and their mothers remain in the hospital for longer periods of time (on average 4 days). Thus, by remaining in hospital there is a greater likelihood that infants delivered by Cesarean section, and their mothers, will be available to participate. Potential effects of Cesarean section delivery and related maternal obstetric medication have been studied by numerous researchers with little agreement as to the findings. As stated earlier (see Method section) several researchers have found no effects of either maternal obstetric medication or Cesarean section delivery on postnatal infant behavior (Davis & Emory, 1995; Gunnar, Porter, Wolf, Rigatuso, & Larson, 1995; Trowell, 1982). However, Sepkoski and her colleagues have found that epidural anesthesia given to mothers delivering by SVD may have a deleterious effect on infant orienting response during the first month of life (Sepkoski, Lester, Ostheimer, &

Brazelton, 1992). While it is possible that the same holds true for mothers delivering by Cesarean section Sepkoski et al. provide no data in this regard. Nevertheless, if infants are having difficulty orienting then this would, in turn, decrease the likelihood for mutual gaze behavior and consequently reduce the likelihood of finding sex differences in mutual gaze behavior in a newborn sample. Thus, although the large number of participants delivered by Cesarean section in the present study may have provided a confound, it is also, as stated by M. Ramsay (personal communication, June 29, 1999) the reality of neonatal research. Further, the more rigorous methodology used in the current study in combination with little empirical evidence to support exclusion of infants delivered by Cesarean section in research on mutual gaze suggests that the nonreplication of Hittelman and Dickes findings is genuine. Additional research is warranted to investigate the effects of mode of delivery on newborns' mutual gaze behavior.

Third, the strong evidence for sex differences in mutual gaze behavior by 13 to 18 weeks postpartum indicates the presence of this sex-typed behavior pattern in early infancy. The evidence for sex differences in both the mean and total duration of mutual eye contact in young infants found in this study demonstrates that very young infants show the same sex-typed behavior patterns that are seen in older children and adults (Ashear & Snortum, 1971; Exline, 1963; Exline, Gray & Schuette, 1965; Kleinke, 1986; Levine & Sutton-Smith, 1979; see also, Appendix A), and is consistent with studies investigating gaze behavior specifically in older infant populations (Robson, Pedersen, & Moss, 1969). Further, it extends the evidence for this sex-typed behavior pattern, generally studied using older infants within the mother-infant dyad (Lasky & Klein, 1979; Robson, Pedersen, & Moss, 1969; Stern, 1974), to an even younger population of infants interacting within an unfamiliar dyad, indicating that sex differences in mutual gaze behavior are evident in a wider context than has been previously demonstrated.

A fourth important finding is the evidence which shows that the emergence of sex differences in mutual gaze behavior from the initial testing in the first days postpartum

(Time 1) to the follow-up testing at 13 to 18 weeks (Time 2) is entirely accounted for by a radical change in female infants' mutual gaze behavior. While male infants' mean eye contact time with the interacter remained unchanged from Time 1 to Time 2, female infants' mutual eye contact increases by a factor of four. Data for total duration of mutual eye contact show a similar pattern: While boy's behavior did not change significantly from Time 1 to Time 2, girls showed a 480% increase in mutual eye contact behavior over the same time period. The fact that girls behavior changed drastically while boy's behavior remained unchanged is an exciting and unique contribution to the literature on mutual gaze behavior, as well as to the literature on the development of gender-typed behavior, and it could help focus further research in both of these areas.

Finally, the link found between mothers' sex stereotyped perceptions of her infant, as measured by the Paston Rating Scale, and infant behavior is also a novel contribution by the current study. Numerous studies have assumed the existence of a link between parental attitudes and child behavior (e.g., Maccoby & Jacklin, 1972) but few have actually demonstrated this association, particularly in a sample of young infants. The current study provides empirical evidence that mothers' sex-typed beliefs about their infants are related to their infant's sex-typed behavior.

Empirical support for the four original hypotheses is mixed with the unique and interesting findings supporting both social learning theory and biological perspectives on the genesis of sex differences in mutual gaze behavior. Although these two theoretical perspectives are generally considered to be diametrically opposed the results from this study are sufficiently robust to support either perspective, and to provide support for only one position while ignoring the other would be remiss. As such, the results will be discussed within the context of each of the two theoretical perspectives with suggestions regarding integration of these perspectives and further research to follow.

Social Learning Theory

While there are many variations on social learning theory all social learning theories relating to the development of gendered behavior in infants and young children include the following basic tenets: (a) sex stereotyped behaviors are learned through a system of social influences wherein adults structure children's environments such that culturally appropriate sex-typed behaviors predominate (Bussey & Bandura, 1984); and (b) adults encourage gender-appropriate behavior while discouraging gender-inappropriate behaviors (Bussey & Bandura, 1984; Fagot, 1978; Maccoby & Jacklin, 1972; Smith & Lloyd, 1978).

The absence of a pattern of significant sex differences in mutual gaze behavior in the sample of newborns studied here, in combination with the presence of clear and significant sex differences evident by 13 to 18 weeks of age is extremely important from the social learning perspective. Theoretically, it can be assumed that the presence of sex differences in mutual gaze behavior in neonates would indicate the potential for a biological basis for this sex-typed behavior pattern: if the sex-typed behavior pattern is present at birth then no learning has occurred to bring about its manifestation. Given that no empirical support was found for sex differences in mutual gaze behavior in the first days of life, it appears unlikely within the context of the social learning perspective that this behavior pattern is present at birth. Thus, while it does not entirely rule out the possibility of a biological substrate for sex differences in mutual gaze behavior, social learning theorists would focus on the social forces at work to produce sex-typed behavior between birth and four months of age.

Indications of socialization are evident in the emergence of sex differences in the predicted direction by the follow-up (Time 2) testing session at 13 to 18 weeks postpartum, with females displaying longer duration of mutual eye contact than males by this point in time. During the interim period between testing sessions most infants have spent the majority of their time in the company of their mother and other female adults. This study has provided empirical evidence which supports earlier research demonstrating that infants

and young children are more attentive to female adults in their environment (Vlietstra & Manske, 1981; Ward, Phillips, & Cooper, 1998). Further, previous research has demonstrated that mothers begin to differentially label their infants as a function of the infant's sex within 24-hours after birth (Karraker, Vogel, & Lake, 1995; Leeb & Rejskind, 1997, in preparation; Reid, 1994; Rubin, Provenzano, & Luria, 1974), and that adults treat infants differently based on the infant's sex (or perceived sex) (Seavey, Katz, & Zalk, 1975; Sidorowicz & Sparks-Lunney, 1980; Smith & Lloyd, 1978; Thoman, Leiderman, & Olson, 1972). As such it is possible that the mother and other female adults are the primary socializing agents during this time and infants are likely to selectively attend to and learn from them.

The drastic change seen in female infants' behavior in this study could be the result of differential treatment of male and female infants by the primary socializing agents during the period between their first and second visit to the study. The differential treatment is likely being done in such a manner that female infants are encouraged and rewarded for maintaining longer periods of eye contact, thus radically increasing their mutual gaze behavior from Time 1 to Time 2, while male infants are neither encouraged nor rewarded for long bouts of mutual gaze behavior and as such their gaze behavior does not change over the study period. Further research is warranted to determine whether this is the case, and who the primary socializing agents are.

The fact that mothers' ratings of their infant on the Paston Rating Scale at Time 2 are predictive of infant gaze behavior at Time 2, such that infants with higher (more feminine) ratings are making more mutual eye contact with the interacter than infants with lower (more masculine) ratings (all at 13 to 18 weeks of age) could be interpreted as further support for mothers differentially encouraging, or socializing, sex-typed behavior patterns between the first and second visits to the study. The point at which this begins is not clear. Mothers may simply be responding to sex differences in mutual gaze behavior already present in their infant prior to 13 to 18 weeks of age. Nevertheless, because girls are more

likely to receive more feminine Paston scores it appears that mothers are recognizing the femininity in their female infants and encouraging feminine eye contact behavior from them. Further, this evidence lends additional support to the fact that girl's behavior is primarily responsible for the appearance of sex differences in mutual gaze behavior by Time 2. Girls are recognized as being more feminine and encouraged for acting in a more feminine manner than boys and as such girls' behavior changes drastically while boys' behavior remains unchanged.

Although the previous findings can be accounted for nicely within the social learning perspective, there are several findings in this study that do not conform to the strictures of a social learning theory explanation for the development of sex differences in eye contact in young infants. First, when examined more closely, the data reveal that more than 60% of the infants ($\underline{n} = 5$) being rated as most feminine (high Paston scores) are actually male infants and these infants are behaving in a feminine way (i.e., making more eye contact with the interacter than infants receiving lower Paston scores). If mothers, in fact, recognize that girls are more feminine and encourage them to act as such, while recognizing boys as less feminine and providing little encouragement for feminine behavior, then these boys do not fit the pattern predicted by social learning theory and social learning theory can not adequately explain the behavior of these boys.

The second finding for which the social learning perspective can not adequately account is the evidence for predicting total duration of eye contact at 13 to 18 weeks from the mean duration of eye contact in the newborn sample. If sex differences in eye contact are not present at Time 1 and are learned during the interim weeks between testing at Time 1 and Time 2, then there should be no relationship between infant behavior at Time 1 and infant behavior at Time 2. The social learning perspective can not sufficiently explain this relationship.

Thus, while many of the findings in this study appear to support social learning as the impetus for the development of differential gaze patterns in young infants this

theoretical perspective does not adequately account for all of the findings. In addition, a great deal of biophysical development is occurring during the first four months of life and it is unlikely that environment and differential treatment of male and female infants is solely responsible for the emergence of sex-typed patterns of mutual gaze behavior. As such, the role of biology must be considered.

Biological Theory

Biological and psychobiological theories of development contend that differential development is the result of prewired differences in the internal mechanisms responsible for human development. The cornerstone of these theories is that developmental outcomes are hard-wired such that developmental sequelae will manifest over time regardless of their overt presence or absence at birth. Height provides an excellent and simple example of this theory: Individuals are not born at their adult height. However, barring catastrophic intervention, they will achieve their maximum height by adulthood.

With regards to the development of gendered behavior patterns these theories hold that the precursors for behavioral differences exist or develop in utero and contribute to the subsequent development of sex and gender differentiated patterns of behavior later in life. A number of researchers are currently investigating the effects of the brain, genetics, and hormones on differential patterns of sex-typed behavior but no consensus has yet been reached in the causal relationship between brain structure, genetics, and hormonal influences (c.f. Berenbaum & Hines, 1992; Berenbaum, Korman, & Leveroni, 1995; Berenbaum & Snyder, 1995; Blum, 1997; Hines & Kaufman, 1994; LeVay, 1991; Meyer-Bahlburg et al., 1995). Although behavioral differences, like adult height, may not be evident at birth, the precursors responsible for these differences are in existence and their latent presence has permanent effects on the sexual differentiation of the brain and the subsequent behavioral manifestations which develop over time.

Unlike the conclusion drawn, based on the social learning perspective, that the lack of evidence for significant sex differences in mean and total duration of eye contact in the newborn sample indicates a lack of this sex-typed behavior pattern at birth, and the presence of sex differences in measures of mutual gaze behavior at 13 to 18 weeks indicates learning of a gendered behavior over time, these same results, when placed within the context of a biological approach can be interpreted in a very different light. From the biological perspective the clear and significant sex differences seen in mutual gaze behavior by Time 2 indicate the possibility that the sex differences in mutual gaze behavior are present, but latent, at birth, and in the ensuing weeks between visits to the study the differences develop and manifest to a noticeable degree in response to some internal biological mechanism. However, because this study was not designed specifically to investigate which biological mechanisms are responsible for the development of this sex-typed behavior pattern, interpretation of the findings can only be used to provide evidence for the possibility of underlying biological mechanisms and the exact internal cues for development require empirical investigation beyond the scope of this study.

The presence of a relationship between newborn gaze behavior and gaze behavior later in infancy appears to indicate further potential for an underlying biological mechanism at work to produce sex differences in mutual gaze behavior over time. If development of sex differences in mutual gaze behavior is due simply to social learning and differential treatment of male and female infants, and no sex difference in this behavior is evident at birth, then no relationship between behavior at birth and behavior later in infancy would be expected because development is the result of external factors working alone. That this study provides evidence for a predictive relationship between one measure of eye contact at Time 1 (mean duration) and another measure of eye contact at Time 2 (total duration) allows speculation that the biological precursors for the sex difference are present and active but not overt at birth, and over time are providing internal cues for development. It can be speculated that the biological precursors, in turn, cue the development of mutual

gaze behavior in girls much like testosterone, and other androgens, cue the development of male-typical behaviors in boys (Berenbaum & Hines, 1992; Berenbaum & Snyder, 1995; Hines & Kaufman, 1994; Money & Ehrhardt, 1972). During the 12 to 17 weeks between visits to the study female infants biologically respond to underlying developmental cues which cause a radical increase their eye contact behavior while male infants receive no biological cues during this time and as such their behavior remains unchanged during the course of this developmental period. From this perspective, the development of sex differences in mutual gaze behavior mirror, in a microcosmic way, the phenomenon seen in sex reassignment wherein genotypically male individuals reassigned at birth as females do not display male-typical behavior, or report discomfort in their sex reassignment until puberty at which point the hormonal and genetic environment is conducive to supporting specific gender-typed behavior patterns (Diamond, 1982, 1996, 1998; Diamond & Sigmundson, 1997; Slijper, Drop, Molenaar, & de Muinck Keizer-Schrama, 1998, Zucker, 1996).

The link found between mothers' sex stereotyped perceptions of her infant at Time 2, as measured by the Paston Rating Scale, and infant behavior at Time 2 indicates that mothers are accurately perceiving the developmental change in their infants. More importantly, however, is the fact that mothers are accurately perceiving their infant's degree of gender typing regardless of their infant's biological sex. Boys who display more feminine-typical behavior are receiving higher (more feminine) scores on the Paston Rating Scale and are displaying more feminine gaze patterns, that is, longer durations of mutual gaze.

Thus, based on the empirical evidence from the current study, it appears possible that, although the manifestations of sex differences in mutual gaze behavior are not evident in the first 113 hours postpartum, the seeds for later development of this sex-typed behavior pattern may be present at birth and the behavior pattern develops quickly thereafter. A longitudinal study replicating this study and regularly sampling the behavior

of infants between the ages of 1 and 13 weeks postpartum would be crucial in determining when this sex-typed behavior pattern is initially manifested. Additionally, although this study highlights the potential for an underlying biological mechanism responsible for the development of differential patterns of mutual gaze behavior, the scope of the study is limited and as such provides no clue as to the specific internal biological mechanism responsible for this interesting and important sex-typed behavior pattern. Further research with biologically unique populations, for example girls with CAH--as was done by Hines and Kaufman (1994), and is currently being done by Berenbaum and her colleagues--could help pinpoint the biological genesis of this sex-typed behavior pattern, as well as aid in clarifying whether the sex differences could be based on a biological predisposition for females (and more feminine males) to engage in mutual gaze behavior.

Integrating the Social Learning and Biological Perspectives

> It is now outmoded to juxtapose nature versus nurture, the genetic versus the environmental, the innate versus the acquired, the biological versus the psychological, or the instinctive versus the learned . . . The basic proposition should not be a dichotomization of genetics and environment, but their interaction. (Money & Ehrhardt, 1972, p. 1)

Although the findings of this study appear to be sufficiently robust and adequately flexible to conform to either a social learning or a biological-psychobiological perspective it is difficult to believe that either perspective is so powerful and deterministic as to render the valid empirical input from the other perspective irrelevant. It is likely that neither socialization nor underlying biological mechanisms is solely responsible for the development of differential patterns of gaze behavior for males and females. More defensible is the view that the development of sex-typed behavior patterns such as mutual gaze are the result of the combined effects of biological precursors and environmental influences. Returning to the height analogy, individuals are biologically prewired to achieve

a certain height by adulthood. However, actual growth is affected by numerous biological and environmental influences: for example, availability of food (environmental) and efficacy of the body to make use of ingested nutrients (biological). Thus, maximum height is dependent on the serendipitous confluence of biological precursors and environmental influences. Similarly, mutual gaze behavior may be a sex-typed behavior pattern that is biologically prewired but not evident at birth, and is one whose outcome is highly dependent on developmental, contextual, and environmental factors to bring it to fruition.

The relationship between eye contact behavior at Time 1 and eye contact behavior at Time 2 may be indicative of a biological precursor embodying the potential for the development of sex-typed mutual gaze behavior that is latent at birth. It is possible that mothers' sex-typed perceptions of their infant and biological mechanisms cueing infant behavior work as a continual feedback loop such that infants' potentially prewired gendered behaviors and mothers' (and other adults') gendered perceptions and subsequent socialization activities are continually encouraging and reinforcing one another to produce a combined internal and external environment conducive to the development of sex-typed behavior patterns such as mutual gaze within a dyadic interaction. The male infants with high Paston ratings and more feminine eye contact behavior are an important sample to follow-up in this regard. These nonstereotypical males demonstrate the large overlap between biological sex and gender-typed behavior. Further investigation of a larger sample of infants such as these could shed light on the potential for the sex differences to be realized through a complex interplay between postnatal biophysical development and differential treatment by caregivers and other important adults within the environmental context.

CHAPTER V Summary and Conclusions

This study was designed to investigate the genesis of a specific gender-typed behavior pattern that is of one of the most salient nonverbal behaviors in human interaction throughout the life span: mutual eye-to-eye contact. The presence of a sex difference in mutual gaze behavior is well documented from late infancy through adulthood but little research had been done to determine whether this gender-typed behavior pattern is present at birth.

Mutual gaze is one of the earliest channels of dyadic communication available to infants (Greenman, 1963; Haith, Bergman, & Moore, 1977; Moss & Robson, 1968) and is the only communicative channel over which newborns and young infants have control (Klaus & Kennell, 1976; Klaus, Kennell, Plumb, & Zuehlke, 1970; Rhinegold, 1961; Robson, 1967; Stern, 1974). The presence of this behavior is at the root of healthy social interactions and a lack of mutual gaze behavior has been found in a variety of psychopathological conditions including infantile prepsychotic states (Massie, 1977, 1978; Persson-Blennow, Binett, & McNeil, 1988; Wolff & Chess, 1964). It has been suggested by numerous researchers that mutual eye contact plays an essential role in the establishment and maintenance of a positive emotional relationship within the adult-infant dyad (Arco, Self, & Gutrecht, 1979; Fraiberg, 1974; Klaus & Kennell, 1975; Klaus, Kennell, Plumb, & Zuehlke, 1970; Rhinegold, 1961; Robson, 1967; Stern, 1964; van Wulften Palthe & Hopkins, 1984). As such, the presence of sex differences in mutual gaze behavior early in life is likely to have long-term ramifications on later social behavior.

The goal of this study was to provide empirical evidence as to whether the sex differences in mutual gaze behavior are present at birth which, in turn, would aid in unraveling the differential effects of biological and social influences on mutual gaze behavior. In order to do this it was necessary to investigate the possibility for this behavior pattern in its earliest form, that is in dyadic interactions between very young infants and

unfamiliar adults. Empirical support for the four original hypotheses was mixed with the unique and interesting findings supporting both social learning theory and biological perspectives on the genesis of sex differences in mutual gaze behavior. It is evident that while overt sex differences in mutual gaze behavior are not present in neonates the possibility for precursors to this behavior exist at birth and development of the sex-typed behavior pattern occurs in a definitive and conspicuous manner some time during the first four months of life. Additionally, infants are attending more to female adults in their environment, and mothers' sex-typed perceptions and ratings of infants accurately reflect infant behavior. However, the causal relationship(s) between these important findings and whether the development of these sex differences is the result of biological precursors, external reinforcement, or a complex interplay between these two forces is as yet unclear.

Additional research is still necessary to determine the exact nature of the forces, particularly the biological forces, at work to produce sex differences in mutual gaze. Genetic and hormonal studies, such as those being done by Hines and Kaufman (1994) and Berenbaum and her colleagues (Berenbaum & Hines, 1992; Berenbaum & Snyder 1995) may be the key to determining the degree to which biology and social influences interact to produce sex-typed behavior patterns such as this one. Based on the results of this study it is evident that further research should focus predominantly on girls as it is their behavior that undergoes a radical change from birth to four months postpartum: What change producing factors occur in, or to, girls but not boys in the first weeks or months of life? Furthermore, when exactly do these changes begin to occur? By pinpointing the precise timing of this radical change in girls' mutual gaze behavior internal and external forces can then be identified and examined systematically. Equally interesting and informative would be investigating the non-typical boys, that is those boys whose eye contact behavior was found to be more feminine and who received higher Paston scores at Time 2. In studying the atypical behavior of these boys relative to the behavior of both

typical boys and girls a great deal of information can be gathered regarding the overlap between sex-typical and gender-typed gaze behavior.

Sex differences in mutual gaze behavior are unlikely to be the result of simply biological or social forces acting alone but rather a complex interplay of these two forces acting in concert. This study has shown that infants' sex-typed behavior and mothers' gender-typed perceptions begin early in life. Subsequent research in this area must now focus on the specific forces involved in bringing sex differences in mutual gaze behavior to fruition.

References

Abromovitch, R., & Daly, E. M. (1978). Children's use of head orientation and eye contact in making attributions of affiliation. Child Development, 49, 519-522.

Allen, L. S., Hines, M., Shryne, J. E., & Gorski, R. A. (1989). Two sexually dimorphic cell groups in the human brain. The Journal of Neuroscience, 9, 497-506.

American Psychological Association. (1994). Publication manual of the American Psychological Association (4th ed.). Washington, DC: APA.

Angier, N. (1994, December 18). Matter over mind? The curse of living within one's genes. The New York Times, sec. 4, pp. 1, 4.

Arco, C. M. B., Self, P. A., & Gutrecht, N. (1979). The effect of increased maternal visual regard on neonatal visual behavior. Journal of Clinical Child Psychology, 8, 117-120.

Argyle, M., & Ingham, R. (1972). Gaze, mutual gaze, and proximity. Semiotica, 1, 32-49.

Arnold, A. P., & Gorski, R. A. (1984). Gonadal steroid induction of structural sex differences in the central nervous system. Annual Review of Neruoscience, 7, 413-442.

Ashear, V., & Snortum, J. R. (1971). Eye contact in children as a function of age, sex, social and intellective variables. Developmental Psychology, 4, 479.

Aslin, R. N. (1987). Motor aspects of visual development in infancy. In P. Salapatek & L. Cohen (Eds.), Handbook of infant perception: Vol. 1. From sensation to perception (pp. 43-113). Orlando: Academic.

Average Annual Income for Selected Family Types and Unattached Individuals: Data for 1980, 1989, 1994, 1995 [On-line]. Federal Government of Canada: Statistics Canada [Catalogue no. 13-207]. Available: http://www.statcan.ca/english/Pgdb/People/Families/famil05.htm).

Bailey, J. M., & Zucker, K. J. (1995). Childhood sex-typed behavior and sexual orientation: A conceptual analysis and quantitative review. Developmental Psychology, 31, 43-55.

Banks, M. S., & Bennett, P. J. (1991). Anatomical and physiological constraints on neonatal visual sensitivity and determinants of fixation behavior. In M. J. S. Weiss & P. R. Zelazo (Eds.), Newborn attention: Biological constraints and the influence of experience (pp. 177-217). New Jersey: Ablex.

Banks, M. S., & Shannon, E. (1993). Spatial and chromatic visual efficiency in human neonates. In C. E. Granrud (Ed.), Visual perception and cognition in infancy. New Jersey: Erlbaum.

Beatty, W. W. (1979). Gonadal hormones and sex differences in nonreproductive behaviors in rodents: Organizational and activational influences. Hormones and Behavior, 12, 112-163.

Bell, N. J., & Carver, W. (1980). A reevaluation of gender label effects: Expectant mothers' responses to infants. Child Development, 51, 925-927.

Benenson, J. F. (1990). Gender differences in social networks. Journal of Early Adolescence, 10, 472-495.

Benenson, J. F. (1993). Greater preference among females than males for dyadic interaction in early childhood. Child Development, 64, 544-555.

Berenbaum, S. A., & Hines, M. (1992). Early androgens are related to childhood sex-typed toy preferences. Psychological Science, 3, 203-206.

Berenbaum, S. A., & Snyder, E. (1995). Early hormonal influences on childhood sex-typed activity and playmate preferences: Implications for the development of sexual orientation. Developmental Psychology, 31, 31-42.

Berenbaum, S. A., Korman, K., & Leveroni, C. (1995). Early hormones and sex differences in cognitive abilities. Learning and Individual Differences, 7, 303-321.

Blum, D. (1997). Sex on the brain. The biological differences between men and women. New York: Viking Penguin.

Bower, T. G. R. (1989). The perceptual world. The rational infant: Learning in infancy (pp. 9-39). New York: Freeman.

Brooks, C. I., Church, M. A., & Fraser, L. (1986). Effects of duration of eye contact on judgments of personality characteristics. The Journal of Social Psychology, 126, 71-78.

Bussey, K., & Bandura, A. (1984). Influence of gender constancy and social power on sex-linked modeling. Journal of Personality and Social Psychology, 47, 1292-1302.

Cappella, J. N. (1981). Mutual influence in expressive behavior: Adult-adult and infant-adult dyadic interaction. Psychological Bulletin, 89, 101-132.

Cohn, J. F., & Tronick, E. Z. (1987). Mother-infant face-to-face interaction: The sequence of dyadic states at 3, 6, and 9 months. Developmental Psychology, 23, 68-77.

Daly, S. (1978). Behavioural correlates of social anxiety. British Journal of Social and Clinical Psychology, 17, 117-120.

Davis, M., & Emory, E. (1995). Sex differences in neonatal stress reactivity. Child Development, 66, 14-27.

Diamond, M. (1982). Sexual identity, monozygotic twins reared in discordant sex roles and a BBC follow-up. Archives of Sexual Behavior, 11, 181-186.

Diamond, M. (1996). Response: Considerations for sex assignment. Journal of Sex & Marital Therapy, 22, 161-174.

Diamond, M. (1998). Intersexuality: Recommendations for management. Archives of Sexual Behavior, 27, 634-641.

Diamond, M., & Sigmundson, H. K. (1997). Sex reassignment at birth. Long-term review and clinical implications. Archives of Pediatric and Adolescent Medicine, 151, 298-304.

Dodwell, P. C., Humphrey, G. K., & Muir, D. W. (1987). Shape and pattern perception. In P. Salapatek & L. Cohen (Eds.), Handbook of infant perception: Vol. 2. From perception to cognition (pp. 1-77). Orlando: Academic.

Easterbrook, M. A., & Amendola, D. (1998, April). Timing visual pursuit to investigate newborn interest in a face pattern. Poster presented at the XIth Biennial International Conference on Infant Studies. Atlanta, GA.

Exline, V. (1963). Explorations in the process of person perception: Visual interaction in relation to competition, sex, and need for affiliation. Journal of Personality, 31, 1-20.

Exline, R., Gray, D., & Schuette, D. (1965). Visual behavior in a dyad as affected by interview content and sex of respondent. Journal of Personality and Social Psychology, 1, 201-209.

Fagot, B. I. (1978). The influence of sex of child on parental reactions to toddler children. Child Development, 49, 459-465.

Fagot, B. I., & Hagan, R. (1991). Observations of parent reactions to sex-stereotyped behaviors: Age and sex effects. Child Development, 62, 617-628.

Fogel, A., Young Dedo, J., & McEwen, I. (1992). Effect of postural position and reaching on gaze during mother-infant face-to-face interaction. Infant Behavior and Development, 15, 231-244.

Fraiberg, S. (1974). Blind infants and their mothers: An examination of the sign system. In M. Lewis & L. A. Rosenblum (Eds.), The effect of the infant on its caregiver (pp. 251-232). New York: Wiley.

Gable, R. K. (1986). Instrument Development in the Affective Domain. Boston: Kluwer-Nijhoff.

Ganon, E. C., & Swartz, K. B. (1980). Perception of internal elements of compound figures by one-month-old infants. Journal of Experimental Child Psychology, 30, 159-170.

Greenman, G. W. (1963). Visual behavior of newborn infants. In A. J. Solnit & S.A. Provence (Eds.), Modern perspectives in child development (pp. 71-79). New York: International Universities Press.

Gumperz, J. J. (1982). Discourse strategies. Cambridge, England: Cambridge University Press.

Gunnar, M. R., Porter, F. L., Wolf, C. M., Rigatuso, J., & Larson, M. C. (1995). Neonatal stress reactivity: Predictions to later emotional temperament. Child Development, 66, 1-13.

Hains, S. M. J., & Muir, D. W. (1996). Infant sensitivity to adult eye direction. Child Development, 67, 1940-1951.

Haith, M. M., Bergman, T., & Moore, M. J. (1977). Eye contact and face scanning in early infancy. Science, 198, 853-855.

Henley, N. M. (1977). Body politics: Power, sex, and nonverbal communication. New Jersey: Prentice-Hall.

Hickney, T. L., & Peduzzi, J. D. (1987). Structure and development of the visual system. In P. Salapatek & L. Cohen (Eds.), Handbook of infant perception: Vol. 1. From sensation to perception (pp. 1-36). Orlando: Academic.

Hines, M., & Kaufman, F. R. (1994). Androgen and the development of human sex-typical behavior: Rough-and-tumble play and sex of preferred playmates in children with Congenital Adrenal Hyperplasia (CAH). Child Development, 65, 1042-1053.

Hittelman, J. H., & Dickes, R. (1979). Sex differences in neonatal eye contact time. Merrill-Palmer Quarterly, 25, 171-184.

Huston, A. C. (1983). Sex typing. In P. H. Mussen (Ed.), Handbook of child psychology: Vol. 4. Socialization, personality, and social development (pp. 387-468). New York: Wiley.

Johnson, M. H., Dziurawiec, S., Ellis, H., & Morton, J. (1991). Newborns' preferential tracking of face-like stimuli and its subsequent decline. Cognition, 40, 1-19.

Kimble, C. E., Forte, R. A., & Yoshikawa, J. C. (1981). Nonverbal concomitants of enacted emotional intensity and positivity: Visual and vocal behavior. Journal of Personality, 49, 271-283.

Klaus, M. H., & Kennell, J. H. (1976). Maternal-infant bonding. In M. H. Klaus & J. H. Kennell (Eds.), Maternal-infant bonding (pp. 1-15). St. Louis, MO: Mosby.

Klaus, M. H., Kennell, J. H., Plumb, N., & Zuehlke, S. (1970). Human maternal behavior at the first contact with her young. Pediatrics, 46, 187-192.

Kleiner, K. A. (1987). Amplitude and phase spectra as indices of infants' pattern preferences. Infant Behavior and Development, 10, 49-59.

Kleiner, K. A. (1990). Models of neonates' preferences for facelike patterns: A response to Morton, Johnson, and Maurer. Infant Behavior and Development, 13, 105-108.

Kleiner, K. A., & Banks, M. S. (1987). Stimulus energy does not account for 2-month-olds' face preferences. Journal of Experimental Psychology: Human Perception and Performance, 13, 594-600.

Kleinke, C. L. (1986). Gaze and eye contact: A research review. Psychological Bulletin, 100, 78-100.

Kleinke, C. L., Desautels, M. S., & Knapp, B. E. (1977). Adult gaze and affective and visual responses of preschool children. The Journal of Genetic Psychology, 131, 321-322.

Korner, A. F. (1974a). The effect of the infant's sex on the caregiver. In H. L. Bee (Ed.), Social issues in developmental psychology (pp. 78-84). New York: Harper & Row.

Korner, A. F. (1974b). The effect of the infant's state, level of arousal, sex, and ontogenetic stage on the caregiver. In M. Lewis & L. A. Rosenblum (Eds.), The effect of the infant on its caregiver (pp. 105-121). New York: Wiley.

Knackstedt, G., & Kleinke, C. L. (1991). Eye contact, gender, and personality judgments. The Journal of Social Psychology, 131(2), 303-304.

Leveroni, C., Korman, K., & Berenbaum, S. A. (1996). The need for empirical data to evaluate biopsychosocial theories of cognitive sex differences: reply to commentaries. Learning and Individual Differences, 8, 61-64.

Leeb, R. T., & Rejskind, F. G. (1998, April). Paternal Sex-Typing of Newborns: Standardization of a Rating Scale. Poster presented at the XIth Biennial International Conference on Infant Studies. Atlanta, GA.

Leeb, R. T., & Rejskind, G. (1997, August). Maternal sex-typing of newborns: Development of a rating scale. Poster presented at the annual meeting of the American Psychological Association. Chicago, IL.

LeVay, S. (1991). A difference in hypothalamic structure between heterosexual and homosexual men. Science, 253, 1034-1037.

Levine, M. H., & Sutton-Smith, B. (1973). Effects of age, sex, and task on visual behavior during dyadic interaction. Developmental Psychology, 9, 400-405.

Lewis, T. L., Mondloch, C. J., Budreau, D. R., Maurer, D., Dannemiller, J. L., Stephens, B. R., & Kleiner, K. A. (1998, April). Face perception in young infants. Poster presented at the XIth Biennial International Conference on Infant Studies. Atlanta, GA.

MacLusky, N. J., & Naftolin, F. (1981). Sexual differentiation of the central nervous system. Science, 211, 1294-1303.

Maccoby, E. E., & Jacklin, C. N. (1974). The Psychology of Sex Differences, . California: Stanford University Press.

Martin, C. L. (1999). A developmental perspective on gender effects and gender concepts. In W. B. Swann, Jr., J. H. Langlois, & L. A. Gilbert (Eds.), Sexism and stereotypes in modern society. The gender science of Janet Taylor Spence (pp. 45-73). Washington, DC: APA.

Massie, H. N. (1977). Patterns of mother-infant behavior and subsequent childhood psychosis: A research and case report. Child Psychiatry and Human Development, 7, 211-230.

Massie, H. N. (1978). blind ratings of mother-infant interaction in home movies of prepsychotic and normal infants. American Journal of Psychiatry, 135, 1371-1374.

Maurer, D., & Barrera, M. (1981). Infants' perception of natural and distorted arrangements of a schematic face. Child Development, 52, 196-202.

Maurer, D., & Maurer, C. (1988). The world of the newborn. New York: Basic.

Maurer, D., & Young, R. E. (1983). Newborn's following of natural and distorted arrangements of facial features. Infant Behavior and Development, 6, 127-131.

Messer, D. J., & Vietze, P. M. (1984). Timing and transitions in mother-infant gaze. Infant Behavior and Development, 7, 167-181.

Meyer, J. W., & Sobieszek, B. I. (1972). Effect of a child's sex on adult interpretations of its behavior. Developmental Psychology, 6, 42-48.

Meyer-Bahlburg, H. F. L., Ehrhardt, A. A., Rosen, L. R., Gruen, R. S., Veridiano, N. P., Vann, F. H., & Neuwalder, H. F. (1995). Prenatal estrogens and the development of homosexual orientation. Developmental Psychology, 31, 12-21.

Money, J., & Ehrhardt, A. A. (1972). Man & woman, boy & girl. Baltimore, MD: The Johns Hopkins University Press.

Money, J., & Tucker, P. (1975). Sexual signatures. On being a man or a woman.(pp. 86-118). Boston, MA: Little-Brown.

Morton, J., Johnson, M. H., & Maurer, D. (1990). On the reason for newborns' responses to faces. Infant Behavior and Development, 13, 99-103.

Moss, H. A., & Robson, K. S. (1968). Maternal influences in early social visual behavior. Child Development, 39, 401-408.

Muir, D. W., Hains, S. M. J., & Symons, L. A. (1994). Baby and me: Infants need minds to read! Cahiers de Psychologie Cognitive, 13, 669-682.

Muirhead, R. D., & Goldman, M. (1979). Mutual eye contact as affected by seating position, sex, and age. The Journal of Social Psychology, 109, 201-206.

Mulac, A., Studley, L. B., Wiemann, J. M., & Bradac, J. J. (1987). Male/female gaze in same-sex and mixed-sex dyads. Gender-linked differences in mutual influence. Human Communication Research, 13, 323-343.

Nimmons, D. (1993, March). Sex and the brain. Discover, 64-71.

Peery, J. C., & Stern, D. N. (1976). Gaze duration frequency distributions during mother-infant interaction. Journal of Genetic Psychology, 129, 45-55.

Pelàez-Nogueras, M. Gewirtz, J. L., Field, T., Cigales, M., Malphurs, J., Clasky, S., & Sanchez, A. (1996). Infants' preference for touch stimulation in face-to-face interactions. Journal of applied Developmental Psychology, 17, 199-213.

Persson-Blennow, I., Binett, B., & McNeil, T. F. (1988). Offspring of women with nonorganic psychosis: Antecedents of anxious attachment to the mother at one year of age. Acta Psychiatricia Scandanivica, 78, 66-71.

Pilkonis, P. A. (1977). The behavioral consequences of shyness. Journal of Personality, 45, 596-611.

Podrouzek, W., & Furrow, D. (1988). Preschoolers' use of eye contact while speaking: The influence of sex, age, and conversational partner. Journal of Psycholinguistic Research, 17, 89-98.

Post, B., & Heatherington, E. M. (1974). Sex differences in the use of proximity and eye contact in judgments of affiliation in preschool children. Developmental Psychology, 10, 881-889.

Reid, G. M. (1994). Maternal sex-stereotyping of newborns. Psychological Reports, 75, 1443-1450.

Rhinegold, H. L. (1963). Controlling the infant's exploratory behaviour. In B. M. Foss (Ed.), Determinants of infant behaviour II, (pp. 171-178). London: Methuen.

Robson, K. S. (1967). The role of eye-to-eye contact in maternal-infant attachment. Journal of Child Psychology and Psychiatry, 8, 13-25.

Robson, K. S., Pedersen, F. A., & Moss, H. A. (1969). Developmental observations of diadic gazing in relation to the fear of strangers and social approach behavior. Child Development, 40, 619-627.

Rosenthal, M. K. (1984). Sex differences in mother-infant interaction during breast-feeding in the neonatal period. The Southern Psychologist, 2, 3-7.

Rothbart, M. K., & Maccoby, E. E. (1966). Parents' differential reactions to sons and daughters. Journal of Personality and Social Psychology, 4, 237-243.

Rubin, J. Z., Provenzano, F. J., & Luria, Z. (1974). The eye of the beholder: Parents' views on sex of newborns. American Journal of Orthopsychiatry, 44, 512-519.

Russo, N. F. (1975). Eye contact, interpersonal distance, and the equilibrium theory. Journal of Personality and Social Psychology, 31, 497-502.

Salapatek, P. (1975). Pattern perception in early infancy. In L. B. Cohen & P. Salapatek (Eds.), Infant perception: From sensation to cognition (vol. 1), (pp. 133-234). New York: Academic.

Schölmerich, A., Leyendecker, B. & Keller, H. (1995). The study of early interaction in a contextual perspective: Culture, communication, and eye contact. In J. Valsiner (Ed.), Comparative-cultural and constructivist perspectives. Child development within culturally structured environments (vol. 3), (pp. 29-51). Norwood, NJ: Ablex.

Seavey, C. A., Katz, P. A., & Zalk, S. R. (1975). Baby X: The effect of gender labels on adult responses to infants. Sex Roles, 1, 103-109.

Sepkoski, C. M., Lester, B. M., Ostheimer, G. W., & Brazelton, T. B. (1992). The effects of maternal epidural anesthesia on neonatal behavior during the first month. Developmental Medicine and Child Neurology, 34, 1072-1080.

Sidorowicz, L. S., & Sparks-Lunney, G. (1980). Baby X revisited. Sex Roles, 6, 67-73.

Slater, A., & Morison, V. (1991). Visual attention and memory at birth. In M. J. Solomon Weiss & P. R. Zelazo (Eds.), Newborn attention: Biological constraints and the influence of experience (pp. 256-277). New Jersey: Ablex.

Slijper, F. M. E., Drop, S. L. S., Molenaar, J. C., & de Muinck, Keizer-Schrama, S. M. P. F. (1998). Long-term psychological evaluation of intersex children. Archives of Sexual Behavior, 27, 125-144.

Slijper, F. M. E., Drop, S. L. S., Molenaar, J. C., & Scholtmeijer, R. J. (1994). Neonates with abnormal genital development assigned the female sex: Parent counseling. Journal of Sex Education and Therapy, 20, 9-17.

Smith, C., & Lloyd, B. (1978). Maternal behavior and perceived sex of infant: Revisited. Child Development, 49, 1263-1265.

Snow, M. E., Jacklin, C. N., & Maccoby, E. E. (1983). Sex-of-child differences in father-child interaction at one year of age. Child Development, 54, 227-232.

Stern, D. N. (1974). Mother and infant at play: The dyadic interaction involving facial, vocal, and gaze behaviors. In M. Lewis & L. A. Rosenblum (Eds.), The effect of the infant on its caregiver (pp. 187-214). New York: Wiley.

Tabachnick, B. G., & Fidell, L. S. (1996). Using Multivariate Statistics (3rd ed.). New York: HarperCollins.

Tannen, D. (1990a). Gender differences in conversational coherence: Physical alignment and topical cohesion. In B. Dorval (Ed.), Conversational organization and its development, (pp. 165-206). New Jersey: Ablex.

Tannen, D. (1990b). You just don't understand: Women and men in conversation. New York: Ballantine

Thayer, S. (1977). Children's detection of on-face and off-face gazes. Developmental Psychology, 13, 673-674.

Thoman, E. B., Leiderman, H., & Olson, J. P. (1972). Neonate-mother interaction during breast-feeding. Developmental Psychology, 6, 110-118.

Thomas, H. (1973). Unfolding the baby's mind: The infant's selection of visual stimuli. Psychological Review, 80, 468-488.

Trowell, J. (1982). Possible effects of emergency cesarean section on the mother-child relationship. Early Human Development, 7, 41-51.

Valenza, E., Simion, F., Cassia, V. M., & Umiltà, C. (1996). Face preference at birth. Journal of Experimental Psychology: Human Perception and Performance, 22, 892-903.

Vlietstra, A. G., & Manske, S. H. (1981). Looks to adults, preferences for adult males and females, and interpretations of an adult's gaze by preschool children. Merrill-Palmer Quarterly, 27, 31-41.

Ward, C. D., Phillips, P. M., & Cooper, R. P. (1998, April). Lack of preference for the paternal face in four-month-olds. Poster presented at the XIth Biennial International Conference on Infant Studies. Atlanta, GA.

Will, J. A., Self, P. A., & Datan, N. (1976). Maternal behavior and perceived sex of infant. American Journal of Orthopsychiatry, 46, 135-139.

Wolff, P. (1963). Observations on the early development of smiling. In B. M. Foss (Ed.), Determinants of infant behaviour II, (pp. 113-138). London: Methuen.

Wolff, S., & Chess, S. (1964). A behavioural study of schizophrenic children. Acta Psychiatricia Scandanivica, 40, 438-466.

van Wulften Palthe, T. & Hopkins, B. (1984). Development of the infant's social competence during early face-to-face interaction: A longitudinal study. In H. F. R. Prechtl (Ed.), Continuity of neural functions from prenatal to postnatal life (198-219). Philadelphia, PA: Lippincott.

Zucker, K. J. (1996). Commentary on Diamond's "Prenatal predisposition and the clinical management of some pediatric conditions". Journal of Sex & Marital Therapy, 22, 148-160.

Appendix A

Table A1

Studies on Eye Contact in Neonates and Infant Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Hittelman & Dickes, 1979 Sex Differences in Neonatal Eye Contact Time	15 M, 15 F age: 24-60 hours (N=30)	EC by unfamiliar F E. 2 Conditions: 1) with speech 2) without speech S's in 4 positions 1) supine in bassinet 2) cradled flat 3) cradled partly upright 4) held full upright	E attempted to make EC with S in all S positions. E's face 10-12 in. from S in "en face" position. E replicated maternal facial expression in speech & no speech conditions. Speech taped. Interaction lasted 66 sec./S position. 33 sec. with speech, 33 sec. without speech. After 4th position speech ended, E talked extemporaneously to S. E gazed at S 100%. When S looked EC recorded by E on event recorder with foot pedals. After interaction E rated S on attractiveness, appeal , cuddliness, responsivity, & guessed S's sex	*No sex differences found on EC during extemporaneous speech (no means) or amount of eyes-open time (M=240.9 sec. F, M=203.1 sec. M) *F spent more time in EC than M (M=74 sec. F, M=49.13 sec. M). *F greater percentage of time in EC than M (M=31% F, M=21% M). *No sex differences in frequency of EC. *F longer duration of EC than M (M=3.71 sec. F, M=2.53 sec. M). *No differences found in speech vs. no speech conditions. *F increased EC with position changes. M's EC constant across positions. *F increased EC from position 1 to position 2 & from position 3 to position 4, but not from 2 to 3. *Eye-open cannot account for sex differences found. *E able to guess sex of M 100%, but no better than chance guessing sex of F's. *Explanation 1: Social learning theory discarded because no time for S's to learn. *Explanation 2: EC indexes personal relatedness. From birth M & F already

(table continues)

Appendix A

Table A1

Studies on Eye Contact in Neonates and Infant Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Hittelman & Dickes, 1979 (con't)				relating differently to adult F. No explanation why. *Interpretation: Mothers find infant EC reinforcing, in turn look more with infants using more EC (F's) and less with infants using less EC (M's). *Interpretation: Infants regulate social contact through EC. No explanation related to reason for sex differences. *Explanation 3: Sex differences related to temporary manifestation of F's greater physiological maturity with long-term consequences in interpersonal relatedness.
Lasky & Klein, 1979 The Reactions of Five-Month-Old Infants to Eye Contact of the Mother and of a Stranger	40 M, 40 F age: 4-6 mo. (N=80) (Guatemala/Ladino)	2 conditions: 1) EC from mother 2) EC from strange F E	Infant in baby seat on table. Mother or E seated at table, facing infant, eyes closed. At signal, open eyes & talks. Looks either into S's eyes (EC) or at picture above S (no EC). Gaze for 1 min. then gaze switched to other focus. End after 2 min. 20 S's (10 M, 10 F) in each of 4 start condition groups: 1) mother with EC 2) mother without EC 3) stranger with EC	*Sex differences in EC not investigated. *If mother made EC 1st, S's looked more when mother looking than not (no means). *S's looked more at stranger (M=27.4 sec.) than at mother (M=17.8 sec.) regardless of 1st fixation. *Generally S's looked at stranger more than at mother & more when EC maintained by adult (M=24.8 sec.) than not (M=20.4 sec.) *Explanation 1: EC is important for infants, not just the eyes themselves.

(table continues)

Appendix A

Table A1

Studies on Eye Contact in Neonates and Infant Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Lasky & Klein, 1979 (con't)			4) stranger without EC 2 O's: O1 observed adult, O2 observed infant & recorded EC.	*Explanation 2: EC indexes attention & interest (implied, not stated directly).
Robson, Pedersen, & Moss, 1969 Developmental Observations of Diadic Gazing in Relation to the Fear of Strangers and Social Approach Behavior	40 mother-infant pairs 20 M, 25 F age: 8 mo. follow-up age: 9.5 mo. mother age: 18-34 (data part of follow-up study)	Stranger approaches & holds S while maintaining EC.	2 M O's conducted interview with mother. Interview included: 2 min. introduction, infant unrestrained. Infant placed on mother's lap, O1 approached, picked up S, & held for 1 min. while maintaining EC. Infant returned to lap. Interview with mother continued. Interaction with S repeated at end of interview with mother. O2 recorded S's behavior.	*Sex differences found in original study. *Mother score on Interest in Affectionate Contact With Infant (IAC) related to M & F EC at 1 mo. (r=.45 M, r=.34 F) & with F EC only, at 3 mo. (r=.43) *Frequency of mother-M EC at 1 mo. predictive of M EC with stranger at 8 mo. (r=.57) & of M spontaneous social behavior with stranger at 8 mo. *Mother's antenatal attitudes contribute to EC with M's. *Explanation 1: F infants more developmentally advanced than M infants. *Explanation 2: Both E's M, maybe related to more approach behavior (i.e., EC) with F infants. *No results reported concerning mother's greater EC with F infants, however, this is implied.

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Abromovitch & Daly, 1978 Children's Use of Head Orientation and Eye Contact in Making Attributions of Affiliation	Study 1 9 M, 9 F age: 3.7 yrs. 11 M, 11 F age: 4.4 yrs. (N=40) Study 2 15 M, 15 F age: 4.5 yrs.. 16 M, 16 F age: 6.3 yrs. (N=62)	Study 1 Videotapes of 4 FF dyads (N=8) in conversation, either facing each other (with EC) or facing camera (without EC). S's asked which pairs like/don't like each other. Study 2 Videotapes of F E giving instructions, from memory, for a rhyming game. 2 conditions: 1) with EC (looking into camera) 2) without EC (facing camera, looking down). S's asked which lady they would like to play with most.	Study 1 S's shown videotapes. 4 conditions: 2 with EC, 2 without EC in random order. 2 dyad pairs used in each video. 2 F E's: 1 ran video, 1 (unable to see TV) questioned S's and recorded answers. Study 2 S's shown videotapes by same 2 F E's. 2 different E's gave instructions on video in 2 conditions (F1 w/EC, F1 w/o EC, F2 w/EC, F2 w/o EC) in 4 random orders.	Studies 1 & 2 *No significant sex differences found in either study. *No age differences found in Study 1, but differences found in Study 2: preschool S's showed no preference for EC conditions (15 chose EC, 15 chose no EC) in determining liking, elementary aged S's chose EC conditions majority of time (26/32) in determining liking. *Trend toward sex differences in Study 2: F preschool S's chose EC conditions 66%, M chose EC only 33%. *Explanation 1: F show greater sensitivity/interest in social relations. *Explanation 2: Because sex differences were found only in younger S's who did not use EC as cue for affiliation, it may be easier to judge other's relationships than own. Sex differences are a developmental transition phenomenon.
Benenson, 1993 Greater Preference Among Females...	Study 1 10 M, 10 F age: 4 yrs.	Study 1 Friendship making in 2 conditions: 1) dyadic interaction with	Study 1 Professional puppeteer (F E) engaged S's in interaction with 1st 1 puppet (dyadic),	Study 1 *F looked more often than M in dyadic puppet interaction (M=76.38% F, M=57.70% M).

(table continues)

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Benenson, 1993 (con't)	10 M, 11 F age: 5 yrs. (N=41)	one puppet 2) group interaction with three puppets.	then 3 puppets (group). Focus of interaction was friendship making. S sat next to E for interaction. Session was videotaped & later coded for smiling & frequency of EC. EC measured only in dyad condition.	puppet condition, M smiled more than F in group condition, *Explanation 1: F enjoyed dyadic condition more than M. *Explanation 2: E was F & may have interacted differently with M & F S's. *Explanation 3: Specific puppets may have elicited different reactions by M & F S's.
	Study 2 11 M, 13 F age: 3 yrs. 26 M, 25 F age: 4 yrs. (N=75)	Study 2 Decision making in 2 conditions: 1) dyadic interaction with 1 puppet 2) group interaction with 3 puppets.	Study 2 F undergraduate trained as puppeteer. Interaction with S's done using scripts. 2 minute warm-up, 6 minute interaction for each; group and dyad conditions. Different puppets used in dyad and group. Puppet(s) invites S to sleep over but house is too small.	Study 2 *F smiled more in dyadic condition than M (M=19.5 f, M=8.45 M). F smiled less in group condition than in dyadic condition (M=7.07 group, M=19.5 dyad), but same amount as M in group (M=7.07 F, M=7.31 M). *F made more frequent EC than M in dyadic condition across age. *3 yr. old F more frequent EC than 3 yr. old M in dyadic condition. *No sex difference in EC in 4 yr. old S's. 4 yr. old F EC = 4 yr. old M EC. *Explanation 1: F prefer dyadic interaction

(table continues)

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Benenson, 1993 (con't)			S asked to decide whether everyone should sleep outside build a bigger house together, or sleep at grandmother's house. Interaction videotaped & later coded.	*Explanation 2: EC performs relational function for F and dominance/aggressive function for M (not stated explicitly). *Explanation 3: EC indexes comfort and intimacy. M not comfortable in intimate dyadic interaction. *Explanation 4: Interaction content may engage M & F differently.
Kleinke, Desautels, & Knapp, 1977 Adult Gaze and Affective and Visual Responses of Preschool Children	24 M, 24 F age: 3-5 yrs.	5 minute word game with F E.	E read vocabulary items while making either 80% EC (high gaze condition) or 20% EC (low gaze condition). E and S sat 3 ft. apart. S's rated liking for E on 5-point scale. O watched S from behind mirror.	F gazed at E more than M (40.7% F vs. 30.5% M). *All S's gazed more at E in high gaze condition (45.1% high vs. 26.2% low.). *M liked E less in high gaze condition (M=2.61) than low gaze condition (M=4.67). *F like E more in high gaze condition (M=4.08) than low gaze condition (M=3.67). *No relationship between S's amount of gaze and reported liking of E. *Explanation: EC has different meaning for M & F preschoolers. M experience more reprimands & negative sanctions from teachers & more punishment in general. Adult gaze communicated to M they are doing/going to do something wrong. F interpret EC as approval

(table continues)

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Podoruzek & Furrow, 1988 Preschoolers' Use of Eye Contact While Speaking: The Influence of Sex, Age, and Conversational Partner	21 M 12 F age: 2-2.5 yrs. Retested at age 3.5-4 yrs. (Bermuda)	2 conditions: 1) free-play with mother 2) free-play with either M or F E.	S's videotaped in home for 15 minutes with mother & 15 minutes with E. S's played with Fisher-Price play house & farm. While S's played with E mother remained in room. Videotapes coded by O's. EC was examined only in conjunction with S's verbalizations.	*Overall S's engaged in more EC with E (stranger) than mother. *F made more EC than M (M=21.48% F, M=15.07% M). *No mention of M vs. F E. *Explanation 1: F more sociable than M. Authors say this is unlikely given Maccoby and Jacklin's research. *Explanation 2: Differences in functional use of language by M & F. F use EC in information seeking contacts. *Explanation 3: F rely more on external interactive cues than M. *Explanation 4: Adults serve different social-verbal role in contacts with M & F children. Mother use more social speech & praise with F's and more referential speech with M's.
Post & Heatherington, 1974 Sex Differences in the Use of Proximity and Eye Contact in Judgments of Affiliation in Preschool Children	20 M, 20 F age: 4 yrs. 20 M, 20 F age: 6 yrs. (N=80)	Pictures of M & F with and without EC (M & F adults) at various distances (near/far)	S's shown opposing pairs of pictures (e.g., EC near vs. EC far, no EC near vs. no EC far, etc.) and asked to choose which people liked each other.	*No main effect for sex. *Main effect for age: older S's used EC and proximity to determine friendship relationship. 4 yr. olds use EC as cue approximately 50%, 6 yr. olds use EC as cue approximately 70%. *Age X Sex significant: with age only F improve in ability to use EC as cue (M=41.25% age 4 F,

(table continues)

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Post & Heather-ington, 1974 (con't)				M=77.5% age 6 F). M use EC as cue same at ages 4 & 6 (M=57.5%) *Explanation 1: F become more sensitive to social cues earlier than M because F learning "expressive" sex role. *Explanation 2: At age 4 neither M nor F understood directions & F's understanding increased more rapidly with age. (rejected) *Explanation 3: Younger children & M's don't use EC & proximity as cues for liking/affiliation. Instead they use EC as cue for aggression. This is learned socially.
Thayer, 1977 Children's Detection of On-Face and Off-Face Gazes	24 M age: 6 yrs. 2 groups with 12 S's each.	2 conditions: 1) Adult (M?) gaze 2) M child (peer)gaze.	S & gazer sat face-to-face 2 m apart with chin rests. 7 fixation points. Each point 10 cm apart. Only point #4 was on-face (bridge of S's nose, assumed as EC). 70 judgments made by each S.	*Compared findings to 2 studies with adult dyads & adult-child dyads. *Children worse in detecting off-face gaze regardless of gazer's age (70.1% incorrect when child-child, 73.4% incorrect when adult-child, 17.7% incorrect when adult-adult). *For children off-face gaze is functionally equivalent to direct EC as regulator of behaviors influenced by EC *Explanation: EC judgments due to perceptual development not cognitive-social differences (i.e., status-power-role) because age/status of gazer found not to be relevant.

(table continues)

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Vlietstra & Manske, 1981 Looks to Adults, Preferences for Adult Males and Females, and Interpretations of an Adult's Gaze by Preschool Children	Study 1 17 M, 17 F age: 4-5 yrs.	Study 1 Playing with gender-neutral toys	Study 1 4 E's: 2 M, 2 F. 1/2 S's tested by M E & 1/2 S's tested by F E. E & S sat on floor approximately 18 in. apart. S given toys to play with & allowed to play for 10 min. E gazed 100% at S. 2 O's: One on each side of S, behind mirror, recorded EC. After session S's asked their preference for M or F adult n 3 situations: 1) to work/play with at home 2) as teacher at school 3) as E to play with. (Unclear if all children played with same & opposite sex E.)	Study 1 *F looked at E (M & F) more than M (M=29.31 F, M=22.0 M). *M & F looked more at F E than at M E (M=29.76 F E, M=21.06 M E). *No support for children looking more at adults of same sex. *No sex difference in number/percentage of looks while playing. *Explanation 1: (for lack of support for S's looking more at same-sex adult) Children look more at familiar same-sex adults than unfamiliar. (Other studies used familiar adults, this study used strange adults.) *Explanation 2: F find visual information more interesting/important than M. *Explanation 3: A proximal social interaction pattern is established by F early & encouraged by adults. *Explanation 4: F look to adults for approval more than M.

(table continues)

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Vlietstra & Manske, 1981 (con't)	Study 2 64 S's age: 4-5 approximately 1/2 M/F	Study 2 Pictures of adult sitting & child playing. Adult either gazing at child or eyes averted (no EC). 1/2 depicted M adult, 1/2 depicted F adult. Child depicted as gender ambiguous.	Study 2 S's shown pictures in 4 conditions: 1,2) F adult gazing/not gazing 3,4) M adult gazing/ not gazing. S's asked what the child & adult are doing, does the adult like/dislike/not know what the child is doing?	Study 2 *Approval interpretation commonly given by S's for direct gaze by both M & F adult (M=6.75 approving vs. M=3.03 disapproving vs. M=2.25 neutral. *Neutral interpretation often given by S's for averted gaze by both M & F adult (M=5.06 approving vs. M=2.03 disapproving vs. M=4.84 neutral). *F interpret direct gaze as approval more than M (M=8.40 F, M=5.18 M). *M interpret direct gaze as disapproval more than F (M=4.00 M, M=2.06 F). *No sex difference in number of neutral interpretations or interpretations of averted gaze. *For M, disapproval interpretations correlated with glances to E (r=.34). *For F, glances to E did not correlated singlely with approval or disapproval interpretations. *Explanation: M & F interpret adult gaze differently in proximal situations. M receive more reprimands therefore likely to interpret gaze as a signal for intervention or noninterventions. F view adults as more approving. F looks to

(table continues)

Appendix A

Table A2

Studies on Eye Contact in Preschool Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Vlietstra & Manske, 1981 (con't)				adults information seeking. For more dependent therefore look more. *Thus, children look to adults for information and direction more than approval. This behavior is learned.

Appendix A

Table A3

Studies on Eye Contact in School- and Mixed-Age Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Ashear & Snortum, 1971 Eye Contact in Children as a Function of Age, Sex, Social and Intellective Variables	5 M, 5 F age: preschool 10 M, 10 F grade: K, 2, 5, 8 (N=90)	Interview concerning interests & aspirations by F E.	E's gaze was 100%. When S met E's gaze E triggered event recorder for duration of gaze. Teacher ratings for social and intellective characteristics collected.	*F made more EC while speaking & overall (including periods of silence), but not while listening. (No means given). *No explanations given.
Levine & Sutton-Smith, 1973 Effects of Age, Sex, and Task on Visual Behavior During Dyadic Interaction	12 M, 12 F (at each age level) ages: 4-6, 7-9, 10-12, adult (N=96) (All S's acquainted but not friends. Authors wanted unacquainted S's to control for degree of familiarity.)	2 tasks: 1) conversation: S's instructed to get to know other person better 2) joint block construction: S's instructed to "build anything you want together".	S's brought into room by F E. S's seated face-to-face on chars at table, 2 ft. apart. 2 O's watched from behind mirror. O1 watched S1 & depressed button on event recorder when S1 looked at eyes of S2. O2 did likewise with S2. S's talked for 5 min. + 2 min. warm-up. After 5 min. F E returned & put blocks out. S's built for 5 min. + 2 min. warm-up. Audio recordings made to	*Increase in EC with age during conversation (M=95.8 sec., age 4 M - M=154.7 sec., adult M; M=102.3 sec., age 4 F - M=197.9 sec., adult F) but not during building task (M=12.1 sec., age 4 M - M=2.7 sec., adult M; M=8.0 sec., age 4 F - M=8.1 sec., adult F). *Significant decrease in EC during age 10-12 (M=59.4, age 7 M vs. M=45.7, age 10 M vs. M=81.3, adult M; M=77.0, age 7 F vs. M=62.1, age 10 F vs. M=145.1, adult F). *F more EC than M on overall mutual EC and EC while speaking. *On construction task F not significantly more EC than M. *Generally more EC for both M & F during conversation than building.

(table continues)

Appendix A

Table A3

Studies on Eye Contact in School- and Mixed- Age Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Levine & Sutton-Smith, 1973 (con't)			investigate verbal dominance. S's asked to report liking for partner.	*More EC listening than speaking at all ages across gender. *Explanation 1: For decrease in EC at age 10-12, may be due to self-consciousness. *Explanation 2: EC is situationally specific. EC may follow a social learning model rather than a cognitive-developmental model. EC is a developmental phenomenon.
Russo, 1975 Eye Contact, Interpersonal Distance, and the Equilibrium Theory	24 M, 24 F (at each grade level) grade: K, 3, 6 (N=144) Divided into: 12 M, 12 F same-sex friend dyads 12 M, 12 F same-sex "not particularly friends" dyads.	6 min. conversation on topic of S's choice	F E explained task to S's. S's sat face-to-face on chairs and talked for 3 2-min. periods. At end of each period chairs moved to change distance: 12 in., 42 in., 72 in. 1 O watched each S's face for measurement of gaze direction. Recorded on event recorder. O's not visible to S's.	*Overall percent of time in EC increased linearly with distance and age (means available for M & F at each grade level). *F use more EC than M overall. *Friends use more EC than not friends overall. **Mean length of mutual glance higher in friend dyads: length indexes intimacy in interaction. *Proportion of time in EC related to friendship/intimacy. *Explanation 1: F socialized to have higher affiliative orientation. This is expressed through EC. Authors reject. *Explanation 2: F rely on external cues for (social?) information & eyes are a good source (not stated, implied). **Explanation 3: Percent of time engaged in EC indexes information seeking.

(table continues)

Appendix A

Table A3

Studies on Eye Contact in School- and Mixed- Age Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Tannen, 1990 Differences in Conversa-tional Coherence: Physical Alignment and Topical Cohesion	2 pair (1 M pair, 1 F pair) at each grade level. grades: 2, 6, 10, and age 25 At each grade 1 pair MM, 1 pair FF. All pairs friends. (N=16, in 8 same-sex pairs)	S's instructed to "discuss something serious or intimate".	S's brought into E's office to talk. S's sat in chairs. Chairs at right angles (S's did not necessarily orient themselves according to the constraints of the chairs, but all sat on chairs). E (M) told S's to discuss something serious & left room. E returned after 5 min. to check if S's following instructions and told S's to continue talking. 15 min. interaction + 5 min. warm-up Interaction videotaped.	*F align so facing each other. M align so not facing each other. In extreme case (grade 10 M) both faced straight ahead. *F anchor eye gaze (EC) on other's face. M anchor eye gaze elsewhere, little EC (no means). *Explanation: F relational & concerned with intimacy. EC indexes intimacy for F. M concerned with status & power. EC indexes status for M. Therefore, EC has different meaning for M & F. This pattern is learned socially through interaction with peers.

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

Author, Date, Title	Subjects	Content	Procedure	Results & Explanations
Argyle & Ingham, 1972 Gaze, Mutual Gaze, and Proximity	Study 1 24 pairs of graduate/undergraduate students. 8 pairs in 3 sex combinations: MM, FF, MF. (N=48) Study 2 N=34 (no other S information given). Results given for 3 sex combinations: MM, FF, MF.	Study 1 Two 3 min. conversations about neutral topics (travel & holidays, books & films) at 2 distances: 2 ft. and 10 ft. All S's received both topics and both distances. Study 2 Same as Study 1, but at distances of 3 ft. and 6 ft.	Study 1 S's seated at 90 degree angle facing 1-way mirror. 2 O's recorded S's total gaze with event recorder. 1 O per S. Computed from recordings; total mutual EC for each pair; average length of glance for each S; & average length of EC for each pair. Study 2 Method similar to Study 1 but S's seated face-to-face.	Study 1 *Gaze increased with increased distance for all S pairs: total EC increased by 90%, length of EC increased by 48%. *Significant effect for sex in frequency of EC (no direction given). *Explanation: Distances were unnatural. Study 2 *Frequency of EC affected by distance overall. *Duration of EC not affected by distance overall. *Duration of EC increased significantly for F from 3 ft. (M=0.68 sec.) to 6 ft. (M=1.42 sec.). *Duration of EC decreased nonsignificantly for M form 3 ft. (M=1.06 sec.) to 6 ft. (M=0.86 sec.). *Frequency of EC did not change for 3 ft. to 6 ft. for ether M or F. *At both distances F had greater frequency of EC than M (M=38.9% F at 3 ft., M=37.9% F at 6 ft.;

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Argyle & Ingham, 1972 (con't)				M=22.1% M at 3 ft., M=23.4% M at 6 ft.) *Significant interaction of sex by distance (no direction given) for both frequency of EC and duration of EC. *Looking while listening more affected by distance than looking while talking (no direction given). *Explanation 1: Equilibrium Theory: There is an equilibrium for intimacy. Non-verbal and physical signals are used as cues and balanced according to one another. E.g., EC & proximity, if proximity increases EC will decrease, and vice versa. *Explanation 2: EC indexes intimacy, F use looking while talking as intimacy signal, M use looking while listening as intimacy signal
Brooks, Church, & Fraser, 1986 Effects of Duration of Eye Contact on Judgments of Personality Characteristics	60 M, 60 F age: undergraduates (N=120)	Videotapes of interview with a M interviewer & either a M or F interviewee. Each video interview segment = 60 sec. Interviewer looked 100%.	S's asked to rate interviewee on 21 bipolar personality adjectives.	*M interviewee rated higher in leadership qualities as EC increased. *M S's rated only F interviewee as more assertive with increased EC, & F S's rated only M interviewee as more assertive with increased EC. *Ratings generally consistent with traditional sex-role stereotypes.

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

Author, Date, Title	Subjects	Content	Procedure	Results & Explanations
Brooks, Church, & Fraser, 1986 (con't)		3 EC conditions for interviewee: 1) 5 sec. EC from secs. 25-30 2) 30 sec. EC from secs. 0-5, 12-17, 22-27, 30-35, 42-47, & 52-57 3) 50 sec. EC from secs. 0-20, 25-40, & 45-60.		*As EC increased interviewees seen as more potent (e.g., assertive, decisive, dominant, aggressive). *Explanation 1: EC indexes potency, power, control & positive emotional state. *Increasing EC from condition 1 to condition 2 produced significant changes in impressions. No change in impression from condition 2 to condition 3. *Explanation 2: Increase in EC frequency from condition 1 to 2 may be related to change in impression from condition 1 to 2. *Explanation 3: Duration EC per glance may be related to change in impression from condition 1 to 2. *Explanation 2 + 3: Both duration and frequency of EC may be related to formation of impressions.
Daly, 1978 Behavioural Correlates of Social Anxiety	6 M, 6 F scoring high on social avoidance/distress scale 6 M, 6 F scoring medium on scale 6 M, 6 F scoring low on scale.	2 open-ended questions & instructions for a role-playing task.	S's videotaped (doesn't say where recorder was located or who did recording) during both tasks. Tapes coded for arm & hand movements, talking, & EC.	*Sex differences were not assessed. *High anxious S's made less total EC with E while talking. *No difference in EC while listening between high & low anxious S's. *More variability in duration of EC for high anxious S's. *Bimodal distribution of EC duration for

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Daly, 1978 (con't)	age: 15-17 (N=36)		EC coded for 2 conditions: 1) while S talking 2) while S listening. Both length and frequency of EC recorded.	high anxious S's with clusters at extremes: S's held EC for very long periods or glanced away quickly (no means). *Explanation: EC while talking is a function of topic intimacy.
Exline, 1963 Explorations in the Process of Person Perception: Visual Interaction in Relation to Competition, Sex, and Need for Affiliation	48 M in 16 M triads, 48 F in 16 F triads (n=32 triads, N=96) 8 triads (4 M, 4 F) communion-oriented, 8 triads control-oriented.	Group discussion task. 2 conditions: 1) discussion ending in choice of 1 S's idea. Implication of reward for S whose idea is chosen (competition) 2) discussion not resulting in choice (non-competitive).	S's told to discuss in clockwise order until each S had spoken twice. After each S spoke twice, free discussion permitted. O's recorded EC from behind mirror. Used event recorder to record frequency and duration of EC between dyads. (Results obtained, hypotheses presented, post hoc analyses done, further hypotheses presented.)	*F used more EC than M overall (M=37.3% F, M=23.2% M). *High affiliation F used more EC than low affiliation F (M=40% high, M=34.6% low). *Low affiliation M used more EC than high affiliation M (M=26.6% Low, M=19.8% high). *F look more overall, while speaking, & while listening than M. *M more likely to use non-mutual EC. *Explanation 1: For low affiliators EC represents struggle for dominance. *Explanation 2: EC not related to affiliation/intimacy/communion. *Explanation 3: measure of affiliation through EC confounded by way high & low affiliation defined. *Competition inhibited EC among high affiliators (M =8.4% non-competitive, M =3.3% competitive, across gender).

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Exline, 1963 (con't)				*Competition increased EC among low affiliators (M=2.8% M non-competitive, M=3.0% M competitive; M=4.5% F non-competitive, M=7.6% F competitive). *Explanation 1: M & F give different weight to importance of visual information in the visual field. *Explanation 2: F value information gained through visual input more than M because F are more dependent on the social field, more affiliative (implied), & respond to competitive situations with gaze aversion to avoid reception of "unpleasant" visual information. M are less affiliative (implied), less dependent on the social field, & respond to the challenge of a competitive situation in a more assertive way. (This does not explain the reversal in use of EC by affiliative vs. non-affiliative F's in competition.)
Kimble, Forte, & Yoshikawa 1981 Nonverbal...: Visual and Vocal Behavior	48 F Age: undergraduates	Liking or anger message at either strong or weak intensity delivered either to a M RA or a video camera.	M E gave S short emotional message (either positive/liking or negative/anger) to memorize & perform 4 times: 1) strong intensity to camera	*More EC, longer EC in high intensity conditions. *Greatest EC in high negative intensity condition regardless of recipient. *S's self-reported more looking in high negative intensity condition.

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Kimble, Forte, & Yoshikawa 1981 (con't)			2) weak intensity to camera 3) strong intensity to M RA 4) weak intensity to M RA M RA & camera 3.5 ft. from S. S videotaped from behind mirror. EC coded from videotapes.	*Explanation 1: Duration of EC indexes intensity for negative emotions only. *Explanation 2: Frequency of EC implies intense positive emotion (i.e., liking/affiliation & intensity), duration of EC implies negative emotions (intensity only).
Knackstedt & Kleinke, 1991 Eye Contact, Gender, and Personality Judgments	36 M, 47 F age: undergraduates (N=83) (Replication of Brooks, Church, & Fraser, 1986)	Videotapes of opposite-sex interviewer giving instructions to M or F interviewee who remained silent. Interviewer made 100% EC. Interviewee reciprocated EC for either 5 sec. or 45 sec. (out of 60 sec. total).	S's rated interviewee on 11 bipolar personality adjectives on 7-point scale.	*Interviewee rated as more potent in high EC condition (M=4.08) vs. low EC condition (M=3.14). *Interviewee rated as more mature/efficient in high EC condition (M=4.65) vs. low EC condition (M=3.92). *F interviewee rated as more attractive (M=4.65) than M (M=3.97) regardless of level of EC. *Explanation: EC communicates immediacy and openness to personal involvement.

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Muirhead & Goldman, 1979 Mutual Eye Contact as Affected by Seating Position, Sex, and Age	216 adult pairs ages: 18-30, 31-55, 56+ (n=72 pairs/group) (N=432) 3 sex combinations: MM, FF, MF with equal numbers of S's in each combination	Conversations between acquaintances (likely friends or intimates) in a shopping mall restaurant (face-to-face position) or seated on bench (adjacent position).	C observed S's from approximately 15 ft. away. Duration of EC measured with stopwatch. S's observed for 5 min. during which C made three 15 sex. recordings: at beginning, mid-way (around 2 min. 30 sec.), end.	*Overall more EC when S's seated face-to face (M=2.82 sec.) than adjacent (M=1.20 sec.). *Across seating positions senior (56+) MM pairs had greatest EC (M=3.70). *Young (18-30) MM pairs had least EC (M=1.41). *Middle-age (31-55) MM, FF pairs had equivalent EC (M=1.81 MM, 1.72 FF). *Equal EC (no means) when senior MM and FF pairs seated adjacent. When seated face-to-face MM made significantly more EC. *Explanation 1: EC indexes attention. *Explanation 2: EC indexes a "particular kind of intimacy". *Authors note: Attention and intimacy explanations based on results using young adults, these interpretations may not apply to middle-age or senior adults. *Explanation 3: Senior adults are preparing for death and are disengaging from social intimacy.

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Mulac, Studley, Wiemann, & Bradac, 1987 Male/Female Gaze in...Dyads	108 undergraduates (54 men, 54 women divided into 27 male/male, 27 female/female and 54 male/female dyads) All participants interacted in both same- & mixed-sex conditions	10 minute problem-solving interaction	S's sat at a table at right angles to one another. Interactions were videotaped and later coded for EC and vocal behavior.	*F/F dyads displayed more mutual gaze over all than M/M and M/F dyads. *No differences were found between M/M and M/F dyads on any gaze or vocal behaviors. *Explanation 1: Women are oriented to social-emotional aspects of conversation & relationships. Men are oriented to instrumental & task-oriented aspects of conversation & relationships. In male/female dyads, women conform to the male pattern of behavior. *Explanation 1: Men have greater status/power so women conform to their behavior pattern. *Explanation 2: Women have a larger repertoire of gaze behavior and can be more flexible. *Explanation 3: Women are more sensitive to their partner's psychological state. *Explanation 4: Men may interpret mutual gaze as bid for intimacy & women are trying to avoid "sending the wrong signals".

(table continues)

Appendix A

Table A4

Studies on Eye Contact in Adult Populations

AUTHOR, DATE, TITLE	SUBJECTS	CONTENT	PROCEDURE	RESULTS & EXPLANATIONS
Pilkonis, 1977 The Behavioral Consequences of Shyness	11 shy M, 11 shy F 12 not shy M, 12 not shy F age: undergraduates (N=46)	2 conditions: 1) unstructured, opposite-sex interaction (conversation with C 2) structured interaction (S prepare & deliver short speech) with either E or C. (All S's did both conditions)	While waiting for E to begin, S & C conversed while sitting on bench for 5 min. S & C videotaped and observed by E from behind mirror. After 5 min. E returned & asked S & C to get chairs from another room. S always placed chair 1st upon return. E explained structured speech. If C present, speech 2-person activity. If not, S did alone. Regardless, S always prepared and presented speech. Also videotaped. Videotapes scored for verbal & nonverbal behaviors including EC.	*Shy M had least frequency of EC (no means). *Not shy M had greatest frequency of EC (no means). *F sustained longer duration of EC than M (no means). *Interpretation: Social anxiety created reluctance to talk, look, or make EC in M & created a need to be pleasing/affiliative in F (expressed through nodding, smiling, & EC). *Explanation 1: Shyness expressed differently by M & F because of normative roles for each sex. *Explanation 2: EC indexes affiliation. F more affiliative than M because of social learning. When face with social anxiety M withdraw & F increase affiliative behavior.

Appendix B

MCGILL UNIVERSITY
FACULTY OF EDUCATION

CERTIFICATE OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

A review committee consisting of **three** of the following members:

1. Prof. E. Lusthaus	1. Prof. M. Maguire
2. Prof. R. Ghosh	2. Prof. N. Jackson
3. Prof. M. Downey	3. Prof. R. Turcotte

has examined the application for certification of the ethical acceptability of the project entitled:

GENDER TYPING AND MUTUAL GAZE BEHAVIOR IN YOUNG INFANTS: HERE'S LOOKING AT YOU, KID

as proposed by:

Applicant's Name REBECCA LEE Supervisor's Name G. Rejskind

Applicant's Signature [signature] Supervisor's Signature [signature]

Degree Program _____ Granting Agency _____

The review committee considers the research procedures as explained by the applicant in this application, to be acceptable on ethical grounds.

(Signatures)

a) [signature] Date 96/01/07

b) [signature] Date 96/01/19

c) [signature] Date 96/01/29

Associate Dean (Academic) [signature] Date 5/2/96

March 1995

Appendix C

HÔPITAL GÉNÉRAL JUIF - SIR MORTIMER B. DAVIS
THE SIR MORTIMER B. DAVIS - JEWISH GENERAL HOSPITAL

March 28, 1996

Ms. Rebecca Leeb
Department of Educational &
Counselling Psychology
McGill University
3700 McTavish Street
Montreal, Quebec
H3A 1Y2

Subject: ***Protocol entitled "Here's Looking at You, Kid!"***

Dear Ms. Leeb:

Please be advised that the protocol and English consent forms for the above-mentioned study have been approved. The approved consent forms are those accompanying your letter dated March 14, 1996. Please note that this approval is for the period of one year, at which point you must submit a protocol annual report to the Committee for re-approval.

Sincerely,

J. Mendelson, MD
Chairman, Research and Ethics Committee

HÔPITAL D'ENSEIGNEMENT DE L'UNIVERSITÉ MCGILL — A MCGILL UNIVERSITY TEACHING HOSPITAL
3755 CHEMIN DE LA CÔTE-STE-CATHERINE, MONTRÉAL (QUÉBEC) H3T 1E2
TÉL. : (514) 340-8222 FAX : (514) 340-7510

Appendix D

Measuring Parental Sex-Stereotyping of Newborns: Development, Standardization, and Pilot Testing of the Parental Sex-Typing of Newborns (Paston) Rating Scale

Research on sex and gender stereotyping has seen a recent resurgence due to the current focus on determining the relative influence of biological and social variables on the development of gendered behavior. Studies of parental stereotyping of newborns demonstrate that both mothers and fathers begin to differentially label their infants as a function of the infant's sex within 24-hours after birth. For example, newborn girls are describes a being smaller, prettier, and more delicate while newborn boys are described as being larger and more athletic (Karraker, Vogel, & Lake, 1995; Leeb & Rejskind, 1997, 1998; Reid, 1994; Rubin, Provenzano, & Luria, 1974). This early sex-stereotyping has long-term consequences in the development of children's beliefs and expectations regarding what constitutes gender appropriate behavior for others and for themselves.

Paper-and-pencil rating scales have most commonly been used to determine the extent and nature of adults' gendered beliefs (for reviews cf.: Huston, 1983; Maccoby & Jacklin, 1974; Stern & Karraker, 1989). This is particularly true in research investigating parents' sex-stereotyped expectations of, and beliefs about, their own newborns (Karraker, Vogel, & Lake, 1995; Leeb & Rejskind, 1997, 1998; Reid, 1994; Rubin, Provenzano, & Luria, 1974). Unfortunately, the measures used in past studies have been informal, and little if any information on scale reliability and/or validity is given. Because past measures have not been standardized, interpretation of results is difficult and comparisons of findings across studies are virtually impossible. A formal scale with well documented reliability and validity is needed and would fill a conspicuous void in the literature.

The purpose of the present study was to develop such a formal, reliable, and valid gender-typing scale for use in research on parents and newborns. Furthermore, because sex-typed expectations of one's own infant may differ from expectations of infants in

general, a second purpose of this study was to determine whether parents' sex-stereotyped perceptions of newborns were applicable to babies generally or specific to their own baby.

Pilot Testing of the Paston Rating Scale

Method

Participants

One hundred eighty-four mothers and 100 fathers, with 185 newborns (99 female, 86 male) participated in the pilot study by completing the Parental Sex-Typing of Newborns (Paston) Rating Scale within the first 4.3 to 152.3 hours postpartum ($\underline{M}$ = 39.92). Participants were drawn from the postpartum unit of the Sir Mortimer B. Davis-Jewish General Hospital located in Montreal, Quebec, Canada. Treatment of all participants was in accordance with the ethical standards of the American Psychological Association (APA, 1994), McGill University (see Appendix B), and the S.M.B.D.-Jewish General Hospital (see Appendix C).

Sample characteristics were as follows: Forty-one point eight percent of the mothers were primiparous. Multiparous mothers had an average of 2.2 children (excluding the new baby). Pre-term infants accounted for 13.9% of the total sample. The majority of the participants were Caucasian (68.6%). All parents spoke English well enough to understand and complete the questionnaire as determined by a short, informal interview, and 57.8% of the sample reported speaking English as the primary language in the home. The remaining portion of the sample reported speaking French (16.7%), Yiddish (10.9%), Chinese, Hebrew, Hindi, Inuktitut, Italian, Russian, Spanish, Tagalog, or Vietnamese (combined 14.6%) as the primary language in the home.

The average annual household income of 24.7% of the participants was less than $29,999; 26.3% of the participants reported an income in the range of $30,000 to $49,999; 15.5% were in the $50,000 to $69,999 range; and 21.6% had incomes greater than $70,000. According to the most recent census data available, the average annual income for

a Canadian economic family is $55,247 (Statistics Canada, 1995). Information regarding household income was withheld by 11.9% of the sample.

Instrument

The steps taken in the construction of the Paston Rating Scale, follow the techniques outlined by Gable (Gable, 1986; Gable & Wolf, 1993). (For additional details on scale construction, see Table D1.) To begin, studies for review were identified using several computer generated searches of the literature on gender labeling of infants (1965-1995). Fourteen studies were selected from the review based on age of infant and reported use of rating scales to measure gender labeling. Adjectives from all relevant studies were pooled in order to form a comprehensive list of masculine and feminine descriptors. (For a list of the studies reviewed and descriptors derived, see Table D2.) The majority of these descriptors were bipolar adjective pairs. Subsequently, adjectives and bipolar adjective pairs were grouped according to construct similarity, and a list of descriptors was constructed. The list was given to experts in infancy and child development who were asked to judge the descriptors as to appropriate reflection of the underlying construct (i.e., discrimination between male and female infants). Unfortunately, there was insufficient agreement between experts to make their judgments useful. Consequently, these authors excluded items which were felt to be inappropriate descriptors of newborns or young infants (e.g., trustworthy-untrustworthy; truthful; reflective-impulsive). Where redundant items were found (e.g., attractive-unattractive, pretty-plain, beautiful-plain) one bipolar pair was selected to be representative of the construct and the rest were excluded. The remaining items were used to construct the Paston Rating Scale. This instrument included 30 bipolar adjective pairs, each anchored at the ends of a six-point (otherwise unlabeled) continuum, for example: resilient :__:__:__:__:__:__: fragile.

Appendix D

Table D1

Constructing the Parental Sex-Typing of Newborns (Paston) Rating Scale

STEP	BRIEF DESCRIPTION	ACTION	OUTCOME	NOTES
1	Review of Literature	Studies for review were identified using several computer searches of the literature (1965-present).	15 studies measuring gender labeling of infants were selected from the larger review of the literature based on age of infant and reported use of rating scales. (Studies which reported measuring gender labeling but did not list the scale items were excluded.)	Bipolar adjective scales were most common (e.g., resilient vs. fragile with Likert-type increments between extremes). Several studies used single adjective scales (e.g., coy, inquisitive), or statement scales (e.g., "My baby has fine, delicate features." (Reid, 1994, p. 1448)).
2	Pooling of Adjectives	Adjectives from all studies were pooled in order to form a comprehensive list of all masculine and feminine descriptors used.	3 single masculine descriptors (alert, precocious, inquisitive), 4 single feminine descriptors (warm, coy, receptive, truthful), and 54 bipolar descriptors were identified.	When counting bipolar descriptors it was found that on several occasions one descriptor was matched by different researchers to two or more opposite sex descriptors.
3	Groupings	In cases where more than one bipolar descriptor pair was found, descriptor pairs were grouped according to construct similarity.	13 bipolar descriptor pair groups containing 2-4 adjective pairs were formed. For example, little-big, small-large, short-long were grouped together.	
4	Final Descriptor List	From steps 1-3 above a final list of descriptors was constructed.	The list contained: • 23 bipolar descriptor pairs (e.g., cuddly-not cuddly; quiet-loud) • 13 bipolar descriptor pair groups (see step 3) and • 7 single adjectives (see step 2).	

(table continues)

Appendix D

Table D1

Constructing the Parental Sex-Typing of Newborns (Paston) Rating Scale

STEP	BRIEF DESCRIPTION	ACTION	OUTCOME	NOTES
5	Exclusion Criteria (con't)	[1] Items deemed to be inappropriate descriptors of newborns or young infants were excluded (e.g., trustworthy-untrustworthy; truthful; reflective-impulsive) [2] Redundant items (e.g., attractive-unattractive, pretty-plain, beautiful-plain) one bipolar pair (pretty-plain) was selected to be representative of the construct and the rest were excluded	[1, 2] Five single adjectives and nine bipolar descriptor pairs were excluded.	
6	The Sex-Typing of Newborns rating scale	The remaining 30 bipolar descriptor pairs were used to construct the final scale.	See Appendix D, Table D3a-c A questionnaire containing 3 sub-scales: 1) Own Baby: parents rate their own newborn 2) Baby Girl: parents rate newborn baby girls in general 3) Baby Boy: parents rate newborn baby boys in general	Each item is rated on a six-point scale to avoid respondents choosing the neutral and/or "politically correct" response for all bipolar pairs.
7	Analyses: • Alpha internal-consistency reliability • Discriminant analysis • Principal-component analysis	See Appendix D		

In order to determine whether parents' perceptions of newborns were applicable to babies generally or specific to their own baby, two alternate forms were constructed. Both forms used the same 30 items in the same order. On the first form, participants were asked to rate their own newborn ('Own Baby' or OB). The second form ('Hypothetical Baby' or HB) consisted of two parts which were hypothetical in nature and asked participants to rate baby girls ('Baby Girl' or HBG) and baby boys ('Baby Boy' or HBB) in general. Parents were asked to complete both forms of the Paston Rating Scale. (See Table D3a-c for a sample 30-item Paston Rating Scale.)

Procedure

Parents were approached in the mother's room on the postpartum unit of the hospital and asked if they would be willing to complete a short questionnaire regarding their beliefs about their own newborn as well as newborns in general. After parents agreed to participate, the experimenter recorded on a demographics form the date, the infant's date and time of birth, the sex of the newborn, number and sex of siblings, primary language spoken in the home, mother's and father's visible ethnicity, and whether or not the infant was in the neonatal intensive care unit. In cases where information was not readily apparent (e.g., additional languages spoken in the home) the experimenter asked for the information directly. This informal interview also established the language competency of the participants.

Parents then received the Paston Rating Scale and specific instructions about how to correctly complete it. (See Table D4 for verbatim instructions.) The first page of the mother's questionnaire contained three demographic questions not included on the experimenter's demographics form mentioned previously: mother's education, father's education, and average annual household income. (See Appendix E for a copy of this page.) It was felt that participants would be more comfortable answering these questions in written form rather than orally. The questions were included on the mother's questionnaire rather than the father's because mothers were more likely to agree to participate in the study

than fathers. Pages 2 to 4 of the mother's questionnaire, and 1 to 3 of the father's questionnaire, contained the actual rating scales. Each participant received the two alternate forms of the scale in the same order (OB then HB: HBG, HBB).

After completing the instructions and answering any questions, the experimenter left the parents to complete the questionnaires alone. Parents were instructed not to compare or discuss their answers with one another until the questionnaires had been completed and returned to the experimenter. Participants received the same instructions in cases where two or more mothers (and fathers) sharing the same semi-private room were participating.

Participants were told that they did not have to complete the questionnaire immediately, and that the experimenter would check back periodically to see if the questionnaires were complete or if any clarification was needed. As new parents have many demands on their time during the day, it was common for them to complete the questionnaire during the evening after the experimenter had left the hospital. Consequently, questionnaires were often collected the day following their distribution.

Item scoring

Scores were assigned to items as follows:

adjective a : 1 : 2 : 3 : 4 : 5 : 6 : adjective b.

It was decided that high scores on each form should reflect stereotypically feminine traits and low scores should reflect stereotypically masculine traits. Therefore, reverse scoring was required on the following 14 out of the 30 items. These items were scored in the following manner: adjective a : 6 : 5 : 4 : 3 : 2 : 1 : adjective b.

Results and Analyses

Past researchers have demonstrated that mothers and fathers think differently about their infants (Karraker, Vogel, & Lake, 1995; Maccoby & Jacklin, 1972; Reid, 1994; Rubin, Provenzano, & Luria, 1974). Taking this into account, the data collected from mothers and fathers on each of the three parts of the Paston Rating Scale (OB, HBG, and HBB) were analyzed separately.

All data were analyzed using SPSS (version 6.12) designed for the Power Macintosh personal computer. Three analysis techniques, alpha internal consistency reliability, discriminant analysis, and principal components analysis, were used to determine the reliability and validity.

Reliability. Alpha internal-consistency reliability was estimated using the general form of the Spearman-Brown Prophecy Formula for each of the three parts completed by both mothers and fathers. Overall reliability was excellent: mother's OB questionnaire (/=.83); father's OB questionnaire (/=.84); mother's HBG questionnaire (/=.85); father's HBG and HBB questionnaires (/=.87); and mother's HBB questionnaire (/=.88).

Validity. According to Gable (Gable, 1986; Gable & Wolf, 1993), validity addresses the appropriateness, meaningfulness, and usefulness of the inferences which can be made from the test scores (American Psychological Association, 1985 in Gable, 1986) and is assessed by answering the question: Does this instrument measure what it is supposed to measure? That is, does the instrument address the stated underlying construct, in this case discrimination between male and female infants, in a meaningful and useful way. Construct validity was measured using discriminant analysis and an exploratory principal components analysis (factor analysis).

Discriminant analysis of the OB form revealed 9 of the 30 items on the mother's form and 5 of the 30 items on the father's form discriminated between male and female newborns at a significant level ($p \leq .05$, see Table D5 for F-values.)

Table D5

Discriminant Analysis for Infant Sex: F-values and Significance Levels

	Mothers		Father	
	OB[a] Form	HBG[b] & HBB[c] Forms	OB[a] Form	HBG[b] & HBB[c] Forms
Item Stem	F[†]	F[††]	F[†††]	F[††††]
Active	0.0512	4.4856*	0.3889	370.9440***
Affectionate	0.0457	27.8204***	1.7133	1.8329
Athletic	10.4770***	73.4803***	5.4831*	93.4490***
Attentive	1.0727	10.6260***	0.0021	2.5181
Behaved	0.2456	15.3008***	0.1780	76.4186***
Comfort	2.4270	12.2947***	0.0002	0.5021
Coordinated	0.0414	1.3745	0.2979	0.3540
Cranky	2.3772	12.0386***	1.8924	10.3754***
Cries	0.0464	2.6980	0.0301	16.0142***
Cuddly	0.3875	16.1044***	0.1367	8.4529**
Cute	2.5715	5.6221**	1.3627	0.0476
Demand	0.0397	2.0762	0.6744	137.1554***
Excite	2.7922	29.6822***	1.4239	57.9028***
Feature	0.1717	119.2425***	0.6933	4.4754*
Feminine	243.6412***	368.2373***	73.9445***	193.4903***
Hair	3.2791	0.5003	2.7724	0.1137
Independent	0.3393	2.1268	0.9020	1.5875

(table continues)

[a]OB = Paston Own Baby Form.
[b]HBG = Paston Hypothetical Baby Girl Form.
[c]HBB = Paston Hypothetical Baby Boy Form
[†]df=183. [††]df=286. [†††]df=98. [††††]df=175.
*p<.05. **p≤.10. ***p≤.001.

Table D5

Discriminant Analysis for Infant Sex: F-values and Significance Levels

	Mothers		Fathers	
	OB[a] Form	HBG[b] & HBB[c] Forms	OB[a] Form	HBG[b] & HBB[c] Forms
Item Stem	F[†]	F[††]	F[†††]	F[††††]
Masculine	243.9401***	368.1730***	126.4992***	308.8725***
Messy	0.0003	53.0121***	0.3749	38.8255***
Noisy	0.1278	46.4073***	0.2647	9.2425**
Pretty	4.4380*	42.1220***	3.0860	14.3317***
Resilient	6.1432**	63.9796***	1.1031	0.0797
Responsive	0.0025	1.5285	6.6133**	1.6449
Shy	1.9457	11.0397***	0.0402	0.0128
Small	3.7734*	75.1329***	1.1209	5.7166**
Sociable	0.4193	1.8617	0.5138	57.7370***
Soft	12.5853***	120.3744***	4.2507*	42.0198***
Strong	3.2758	13.9435***	0.2683	389.2745***
Sturdy	11.6544***	116.2787***	2.0523	78.7310***
Tough	7.9539**	107.5080***	0.9395	20.1162***

[a]OB = Paston Own Baby Form.
[b]HBG = Paston Hypothetical Baby Girl Form.
[c]HBB = Paston Hypothetical Baby Boy Form
[†]df=183. [††]df=286. [†††]df=98. [††††]df=175.
*p<.05. **p≤.10. ***p≤.001.

For the purposes of this analysis, the HBB and HBG questionnaires were combined to form the HB (Hypothetical Baby) form. This allowed for the creation of a grouping variable, questionnaire sex, which was functionally equivalent to the grouping variable, sex of newborn, used in the discriminant analysis of the OB form. Twenty three of the 30 items on the mothers' HB form and 20 of the 30 items on the fathers' HB form discriminated between male and female infants at a significant level ($p \leq .05$, see Table D5 for F-values.)

An exploratory principal components analysis failed to reveal a meaningful or useful underlying factor structure for data collected on either the OB or the HB form for mothers or fathers.

Discussion

Given the current resurgence of interest in research on sex and gender stereotyping, particularly in the area of infancy, and the informal nature of gender-typing measures used in past research studies, the Paston Rating Scale is important because it fills a conspicuous void.

The instrument and its associated forms, Own Baby and Hypothetical Baby (comprised of Hypothetical Baby Girl and Hypothetical Baby Boy), appear to be a reliable and valid measure of mothers' and fathers' sex-stereotyped perceptions of their own newborn and newborns in general.

It is evident that parents' sex-typed perceptions of their own baby diverge from their sex-typed perceptions of babies in general based on the differences in items discriminating male from female newborns on the OB and HB forms. Thus, the OB and HB forms each fill a separate measurement need for unique forms relating to parents' own infants and to infants in general.

In order to improve the instrument's construct validity several changes were made to the Paston Rating Scale based on the results of the analyses conducted in this pilot study. Careful inspection of the results of the discriminant analyses revealed that all but three of

the 30 items differentiated between male and female newborns at a significant level on at least one of the forms, and a majority of the items differentiated between male and female newborns at a significant level on two or more of the parts (OB, HBB, HBG).

Two of the three items which did not discriminate between male and female newborns on any form (has lots of hair/has little hair and very coordinated/not very coordinated) were deleted from the instrument. The third item (independent/dependent) remains on all parts of the Paston Rating Scale for several reasons. Theoretically, it is a quintessential stereotypical difference. Furthermore, deletion of this item would not radically improve the reliability or validity of the instrument.

Additionally, the Paston Rating Scale, including the item independent/dependent has been used successfully in research related to sex-typing of newborns and is currently being pilot tested using a group of parents with older infants (age 13 to 18 weeks postpartum). Pilot testing this instrument on older infants would expand the use of the scale to allow for investigation of change over time in parents' sex-stereotyped perceptions of their infant and infants in general as they become more familiar with their own infant and their knowledge base of infants grows. Based on an extensive review of the literature on gender labeling of infants Stern and Karraker (1989) demonstrated that adjectives found not to discriminate between male and female neonates were useful descriptors of older infants. Thus, it is possible that although the item independent/dependent was found not to discriminate in this study, it will have discriminative power when used with an older sample of infants and thus remains on the Paston Rating Scale until pilot testing is complete.

Conclusion

The final Parental Sex-Typing of Newborns (Paston) Rating Scale is a reliable and valid 28-item instrument with two forms: Own Baby and Hypothetical Baby, and three parts (Own Baby [OB], Hypothetical Baby Girl [HBG], and Hypothetical Baby Boy [HBB]). (See Table D6a-c for a sample 28-item Paston Rating Scale.) It is designed to

measure parents sex-typed beliefs and perceptions of their own newborn, as well as male and female newborns in general. Use of this scale in research related to parental sex-stereotyping of newborns will facilitate a broader understanding of research results, aid in highlighting the origins of children's beliefs and expectations regarding gender appropriate behavior, and promote clear interpretation of research findings across studies.

References

American Psychological Association. (1994). Publication manual of the American Psychological Association (4th ed.). Washington, DC: APA.

Bell, N. J., & Carver, W. (1980). A reevaluation of gender label effects: Expectant mothers' responses to infants. Child Development, 51, 925-927.

Broverman, I. K., Broverman, D. M., Clarkson, F. E., Rosenkrantz, P. E., & Vogel, S. R. (1970). Sex role stereotypes and clinical judgments of mental health. Journal of Consulting and Clinical Psychology, 34, 1-7.

Condry, J., & Condry, S. (1976). Sex differences: A study of the eye of the beholder. Child Development, 47, 812-819.

Fagot, B. I. (1978). The influence of sex of child on parental reactions to toddler children. Child Development, 49, 459-465.

Hittelman, J. H., & Dickes, R. (1979). Sex differences in neonatal eye contact time. Merrill-Palmer Quarterly, 25, 171-184.

Karraker, K. H., Vogel, D. A., & Lake, M. A. (1995). Parents' gender-stereotyped perceptions of newborns: The eye of the beholder revisited. Sex Roles, 33, 687-701.

Maccoby, E. E., & Jacklin, C. N. (1974). The Psychology of Sex Differences. Stanford, CA: Stanford University Press.

Meyer, J. W., & Sobieszek, B. I. (1972). Effect of a child's sex on adult interpretations of its behavior. Developmental Psychology, 6, 42-48.

Reid, G. M. (1994). Maternal sex-stereotyping of newborns. Psychological Reports, 75, 1443-1450.

Rubin, J. Z., Provenzano, F. J., & Luria, Z. (1974). The eye of the beholder: parents' views on sex of newborns. American Journal of Orthopsychiatry, 44, 512-519.

Seavey, C. A., Katz, P. A., & Zalk, S. R. (1975). Baby X: The effect of gender labels on adult responses to infants. Sex Roles, 1, 103-109.

Smith, K. E., & Barclay, L. K. (1979). Kindergarten children's descriptive sex-stereotyping of infants. American Journal of Orthopsychiatry, 49, 514-517.

Stern, M., & Karraker, K. H. (1989). Sex stereotyping of infants: A review of gender labeling studies. Sex Roles, 20, 501-522.

Will, J. A., Self, P. A., & Datan, N. (1976). Maternal behavior and perceived sex of infant. American Journal of Orthopsychiatry, 46, 135-139.

Appendix D

Table D2

Studies Reviewed for Instrument Construction and Descriptors Derived

Descriptor		Source
fragile	resilient	Karraker, Vogel, & Lake, 1995 Maccoby & Jacklin, 1974 Rubin, Provenzano, & Luria, 1974 Seavey, Katz, & Zalk, 1975 Stern & Karraker, 1989
tough	gentle	Smith & Barclay, 1979 Stern & Karraker, 1989
strong	weak	Condry & Condry, 1976 Karraker, Vogel, & Lake, 1995 Maccoby & Jacklin, 1974 Rubin, Provenzano, & Luria, 1974 Seavey, Katz, & Zalk, 1975 Smith & Barclay, 1979 Stern & Karraker, 1989
delicate	robust hardy sturdy	Bell & Carver, 1980 Hittelman & Dickes, 1979 Karraker, Vogel, & Lake, 1995 Maccoby & Jacklin, 1974 Meyer & Sobieszek, 1972 Rubin, Provenzano, & Luria, 1974 Stern & Karraker, 1989
aggressive	nurturant empathic passive	Broverman et al., 1970 Condry & Condry, 1976 Fagot, 1978 Karraker, Vogel, & Lake, 1995 Maccoby & Jacklin, 1974 Meyer & Sobieszek, 1972 Rubin, Provenzano, & Luria, 1974 Stern & Karraker, 1989
athletic	not very athletic	Reid, 1994
well coordinated	awkward	Karraker, Vogel, & Lake, 1995 Rubin, Provenzano, & Luria, 1974
inquisitive	(no opposite given)	Meyer & Sobieszek, 1972 Stern & Karraker, 1989
dependent	independent	Broverman et al., 1970 Fagot, 1978 Karraker, Vogel, & Lake, 1995 Maccoby & Jacklin, 1974 Meyer & Sobieszek, 1972 Rubin, Provenzano, & Luria, 1974 Stern & Karraker, 1989
needs comfort	needs less comfort	Maccoby & Jacklin, 1974
cries easily emotional	rarely cries not emotional	Broverman et al., 1970 Maccoby & Jacklin, 1974

(table continues)

Appendix D

Table D2

Descriptor		Source
relaxed	nervous	Karraker, Vogel, & Lake, 1995 Rubin, Provenzano, & Luria, 1974 Stern & Karraker, 1989
easy going calm	fussy excitable nervous	Broverman et al., 1970 Karraker, Vogel, & Lake, 1995 Meyer & Sobieszek, 1972 Rubin, Provenzano, & Luria, 1974 Smith & Barclay, 1979 Stern & Karraker, 1989
cheerful happy	cranky fussy	Karraker, Vogel, & Lake, 1995 Meyer & Sobieszek, 1972 Rubin, Provenzano, & Luria, 1974 Seavey, Katz, & Zalk, 1975 Smith & Barclay, 1979 Stern & Karraker, 1989
well coordinated	awkward	Karraker, Vogel, & Lake, 1995 Rubin, Provenzano, & Luria, 1974
well behaved	not well behaved	Stern & Karraker, 1989
good	bad	Condry & Condry, 1976
trustworthy	untrustworthy	Fagot, 1978
reflective	impulsive	Fagot, 1978 Meyer & Sobieszek, 1972 Stern & Karraker, 1989
coy	(no opposite given)	Meyer & Sobieszek, 1972 Stern & Karraker, 1989
precocious	(no opposite given)	Seavey, Katz, & Zalk, 1975 Stern & Karraker, 189
attractive pretty cute sweet beautiful	unattractive plain not cute ugly not beautiful	Condry & Condry, 1976 Hittelman & Dickes, 1979 Karraker, Vogel, & Lake, 1995 Maccoby & Jacklin, 1974 Rubin, Provenzano, & Luria, 1974 Seavey, Katz, & Zalk, 1975 Smith & Barclay, 1979 Stern & Karraker, 1989
appealing	unappealing	Hittelman & Dickes, 1979
clean	dirty	Broverman et al., 1970 Maccoby & Jacklin, 1974
much hair	little hair	Seavey, Katz, & Zalk, 1975
alert attentive	inattentive sleepy	Karraker, Vogel, & Lake, 1995 Meyer & Sobieszek, 1972 Rubin, Provenzano, & Luria, 1974 Stern & Karraker, 1989
receptive	disinterested	Meyer & Sobieszek, 1972 Stern & Karraker, 1989
affectionate	distant	Maccoby & Jacklin, 1974 Meyer & Sobieszek, 1972 Stern & Karraker, 1989

(table continues)

Appendix D

Table D2

Descriptor		Source
cuddly	rigid not cuddly	Hittelman & Dickes, 1979 Karraker, Vogel, & Lake, 1995 Meyer & Sobieszek, 1972 Rubin, Provenzano, & Luria, 1974 Smith & Barclay, 1989 Stern & Karraker, 1989
soft	hard rough firm	Broverman et al., 1970 Karraker, Vogel, & Lake, 1995 Rubin, Provenzano, & Luria, 1974 Seavey, Katz, & Zalk, 1975 Stern & Karraker, 1989
large featured	fine featured	Karraker, Vogel, & Lake, 1995 Rubin, Provenzano, & Luria, 1974 Stern & Karraker, 1989
needs verbal stimulation	needs physical stimulation	Will, Self, & Datan, 1975
good eater	poor eater bad eater	Karraker, Vogel, & Lake, 1995 Rubin, Provenzano, & Luria, 1974 Smith & Barclay, 1979 Stern & Karraker, 1989

References

Bell, N. J., & Carver, W. (1980). A reevaluation of gender label effects: Expectant mothers' responses to infants. Child Development, 51, 925-927.

Broverman, I. K., Broverman, D. M., Clarkson, F. E., Rosenkrantz, P. E., & Vogel, S. R. (1970). Sex role stereotypes and clinical judgments of mental health. Journal of Consulting and Clinical Psychology, 34(1), 1-7.

Condry, J., & Condry, S. (1976). Sex differences: A study of the eye of the beholder. Child Development, 47, 812-819.

Fagot, B. I. (1978). The influence of sex of child on parental reactions to toddler children. Child Development, 49, 459-465.

Hittelman, J. H., & Dickes, R. (1979). Sex differences in neonatal eye contact time. Merrill-Palmer Quarterly, 25(3), 171-184.

Karraker, K. H., Vogel, D. A., & Lake, M. A. (1995). Parents' gender-stereotyped perceptions of newborns: The eye of the beholder revisited. Sex Roles, 33(9/10), 687-701.

Maccoby, E. E., & Jacklin, C. N. (1974). The Psychology of Sex Differences. Stanford, CA: Stanford University Press.

Meyer, J. W., & Sobieszek, B. I. (1972). Effect of a child's sex on adult interpretations of its behavior. Developmental Psychology, 6(1), 42-48.

Reid, G. M. (1994). Maternal sex-stereotyping of newborns. Psychological Reports, 75, 1443-1450.

Rubin, J. Z., Provenzano, F. J., & Luria, Z. (1974). The eye of the beholder: parents' views on sex of newborns. American Journal of Orthopsychiatry, 44(4), 512-519.

Seavey, C. A., Katz, P. A., & Zalk, S. R. (1975). Baby X: The effect of gender labels on adult responses to infants. Sex Roles, 1(2), 103-109.

Smith, K. E., & Barclay, L. K. (1979). Kindergarten children's descriptive sex-stereotyping of infants. American Journal of Orthopsychiatry, 49(3), 514-517.

Stern, M., & Karraker, K. H. (1989). Sex stereotyping of infants: A review of gender labeling studies. Sex Roles, 20(9/10), 501-522.

Will, J. A., Self, P. A., & Datan, N. (1976). Maternal behavior and perceived sex of infant. American Journal of Orthopsychiatry, 46(1), 135-139.

Appendix D

Table D3a

Sample 30-item Paston Rating Scale: OB Form

Directions: Below are 30 pair of adjectives. Each pair is an opposite, for example, resilient is the opposite of fragile. Please place an "x" or a checkmark in the blank that best describes **YOUR NEW BABY**. You may use all six blanks! If you can not answer for your baby right now, imagine what he/she will be like in the future.

1.	resilient	:__:__:__:__:__:__:	fragile
2.	very cute	:__:__:__:__:__:__:	not very cute
3.	sociable	:__:__:__:__:__:__:	unsociable
4.	messy/dirty	:__:__:__:__:__:__:	not messy/clean
5.	well coordinated	:__:__:__:__:__:__:	not well coordinated
6.	cranky/fussy	:__:__:__:__:__:__:	happy/cheerful
7.	responsive	:__:__:__:__:__:__:	not very responsive
8.	noisy/loud	:__:__:__:__:__:__:	quiet
9.	very feminine	:__:__:__:__:__:__:	not very feminine
10.	strong	:__:__:__:__:__:__:	weak
11.	demanding	:__:__:__:__:__:__:	not very demanding
12.	large features	:__:__:__:__:__:__:	fine features
13.	shy	:__:__:__:__:__:__:	outgoing
14.	attentive	:__:__:__:__:__:__:	inattentive
15.	very masculine	:__:__:__:__:__:__:	not very masculine
16.	has lots of hair	:__:__:__:__:__:__:	has little hair
17.	pretty	:__:__:__:__:__:__:	plain
18.	excitable	:__:__:__:__:__:__:	calm/relaxed
19.	soft	:__:__:__:__:__:__:	firm/hard
20.	needs comfort	:__:__:__:__:__:__:	needs little comfort
21.	small	:__:__:__:__:__:__:	big/large
22.	very affectionate	:__:__:__:__:__:__:	not very affectionate
23.	independent	:__:__:__:__:__:__:	dependent
24.	active	:__:__:__:__:__:__:	passive
25.	cries easily	:__:__:__:__:__:__:	rarely cries
26.	sturdy	:__:__:__:__:__:__:	delicate
27.	cuddly	:__:__:__:__:__:__:	not very cuddly
28.	well-behaved	:__:__:__:__:__:__:	not well-behaved
29.	tough	:__:__:__:__:__:__:	gentle
30.	looks athletic	:__:__:__:__:__:__:	does not look athletic

(table continu

Appendix D

Table D3b

Sample 30-item Paston Rating Scale: HBG Form

Directions: Please do this page even if your new baby is a boy.

We would like to know how you would describe baby **GIRLS** in general. Below are 30 pair of adjectives. Just as you did on the previous page, please place an "x" or a checkmark in the blank that best describes what you would *imagine* newborn baby **GIRLS** (in general) to be most like.

1.	resilient	:__:__:__:__:__:__:	fragile
2.	very cute	:__:__:__:__:__:__:	not very cute
3.	sociable	:__:__:__:__:__:__:	unsociable
4.	messy/dirty	:__:__:__:__:__:__:	not messy/clean
5.	well coordinated	:__:__:__:__:__:__:	not well coordinated
6.	cranky/fussy	:__:__:__:__:__:__:	happy/cheerful
7.	responsive	:__:__:__:__:__:__:	not very responsive
8.	noisy/loud	:__:__:__:__:__:__:	quiet
9.	very feminine	:__:__:__:__:__:__:	not very feminine
10.	strong	:__:__:__:__:__:__:	weak
11.	demanding	:__:__:__:__:__:__:	not very demanding
12.	large features	:__:__:__:__:__:__:	fine features
13.	shy	:__:__:__:__:__:__:	outgoing
14.	attentive	:__:__:__:__:__:__:	inattentive
15.	very masculine	:__:__:__:__:__:__:	not very masculine
16.	has lots of hair	:__:__:__:__:__:__:	has little hair
17.	pretty	:__:__:__:__:__:__:	plain
18.	excitable	:__:__:__:__:__:__:	calm/relaxed
19.	soft	:__:__:__:__:__:__:	firm/hard
20.	needs comfort	:__:__:__:__:__:__:	needs little comfort
21.	small	:__:__:__:__:__:__:	big/large
22.	very affectionate	:__:__:__:__:__:__:	not very affectionate
23.	independent	:__:__:__:__:__:__:	dependent
24.	active	:__:__:__:__:__:__:	passive
25.	cries easily	:__:__:__:__:__:__:	rarely cries
26.	sturdy	:__:__:__:__:__:__:	delicate
27.	cuddly	:__:__:__:__:__:__:	not very cuddly
28.	well-behaved	:__:__:__:__:__:__:	not well-behaved
29.	tough	:__:__:__:__:__:__:	gentle
30.	looks athletic	:__:__:__:__:__:__:	does not look athletic

(table continu

Appendix D

Table D3c

Sample 30-item Paston Rating Scale: OB Form

Directions: Please do this page even if your new baby is a girl.

We would like to know how you would describe baby **BOYS** in general. Below are 30 pair of adjectives. Just as you did on the previous page, please place an "x" or a checkmark in the blank that best describes what you would *imagine* newborn baby **BOYS** (in general) to be most like.

1.	resilient	:__:__:__:__:__:__:	fragile
2.	very cute	:__:__:__:__:__:__:	not very cute
3.	sociable	:__:__:__:__:__:__:	unsociable
4.	messy/dirty	:__:__:__:__:__:__:	not messy/clean
5.	well coordinated	:__:__:__:__:__:__:	not well coordinated
6.	cranky/fussy	:__:__:__:__:__:__:	happy/cheerful
7.	responsive	:__:__:__:__:__:__:	not very responsive
8.	noisy/loud	:__:__:__:__:__:__:	quiet
9.	very feminine	:__:__:__:__:__:__:	not very feminine
10.	strong	:__:__:__:__:__:__:	weak
11.	demanding	:__:__:__:__:__:__:	not very demanding
12.	large features	:__:__:__:__:__:__:	fine features
13.	shy	:__:__:__:__:__:__:	outgoing
14.	attentive	:__:__:__:__:__:__:	inattentive
15.	very masculine	:__:__:__:__:__:__:	not very masculine
16.	has lots of hair	:__:__:__:__:__:__:	has little hair
17.	pretty	:__:__:__:__:__:__:	plain
18.	excitable	:__:__:__:__:__:__:	calm/relaxed
19.	soft	:__:__:__:__:__:__:	firm/hard
20.	needs comfort	:__:__:__:__:__:__:	needs little comfort
21.	small	:__:__:__:__:__:__:	big/large
22.	very affectionate	:__:__:__:__:__:__:	not very affectionate
23.	independent	:__:__:__:__:__:__:	dependent
24.	active	:__:__:__:__:__:__:	passive
25.	cries easily	:__:__:__:__:__:__:	rarely cries
26.	sturdy	:__:__:__:__:__:__:	delicate
27.	cuddly	:__:__:__:__:__:__:	not very cuddly
28.	well-behaved	:__:__:__:__:__:__:	not well-behaved
29.	tough	:__:__:__:__:__:__:	gentle
30.	looks athletic	:__:__:__:__:__:__:	does not look athletic

HAVE YOU COMPLETED ALL OF THE PAGES? PLEASE DO. WE ARE INTERESTED IN HOW YOU DESCRIBE YOUR OWN NEW BABY AS WELL AS OTHER BABIES OF THE SAME AND OPPOSITE SEX!

THANK YOU!

Appendix D

Table D4

Sample Instructions for the Administrator of the Scale

"We are interested in knowing how you describe your own new baby as well as other babies of the same and opposite sex.

(Show the first page:) On the first page there are three questions that let us get to know who our participants are. These questions, and all of the questions on this questionnaire, are anonymous and your name from the consent form will never be connected to your responses here.

(Show page 2): On this page please describe your own new baby.

There are 30 adjective pairs listed. Each pair is an opposite. For example, resilient is the opposite of fragile, noisy or loud is the opposite of quiet, pretty is the opposite of plain.

There are 6 blanks between each pair of words. Place an "x" or a check mark in the blank that best describes your new baby. You may use any of the six blanks. That is, if you think your new baby is very resilient you would put a mark in the space closest to the word resilient. (Point to the blank that is closest to the word resilient.) If, on the other hand, you think your new baby is very fragile you would put your mark in the space that is closest to the word fragile. (Point to the blank that is closest to the word fragile.) If you think your baby is somewhere in between, you can put your mark in one of the middle blanks. (Point to the blanks between the two extremes.)

If you can not answer for your new baby right now, imagine what he/she will be like in the future.

(While showing the third page:) On the second page we would like you to describe baby girls in general. All of the adjectives are the same as the ones on the first page, only this time we would like you to think of all of the baby girls you know and answer each item based on these babies. If you do not know any baby girls, imagine what you think baby girls are like.

Again, you may use any of the six blanks.

(While showing the fourth page:) Finally, on the last page we would like you to describe baby boys in general. All of the adjectives are the same as the ones on the second page, only this time we would like you to think of all of the baby boys you know and answer each item based on these babies. If you do not know any baby boys, imagine what you think baby boys are like.

Like before, you may use any of the six blanks.

Please fill in all three pages.

Do you have any questions before you begin?"

Appendix D

Table D6a

Sample 28-item Paston Rating Scale: OB Form

Directions: Below are 30 pair of adjectives. Each pair is an opposite, for example, resilient is the opposite of fragile. Please place an "x" or a checkmark in the blank that best describes **YOUR NEW BABY**. Please use only one of the six blanks! If you can not answer for your baby right now, imagine what he/she will be like in the future.

1.	resilient	:__:__:__:__:__:__:	fragile
2.	very cute	:__:__:__:__:__:__:	not very cute
3.	sociable	:__:__:__:__:__:__:	unsociable
4.	messy/dirty	:__:__:__:__:__:__:	not messy/clean
5.	soft	:__:__:__:__:__:__:	firm/hard
6.	cranky/fussy	:__:__:__:__:__:__:	happy/cheerful
7.	responsive	:__:__:__:__:__:__:	not very responsive
8.	noisy/loud	:__:__:__:__:__:__:	quiet
9.	very feminine	:__:__:__:__:__:__:	not very feminine
10.	strong	:__:__:__:__:__:__:	weak
11.	shy	:__:__:__:__:__:__:	outgoing
12.	large features	:__:__:__:__:__:__:	fine features
13.	attentive	:__:__:__:__:__:__:	inattentive
14.	very masculine	:__:__:__:__:__:__:	not very masculine
15.	pretty	:__:__:__:__:__:__:	plain
16.	demanding	:__:__:__:__:__:__:	not very demanding
17.	excitable	:__:__:__:__:__:__:	calm/relaxed
18.	needs comfort	:__:__:__:__:__:__:	needs little comfort
19.	active	:__:__:__:__:__:__:	passive
20.	small	:__:__:__:__:__:__:	big/large
21.	very affectionate	:__:__:__:__:__:__:	not very affectionate
22.	independent	:__:__:__:__:__:__:	dependent
23.	cries easily	:__:__:__:__:__:__:	rarely cries
24.	sturdy	:__:__:__:__:__:__:	delicate
25.	cuddly	:__:__:__:__:__:__:	not very cuddly
26.	well-behaved	:__:__:__:__:__:__:	not well-behaved
27.	tough	:__:__:__:__:__:__:	gentle
28.	looks athletic	:__:__:__:__:__:__:	does not look athletic

(table continues)

Appendix D

Table D6b

Sample 28-item Paston Rating Scale: HBG Form

Directions: Please do this page even if your new baby is a boy.

We would like to know how you would describe baby **GIRLS** in general. Below are 30 pair of adjectives. Just as you did on the previous page, please place an "x" or a checkmark in the blank that best describes what you would *imagine* newborn baby **GIRLS** (in general) to be most like.

1.	resilient	:__:__:__:__:__:__:	fragile
2.	very cute	:__:__:__:__:__:__:	not very cute
3.	sociable	:__:__:__:__:__:__:	unsociable
4.	messy/dirty	:__:__:__:__:__:__:	not messy/clean
5.	soft	:__:__:__:__:__:__:	firm/hard
6.	cranky/fussy	:__:__:__:__:__:__:	happy/cheerful
7.	responsive	:__:__:__:__:__:__:	not very responsive
8.	noisy/loud	:__:__:__:__:__:__:	quiet
9.	very feminine	:__:__:__:__:__:__:	not very feminine
10.	strong	:__:__:__:__:__:__:	weak
11.	shy	:__:__:__:__:__:__:	outgoing
12.	large features	:__:__:__:__:__:__:	fine features
13.	attentive	:__:__:__:__:__:__:	inattentive
14.	very masculine	:__:__:__:__:__:__:	not very masculine
15.	pretty	:__:__:__:__:__:__:	plain
16.	demanding	:__:__:__:__:__:__:	not very demanding
17.	excitable	:__:__:__:__:__:__:	calm/relaxed
18.	needs comfort	:__:__:__:__:__:__:	needs little comfort
19.	active	:__:__:__:__:__:__:	passive
20.	small	:__:__:__:__:__:__:	big/large
21.	very affectionate	:__:__:__:__:__:__:	not very affectionate
22.	independent	:__:__:__:__:__:__:	dependent
23.	cries easily	:__:__:__:__:__:__:	rarely cries
24.	sturdy	:__:__:__:__:__:__:	delicate
25.	cuddly	:__:__:__:__:__:__:	not very cuddly
26.	well-behaved	:__:__:__:__:__:__:	not well-behaved
27.	tough	:__:__:__:__:__:__:	gentle
28.	looks athletic	:__:__:__:__:__:__:	does not look athletic

(table continu

Appendix D

Table D6c

Sample 28-item Paston Rating Scale: HBB Form

Directions: Please do this page even if your new baby is a girl.

We would like to know how you would describe baby **BOYS** in general. Below are 30 pair of adjectives. Just as you did on the previous page, please place an "x" or a checkmark in the blank that best describes what you would *imagine* newborn baby **BOYS** (in general) to be most like.

1.	resilient	:__:__:__:__:__:__:	fragile
2.	very cute	:__:__:__:__:__:__:	not very cute
3.	sociable	:__:__:__:__:__:__:	unsociable
4.	messy/dirty	:__:__:__:__:__:__:	not messy/clean
5.	soft	:__:__:__:__:__:__:	firm/hard
6.	cranky/fussy	:__:__:__:__:__:__:	happy/cheerful
7.	responsive	:__:__:__:__:__:__:	not very responsive
8.	noisy/loud	:__:__:__:__:__:__:	quiet
9.	very feminine	:__:__:__:__:__:__:	not very feminine
10.	strong	:__:__:__:__:__:__:	weak
11.	shy	:__:__:__:__:__:__:	outgoing
12.	large features	:__:__:__:__:__:__:	fine features
13.	attentive	:__:__:__:__:__:__:	inattentive
14.	very masculine	:__:__:__:__:__:__:	not very masculine
15.	pretty	:__:__:__:__:__:__:	plain
16.	demanding	:__:__:__:__:__:__:	not very demanding
17.	excitable	:__:__:__:__:__:__:	calm/relaxed
18.	needs comfort	:__:__:__:__:__:__:	needs little comfort
19.	active	:__:__:__:__:__:__:	passive
20.	small	:__:__:__:__:__:__:	big/large
21.	very affectionate	:__:__:__:__:__:__:	not very affectionate
22.	independent	:__:__:__:__:__:__:	dependent
23.	cries easily	:__:__:__:__:__:__:	rarely cries
24.	sturdy	:__:__:__:__:__:__:	delicate
25.	cuddly	:__:__:__:__:__:__:	not very cuddly
26.	well-behaved	:__:__:__:__:__:__:	not well-behaved
27.	tough	:__:__:__:__:__:__:	gentle
28.	looks athletic	:__:__:__:__:__:__:	does not look athletic

HAVE YOU COMPLETED ALL OF THE PAGES? PLEASE DO. WE ARE INTERESTED IN HOW YOU DESCRIBE YOUR OWN NEW BABY AS WELL AS OTHER BABIES OF THE SAME AND OPPOSITE SEX!

THANK YOU

Appendix E

Sample Here's Looking at You, Kid! consent form

(McGill letterhead goes here)

CONSENT FORM
for **Here's Looking at You, Kid!**

Dear Parents,

We are interested in studying babies' social behavior with adults and how this behavior changes over time. We are also interested in sex differences in babies' social behavior. Information from this study will help us understand how boys and girls develop different patterns of behavior that continue throughout life.

Your participation in this project is voluntary and involves allowing two (2) well trained research assistants to hold your baby today when he/she is awake and not fussy.

The entire study should take no more than 20 minutes to complete. The two research assistants (a man and a woman) will each hold and look at your baby for 3 minutes. Your baby's behavior will be recorded by the research assistants on a lap top computer. Nothing will be done that could, in any way, hurt your baby. While the research assistants are holding your baby, you will be asked to fill out a short questionnaire about your beliefs about your baby's behavior and about babies' behavior in general.

Because we are studying sex differences it is important that the research assistants not know the sex of your baby. To make sure of this, we ask that you remove or hide any clothing or toys that could give away your baby's sex. Also, please dress your baby in something that is neither pink nor blue.

You are welcome and invited to stay with your baby for the whole study. We foresee no potential risks as a result of participating and ask that you and your baby participate only at a time when you are comfortable with the project. If you or your baby become upset at any time we will stop the study, and of course, you may withdraw from the study at any point in time without penalty or loss of benefits to which you are otherwise entitled.

Confidentiality

To preserve confidentiality, we will not use your or your baby's names in our records. Instead, you and your baby will be assigned a number that will be used for identification purposes. This consent form on which your name appears will be filed separately with no record of your identification number on it. Also, we will not look at information from your baby specifically, rather, information on all babies will be pooled, and the behaviors of babies as a group will be examined.

We would greatly appreciate your participation in this study. If you are willing to participate and willing to allow your baby to participate, please sign your name on the next page. Again, your participation in the study is voluntary, and your decision will involve no penalty or loss of benefits to which you are otherwise entitled.

If you would like, you may keep this form. Should you have any questions regarding this study or your rights as a subject, please do not hesitate to contact either Rebecca Leeb or Dr. Gill Rejskind at the phone numbers listed below.

Thank you very much for your participation.

Sincerely,

Rebecca T. Leeb, M.A.
Doctoral Candidate, Dept. of Educational Psychology
ph: (514) 938-8406

Gill Rejskind, Ph.D.
Associate Professor, Dept. of Ed. Psych.
ph: (514) 398-4240, loc. 3436

Here's Looking at You, Kid!

I/We would be willing to allow my/our baby to participate in the Here's Looking at You, Kid! project conducted by Rebecca Leeb, and Dr. Gill Rejskind from the Department of Educational and Counselling Psychology, McGill University.

_____ _____

(mother's signature) (today's date)

and/or

_____ _____

(father's signature) (today's date)

Thank you again for your participation!

Appendix F

Sample Here's Looking at You, Kid! demographics form

• Today's date:_____ • Baby's birth date:_____

• Baby's sex: Male Female

• Besides your new baby, how many other children do you have?_____

Are your other children Male Female One/more of each

• What is the primary language spoken in your house?_____

• Mother's visible ethnicity?

1	Black	4	Latino	6	East Indian
2	White	5	Asian	7	Other

• Father's visible ethnicity?

1	Black	4	Latino	6	East Indian
2	White	5	Asian	7	Other

• Questionnaire was given to the father in the hospital? Yes No

• Baby's gestational age _____ • Type of delivery _____

• Apgar scores _____ • Baby's weight _____

Notes:

Appendix G

Sample Education and Income Questions--page 1 Paston (mother)

(McGill letterhead goes here)

Congratulations on your new baby and thank you for agreeing to participate in the Here's Looking at You, Kid! study.

Please do not write your name or make any other identifying marks on these pages. All of your responses will be kept in the strictest confidence. Also, we will not be evaluating individual questionnaires, instead, all of the information we get will be pooled and group characteristics will be examined.

The following questions are to help us get to know who our participants are.

- What is the highest level of school completed by mother? (please circle one)

1 Less than high school
2 Some/all of high school
3 Some/all of CEGEP
4 Yeshiva
5 Some university
6 Completed university
7 Post-university

- What is the highest level of school completed by father? (please circle one)

1 Less than high school
2 Some/all of high school
3 Some/all of CEGEP
4 Yeshiva
5 Some university
6 Completed university
7 Post-university

- What is the average annual income of your household? (please circle one)

1 less than $29,999
2 $30,000 - $49,999
3 $50,000 - $69,999
4 $70,000 or more

- Please do ALL of the following pages. We would like to know how you describe your own new baby as well as other babies of the same and opposite sex.

Thank you!

Appendix H

Sample Interacter questionnaire

Name and ID number:_____

Please rate the baby you just held on the adjectives below.

1.	resilient	:__:__:__:__:__:__:	fragile
2.	very cute	:__:__:__:__:__:__:	not very cute
3.	sociable	:__:__:__:__:__:__:	unsociable
4.	messy/dirty	:__:__:__:__:__:__:	not messy/clean
5.	soft	:__:__:__:__:__:__:	firm/hard
6.	cranky/fussy	:__:__:__:__:__:__:	happy/cheerful
7.	responsive	:__:__:__:__:__:__:	not very responsive
8.	noisy/loud	:__:__:__:__:__:__:	quiet
9.	very feminine	:__:__:__:__:__:__:	not very feminine
10.	strong	:__:__:__:__:__:__:	weak
11.	shy	:__:__:__:__:__:__:	outgoing
12.	large features	:__:__:__:__:__:__:	fine features
13.	attentive	:__:__:__:__:__:__:	inattentive
14.	very masculine	:__:__:__:__:__:__:	not very masculine
15.	pretty	:__:__:__:__:__:__:	plain
16.	demanding	:__:__:__:__:__:__:	not very demanding
17.	excitable	:__:__:__:__:__:__:	calm/relaxed
18.	needs comfort	:__:__:__:__:__:__:	needs little comfort
19.	active	:__:__:__:__:__:__:	passive
20.	small	:__:__:__:__:__:__:	big/large
21.	very affectionate	:__:__:__:__:__:__:	not very affectionate
22.	independent	:__:__:__:__:__:__:	dependent
23.	cries easily	:__:__:__:__:__:__:	rarely cries
24.	sturdy	:__:__:__:__:__:__:	delicate
25.	cuddly	:__:__:__:__:__:__:	not very cuddly
26.	well-behaved	:__:__:__:__:__:__:	not well-behaved
27.	tough	:__:__:__:__:__:__:	gentle
28.	looks athletic	:__:__:__:__:__:__:	does not look athletic

Appendix I

Sample Here's Looking at You (again), Kid! contact form

(McGill letterhead goes here)

Here's Looking at You (again), Kid!

Dear Parents,

Thank you for participating in the Here's Looking at You, Kid! study. Your participation is really important and very helpful.

We would also like to see how your baby's behavior changes as she/he gets older. To do this, we would like to do the exact same study when your baby is about 3 ½ months old.

The follow-up study will follow the same procedure as the study you just participated in: Two research assistants will hold and look at your baby for 3 minutes each. Your baby's behavior will be recorded by the research assistants using a lap top computer. While the research assistants are holding your baby, you will be asked to fill out a short questionnaire about your beliefs about your baby's behavior and about babies' behavior in general.

As was the case for this study, all results from the follow-up study will be anonymous and you and your baby will be identified only by a number. Should you decide at any point that you do not want to participate in the follow-up study you are free to withdraw and we will not contact you again.

We would really appreciate your allowing us to call you for the follow-up study. If you are interested in doing this please give us your name and phone number in the space provided below. We will call you to arrange a convenient time to do the study again. Thank you.

Sincerely,

Rebecca T. Leeb, M.A.
Doctoral Candidate, Dept. of Ed. Psych.

Gill Rejskind, Ph.D.
Associate Prof., Dept. of Ed. Psych.

Yes! Please call me about the follow-up study.

My First Name is:_____

I can be reached at: day:_____

evening:_____

Appendix J

Sample Here's Looking at You (again), Kid! consent form

(McGill letterhead goes here)

CONSENT FORM
for **Here's Looking at You (again), Kid!**

Dear Parents,

Thank you for participating in the first part of our study. We are still interested in studying babies' social behavior with adults and, especially, how this behavior changes over time. We are also interested in sex differences in babies' social behavior. Information from this study will help us understand how boys and girls develop different patterns of behavior that continue throughout life.

Your participation in this project is voluntary and involves allowing two (2) well trained research assistants to hold your baby today when he/she is awake and not fussy.

The study will be exactly the same as it was the first time and should take no more than 20 minutes to complete. The two research assistants (a man and a woman) will each hold and look at your baby for 3 minutes. Your baby's behavior will be recorded by the research assistants on a lap top computer. Nothing will be done that could, in any way, hurt your baby. While the research assistants are holding your baby, you will be asked to fill out a short questionnaire about your beliefs about your baby's behavior.

Because we are studying sex differences it is important that the research assistants not know the sex of your baby. To make sure of this, we ask that you remove or hide any clothing or toys that could give away your baby's sex. Also, please dress your baby in something that is neither pink nor blue.

You are welcome and invited to stay with your baby for the whole study. We foresee no potential risks as a result of participating and ask that you and your baby participate only at a time when you are comfortable with the project. If you or your baby become upset, or if your baby begins to cry, at any time we will stop the study. Participation in this study is voluntary, and your decision not to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

Confidentiality

To preserve confidentiality, we will not use your or your baby's names in our records. Instead, you and your baby will be assigned a number that will be used for identification purposes. This consent form on which your name appears will be filed separately with no record of your identification number on it. Also, we will not look at information from your baby specifically, rather, information on all babies will be pooled, and the behaviors of babies as a group will be examined.

We would greatly appreciate your participation in the second part of this study. If you are willing to participate and willing to allow your baby to participate, please sign your name on the next page. Again, your participation in the study is voluntary, and your decision will involve no penalty or loss of benefits to which you are otherwise entitled.

If you would like, you may keep this form. Should you have any questions regarding this study, please do not hesitate to contact either Rebecca Leeb or Dr. Gill Rejskind at the phone numbers listed below.

Thank you very much for your participation again.

Sincerely,

Rebecca T. Leeb, M.A.
Doctoral Candidate, Dept. of Educational Psychology
ph: (514) 938-8406

Gill Rejskind, Ph.D.
Associate Professor, Dept. of Ed. Psych.
ph: (514) 398-4240, loc. 3437

Appendix J

Here's Looking at You, Kid!

I/We would be willing to allow my/our baby to participate in the Here's Looking at You (again), Kid! project conducted by Rebecca Leeb, and Dr. Gill Rejskind from the Department of Educational and Counselling Psychology, McGill University.

_____ _____

(mother's signature) (today's date)

and/or

_____ _____

(father's signature) (today's date)

Thank you again for your participation!

If you would like a copy of the results of the study please PRINT your name and address below:

_____

_____

_____

_____

_____

Appendix K

Quick Basic Program to Record Eye Contact

```
'Here's Looking at You Kid!

'Behaviour Logging Software

    'by John Lewis
```

NOTE:
This file contains the source code used in the current executable(i.e. the .exe file of 26 March 1997). Any changes should be made to the code contained in this file, and then a new executablefile created.

This program can be used to log the occurrence of two mutuallyexclusive and continuous behaviour patterns over a predeterminedperiod of time. These two behaviours are arbitrarily referred toas "EyeContact" and "NoEyeContact" throughout this listing. Atthe end of the timed "Interaction period", the total duration, frequency of occurrence, mean duration, and standard deviation from this mean for each behaviour are displayed on the screen. The raw data and a table of the above statistics may then besaved in files which the program gives the extensions ".dat" and ".res", respectively. These files are plain text files andcan be read by most spreadsheet packages; the columns aredelimited by commas.

The length of the "Interaction period" may be altered by changing the "TimePeriod" variable, which is defined near the beginning of the program listing and is in seconds, and then recompiling the program.

The program begins by searching for the directory c:\datalog. This is the default parent directory for the \data and \res subdirectories that will be created automatically if they do not already exist. If the parent directory is not found the program asks the user if it should be created, or if another parent directory should be used.

```
Beginning:

'Basic setup
    CLEAR
    ON ERROR GOTO ErrorHandler

     'Set interaction period
        TimePeriod = 180

     'Arrays
        DIM J(150)
        DIM K(150, 2)

     'Clear screen
        CLS

     'Define interupt key
        KEY 19, CHR$(&H4) + CHR$(&H1F)
        KEY 20, CHR$(&H24) + CHR$(&H1F)
```

```
        '(CTRL-s is the interupt key)

    'Define coding keys
        KEY 15, CHR$(0) + CHR$(57)
        KEY 16, CHR$(&H20) + CHR$(57)

        KEY 17, CHR$(0) + CHR$(48)
        KEY 18, CHR$(&H20) + CHR$(48)
        '(Keys 15 and 16 are space; 17 and 18 are b)

    'Set working directory
        WorkingDir$ = "c:\datalog"
        GOSUB CheckDirectories

Restart:
    'Reset necessary variables
        GOSUB VariableSetup

    'Obtain filename and check for pre-existing file or invalid filename
        GOSUB GetFileName

FileCleared:

    'Setup Experiment
        GOSUB SetupExperiment

    'Begin Interaction
        GOSUB ReadyToBegin

    'Perform statistical calculations
        GOSUB Calculations

    'Display Results
        GOSUB DisplayResults

    'Save Data?
        LOCATE 18, 14: PRINT "Press 'x' to abandon the data, or any other key to save it."
        SLEEP
        IF (INKEY$ <> "x") AND (INKEY$ <> "X") THEN GOSUB InfoWrite

    'Run another experiment?
        LOCATE 18, 13: PRINT "Press 'x' to exit, or any other key to perform another experiment."
        SLEEP
        IF INKEY$ = "x" OR INKEY$ = "X" THEN
            CLS
        ELSE
            GOTO Restart
        END IF
        LOCATE 5, 23: PRINT "Here's Having Looked at You, Kid!"
        LOCATE 15, 20: PRINT "Why have DOS when you could have Linux?"

END


'Subroutines

VariableSetup:
    'Reset necessary variables and arrays
```

```
        Status$ = ""
        StartPoint$ = ""
        TJ = 0
        Frequency1 = 0
        Frequency2 = 0
        Sum1 = 0
        Sum2 = 0
        Mean1 = 0
        Mean2 = 0
        Residual1 = 0
        Residual2 = 0
        Stdev1 = 0
        Stdev2 = 0
        Pass = 0
RETURN

Interupt:
    KEY(15) OFF
    KEY(16) OFF
    KEY(17) OFF
    KEY(18) OFF
    KEY(19) OFF
    KEY(20) OFF
    DO
    LOOP UNTIL INKEY$ = ""
     LOCATE 18, 21: PRINT "You have just terminated the experiment."
     LOCATE 20, 12: PRINT "Press 'x' to exit, or any other key to restart the program."
    SLEEP
    IF INKEY$ = "x" THEN
    CLS
    END
    ELSE GOTO Restart
    END IF
    RETURN

CheckDirectories:
    'Checking for appropriate directories
        Status$ = "CheckWorkingDir"
        CHDIR WorkingDir$
        Status$ = "CheckDataDir"
        CHDIR WorkingDir$ + "\data"
        CHDIR WorkingDir$
        Status$ = "CheckResDir"
        CHDIR WorkingDir$ + "\res"
        CHDIR WorkingDir$
RETURN

GetFileName:
    'Setup screen and obtain interaction ID
        CLS
        LOCATE 5, 28: PRINT "Here's Looking at You, Kid!"
        LOCATE 9, 33: PRINT "Behaviour Logging"
        LOCATE 1, 1: PRINT "Action:  Enter ID"
        LOCATE 14, 32: INPUT "Interaction ID: ", ExpID$
        DataFileName$ = WorkingDir$ + "\data\" + ExpID$ + ".dat"
```



```
        ResFileName$ = WorkingDir$ + "\res\" + ExpID$ + ".res"
```

```
    'Checking filename
        Status$ = "CheckDataFile"
        OPEN DataFileName$ FOR INPUT AS #1
        CLOSE #1

        Status$ = "CheckResFile"
        OPEN ResFileName$ FOR INPUT AS #2
        CLOSE #2
          LOCATE 17, 13: PRINT "Information is already stored under this experiment I.D."
          LOCATE 20, 18: PRINT "Press 'x' to overwrite the previous experiment,"
          LOCATE 22, 16: PRINT "or any other key to use another identification code."
        SLEEP
        IF (INKEY$ = "x") OR (INKEY$ = "X") THEN
            KILL DataFileName$
            KILL ResFileName$
        ELSE
            GOTO GetFileName
        END IF
RETURN


ErrorHandler:
    IF ERR <> 53 AND ERR <> 64 AND ERR <> 76 THEN
         LOCATE 21, 11: PRINT "An error has occurred, terminating program..."
        LOCATE 23, 11: PRINT "Error number: "; ERR
        END
    END IF

    IF ERR = 76 AND Status$ = "CheckWorkingDir" THEN
        CLS
        LOCATE 5, 28: PRINT "Here's Looking at You, Kid!"
         LOCATE 17, 20: PRINT "The directory "; WorkingDir$; " does not exist."
         LOCATE 19, 11: PRINT "Enter the path (e.g. c:\XXX\...\XXX)for an existing directory"
        LOCATE 21, 23: INPUT "or enter 'x' to create C:\datalog: ", NewDir$
        IF NewDir$ = "x" OR NewDir$ = "X" THEN
            MKDIR "C:\datalog"
            MKDIR "C:\datalog\data"
            MKDIR "C:\datalog\res"
        ELSE
            WorkingDir$ = NewDir$
        END IF
        RESUME
    END IF

    IF ERR = 76 AND Status$ = "CheckDataDir" THEN MKDIR WorkingDir$ + "\data"

    IF ERR = 76 AND Status$ = "CheckResDir" THEN MKDIR WorkingDir$ + "\res"

    IF ERR = 58 THEN
        IF Status$ = "CheckDataFile" THEN
            LOCATE 17, 18: PRINT "A data file already exists for this experiment ID."
        ELSE
            LOCATE 17, 17: PRINT "A results file already exists for this experiment ID."
        END IF

        RESUME Restart
    END IF
```

```
    IF ERR = 64 OR (ERR = 76 AND (Status$ = "CheckDataFile" OR Status$ = "CheckResFile")) THEN
        LOCATE 17, 28: PRINT "Experimental ID is invalid."
        LOCATE 19, 22: PRINT "It must have a maximum of 8 characters,"
        LOCATE 20, 19: PRINT "with no punctuation, spaces, or backslashes."
        LOCATE 22, 29: PRINT "Press a key to try again."
       DO
       LOOP UNTIL INKEY$ <> ""
       RESUME GetFileName
    END IF

    IF ERR = 53 THEN RESUME FileCleared
    RESUME

SetupExperiment:
    LOCATE 14, 48: PRINT ExpID$
    LOCATE 20, 15: PRINT "                                          "
    LOCATE 17, 20: PRINT "Press one of the behaviour keys to start        "

    'Turn on timer event trapping
   TIMER ON

    'Activate keys
   KEY(15) ON
   KEY(16) ON
   KEY(17) ON
   KEY(18) ON
   KEY(19) ON
   KEY(20) ON
RETURN

ReadyToBegin:
        CLS
        LOCATE 1, 1: PRINT "Action:  Ready to code"
        LOCATE 5, 28: PRINT "Here's Looking at You, Kid!"
        LOCATE 9, 33: PRINT "Behaviour Logging"
        LOCATE 14, 32: PRINT "Interaction ID: "; ExpID$
        LOCATE 17, 25: PRINT "Ensure that capslock is turned off."
        LOCATE 19, 15: PRINT "Press one of the behaviour keys to start timed period."

        'Reference to time-logging routines
          ON KEY(15) GOSUB EyeContact
          ON KEY(16) GOSUB EyeContact

          ON KEY(17) GOSUB NoEyeContact
          ON KEY(18) GOSUB NoEyeContact

          ON KEY(19) GOSUB Interupt
          ON KEY(20) GOSUB Interupt

    'Data-gathering DO-LOOP
       DO WHILE ((TIMER - J(1)) < TimePeriod) OR StartPoint$ = ""
       LOOP

    'Note end time
       TJ = TJ + 1
       J(TJ) = TIMER

    'Deactivate keys
```

```
        KEY(15) OFF
        KEY(16) OFF
        KEY(17) OFF
        KEY(18) OFF
        KEY(19) OFF
        KEY(20) OFF

    TIMER OFF
     LOCATE 1, 10: PRINT "Interaction period over"
    BEEP

     'Clear buffer of any additional characters
        DO UNTIL INKEY$ = ""
        LOOP


RETURN

BeginInteraction:
    KEY(17) OFF
    KEY(18) OFF
    LOCATE 1, 10: PRINT "Coding      "
    LOCATE 17, 25: PRINT "                          "
    LOCATE 18, 15: PRINT "      (Press ctrl-s to abort the experiment)                "
    LOCATE 19, 15: PRINT "                                          "


RETURN

EyeContact:
    TJ = TJ + 1
    J(TJ) = TIMER
    IF TJ = 1 THEN
          GOSUB BeginInteraction
          StartPoint$ = "Eye contact"
    END IF
    RETURN

NoEyeContact:
    TJ = TJ + 1
    J(TJ) = TIMER
     GOSUB BeginInteraction
     StartPoint$ = "No eye contact"
    RETURN

Calculations:
     'Array translation and frequency counting
         IF StartPoint$ = "Eye contact" THEN ColumnWrite = 1 ELSE ColumnWrite = 2
        FOR i = 2 TO TJ
             dtime = J(i) - J(i - 1)
            IF ColumnWrite = 1 THEN
                 Frequency1 = Frequency1 + 1
                 K(Frequency1, 1) = dtime
                 ColumnWrite = 2
            ELSE
                 Frequency2 = Frequency2 + 1
                 K(Frequency2, 2) = dtime
                 ColumnWrite = 1
```

```
            END IF
        NEXT i

        'REMed out statements here allow viewing of second array
            REM     LOCATE 15, 30: PRINT "1"
            REM     FOR Dd = 1 TO Frequency1
            REM     LOCATE Dd + 15, 30: PRINT K(Dd, 1)
            REM     NEXT Dd

            REM     LOCATE 15, 40: PRINT "2"
            REM     FOR Ee = 1 TO Frequency2
            REM     LOCATE Ee + 15, 40: PRINT K(Ee, 2)
            REM     NEXT Ee

    'Total and mean duration calculation
        IF Frequency1 > 0 THEN
            FOR u = 1 TO Frequency1
            Sum1 = Sum1 + K(u, 1)
            NEXT u
            Mean1 = Sum1  Frequency1
        END IF

        IF Frequency2 > 0 THEN
            FOR v = 1 TO Frequency2
            Sum2 = Sum2 + K(v, 2)
            NEXT v
            Mean2 = Sum2 / Frequency2
        END IF

    'Standard deviation calculation
        IF Frequency1 > 1 THEN
            FOR x = 1 TO Frequency1
            Residual1 = Residual1 + (K(x, 1) - Mean1) ^ 2
            NEXT x
            Stdev1 = (Residual1 / (Frequency1 - 1)) ^ .5
        END IF

        IF Frequency2 > 1 THEN
            FOR y = 1 TO Frequency2
                Residual2 = Residual2 + (K(y, 2) - Mean2) ^ 2
            NEXT y
            Stdev2 = (Residual2 / (Frequency2 - 1)) ^ .5
        END IF
    RETURN

DisplayResults:
    CLS
    LOCATE 1, 1: PRINT "Results"
    LOCATE 3, 25: PRINT "Eye Contact  No Eye Contact"

    LOCATE 5, 1: PRINT "Total duration"
    LOCATE 5, 27: PRINT INT(Sum1 * 100 + .5) / 100
    LOCATE 5, 43: PRINT INT(Sum2 * 100 + .5) / 100

    LOCATE 7, 1: PRINT "Frequency"
    LOCATE 7, 27: PRINT Frequency1
    LOCATE 7, 43: PRINT Frequency2
```

```
    LOCATE 9, 1: PRINT "Mean duration"
    LOCATE 9, 27: PRINT INT(Mean1 * 100 + .5) / 100
    LOCATE 9, 43: PRINT INT(Mean2 * 100 + .5) / 100

    LOCATE 11, 1: PRINT "Standard deviation"
    LOCATE 11, 27: PRINT INT(Stdev1 * 100 + .5) / 100
    LOCATE 11, 43: PRINT INT(Stdev2 * 100 + .5) / 100

    LOCATE 15, 1: PRINT "Starting behaviour:  "; StartPoint$

RETURN

InfoWrite:
    OPEN DataFileName$ FOR OUTPUT AS #1
     WRITE #1, "Experiment:", ExpID$
     WRITE #1, "Date:", DATE$
     WRITE #1, "Time:", TIME$
      WRITE #1, "Starting behaviour = ", StartPoint$
     WRITE #1, ""
      WRITE #1, "Behaviour switch points (secs)"
     FOR WriteJ = 1 TO TJ
     WRITE #1, J(WriteJ)
     NEXT WriteJ
     CLOSE #1

     OPEN ResFileName$ FOR OUTPUT AS #2
      WRITE #2, "Experiment:", ExpID$
      WRITE #2, "Date:", DATE$
      WRITE #2, "Time:", TIME$
       WRITE #2, "Starting behaviour = ", StartPoint$
      WRITE #2, ""
       WRITE #2, "", "Eye contact", "No eye contact"
      WRITE #2, "Total duration", Sum1, Sum2
      WRITE #2, "Frequency", Frequency1, Frequency2
      WRITE #2, "Mean duration", Mean1, Mean2
      WRITE #2, "Standard deviation", Stdev1, Stdev2
     CLOSE #2
     RETURN
```