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Preferential Same-Sex Imitation by Toddlers

by

Elizabeth Hanna

A dissertation submitted in partial fulfillment
of the requirements for the degree of

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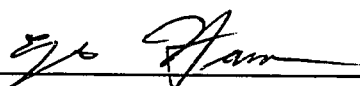
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Abstract

Preferential Same-Sex Imitation by Toddlers

by Elizabeth Hanna

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In the experiment reported here, 18-month-old toddlers ($n = 60$) and 24-month-old toddlers ($n = 60$) were randomly assigned to one of three conditions: observing same-sex models, observing opposite-sex models, or a control condition. Subjects who observed models ($n = 96$) were shown a videotape of either three girls or three boys demonstrating target acts on objects. The subjects were then given the objects and their responses were coded for the number of target acts they produced. Subjects in the control condition ($n = 24$) were given the objects without any demonstration to see what target acts they might spontaneously produce. The results showed a strong effect of observing models: Subjects in both age groups produced significantly more of the target acts after observing the videotapes than those who were given the objects with no demonstration. In addition, results showed an effect for observing same-sex versus opposite-sex models for 18-month-old boys. The 18-month-old boys who observed boy models produced significantly more of the target acts, and produced them earlier in the response period, than boys who observed girls. An interaction was found between the type of object that these boys were given and the sex of the model they observed: Boys who observed boy models produced more target acts when given a hammer or a collapsible cup, and less target acts when given a doll, than boys who observed girl models. These findings are discussed in relation to the development of gender identification and gender-stereotyped behavior in young children.

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GLOSSARY

Gender role or sex role development: the child's ongoing acquisition and development of knowledge of his or her gender, and the development of behavior appropriate to that gender in the child's society.

Gender identity: knowledge of one's gender, used traditionally by researchers in child development as the achievement of the ability to verbally label oneself as a boy or a girl.

Gender stability: the knowledge that one's gender is stable over time.

Gender constancy: the knowledge that one's gender is stable over transformations of outward appearance.

Gender-related or gender-based cognitions: indications that infants and children are using gender distinctions in their perceptual and cognitive processes. Examples are visual habituation to gender categories, sorting objects and pictures by gender categories, and responding differentially to the use of gender labels.

Gender-related or gender-based behavior, sex-linked behavior, sex-typed behavior: behavior that either naturally or culturally distinguishes males from females, such as toy preferences, activity preferences, playmate preferences, etc.

Gender- or sex-segregation, gender affiliation: the phenomenon of children preferring same-sex playmates and peer groups.

Gender-stereotype or sex-stereotype knowledge: indications that children are aware of cultural stereotypes of gender-appropriate behavior in toy preferences, clothing and hairstyles, and activities.

Gender-stereotyped or sex-stereotyped attitudes: the degree to which children approve or disapprove of themselves and others engaging in gender-appropriate versus inappropriate behaviors.

Gender labels: use of language to mark gender distinctions (male/female, boy/girl, his/her, etc.).

Gender labeling—verbal: the ability to verbally label the gender identities of self and/or others.

Gender labeling—nonverbal: the ability to respond correctly by pointing or sorting to the use of verbal labels by another.

Gender appropriate or sex-appropriate behavior and toys: engaging in activities and with objects that are stereotypically held to be appropriate for one's own gender.

Sex-typing: initiations or responses of others to a child that are stereotypically gender appropriate, such as clothing a baby girl in female sex-typed clothes.

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Chapter I: Literature Review

Introduction

The first part of this literature review presents major theories of gender role development, with examples of the research that those theories have generated. The first theories to be discussed are cognitive-developmental theories, starting with Kohlberg's (1966, 1969) concept of gender constancy then examining the influence of schema theories. The second group of theories to be discussed are the social learning theories of Mischel (1966) and Bandura (1969, 1986). The third group of theories are the emphases on group membership and social categories by Maccoby (1988, 1990, 1993) and others. The theoretical part of this review will end with a section on the role of imitation in theories and research on gender role development.

The second part of this literature review examines research that has either concentrated on or included the period of infancy. The goal of this part of the review is to examine the current state of knowledge of the origins of the gender role development in the first three years of life. The research can be divided into three general domains: (a) gender-related cognitions and possible precursors, such as perceptual discrimination research and preverbal and verbal labeling research; (b) gender-related behaviors, such as the emergence of gender-stereotyped preferences, behavioral differences, and gender affiliation; and (c) evidence of sex-typing by parents and peers. It is the intention of this review to demonstrate the convergence of much of this research on ideas of preverbal gender categorization or classification of the self, suggesting the possibility that very young children include themselves as members of one group as opposed to another before they are able to verbally identify these groups (with either productive or receptive language measures).

The final part of this chapter will review my work on peer imitation in infancy as the procedural paradigm for the current research.

Theories of Gender Role Development

Cognitive-Developmental Theories of Gender Role Development

Kohlberg and gender constancy. The original cognitive theory of gender role development was established by Kohlberg (1966, 1969). Kohlberg followed the

descriptions of general cognitive development laid out by Piaget (1952). He believed that children's understanding of identity had to build upon previous stages of cognitive development. He hypothesized that gender identity would not be a solid construct for children until they had reached the stage of Piaget's Concrete Operations and were capable of conserving identities of matter such as mass and volume through various transformations. Kohlberg described three stages of development in gender identification: (a) gender identity, in which the young child by age three can verbally label him- or herself and others as one gender or the other; (b) gender stability, in which the child understands that his or her gender will be stable over time, e.g., being a girl means growing up to be a woman; and (c) gender constancy, in which the child knows that gender will remain constant under outward transformations, such as changes in hairstyle or clothing. Kohlberg believed that the development of gender-related behaviors, such as gender-stereotyped preferences and attitudes, would be strongly influenced by the development of gender identification. He predicted that the development of stereotyped attitudes would follow an inverted U-shaped function. General knowledge and acceptance of gender-appropriate attitudes grows as the child progresses through stages of gender identity and gender stability, reaching the height of the curve as the child establishes gender constancy. Then the influence of sex-stereotyped attitudes diminishes as the child gains more flexibility in his or her attitudes, knowing that behaving in counter-stereotypic ways will not change one's basic identity.

Many studies that tested Kohlberg's theory found support for age-related changes in gender-stereotype knowledge and preferences. For example, DeLucia (1963) found that older children gave more correct responses than younger children when identifying gender-appropriate toys in an age range from 5 to 10 years of age, and that boys gave more correct responses than girls. More recently, Frey and Ruble (1992) found that achieving gender constancy made a difference in boys' responses to televised children: "Preconstant" boys chose an attractive toy over a male-endorsed unattractive toy, whereas "constant" boys chose the male-endorsed toy regardless of its attractiveness (age range 5 to 9 years). Marcus and Overton (1978) compared the responses of kindergarten, first-, and second-grade children on tasks of gender constancy, Piagetian conservation, and gender-

stereotyped preferences. They found a developmental increase in both constancy and conservation tasks, with most of the kindergarten children failing constancy and conservation tasks, and most of the second-graders succeeding at constancy and conservation tasks. They also found that constancy level was unrelated to their gender-stereotype measures, with all children at these ages expressing gender-appropriate preferences.

Gender schema theories. Schema theorists claim that discrepant findings of gender constancy being displayed by 3- and 4-year-olds (Bem, 1989; Martin & Halverson, 1983) weaken the construct, and a more appropriate emphasis is on the development of gender schemas. Martin and Halverson (1983) found that when young children (4-year-olds) were given a "reality check" during standardized procedures (e.g. asked if the child in the picture has "for real" turned into the opposite sex) the children could respond correctly, and therefore be classified as having gender constancy. In an experiment using photographs of nude toddlers, Bem (1989) demonstrated that 3-year-olds who understood that genitalia are the defining attribute of gender could conserve gender across transformations in clothing and hairstyle. These authors and others claim that it is the development of a gender schema and resulting schematic processing that influences the acquisition of gender role behaviors and cognitions.

Bem (1981) theorizes that gender may be a basic category of perception for people—we automatically partition others into two classes. Children are ready to process information on the basis of this partition and so elaborate their gender schema from the current social standards of gender roles. As children develop a self-concept, they apply a schematic selectivity for those attributes that are applicable to themselves. The influence of schemas may be seen in such findings as 4- to 9-year-old children inferring gender-stereotyped behaviors when told a neutral figure is a boy or a girl (Gelman, Collman, & Maccoby, 1986) and 3- to 7-year-olds identifying animal figures as male or female based on attributes such as mood and hairstyle (Leinbach, 1993). In addition, there is evidence for 5- to 9-year-olds displaying selective memory for gender-appropriate stimuli (Liben & Signorella, 1993).

Levy and Fivush (1993) describe the development of selective recall for gender-

appropriate information as a function of the development of gender scripts. Gender scripts are acquired in the same manner as other scripts: As children gain experience in routine events, they form a generalized representation or schema of the event that contains the structure and sequence without the specific details. A script for going to a restaurant may contain items such as looking at a menu or paying a bill but exclude items such as what is eaten or how much is paid. Gender scripts are scripts for events that are stereotypically associated with one gender versus another, e.g., cooking dinner would be a female script and fixing a car would be a male script. Because children are likely to be more involved in gender-appropriate scripts, they acquire more specific script knowledge for their own gender. Having more specific knowledge, they then remember the details of gender-appropriate stimuli more fully. Levy and Fivush also use scripts to explain the finding that younger children are more typed or bound by gender stereotypes than older children—older children show more flexibility because they are better able in general to adapt their scripts and accommodate variability. An example of this phenomenon is Martin's (1989) finding that older children (7- to 10-year-olds) were more likely to use information about hypothetical children's interests when predicting toy choice, whereas younger children (3- to 6-year-olds) relied exclusively on the gender label of the hypothetical child.

Martin (1993) reviews evidence for cognitive bases of gender role development and finds that sophisticated knowledge like Kohlberg's gender constancy is not strongly related to the gender-stereotyped activities and preferences that appear in early childhood. However, a more basic understanding of gender categories as evidenced in the ability to label gender may be tied to the growth of these activities. (The research investigating this will be discussed in the section on the development of labeling abilities in infancy and toddlerhood.) This would support the idea that gender schema and script development contribute more to gender role development than the acquisition of gender constancy. As very young children participate in and observe gender-related behavior, they generalize these experiences into representations of what it means to be female or male, and organize their own behavior accordingly.

Results of recent research question the connection between gender-stereotype knowledge (such as the ability to correctly classify occupations and activities according to

current stereotypes), and gender-stereotyped attitudes or preferences (such as the expression of approval or disapproval for stereotypes). Several studies have found that cognitive measures of gender classification are correlated with age and general cognitive level, but are less likely to be correlated with behavioral measures such as gender affiliation and toy preferences (e.g., Marcus & Overton, 1978; Serbin, Powlishta, & Gulko, 1993; Serbin & Sprafkin, 1986; Signorella, Bigler, & Liben, 1993). For example, the large-scale study on sex-typing in middle childhood by Serbin et al. (1993) found that flexibility scores (reflecting how strongly children adhered to traditional gender-stereotyped attitudes) were related to factors such as father's education and mother's occupation (commonly related to cognitive level). On the other hand, gender-stereotyped preferences were related to mother's gender-stereotyped behaviors in the home. A discussion of environmental factors leads us to the next section.

Social-Learning Theories of Gender Role Development

Modeling theories. Social-learning theories emphasize the societal nature of gender roles and the process of modeling and reinforcement by which children acquire the appropriate behavior for their role. Both Mischel (1966) and Bandura (1969, 1986) elaborated the role of modeling, claiming that modeling influences the acquisition of gender role behavior before children have a clear gender identity. Both also posit that children learn by example the behavior of both sexes, but through differential reinforcement by others they increase the frequency of gender-appropriate behavior. Bandura (1986) states that the basic mechanism is "multiple modeling"—the observation of many examples of appropriate behavior. This is in contradiction to Freud (1905/1953) who felt that identification with the same-sex parent and use of that parent as a model for behavior was the major contribution to gender role development. Instead, Bandura claims that multiple models serve to illustrate categories of appropriate versus inappropriate behaviors, and thus the prevailing culture or societal stereotypes may be more influential than individual parents. In his view, selective imitation of same-sex models relies on gender classification, along with the ability to recognize personal similarity to one group versus the other.

Cultural and environmental influences. Cross-cultural research emphasizes the role of societal reinforcement in the acquisition of gender role behaviors. The observational study

by Whiting and Edwards (1973) found that sex differences were most apparent in societies that treated young boys and girls differently (e.g., girls who had been assigned infant care were more "responsible" and "nurturant" than boys). Another effect of cultural context was found in a recent comparison of 4-year-olds in England and Hungary (Turner, Gervai, & Hinde, 1993). Aggression is often cited as a stable sex difference across cultures (e.g., Maccoby & Jacklin, 1974) but in this sample, both sexes of children in Hungary were equally aggressive, and both were significantly more aggressive than even the boys in the English sample. The authors hypothesize that differences in child-teacher ratio, resources, and levels of adult control may have increased the aggression of the children in Hungary (the time period of the observations, 1988-1991, did not contain any overt differences in general aggression between the two cultures, such as war versus peace). A similarity across the two cultures was that boys in both England and Hungary showed stronger sex-typing than girls, with stronger preferences for gender-appropriate toys and activities, and fewer gender-inappropriate preferences.

Research on effects of environmental context has found fewer sex differences when there are fewer differences in contexts for boys versus girls (Bloch, 1987). In her observations of children at home, Bloch found no differences in time spent in such activities as gross-motor play or art activities. However, in group settings, reinforcement for participating in differential contexts through gender-stereotyped behavior comes from both teachers and peers. Preschool-aged boys and girls (3- to 5-year-olds) received more positive reinforcement from one another (and even more so from boys) for engaging in gender-appropriate activities (Lamb & Roopnarine, 1979). Children as young as 2 years old will label a gender-inappropriate toy as "bad" for other children at the same time as they show no hesitation to play with it themselves (Bussey & Bandura, 1992). The authors claim that this demonstrates that the children are first evaluating behavior by external standards and only later incorporating them into personal standards.

Sex reassignment and rearing influences. Another view that relies on the interplay between cognitive classification and social processes is that of Money and Ehrhardt (1972). Money and Ehrhardt review biological evidence for sex differences and clinical evidence from cases of sex reassignment, and conclude that the majority of gender differentiation

takes place after birth and in the context of social relations. They cite the many successful sex reassignments that have two factors in common: (a) when reassignment is at an early age, preferably before 18 months and the acquisition of language; and (b) when others' interactions with the child are consistent with the sex of reassignment. The power of the gender label and resulting rearing practices in establishing identity is especially clear in cases where successful reassignment occurs even when the assigned sex contradicts external genital sex (Money, Hampson, & Hampson, 1957).

Sex differences in sex-typing. The phenomena of boys showing stronger gender-stereotyped behaviors and attitudes than girls are well-documented. Signorella et al. (1993) found stronger gender-stereotyped attitudes in elementary-school-aged boys than in girls, evidenced by a lower rate of "both" responses when asked to identify which activities went with which gender. DeLucia (1963) found 5- to 10-year-old boys to be more thorough than girls at classifying gender-appropriate toys for both boys and girls. Levy and Fivush (1993) found that boys displayed more selective recall than girls of gender-appropriate scripts at 36 months, and Bauer (1993) and Bearman (1993) found the same in 2-year-old boys.

Bussey and Perry (1982) found that 8-year-old boys displayed stronger rejection of gender-inappropriate behavior than girls did, and Perry and Bussey (1979) found that 8- to 9-year-old boys imitated less gender-inappropriate behavior. Bussey and Bandura (1992) found that 4-year-old boys displayed stronger self-sanctions than girls for gender-inappropriate behavior. Lamb and Roopnarine (1979) found that 3- to 4-year-old boys engaged in more reinforcement for gender-appropriate behavior in their peers than did girls. Similarly, Serbin, Connor, Burchardt, and Citron (1979) found that 3- to 5-year-old boys were less likely to play with gender-inappropriate toys in the presence of any peer, whether male or female, whereas girls were less likely to play with the inappropriate toy only when in the presence of a male peer.

Marcus and Overton (1978) found that 5- to 8-year-old boys were more likely to prefer male adult professions over female and exclusively preferred male television characters. Serbin et al. (1993) also found stronger gender-appropriate activity preferences in 5- to 11-year-old boys than in girls. Turner et al. (1993), as mentioned above, found that 4-year-

old boys in both England and Hungary expressed stronger preferences than girls for gender-appropriate toys and activities. Fagot, Leinbach, and Hagan (1986), O'Brien and Huston (1985), O'Brien, Huston, and Risley (1983), and Perry, White, and Perry (1984) all found that boys ranging in age from 14 months to 5 years expressed stronger preferences for gender-appropriate objects than did girls.

Frey and Ruble (1992) found that 5- to 9-year-old boys more readily accepted a same-sex peer's endorsement of a toy than did girls. Slaby and Frey (1975) found that 4- to 5-year-old boys watched same-sex models more than girls. Serbin and Sprafkin (1986) found stronger gender affiliation in 3- to 7-year-old boys than in girls, as did La Freniere, Strayer, and Gauthier (1984) with boys by 5 years of age. Howes (1988) found that 16- to 33-month-old boys were more likely to respond positively to another boy's communication than to a girl's.

In the social learning view, these phenomena can be explained by research that finds fathers to be more influential than mothers in the sex-typing of their children, and stricter with sons than with daughters in reinforcing gender-appropriate behavior. Observations of parent-child interaction have found that both parents respond more positively to their child's playing in gender-appropriate ways and with gender-appropriate toys (Fagot & Leinbach, 1989, with 27-month-olds; Caldera, Huston, & O'Brien, 1989, with 18- to 23-month-olds), but fathers respond less positively than mothers to gender-inappropriate play from toddlers of both sexes (Caldera et al., 1989, with 18- to 23-month-olds). In addition, more gender-stereotype measures of fathers than mothers are related to their children's gender-stereotyped behavior (Weinraub et al., 1984, with 26- to 36-month-olds). In addition, fathers initiate the most gender-appropriate play with sons (Jacklin, DiPietro, & Maccoby, 1984, with 45-month-olds), and more strongly reject inappropriate play with sons than with daughters (Caldera et al., 1989, with 18- to 23-month-olds).

Another view of why boys display stronger gender-stereotyping concerns the interplay of gender and status in society (discussed in Bandura, 1986; Kohlberg, 1966; Serbin et al., 1993). Although much progress has been made in equalizing opportunities for men and women over the past 30 years, men still hold higher status than women, as seen in the predominance of men in the most influential positions in American society. It is possible

that the higher status of males gives girls more flexibility—behavior can be defined as appropriate because it is female, or behavior can be defined as appropriate because it is of higher status. For boys, on the other hand, gender-inappropriate behavior is doubly negative.

Group Membership Theories of Gender Role Development

Maccoby and "self-socialization." Although some knowledge of gender stereotypes and the degree of gender-stereotyping in behaviors such as toy and activity preferences may be linked to parental behavior and cultural influences, other phenomena of gender role development, such as sex-segregation, may not be. Sex-segregation, especially, seems to develop on a timetable unrelated to gender-stereotyped behavior (see Berenbaum & Snyder, 1995, for evidence linking prenatal hormone exposure to toy and activity preferences but not playmate preferences). Maccoby (1988, 1990, 1993) is one theorist who has focused on sex-segregation as a basic mechanism in gender role development. Maccoby and Jacklin (1974) emphasize a process of "self-socialization" in the selection and segregation of same-sex playmates that is more influential in the acquisition of gender-appropriate behavior than processes of sex-typing or gender identification with adults. The difference between Maccoby's view and Kohlberg's view (in which the achievement of gender identity, the initial categorization of oneself into one gender group versus the other, is also the beginning of gender role development) is that for Kohlberg, categorization leads to identification with adults, and adult behavior determines the gender-stereotyping of the child. For Maccoby, self-categorization leads to identification with the child's peer group.

Maccoby (1990) comes to the following conclusions after reviewing research on sex-segregation: (a) Sex-segregation is widespread cross-culturally, (b) the sex difference in playmate choice is large compared to other sex differences, (c) sex-segregation is resistant to change throughout childhood, (d) sex-segregation is not linked to gender-stereotyped activities (e.g., children will segregate when engaged in neutral activities as well), (e) sex-segregation appears early and increases to a high level by age 6, where it remains high until adolescence, and (f) children's preferences for same-sex playmates seem unrelated to individual differences such as toy and activity preferences. Because of these findings, Maccoby (1988, 1990) stresses that it is gender identity based on group membership that

fuels the acquisition of gender role behaviors. Once children know that they belong to one group rather than the other, their identity is bound up with that group. Once a girl can cognitively categorize herself as female, she will begin to prefer to do what she conceives of as female things, and what is conceived of as female is influenced by the peer group.

Influences of the peer group. Once children are segregated into groups, Maccoby (1990) hypothesizes that group differences are fostered by peers. Primary among these differences are gender-stereotyped interaction styles including dominance relations and attitudes toward the opposite sex. By 4 years of age, girls tend to use more verbal strategies to get what they want, and boys tend to use more physical strategies (Charlesworth & Dzur, 1987). Observations of school-aged children in the United States and Canada indicate that girls tend to play in smaller groups and engage in more games involving turn-taking, boys in games involving direct competition (Crombie & Desjardins, 1993; Humphreys & Smith, 1987). As early as 33 months, boys respond to prohibitions of other boys but not to those of girls, whereas girls respond to both sexes (Maccoby & Jacklin, 1987). In sex-segregated group play, preschool-aged girls' themes and toys concentrate on romance (e.g., teen dolls, make-up kits, jewelry) whereas boys' themes focus on action and adventure using sports, TV action heroes, and competition (Maccoby, 1993). In a sample of 3- to 5-year-olds, girls were more passive and waited longer for turns in cooperative situations without adult supervision when paired with boys rather than girls (Powlishta & Maccoby, 1990). In another sample of 3- to 4-year-olds, children played more with gender-inappropriate toys when alone than when in the presence of same-sex or opposite-sex peers, and least of all when in the presence of opposite-sex peers (Serbin et al., 1979). An observation of group play in 3- to 5-year-olds in New Zealand found that boys' same-sex groups had more conflict than girls', mixed-sex groups had the most, and mixed-sex groups had more male themes than female (Smith & Inder, 1993). When asked to approach same-sex and opposite-sex peers by an adult, 3- to 5-year-old children slightly but consistently stayed farther away from opposite-sex peers than same-sex peers, and oriented their bodies farther away (Wasserman & Stern, 1978).

These research findings illustrate the influence of peers on behavior within sex-segregated groups. Children prefer to play with same-sex peers, and will stand closer to

them and be more responsive to them than to opposite-sex peers. Girls are less able to influence boys, and use more verbal negotiation and reciprocity strategies than do boys. Boys are less compliant to girls, more concerned with status with other boys, and they tend to use more physical means of persuasion and competition than do girls. Girls' playgroups tend to be smaller than boys, more intimate, and their play is more conversational and turn-taking. Boys' playgroups are larger and their play is more physical and competitive. All of these are findings within the preschool years, ages 2 to 6. In groups of older children and adults as well, differences in interaction styles are evident between the sexes. In same-sex groups, girls and women tend to show more agreement and positive behavior to one another than men do, and boys and men tend to show more disagreement and concern with dominance (e.g., Carli, 1989; Maltz & Borker, 1983; Savin-Williams, 1979).

The Role of Imitation in Gender Role Development

Theoretical role of imitation (broadly defined). Imitation plays a part in all the major theories on gender role development. Cognitive-developmental theories place imitation at the conclusion of the process of identification with same-sex others. Schema theorists emphasize the acquisition of general rules of behavior from many different sources of information, including the behavior of others. Social-learning theories give imitation a central role, but not imitation of specific individuals such as parents or teachers. Bandura (1986) stresses the importance of observing many different models for acquiring behavior patterns appropriate for a class of people. Group membership and self-socialization theories also imply a process of abstraction of general rules or stereotypes from observations of social interactions that can be used as guides to behavior.

Evidence for preferential same-sex imitation. Research supporting preferential same-sex imitation in children is supplied by several studies (e.g., Barkley, Ullman, Otto, & Brecht, 1977; Bryan & Luria, 1978; Bussey & Bandura, 1984; Grusec & Brinker, 1972; Perry & Bussey, 1979). In a sample of 4- to 7-year-old children, Barkley et al. (1977) found that boys imitated male models more than female models, but all children were even more influenced by whether the modeled behavior was gender-appropriate or not. With 8-year-olds, Bussey and Perry (1982) found that both boys and girls imitated same-sex models more than opposite-sex models, and that boys imitated opposite-sex models even

less than girls. Perry and Bussey (1979) compared the role of single models versus multiple models in their research. When only shown a single model, 8- to 9-year-old children imitated an adult of either sex. But when shown a group of models, with the males demonstrating one behavior and the females demonstrating another, the children switched to imitating same-sex models. When Perry and Bussey compared imitation of models demonstrating gender-appropriate and gender-inappropriate behaviors, boys showed the lowest imitation of both male and female models displaying female behaviors.

The role of gender constancy in preferential same-sex imitation. There is a debate in the literature on what level of gender identification must be acquired before children will demonstrate preferential same-sex imitation. Some researchers report that children must first achieve Kohlberg's gender constancy, understanding that their gender will remain stable through outward transformations. Others think that a simple ability to classify oneself as belonging to one gender over the other is sufficient. Using the Slaby and Frey (1975) test of gender constancy with a sample of 3- to 6-year-olds, Ruble, Balaban, and Cooper (1981) found that only children who scored at the "high constancy" level were influenced by the sex of a model playing with a toy. Children in the high constancy group played more with the toy after observing either a same-sex model or no model than after observing an opposite-sex model; children in the low constancy group played more with the toy after observing either same-sex or opposite-sex models than no model. However, when using multiple models (groups of men and women playing the same game, but all the men demonstrating one distinct pattern of behavior and all the women demonstrating another), Bussey and Bandura (1984) found that all their subjects (2-5-year-olds) imitated same-sex models more than opposite-sex models, with high-constancy children doing even more so.

The role of selective attention in preferential same-sex imitation. Another debate in the literature is that of the process by which preferential same-sex imitation occurs: selective attention versus selective recall or production. Some researchers claim that children imitate more of same-sex models' behaviors than those of opposite-sex models because they pay more attention to same-sex models. Others state that children code and recall behavior differently based on the sex of the model. Slaby and Frey (1975), when first establishing

their technique for testing gender constancy, showed 2- to 5-year-old children a film of both a male and a female model and recorded the amount of time the children spent watching each model. They found that high-constancy boys (mean age = 54 months) watched the male model more than the female model (61% of the time), in comparison to low-constancy boys and all girls, who watched both models relatively equally. On the other hand, Grusec and Brinker (1972) filmed eye movements of 5- to 7-year-old children before testing recall and found that the children watched models equally, but then recalled more of the behavior of same-sex models than that of opposite-sex models. Bryan and Luria (1978) used EEG recordings on 5- to 10-year-old children and found no difference in visual attending to same-sex versus opposite-sex models, even though the children subsequently stated a preference for same-sex models. The Slaby and Frey positive finding of selective attention was only in their male subjects close to 5 years of age, and they also predicted that selective attention would increase with age. The lack of replication by others for selective attention in 5-year-olds and older children indicates that although high-constancy boys may occasionally exhibit a preference for same-sex models in both statements and looking behavior, looking behavior may not be the determining factor in selective recall. This point will be discussed further in subsequent chapters.

Gender Role Development in Infancy and Toddlerhood

The Development of Gender-Related Cognitions

Perceptual discrimination research in early infancy. It is widely accepted that infants readily discriminate male from female adults. Fagan and Singer (1979; also discussed in Fagan & Shepherd, 1982) demonstrated that when 5-month-old infants were allowed to fixate on a face and then were shown the same face paired with an opposite-sex face, they consistently preferred the novel opposite-sex face even when the two faces were featurally very similar (e.g., a brother and a sister both with short dark hair). However, when the infants were shown the familiar face paired with a novel same-sex face, they displayed little preference for the novel face even when the features of the two faces were very dissimilar (e.g., a White woman and an African American woman). Pakizegi (1985) habituated 8-month-olds to one face with variations of female clothing and hairstyles, and found that the infants dishabituated when the hairstyle was switched to a male hairstyle. Leinbach and

Fagot (1993) habituated 5- to 12-month-olds to faces of one sex, and found that some infants at all ages, and the majority of 9- to 12-month-old infants, dishabituated when shown a face of the other sex. Leinbach and Fagot ran a second experiment to try to test for the cues the infants used to distinguish one sex from another. By testing 12-month-olds with gender-stereotyped versus neutral clothing and hairstyle cues, they found that dishabituation to the other sex face decreased with each change to a neutral cue. Leinbach and Fagot concluded that gender-stereotyped cues were important for the infants' perceptual discrimination.

At least two separate groups of researchers have tested intermodal discrimination of male and female faces and voices. Walker-Andrews, Bahrick, Raglioni, and Diaz (1991) measured preferential looking at pairs of male and female faces while listening to a voice of one sex in 4- to 6-month-olds, and found that the 6-month-olds, and some of the 4-month-olds, seemed to match the gender of voice with face. Poulin-DuBois, Serbin, Kenyon, and Derbyshire (1994) used a very similar procedure with 9- and 12-month-olds, and found that both ages seemed to match female faces and voices.

This body of research looking at discrimination abilities implies that infants, at least by the second half of the first year, have formed perceptual categories that distinguish between male and female faces.

Gender labeling research. A more difficult question is when infants are able to use gender labels in language to distinguish categories of male and female, either by responding correctly to adults' language in pointing and sorting tasks, or verbally supplying the label themselves. The youngest age reported to have the ability to respond correctly to adults' use of gender labels is from O'Brien and Huston (1985). They asked toddlers aged 14 to 35 months to point to the girl or the boy when given male-female paired pictures, and concluded that their subjects acquired an understanding of gender labels between 18 and 20 months of age. The majority of toddlers aged 14 to 18 months failed the test (all but one), and the majority of toddlers aged 20 to 35 months passed (with a criterion of 100% correct). However, because the age range over 20 months (20 to 35) was over three times greater than the range below (14 to 18), it is difficult to say within the range exactly when the toddlers were capable of gender labeling.

The majority of researchers studying early gender labeling of others place the onset between 24 and 30 months of age. Thompson (1975) asked 2-year-olds to sort pictures into male and female piles, and found that they could correctly sort pictures of others but failed to sort their own picture correctly. Etaugh, Grinnell, and Etaugh (1989) found that in a group of 20- to 28-month-olds, subjects performed at chance levels in labeling photos (by pointing in response to the adult's question of where's the boy or where's the girl) of both other children and adults, but in a group of 29- to 36-month-olds, subjects were mostly accurate. Etaugh and Duits (1990) also found that toddlers 18 to 26 months of age performed at mostly chance levels in pointing responses to pictures of other children, even when paired with cues of gender-appropriate toys. Leinbach and Fagot (1986), in the largest and most formal experiment of toddlers' gender labeling abilities, compared the ability to label by pointing using photos of adults versus photos of other children in 16- to 43-month-olds. They found that the majority of toddlers under 24 months failed to label the adult photos, and all of them failed to label the children's photos (with a criterion of 10 correct responses out of 12 trials). In the 27- to 30-month age range, 80% of toddlers succeeded at labeling the adult photos, and 50% succeeded at labeling the children's photos. In a similar study that also measured labeling by pointing to photos, Fagot et al. (1986) found that no toddlers under 24 months succeeded at labeling the adult photos. Weinraub et al. (1984) found the majority of their subjects passed a verbal labeling task using pictures of adults and children at 26 months of age (and by a higher percentage of girls than boys), but the majority passed a pointing task for labeling others at 36 months of age. The variations in age reported here (ranging from 24 to 29 months) for the ability to use gender labels is most likely the result of variations in procedure, such as using photographs for male-female pairs versus drawings, and dividing toddlers into younger and older groups with different age ranges. The bulk of the evidence suggests that the youngest age at which the average toddler is capable of correctly using gender labels to classify others in either expression or reception is 24 months, and that verbal labeling may appear before nonverbal.

The ability to apply labels to oneself may appear later than the ability to label others. Weinraub et al. (1984) found that the majority of their subjects were able to label

themselves at 31 months (both by verbal statements and by correctly sorting their own picture into male or female boxes). But even though some of the 26-month-old toddlers in their sample could verbally and nonverbally label others, and verbally label themselves, none of them sorted their own picture correctly. Thompson (1975), as mentioned above, also found that 24-month-olds failed to sort their own picture correctly, while the majority of 30-month-olds succeeded. Research testing gender labels in children 36 months of age and older finds that by this age most children can correctly label both themselves and others (e.g., Bem, 1989; Bussey & Bandura, 1992; Martin & Little, 1990; Slaby & Frey, 1975).

Gender-stereotype knowledge research. Research assessing awareness of gender stereotypes in very young children, similar to research assessing use of labels, often involves asking the children to sort pictures or toys or point to "which goes with which" in order to avoid reliance on the child's developing verbal abilities. For example, Kuhn, Nash, and Brucken (1978) asked 2- and 3-year-olds to pick the doll (male or female) which "goes with" pictures of gender-stereotyped activities, and found a generally high knowledge of stereotypes across the two ages. Perry et al. (1984) similarly showed 2- to 5-year-olds pictures of gender-stereotyped toys paired with neutral toys, and first asked the children to point to the one they themselves preferred. Then, leaving a picture of a group of children the same sex as the subjects in view, the researchers showed the subjects a different set of pictures and asked the children to point to "which toy you think girls/boys would rather play with" (always asking for preferences for the same sex as both the subject and the pictured children). Knowledge of stereotypes concerning these toys appeared low in the 2- to 3-year-olds, with these children performing at chance levels in assigning objects to the pictured children (the same sex as themselves). (However, all the boys, and girls starting at age 3, preferred gender-appropriate toys for themselves, and preferred neutral toys over gender-inappropriate toys.) In another experiment, Levy (1992) assessed toddlers' (20- to 28-month-olds) categorization skills by examining the spontaneous sequential touching of objects that had been categorized by adults as fitting either male or female stereotypes (e.g., screwdriver, gun, baby bottle, necklace). He found that all the toddlers demonstrated some awareness of gender categories in their touching behavior. (He also found that this categorization was unrelated to gender labeling by pointing, using

the Leinbach and Fagot, 1986, procedure.) Thompson (1975) asked 2- and 3-year-olds to sort pictures of objects, clothes, etc. into separate piles for males and females, and also found that all the children had some knowledge of stereotypes, even the ones who couldn't label themselves or sort their own picture correctly. These findings are similar to those with older children that suggest little relation between gender classification abilities and gender-related preferences (e.g., Marcus & Overton, 1978; Serbin et al., 1993). Thus young children may prefer same-sex toys and playmates before they can say that these are appropriate for their sex.

Gender schema research. Schema research is most interested in the effects of schematic processing on memory, and one of the established techniques to assess memory in very young children is imitation (Mandler, 1990; Meltzoff, 1990b). In two studies of imitation investigating gender schemas, Bauer (1993) and Bearman (1993) used a procedure of demonstrating sequences of gender-stereotyped activities for 2-year-olds and testing them for imitation after a delay. In both experiments, the 2-year-old boys showed less recall of female-stereotyped acts than either male-stereotyped or neutral. Girls showed no difference. (All subjects played equivalently with the test objects in an initial baseline phase, and all showed some imitation of the demonstrated sequences over what they had done in baseline.) In Bearman's (1993) experiment, she compared the use of an adult male versus an adult female model for the demonstration—the sex of the model had no impact.

The Development of Gender-Related Behaviors

Toy preferences. It has been clearly demonstrated by researchers using a variety of methods (including naturalistic observations, imitation techniques, and the interview techniques discussed earlier) that children show preferences for gender-appropriate toys well before 3 years of age. For example, O'Brien et al. (1983) observed toddlers in a day-care setting and found gender-appropriate toy preferences in boys as young as 15 months of age. For both boys and girls across their sample of 15- to 35-month-olds, the least favorite toy was gender-inappropriate (a doll for the boys and a truck for the girls). Fein, Johnson, Kosson, Stork, and Wasserman (1975) found gender-appropriate toy preferences in an imitation study with 20-month-olds, especially with a toy gun for boys and a bracelet for girls.

Sex-segregation. Sex-segregation also appears before 3 years. Howes (1988) reported that about half of her youngest subjects (16 to 24 months) preferred same-sex playmates, and that boys were more likely to respond positively to other boys' overtures than to girls'. LaFreniere et al. (1984) found that affiliation with same-sex peers appeared in their 27-month-old subjects, and more strongly in girls than in boys (one of the few reports in the literature of girls displaying a gender-related behavior earlier or at higher levels than boys).

The interplay of gender-related behaviors and gender-related cognitions. Within this research, there is a debate on how much these gender-related behaviors are influenced by gender-related cognitions, if at all. Some researchers find that gender-related behaviors such as toy preferences and sex-segregation appear first in those children that pass gender labeling tests (e.g., Martin, 1993; Martin & Little, 1990) but others find no relationship (e.g., Huston, 1985; Perry et al., 1984; Serbin & Sprafkin, 1986). A third group find evidence of gender-related behaviors before gender-related cognitions, but then find that the behaviors increase once the cognitions appear (e.g., Bussey, 1993; Fagot, 1985; Fagot & Leinbach, 1993; Fagot et al., 1986; O'Brien & Huston, 1985; Thompson, 1975).

Some try to explain the lack of connection of early gender-related behaviors with labeling abilities by discussing ideas of behavioral preferences and compatibility. Slight differences between the sexes at birth, exaggerated by sex-typing of parents and others in their environment, result in differential toy preferences and interaction styles, which then lead to sex-segregation. Serbin, Moller, Powlishta, and Gulko (1991) found that those young children (26 to 40 months of age) labeled as "socially-skilled" or popular were more likely to play with one another regardless of sex composition. Moller (1993) also found that children this age tend to prefer others who have either a similar or complementary play style. Field (1982) found evidence that 2- to 5-year-old children in mixed-age groups preferred playmates who seemed to match their own verbal abilities.

There is scant evidence for stable sex differences in behavior other than toy preferences under the age of two years (for reviews see Huston, 1985; Maccoby & Jacklin, 1974). The slight differences that are documented, such as greater verbal abilities in girls than in boys (e.g., Maccoby & Jacklin, 1974; Field, 1982; Langlois, Gottfried, & Seay, 1973) may support same-sex affiliation before identification or self-categorization (at least as as

evidenced in labeling abilities) can be held accountable. Some minor sex differences that have appeared in recent publications include boys covering more of the paper than girls when scribbling at 18 months (Berefelt, 1987), boys sharing less than girls (but only when in the majority) in a "scarce resource" condition at 1 and 2 years of age (Hay, Caplan, Castle, & Stimson, 1991), and boys performing more motor imitation than verbal at 25 months (Patrick & Richman, 1985). On the other hand, the vast majority of research on the behavior of infants and toddlers report no sex differences on a range of standard perceptual-cognitive tasks (e.g., Baillargeon, 1987; Fagan, 1982; Meltzoff, 1985, 1988a, 1988b; Rovee-Collier & Sullivan, 1980).

Sex-Typing of Infants and Toddlers by Adults and Older Children

Effects of gender label. Stern and Karraker (1989) recently reviewed the research on the effects of gender labeling of infants on various ages of subjects. They examined reports from several laboratories that dressed an infant in neutral clothing and measured the effect of calling the infant a girl or a boy on subjects' reactions. Stern and Karraker conclude that the effects are minimal on adults but often elicit stronger reactions from children. Vogel, Lake, Evans, and Karraker (1991) compared different ages of subjects in a study in which subjects rated neutrally dressed infants on how well certain adjectives applied. They found no sex-typing in the adults' ratings, but children ranging from 5- to 15-year-olds were more likely to rate infants labeled as girls more beautiful, soft and nice than those labeled as boys. Research that examines actual behavior rather than perceptions of adults to cross-labeled or cross-dressed infants has found slightly more evidence of sex-typing. Adults are more likely to offer a gender-appropriate toy to infants and may handle labeled boys more roughly than labeled girls (Lloyd & Duveen, 1989). Stern and Karraker (1989) point out that there was no effect of label for adults (who all had children of their own) with the majority of the measures in the studies they reviewed (e.g., Bell & Carver, 1980; Holman & Williamson, 1979; Stern & Hildebrandt, 1984).

Evidence of sex-typing by parents. Sex-typing by parents of toddlers may be stronger. Caldera et al. (1989) observed both mothers and fathers being more enthusiastic when given gender-appropriate toys than when given gender-inappropriate toys in a play session with their 18- to 23-month-old toddlers. Fagot and Leinbach (1989) found that both

parents responded more positively to gender-appropriate play than neutral or inappropriate play from their 27-month-olds. Weinraub et al. (1984) found relationships between parents' gender-stereotyped attitudes, especially fathers', and their children's toy preferences and labeling abilities when the children were as young as 26 months of age. O'Brien and Huston (1985) found that all parents of a group of children aged 14 to 35 months said that their children had more gender-appropriate toys than inappropriate toys at home, and all the parents predicted that their children would prefer gender-appropriate toys. In this study, the parents' predictions were related to the boys' observed preferences, but not the girls'.

The interplay of sex-typing, gender-related behaviors, and gender-related cognitions.

With evidence of parents subtly reinforcing differences and stressing labels by surrounding infants with dichotomous environments, many theorists attempt to explain the early appearance of gender-related behaviors as the result of socialization pressures. Lloyd and Duveen (1989) discuss the acquisition of gender identity as a "semiotic function"—social gender identities are held for infants by adults and older children, governing their interaction, until infants are able to internalize society's gender system and use it to regulate their own behavior. Fagot and Leinbach (1989, 1993) hypothesize that the parents' affective responses to gender-appropriate behavior that they have observed in their own research mark the importance of gender as a category for infants. Subsequent categorization builds on infants' ability to distinguish gender (at least for faces, as evidenced by the perceptual discrimination research). Once a child has mastered labeling abilities, this categorization becomes "available to consciousness and may serve to organize gender understanding" (Fagot & Leinbach, 1993, p. 219), and gender role development is accelerated. Martin (1993) also posits that the earliest gender-related behaviors are under the influence of parental socialization, but once labeling is achieved, cognitive processes link gender issues in children's behavior and thinking. These theorists, as well as Kohlberg (1966, 1969), Maccoby (1988, 1990, 1993), and Bandura (1986), emphasize the point at which children demonstrate that they are placing themselves in one gender category versus the other.

The bulk of the research on verbal and nonverbal labeling places this point after the first

two years of life. However, some research on visual preferences in infants implies differently. Lewis and Brooks (1974) showed infants ranging from 9 to 18 months pictures of themselves paired with pictures of either same- or opposite-sex peers. They found that the infants looked equivalently at self and same-sex peers, but significantly less at opposite-sex peers. Bower (1989) found evidence of same-sex visual preference in a series of studies examining preferential-looking to pictures of same- or opposite-sex peers with 12-month-olds. When shown still photographs, the infants looked longer at same-sex peers than opposite-sex peers. When shown still photographs of crossed-dressed peers, infants looked longer at those wearing clothing appropriate to themselves. When shown films of crossed-dressed peers moving, however, the infants seemed to ignore the clothing and again looked longer at same-sex peers than opposite-sex peers. Kujawski and Bower (1993) used the same procedure showing subjects only a point-light display (infants were filmed in a dark room with reflective tape on their joints) and also found evidence of same-sex preferential looking, in this case with a longer duration of the first look towards same-sex peers than to opposite-sex peers. Kujawski and Bower hypothesize that infants are capable of an abstract representation of gender that involves intersensory matching, and conclude that these infants are displaying gender identification by detecting a similarity or dissimilarity to themselves.

It is possible that the use of language in the labeling measures described above (either by requesting the child to supply a verbal label, or to respond to a verbal direction) may underestimate the abilities of children under 2 years of age. In investigating the development of memory, for example, it was not until researchers created nonverbal measures such as testing deferred imitation (Meltzoff, 1985, 1988b, in press) or recall of conditioned behaviors (Rovee-Collier, 1990) that they were able to illustrate several facets of long-term memory capabilities in infants. The evidence supplied by Bower (1989), Kujawski and Bower (1993), and Lewis and Brooks (1974) suggests that nonverbal measures of gender role development may also uncover unexpected abilities.

14-Month-Old Toddler Peer Imitation

The idea for the current project stemmed from my research on toddler peer imitation (Hanna & Meltzoff, 1993). In three experiments, toddlers demonstrated target acts to

same-age subjects, and the subjects were tested for imitation across memory delays and changes in context. Although the experiments were designed to study infant imitation of peers (in comparison to previous research on imitation of adults) and to examine constraints on memory for deferred imitation, the procedures used laid the groundwork for the current research.

Experiment 1

In the first experiment, 14-month-old toddlers participated in one of three experimental conditions. In the peer model condition ($n = 20$), subjects observed a previously-trained infant peer "expert" (also aged 14 months) demonstrate target acts on five test objects. After a 5-min delay, the infant subject was given the five objects to see if he or she would reproduce the target acts. The responses of these subjects were compared to the responses of other subjects who participated in either a baseline control condition ($n = 20$), in which subjects never observed a demonstration, and a control peer condition ($n = 20$), in which subjects observed a peer play with the test objects without demonstrating the target acts. The results provided strong evidence for imitation of peer models. Subjects in the peer model condition produced on average 64% of the target acts that they were shown. The mean score for subjects in the peer model condition was 3.20, compared to 0.90 for both subjects in the baseline control condition and subjects in the control peer condition. There was a strong main effect for experimental condition, $F(2,54) = 41.04$, $p < .001$.

Additional analyses on sex of subject and sex of model effects gave no significant results, save for a marginal interaction ($p < .06$). The interaction derived from the fact that girl toddlers who observed a female peer demonstrator produced fewer target acts than those who observed a male peer demonstrator ($M = 2.60$ versus $M = 3.40$), while those in the control peer condition who observed a female peer demonstrator produced more target acts than those who observed a male peer demonstrator ($M = 1.80$ versus $M = 0.60$). Boy toddlers showed no such interaction.

Experiment 2

In the second experiment with 14-month-old toddlers, infants in the peer model condition ($n = 32$) were shown the peer demonstration in the laboratory setting, but were not presented with the test objects until 2 days later in their own homes (change of context),

by a second adult who had not been in the lab on the first day. Infants in the control condition ($n = 32$) visited the laboratory setting, and then were tested 2 days later at home. The results showed that infants imitated their peers after the 48-hr delay and change of context. Subjects who observed a peer demonstration produced on average 52% of the four target acts. The mean score for subjects in the peer model condition was 2.09, compared to 0.94 for subjects in the control condition. Again there was a strong main effect for experimental condition, $F(1,60) = 18.156$, $p < .001$. Additional analyses yielded no significant main effects nor interactions, $ps > .10$. However, similar to the marginal interaction in Experiment 1, the lowest average production of target acts was from those girls toddlers who observed a female peer demonstrator ($M = 1.63$ versus $M = 2.35$ across the other three cells).

Experiment 3

For the third experiment, we were interested in whether 14- to 18-month-old toddlers could perform deferred imitation of their peers when the target behavior was observed in a "real-world" setting. Subjects in the peer model condition observed a peer demonstration at their day-care center. Two days later, subjects were tested at home by a second female experimenter who had not been present at the daycare visit. Subjects in the control condition were tested at home as in Experiment 2 to assess whether they would spontaneously produce the target acts without having seen them being modeled. These subjects were also enrolled in participating day-care centers but never observed a day-care demonstration.

Subjects who observed a day-care demonstration produced on average 72% of the four target acts. The mean score for subjects in the peer model condition was 2.89 compared to 1.00 for subjects in the control condition. The difference between these distributions of scores is significant, $t(16) = 4.15$, $p < .01$ and Mann-Whitney $U = 8.0$, $p < .01$. The small number of subjects and uneven cell sizes in Experiment 3 precluded testing for an effect of sex of model.

Overall, the three experiments on peer imitation established that peers influence behavior in infancy. Although sex differences were nonexistent on the neutral objects used in these studies, some marginal effects suggested an interaction of sex of model with other

factors and raised interest in whether sex of model could have an effect on infant subjects in an experiment specifically designed to test it. The indication in both Experiments 1 and 2 of girls showing less imitation of same-sex models than opposite-sex models in the peer model condition goes against a prediction of same-sex preference, but any indication of an effect of sex of model at this early age suggests further investigation.

There are several possible reasons why an effect of sex of model may have been dampened in these peer imitation experiments. The use of single models rather than the multiple models successfully used by researchers with older children (Bussey & Bandura, 1984; Perry & Bussey, 1979) may have hindered subjects' ability to capitalize on sex of model cues. Another example of how the peer imitation design may have diminished sex of model effects is in the use of many different infants as peer models. Different subjects thus saw different examples of a same-sex or opposite-sex peer. The individual differences in behavior from one model to another may have overwhelmed any group sex differences. Also, the exclusively neutral objects used as stimuli may also have diminished the salience of sex of model. No sex differences in subject's responses have been found in other experiments on the same age subjects using similar stimuli with a single adult male model (e.g., Meltzoff, 1985, 1988a, 1988b) or a single adult female model (Barnat, Klein, & Meltzoff, 1995).

Conclusions

As discussed earlier, sex of model has profound and increasing effects through childhood, especially when combined with gender-stereotyped toys (e.g., Bussey & Bandura, 1984; Perry & Bussey, 1979; Slaby & Frey, 1975). Yet almost no sex of model effects have been reported in children under 3 years (see Dunn & Kendrick, 1982, for imitation of same-sex older siblings by toddlers). However, toddlers are able to discriminate the gender of others, they prefer to play with gender-appropriate toys over gender-inappropriate toys, they prefer to play with same-sex peers than with opposite-sex peers, and they are able to use imitation in general as a powerful guide to behavior. With the wealth of information on the importance of the peer group in gender role development in slightly older children, it seems unlikely that the gender of peers has no effect on toddlers. The general consensus in the literature is that children must identify themselves

with same-sex peers before they will use them preferentially as models for behavior. However, the accepted evidence for the ability to identify one own's gender—either verbally labeling oneself or classifying oneself with same-sex others in sorting pictures—places this identification between 2 and 3 years of age. Thus toddlers (between 1 and 2 years of age) would not be expected to preferentially imitate same-sex others.

Research on affiliation, both in playmate choices and looking preferences, indicates that at some level toddlers may be recognizing their similarity to same-sex others. If they are capable of differentiating between "those who are more like me" versus "those who are less like me," then they are placing themselves into one gender group versus the other, again at some level. If they are recognizing themselves as more like one group versus another, then preferential same-sex imitation may be occurring.

The next chapter will present the preliminary research I undertook to adapt the techniques of the peer imitation experiments to investigate same-sex preferential imitation in toddlers.

Chapter II: Preliminary Research

Introduction

The steps in designing an experiment to elicit preferential same-sex imitation were: (a) to explore gender-stereotyped objects with toddlers and (b) to test how gender-stereotyped objects may influence both spontaneous play and imitation in brief laboratory sessions. It was also necessary to test whether toddlers at this age would imitate peer demonstrators on television, because the eventual goal was to use previously recorded demonstrations. Although Meltzoff (1988a) has shown that 14-month-old infants are able to imitate adults on television, McCall, Parke, and Kavanaugh (1977) used a different design and were less successful in finding imitation of children on television in 18-month-olds. The following four experiments were designed to assess: (a) preferences for gender-stereotyped objects, (b) imitation of actions on gender-stereotyped objects, (c) imitation of peer demonstrators on television, and (d) imitation of sequences of actions on gender-stereotyped and neutral objects. The subjects were 18- to 20-month-old toddlers, an age at which several different aspects of gender-related behavior such as toy preferences and same-sex peer preferences may be emerging (see Chapter 1).

Preliminary Study 1: Preferences for Gender-Stereotyped Objects

Method

Subjects. The subjects were twelve 18- to 20-month-old toddlers ($M = 19.3$ months, range = 17.7-20.5 months), who were part of a larger sample participating in a battery of tasks that will not be reported here. They were recruited from local newspaper birth announcements. The experimenter contacted parents by phone and informed them of the procedure and general purpose of the study. Parents who agreed for their children to participate then made a single half-hour appointment to visit the laboratory and in return were reimbursed for their parking expenses. The subjects were equal numbers of boys ($n = 6$) and girls ($n = 6$), and came from predominantly White, middle-class families.

Stimuli. The stimuli were 14 test objects, all purchased at area toy stores, and selected to fit adult standards of either female-stereotyped, neutral, and male-stereotyped toys. The 14 objects were ranked by 4 adults (2 females and 2 males) from most feminine to most masculine, and the following list is presented in order of the average ranking that each

received. The objects were: (a) a 9 cm long vinyl teen doll, (b) a 13 cm long vinyl baby doll, (c) a 6 cm long plastic baby bottle, (d) a 12.5 cm long plastic comb, (e) a 6 cm high plastic pitcher, (f) a 5 cm high plastic cup, (g) a 5 cm long plastic cat, (h) a 8 cm long plastic dog, (i) a 6 cm long x 6 cm high jumping toy with dice inside a plastic bubble, (j) a 9 cm long plastic wrench, (k) a 8 cm high Duplo™ plastic clown figure, (l) a 12.5 cm long plastic screwdriver, (m) a 8 cm long x 4 cm high truck, and (n) a 12 cm long action figure of a police officer. There was 100% agreement among all four rankers on the object they ranked as most feminine: the teen doll. The teen doll, the baby doll, and the baby bottle were placed in the top three for most feminine by all four rankers (with the baby doll and the baby bottle alternating in second and third place). All four rankers also agreed on the top two most masculine objects: the truck and the police officer action figure.

Test environment. All testing took place in a small room furnished with a rectangular table (1.20 x 0.76 m) covered in black contact paper, and two chairs, one on each of the long sides of the table (one for the experimenter and one for the subject and his or her parent). A camera (Burle camera with Comiscar 12.5 mm Television Lens) was positioned on the wall behind the experimenter's chair focused on the subject's chair. This camera was connected to a VCR (Panasonic GX4 AG-1950) and a character generator (to insert a time code in 0.03-s increments on each frame of the tape) in an observation room next door.

Procedure. The subjects were brought to the laboratory by their parents, and were first escorted to a playroom where they were free to play with toys while their parents filled out information and consent forms. The experimenter then explained the procedure to the parents and answered any questions. This took approximately 10 minutes. The subjects and their parents then accompanied the experimenter to the testing room. Subjects sat on a parent's lap across the table from the experimenter, and in an initial warm-up phase, took turns with rubber squeak toys for approximately 3 min to become comfortable with the experimenter and the room before starting the experiment.

After the warm-up, the experimenter placed a white plastic tray which contained all 14 stimuli on the table in front of the subject. Subjects were prompted to explore the stimuli with comments such as: "These are for you. Look at all these toys." The subjects were given a response period of 3 min to explore the stimuli, then the experimenter removed the

tray. Subjects were videotaped during their response period for later coding, during which an independent coder noted which objects each subject touched.

Results

There was a difference between the number of girls versus boys who touched two of the most feminine objects: the two dolls. All six of the girls touched both the dolls, compared to only one boy out of six who touched the baby doll. None of the boys touched the teen doll. A 2 x 2 contingency table comparing the number of girls to the number of boys who touched either doll found a significant difference, $p < .05$, Fisher's Exact Test. However, there was not a significant difference between boys and girls in touching either of the most masculine objects: the truck and the action figure, $p > .70$, Fisher's Exact Test. Four of the girls and four of the boys touched one or both of the most masculine objects.

The range of objects touched by subjects was computed by first assigning a rank from 1 to 14 for each object using the average ranking of the four adult raters. Then the subjects' lowest rank of object touched was subtracted from their highest rank of object touched, with 1 added to each score to include both endpoints. There was a marginal difference between boys and girls on the range of objects touched, $t(10) = 2.08$, $p < .07$, with girls ($M = 11.83$, $SD = 1.72$) touching a wider range of objects than boys ($M = 9.93$, $SD = 1.60$).

Discussion

The results indicated that although girls do not display an overt preference or avoidance of these gender-stereotyped objects in a brief encounter, boys may do so. In the 3 min response period, during which the subjects were encouraged to touch all the toys, none of the boys touched what adults perceived as a very feminine toy, the teen doll. Five out of six boys touched neither doll. This was not due to boys being more inhibited than girls about touching the toys in general: The number of different toys touched during the response period was approximately the same for boys ($M = 5.67$, $SD = 1.25$) as for girls ($M = 6.50$, $SD = 1.38$). A reanalysis of the range of objects touched excluding the data for the two dolls found that the range touched by boys ($M = 9.67$, $SD = 1.49$) is almost the same as the range touched by girls ($M = 10.17$, $SD = 0.90$).

The finding—that boys tended to avoid touching gender-inappropriate objects—is

consistent with the literature on early sex differences presented in Chapter 1. O'Brien et al. (1983) also found that 15- to 35-month-old boys played the least with a doll when given a range of gender-stereotyped and neutral toys. That this could be replicated in a 3-min laboratory procedure suggested that using gender-stereotyped objects, especially dolls, with imitation techniques may elicit differential responses from boys and girls. This led to the next study, which explored imitation of a target act with a feminine-stereotyped object, the baby doll.

Preliminary Study 2: Imitation of a Target Act with Gender-Stereotyped Objects

Method

Subjects. The subjects were forty-two 18- to 19-month-old toddlers ($M = 18.8$ months, range = 17.9 to 19.3 months), a different part of the larger sample participating in a battery of tasks that will not be reported here. They were recruited in the same manner as described for the previous study. The subjects were equal numbers of boys ($n = 21$) and girls ($n = 21$), and came from predominantly White, middle-class families.

Stimuli and test environment. The stimuli were the 13 cm long vinyl baby doll used in the previous study, and the 6 cm long plastic baby bottle. The target act demonstrated with the stimuli was to pick up the baby bottle and place the tip on the baby doll's mouth, as if feeding the baby. The testing environment was the same as described for the previous study.

Procedure. After the initial warm-up in the testing room (as described above), the experimenter placed the baby doll and the baby bottle on the table in front of the subject, and encouraged him or her to explore the stimuli by using neutral phrases such as, "These are for you to play with." The subject was given a 20-s response period with the stimuli, after which they were removed. This first response period was designed to assess the baseline rate of spontaneous production of the target act of placing the baby bottle on the doll's mouth. The experimenter noted whether or not the subject performed the target act. If not, the experimenter demonstrated it for the subject and returned the objects for a second 20-s response period. This second response period assessed the imitative rate of production of the target act, for those subjects who had not previously performed it. Subjects were videotaped during the entire procedure. An independent coder later scored

whether or not subjects produced the target act during each response period.

Results

In the initial baseline period, 14 of the 21 girls (67%) performed the target act of feeding the baby doll with the bottle, versus 3 of the 21 boys (14%). This difference is significant, $\chi^2(1, N = 42) = 11.96, p < .001$. However, the difference between girls and boys in the second response period was not significant: 6 of the 7 girls who observed a demonstration performed the target act (86%), and 15 of the 18 boys who observed a demonstration produced the target act (83%).

Discussion

In this test of imitation with gender-stereotyped objects, there was a clear and large sex difference in the baseline rate of producing the target act. Two-thirds of the girls produced the target act spontaneously, compared to less than one-fifth of the boys. This finding suggested that gender-stereotyped objects could be useful in eliciting sex differences in certain kinds of behavior at this age.

The target act of feeding a baby with a bottle can be defined as an other-referenced act or an act of passive-other agent use in the terminology of pretend play or symbolic play research (Fein, 1981; Watson & Fischer, 1977). Many of the researchers investigating developmental trends in pretend play use dolls as stimuli to elicit behavior. Fein discussed sex differences in her 1981 review of pretend play research, reporting that several studies that examined play with dolls found that girls demonstrated other-referenced behavior at a marginally earlier age than boys. One example of this is an observational study by Lowe (1977) which reported that girls in a 12- to 36-month-old age range tended to be ahead of boys in doll-related activities such as feeding a doll or combing a doll's hair. Lowe found no differences in activities that were not doll-related. Another example comes from Fenson (1984), who found that 20- to 31-month-old girls had a higher mean than boys on one measure of pretend play (the production of "multischeme combinations"), but showed no difference on several others. Other researchers have found no sex differences (e.g., Belsky & Most, 1981; Watson & Fischer, 1977). Researchers such as Watson and Fischer often use adult modeling to elicit pretend play behaviors, which may be why they report mixed results on sex differences. Very young children consistently use adults, both male

and female, as models for behavior. Although a boy may not think of feeding a doll on his own, he may be just as likely as a girl to imitate an adult doing so. Thus a sex difference in spontaneous behavior may not be replicated in elicited imitative behavior.

In this experiment, no sex differences were found in rates of imitation. Both boys and girls readily produced the target act of feeding a baby with a bottle after observing a demonstration. Again, the use of an adult model to demonstrate the target act may be the reason why there were no differences in imitative responses. As mentioned in Chapter 1, there are no reported findings of preferential same-sex imitation of adults in subjects under 30 months.

The next step in preliminary research was an attempt to use peer demonstrators to elicit differential imitation. In order to use peer demonstrators for this research, however, individual variation across demonstrations should be controlled, so that all subjects observing girls see the same "girl behavior" and all subjects observing boys see the same "boy behavior." This necessitated the use of videotaped demonstrations. The following study explored the amount of imitation that subjects would produce after viewing a videotaped peer demonstration, as well as comparing viewing same-sex models versus opposite-sex models with additional gender-stereotyped and neutral objects.

Preliminary Study 3: Imitation of Peer Demonstrators on Television

Method

Subjects. Subjects were twenty-eight 18- to 20-month-old toddlers ($M = 19.3$ months, range = 17.6 - 19.8 months). They were recruited in the same manner as described for the previous studies. The subjects were equal numbers of boys ($n = 14$) and girls ($n = 14$), and came from predominantly White, middle-class families. Subjects were randomly assigned to participate in either the same-sex model condition ($n = 14$) or the opposite-sex model condition ($n = 14$).

Stimuli. The stimuli were three neutral objects (used in previous imitation studies from this laboratory, e.g., Hanna & Meltzoff, 1993; Meltzoff, in press) and two gender-stereotyped objects, one masculine and one feminine. The first neutral object was a collapsible cup: a blue plastic camping cup (7.6 cm high x 6.3 cm diameter at the base) made from a set of five graduated rings so that it could be collapsed by pushing down on

the top ring. The target act demonstrated was to collapse the cup by pushing down on the top.

The second neutral object was the pull-apart toy: a pull-apart toy made from two small unpainted wooden cubes (2.5 cm) connected to two lengths of white plastic tubing, one hollow and the other solid. The solid tube fit into the hollow tube so that the two pieces could be put together to form one dumbbell-shaped object (12.5 cm long). The target act demonstrated was to pull the object apart.

The third neutral object was the buzzer: a black box (5.4 x 15 x 16.5 cm) with a buzzer hidden inside. The box was sloped so that subjects could view a small hole (1.5 cm in diameter) in the top surface. The target act demonstrated was to activate the buzzer by poking a finger through the hole.

The masculine-stereotyped object was a train: a Fisher-Price green plastic train engine (3.9 cm high x 7.3 long) with a 2.1 cm diameter circular depression in the middle into which a figure could be placed. This was presented with a Fisher-Price green plastic figure of a girl (4.5 cm high and 1.9 cm diameter at the base). The target act demonstrated was to insert the figure into the train.

The feminine-stereotyped object was a doll: a 16 cm long vinyl baby doll, similar to the one used in the previous studies. This was presented with a 9 cm long plastic baby bottle. The target act demonstrated was to place the tip of the bottle on the doll's mouth as if feeding the baby (the same as in the previous study).

Test environment. The testing room was the same as described above, with the addition of a metal cart with two shelves diagonal to the end of the table, which held a television (RCA Colortrak 2000 20 inch) and VCR (Panasonic GX4 AG-1950).

Procedure. After the arrival and the warm-up as described above, the experimenter placed each test object on the table in front of the subject, one at a time for 20 s each. The experimenter encouraged the subject to explore the objects by phrases such as, "These are for you to play with." This initial period with the objects assessed the spontaneous baseline rate of production of the target acts.

After the subject had been given a response period with all the objects, the experimenter turned on the television and VCR and began playing a videotape. The videotape contained

a demonstration by either one girl or one boy toddler (both aged 18 months), who had previously been videotaped while performing the five target acts on the objects. Female subjects in the same-sex model condition ($n = 7$) and male subjects in the opposite-sex model condition ($n = 7$) were shown the girl's videotape. Female subjects in the opposite-sex model condition ($n = 7$) and male subjects in the same-sex model condition ($n = 7$) were shown the boy's videotape.

The experimenter had edited the tapes by selecting the best performance of each target act and copying the selected tape segment three times, so that subjects would observe three exemplars of each target act. Between target acts on different objects the tape faded to black for a one-s interval. The total demonstration of all five target acts on each edited videotape (one of the girl and one of the boy) had a duration of approximately 1 min.

After the videotape demonstration, the subjects were again given the test objects one at a time for 20 s each. The objects were presented in the order of their demonstration. This second period with the test objects was designed to assess subjects' imitation of the target acts that they had observed. Subjects were videotaped for later scoring, during which an independent coder (who was unaware of which model the subjects had observed) scored whether or not subjects produced each target act for all response periods.

Results

There was a significant difference between the baseline and the imitation test in the number of target acts produced, $t(27) = 6.62$, $p < .001$. In the initial response period, subjects produced a mean of 2.11 ($SD = 1.32$) out of the 5 target acts spontaneously, compared to 3.57 ($SD = 1.26$) in the second response period after observing the videotape demonstrations. Sign tests comparing the first and second response periods on each test object found significantly more target acts produced after observing the demonstration on the collapsible cup, the pull-apart toy, and the train, $p_s < .05$. The number of subjects producing each target act before and after the demonstration are presented in Table 1.

A 2 (experimental condition: same-sex model/opposite-sex model) x 2 (sex of subject) x 2 (response period: baseline/imitation) repeated-measures ANOVA (response period as the repeated measure) was conducted on the total number of target acts produced. There was a significant main effect for response period, $F(1,24) = 41.34$, $p < .001$, again

Table 1

Imitation of Peer Demonstrators on Television: Number of Subjects in Each Response Period Who Produced the Target Acts for Each Test Object (N = 28)

Response period	Test objects				
	Cup	Pull	Buzzer	Doll	Train
Baseline	5	11	8	17	18
Imitation	18	23	12	22	25

indicating that subjects produced more target acts after observing the demonstration videotape than before. There was no main effect of experimental condition, $F < 1.0$, and no interactions of other variables with experimental condition, $F_s < 1.5$, indicating that subjects' responses did not vary as a function of whether they observed a same-sex model or an opposite-sex model. However, there was a significant main effect for sex of subject, $F(1, 24) = 6.54$, $p < .05$. There was a higher mean production of target acts in both response periods by girls than by boys. (The means for both boys and girls are presented in Table 2.) This difference is fully accounted for by sex differences in response to one stimulus, the doll and bottle combination. For the girls, 85%, or 12 out of the 14, produced the target act of feeding the bottle to the baby doll in the initial response period, compared to 36%, or 5 out of the 14 boys. This difference is significant, $\chi^2(1, N = 28) = 7.34$, $p < .01$. (The most likely reason why these percentages are higher for both boys and girls in this study than in the previous study is the change to a larger baby and bottle.) In the second response period, 13 of the 14 girls (93%) produced the target act, compared to 9 of the 14 boys (64%), which is not significantly different. None of the other analyses on individual test objects yielded a sex difference.

Table 2

Imitation of Peer Demonstrators on Television: Means and Standard Deviations for Total Number of Target Acts Produced in Each Response Period

Response period	Sex of subject			
	Boys (<u>n</u> = 14)		Girls (<u>n</u> = 14)	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Baseline	1.57	1.40	2.64	1.01
Imitation	3.07	1.38	4.07	0.92

Note. Maximum score = 5.

Discussion

The results show that toddlers can imitate another toddler on a television screen, even with a brief demonstration. However, observing a same-sex peer model versus an opposite-sex peer model did not elicit differential imitation. This may be explained by two reasons. First, observing a single peer model may not elicit preferential same-sex imitation because it does not emphasize the group membership of the model. In this view, the subject would need to see a series of models, all of the same sex, to be influenced by the gender category of the demonstration (Bandura, 1986; Perry & Bussey, 1979; see also Meltzoff & Moore, 1992, for a discussion of the use of multiple exemplars in a study of facial imitation by very young infants). Thus multiple models of each sex were used for the major study described in the next Chapter. Second, the high baseline rates on both of the gender-stereotyped objects may have dampened preferential same-sex imitation effects. The target act on the doll was produced in baseline by 61% of all subjects, and the target act on the train was produced by 64% of all subjects (see Table 1 to compare to the neutral

objects). This high performance in baseline leaves little room for improvement after observing a demonstration, and even less room for influences from the different sexes of the models. Although the neutral objects did not have high baseline rates of production of target acts, they had not been found to elicit preferential same-sex imitation in previous research.

The three target acts produced by significantly more subjects in this study after observing the videotape demonstration were: collapsing the cup, pulling apart the pull-apart toy, and placing the figure in the train. These target acts and their test objects were included in the final design for the major study. Feeding the baby with the bottle had a high baseline rate for girls, which is a likely reason for the lack of a significant improvement in the imitation rate. Thus further research was needed to find target acts with the baby doll that would have a lower baseline rate. The buzzer was the other test object that did not elicit an improvement in production of the target act after the demonstration. Because it seemed that the toddlers had difficulty perceiving the target act on the buzzer on the television screen (possibly because of the black color and the design of a button hidden inside a hole) the buzzer was not included as a test object in the major study.

The final study discussed in this chapter tested additional gender-stereotyped objects in order to have two in each category: neutral (the collapsible cup and the pull-apart toy described above), female-stereotyped, and male stereotyped. Also, because all the gender-stereotyped objects were presented as sets of at least two objects (e.g., the baby doll and the bottle) additional objects needed to be added to each neutral object to make the presentations more comparable (so that all presentations were of sets of objects instead of some sets and some individual objects). Once additional objects were added to the neutral objects, each set then had two target acts that could be performed upon it in a particular sequence (e.g., adding a small wooden cube to be presented with the collapsible cup created the sequence of first dropping the cube into the cup and then collapsing the cup). Additional target acts needed to be created for the gender-stereotyped objects as well. The following study was designed to compare baseline and imitation rates of production of sequences of target acts on sets of neutral and gender-stereotyped stimuli.

Preliminary Study 4: Imitation of Sequences of Actions on
Gender-Stereotyped and Neutral Objects

Method

Subjects. Subjects were thirteen 18- to 20-month-old toddlers. They were recruited in the same manner as described for the previous studies. There were 5 boys and 8 girls, and they came from predominantly White, middle-class families.

Stimuli and test environment. The stimuli used for this research were six sets of test objects: the hammer set (a hammer, a block, and a peg), the train set (the train, a figure, and a piece of track), the doll set (the baby doll, a towel, and a washcloth), the tea set (a pitcher, a cup, and a spoon), the collapsible cup set (the cup and a small wooden cube), and the pull-apart toy set (the pull-apart toy and a large spool). These test objects and the associated target acts are described in detail in the next Chapter, and shown in Figure 2 in the next Chapter. The testing room was the same as described above.

Procedure. After the arrival and the warm-up as described above, the experimenter placed each set of test objects on the table in front of the subject, one at a time for 20 s each. This initial response period was designed to assess the spontaneous production of target sequences by subjects. After the subject had been given all six sets of test objects, the experimenter demonstrated the target sequence for each set of test objects (for example, the target sequence for the hammer set was to first place the peg in a hole in the block and then hammer on the peg). Then the experimenter returned the sets to the subject, one at a time in the order of their demonstration, for 20 s each. This second response period was designed to assess the imitative rate of production of the target sequences. During all response periods, the experimenter noted whether or not the subjects produced the target sequences.

Results and Discussion

Subjects produced almost none of the six target sequences (with a target sequence being both of the target acts associated with a set of test objects) in the initial baseline response period ($M = 0.15$, $SD = 0.56$), and then produced a majority of the six sequences in the second response period after observing the demonstration ($M = 4.38$, $SD = 1.33$). This difference is significant, $t(12) = 10.30$, $p < .001$. For each set of test objects, the number

of subjects who produced the target sequence in the baseline period was 1 at the most (out of 13 subjects). After observing the demonstration, the number of subjects producing the target sequence ranged from 6 to 11. The lowest number was for the doll set, on which 6 out of 8 girls produced the target sequence versus 0 out of 5 boys, $p < .05$, Fisher's Exact Test, two-tailed.

The added complexity of these target sequences succeeded in reducing the baseline rates of production, and yet they were still easily imitated after observing a live adult experimenter. The only set not to achieve an imitative rate of at least 75% overall was the doll set, as a result of the fact that none of the boys produced the target sequence on the doll set. This is in accordance with the results of the other preliminary studies—every one of the four studies has reported a differential response to a doll from boys compared to girls. But because the doll set sequence was imitated at a rate of 75% by the girl subjects, it did seem to be within the capabilities of toddlers this age.

Summary

These four preliminary studies had several significant findings. In terms of designing the procedure and stimuli to be used in the major study, these preliminary studies demonstrated the viability of using both gender-stereotyped stimuli and videotaped peer demonstrations in an imitation paradigm.

Preliminary Study 1 found that boys and girls responded differently to an array of gender-stereotyped and neutral objects, with boys seeming to avoid dolls. Preliminary Study 2 found a distinctive difference in the initial response to a baby doll and bottle from boys versus girls. The majority of the girls spontaneously "fed" the baby doll with the bottle, compared to almost none of the boys. However, boys were then induced to change their behavior upon observing a model, with the majority of the boys feeding the baby doll after observing the experimenter do so. Preliminary Study 3 replicated the baseline response to the baby doll and bottle, again with significantly less of the boys spontaneously feeding the baby. An analysis of the combined data from the first response periods of both Study 2 and Study 3 found a highly significant difference between boys and girls on feeding the baby, $\chi^2(1, N = 70) = 18.53, p < .0001$. Across both studies, 74% of the girls

produced the target act, compared to 23% of the boys.

The differential responses to toys such as the dolls and trucks tested in Study 1 has been found in toddlers by other researchers (Fein et al., 1975; O'Brien & Huston, 1985; O'Brien et al., 1983). In addition, there is some evidence in the pretend play literature that girls and boys may spontaneously perform different actions with objects such as dolls (Fein, 1981). Also, two studies that compared behavior with feminine-stereotyped toys and masculine-stereotyped toys have reported similar data. O'Brien et al. found that boys aged 15 to 35 months spent just as much time with a dollhouse as girls, but the boys almost always played with the dollhouse along with tools, as if "fixing" the house (while girls did not). Fein et al. tested imitation of actions on gender-stereotyped objects with 20-month-old toddlers, and found that both boys and girls imitated more actions with gender-appropriate toys than neutral or inappropriate toys, particularly putting a bracelet on the wrist for girls, and pretending to shoot a gun for boys. The results of Preliminary Studies 2 and 3—that boys and girls may behave differently even when playing with the same objects—are consistent with this literature.

Preliminary Study 3 also replicated the finding from Preliminary Study 2 that boys are influenced to change their behavior with the doll after observing a model, in this case after observing a peer model on a television screen. In both Study 2 and Study 3, there were no sex differences between boys and girls on the number of subjects who produced the target act of feeding the baby doll with the bottle, out of those who had not previously done so. Across the two studies, 78% of the girls and 70% of the boys imitated feeding the baby. This is a strong indication of the influence of modeled behavior with gender-stereotyped objects.

Preliminary Study 3 established that 18- to 20-month-old toddlers can remember and imitate the behavior of another toddler on a television screen. Due to the limited research on imitation of specific target acts demonstrated by peers on videotape, this finding was important, and especially so in order to proceed with a multiple model design. Preliminary Study 4 established six sets of test objects that could be classified as gender-stereotyped or neutral, and which elicited low baseline rates of production of target acts, and high imitative rates. These four studies combined built the foundation for the major study.

Chapter III: Method

Introduction

The general design of this research was to present 18- and 24-month-old subjects with multiple models of one sex or the other demonstrating target acts on sets of test objects of a clearly gender-stereotyped or neutral category. The test objects chosen as stimuli were easily classified by adults as stereotypically masculine, feminine, or neutral (e.g., a hammer, a doll, or a cube). The toddler models chosen to demonstrate target acts on these test objects were readily identified by adults as male or female. Subjects observed multiple models—they were shown three models of the same sex each performing the same target acts on the same sets of test objects. In order to underscore the gender-related information of the demonstrations, test object sets from the same gender-stereotyped category were always presented sequentially, and then tested sequentially, before moving to a different category. The details of the following sections will clarify how the test objects, the videotape demonstrations, and the experimental procedure combined to test imitation of same-sex versus opposite-sex models.

Subjects

The subjects were sixty 18-month-old ($M = 17.98$ months, $SD = 0.16$, range = 17.70-18.23) and sixty 24-month-old toddlers ($M = 24.02$ months, $SD = 0.14$, range = 23.73-24.30), recruited from local newspaper birth announcements. The experimenters contacted parents by phone and informed them of the procedure and general purpose of the study, without divulging the gender-stereotyped aspects so as not to encourage parents to train their children in these distinctions. Parents who agreed for their children to participate then made a single half-hour appointment to visit the laboratory within one week of their child's 18- or 24-month birthday and were reimbursed for their parking expenses. The subjects were equal numbers of boys ($n = 30$) and girls ($n = 30$) at each age, and came from primarily White (115 of the subjects were White, 5 were Asian) and middle- to upper-middle-class families. An additional 18 toddlers participated in the experiment, but were eliminated from the final analysis: 3 for being too shy to play with the objects, 3 for being too active to watch the videotaped demonstration, 2 for being distressed, 1 for parent's interference, and 9 for experimenter error.

Test Environment

The testing room layout is pictured in Figure 1. All testing took place in a small room furnished with a rectangular table (1.20 x 0.76 m) covered in black contact paper, and two chairs. A metal cart diagonal to the end of the table held a television (RCA Colortrak 2000 20 inch) and VCR (Panasonic GX4 AG-1950). A camera (Burle camera with Comiscar 12.5 mm Television Lens) was positioned on the wall behind the experimenter's chair focused on the subject. This camera was connected to a VCR (Panasonic GX4 AG-1950) and a character generator (to insert a time code in 0.03-s increments on each frame of the tape) in an observation room next door.

Stimuli

Test Objects

In the pilot research with 18- to 20-month-old toddlers described in the previous chapter, six sets of test objects that fit adult categories of gender-stereotyped or neutral toys were successfully used in testing imitation of target acts. Two sets fit a masculine category: the hammer set and the train set. Two sets fit a feminine category: the doll set and the tea set. Two sets fit a neutral category: the collapsible cup set and the pull-apart toy set. All six sets of test objects are portrayed in Figure 2.

Hammer set. The hammer set contained a 12.4 cm long plastic hammer, with an orange handle and a purple head. This was presented with a square wooden block (8.7 x 3.8 cm high) with a round hole cut out of the center (2.7 cm diameter), and a 1/2 inch PVC pipe end (4.3 cm long) that could be inserted like a peg into the hole of the block. The target acts demonstrated were inserting the PVC peg into the hole of the block, and tapping several times on the peg with the hammer.

Train set. The train set contained a Fisher-Price green plastic train engine (7.3 x 3.9 cm high) with a 2.1 cm diameter hole in the middle in which a figure could be placed. This was presented with a Fisher-Price green plastic figure of a man with a train engineer's cap (5.5 cm high and 1.9 cm diameter at the base), and a piece of straight unpainted wooden train track (14.6 x 4.0 cm wide). The target acts demonstrated were to insert the figure into the train and place the figure-and-train combination on top of the track.

Doll set. The doll set contained a vinyl baby doll (15.8 x 3.5 cm wide) without clothes,

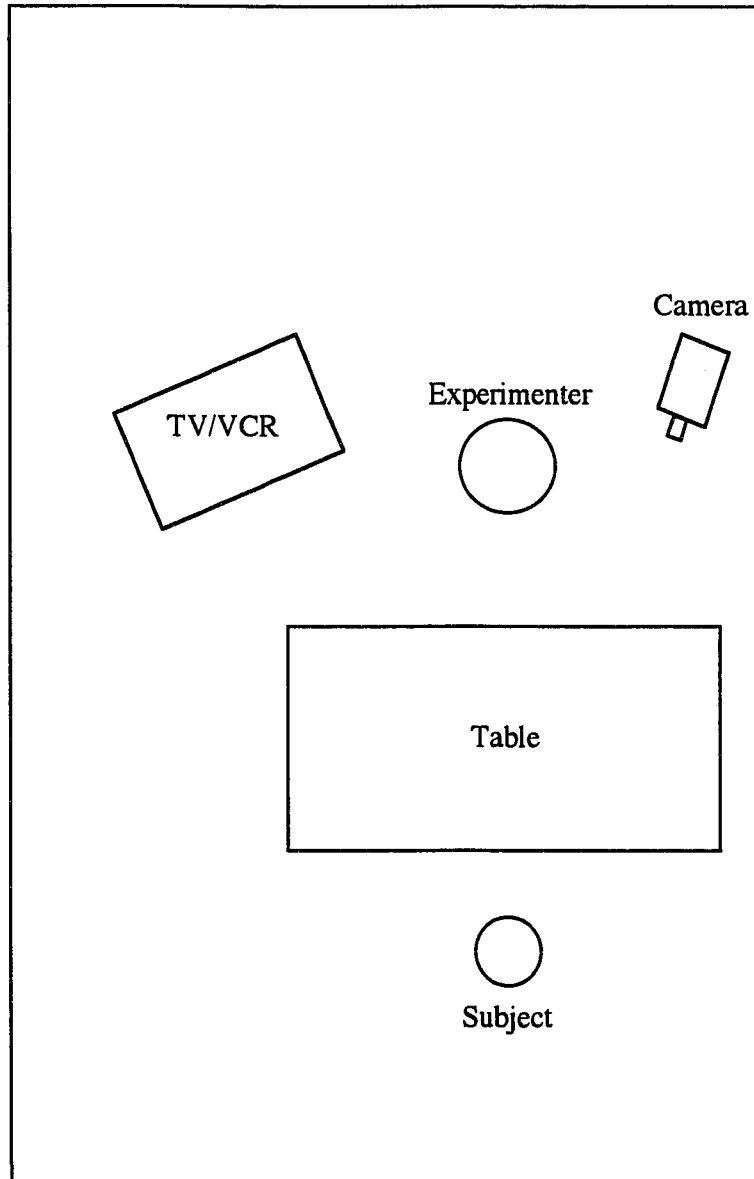


Figure 1. Layout of test room, showing placement of subject, experimenter, and television. (Scale: 5 cm = 1 m).

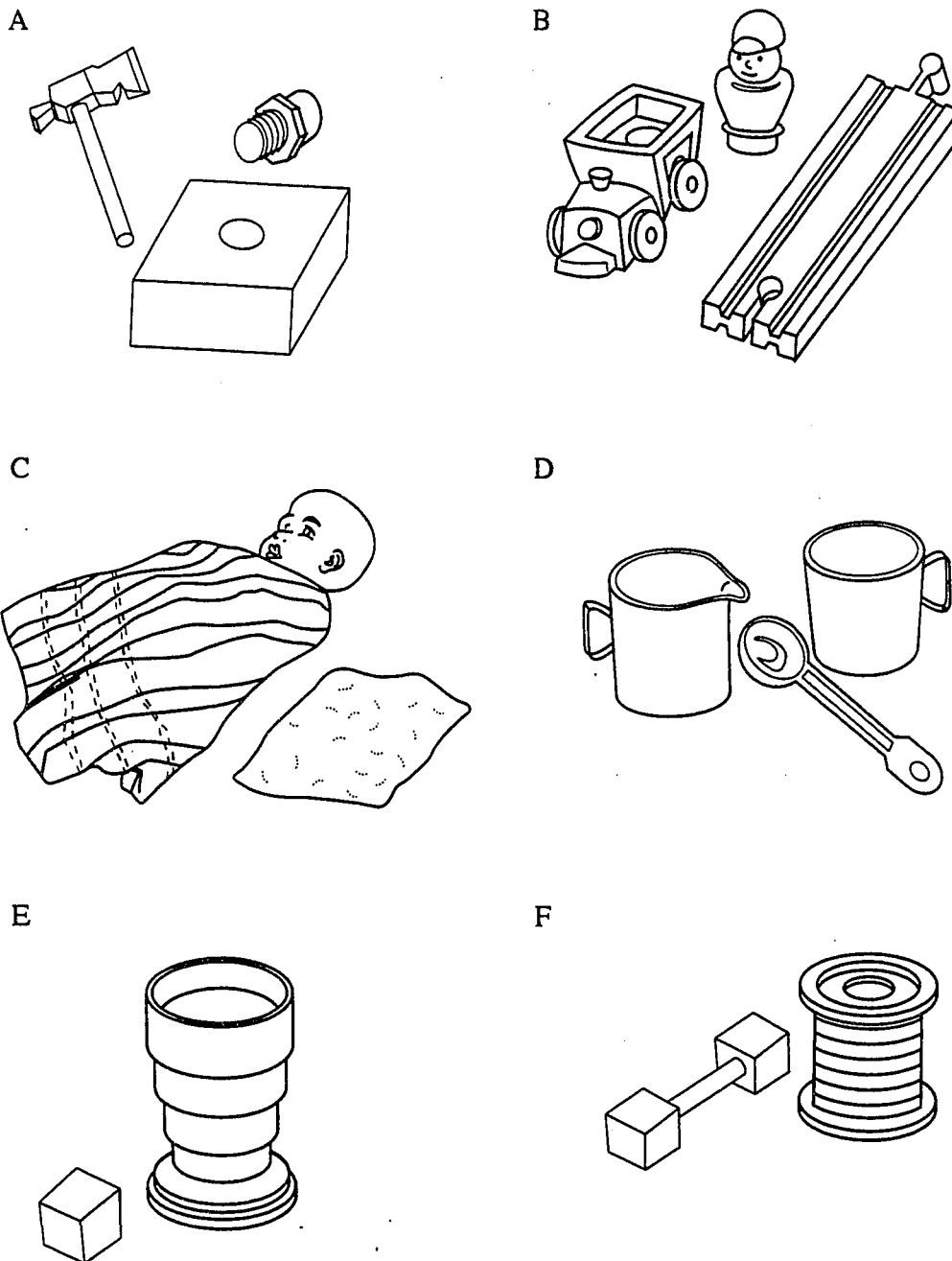


Figure 2. The six sets of test objects used as stimuli: A. The hammer with peg and block. B. The train engine with driver and track. C. The baby doll with blanket and washcloth. D. The tea set with pitcher, cup, and spoon. E. The collapsible cup with cube. F. The pull-apart toy with spool.

swaddled in a cotton pink-and-white striped terrycloth washcloth (30 cm square). This was presented with another small rectangular piece of pink washcloth (9.3 x 6.0 cm). The target acts demonstrated were to unwrap the baby from the larger cloth and wipe either the face or the body of the baby with the smaller cloth.

Tea set. The tea set contained a yellow plastic pitcher with handle (5.7 cm high, 4.6 cm diameter at the top, 3.7 cm diameter at the base), a white plastic cup with handle (4.7 cm high, 4.6 cm diameter at the top, 3.9 cm diameter at the base), and a metal 1/2 teaspoon measuring spoon (10.2 cm long x 2.4 cm wide at the spoon end). The target acts demonstrated were to pick up the pitcher, turn it over above the cup as if pouring liquid into the cup, and then picking up the spoon and placing it into the cup as if to stir.

Collapsible cup set. The collapsible cup set contained a white plastic camping cup (7.6 cm high x 6.3 cm diameter at the base) made from a set of four graduated rings so that it could be collapsed by pushing down on the top ring. This was presented with a small unpainted wooden cube (2.3 cm on all sides). The target acts demonstrated were to pick up the cube, drop it into the cup, and then collapse the cup by pushing down on the top.

Pull-apart toy set. The pull-apart toy set contained a pull-apart toy made from two small unpainted wooden cubes (2.5 cm) connected to two lengths of white plastic tubing, one hollow with a 0.9 cm opening, the other solid with a 0.8 cm diameter. The solid tube fit into the hollow tube so that the two pieces could be put together to form one dumbbell-shaped object (12.5 cm long). This pull-apart toy was presented with a blue plastic spool (5.7 x 4.6 cm diameter) that was hollow in the middle. The target acts demonstrated were to pull apart the toy and insert one of the tube ends into the middle of the spool.

Demonstration Videotapes

The toddler models. During pilot research with 18-month-old toddlers, the experimenter chose certain toddlers for possible use in videotaped demonstrations on the basis of their imitative behavior and their physical characteristics. In order to maximize cues for detecting the sex of the model, girls were chosen who had long or curly hair and feminine features or mannerisms; boys were chosen who had short haircuts and masculine features or mannerisms. These toddlers were scheduled with their parents to return at a time convenient to them for videotaping.

Videotaping took place in a specially-furnished room, with bright lights and microphones in the room and cameras behind a one-way mirror (Sony DXC-327A Color Video Camera connected to Sony U-MATIC VO-5600 VCR, recording onto 3/4-inch videotape). The experimenter sat across a low table from the toddler, who sat in a small children's chair, and the toddler's parent sat at the end of the table. University media staff filmed the entire interaction between the experimenter and the toddler, which consisted of the experimenter demonstrating the target acts on the test objects, then giving the toddler several turns to perform them. The camera was focused to capture the closest possible shot of the toddler with the test objects, resulting in pictures containing the head and upper body of the toddler and approximately an arm's length of the table in front of him or her. The experimenter encouraged the toddler by praising and prompting, and if necessary demonstrated the acts several times to allow for the best possible demonstration to be filmed. Six boys and four girls were filmed in this situation, and their parents were given \$10 for participating.

The experimenter then selected the three girls and three boys who gave the best demonstrations on all six sets of test objects, and edited their videotapes to create the demonstration tapes. The mean age at time of videotaping for the three girl models was 18.9 months (range = 18.1-19.6). The mean age at time of videotaping for the three boy models was 18.6 months (range = 18.4-18.7). Images of all six models performing the second target act on the hammer set are shown in Figure 3.

Editing of models' videotapes into orders of presentation. The equipment used to edit the tapes consisted of two JVC CR-825OU video cassette recorders connected to a Convergence Corporation ECS-90 edit controller. The experimenter began creating one demonstration tape—the girls' tape—with the hammer set. The best performance from each of the three girls of the target acts on the hammer set (a still frame from the tape is shown in Figure 3) was copied onto the edited tape, and a one-s fade-in and fade-out added between each girl's demonstration. Thus the edited demonstration of the hammer set consisted of first Girl A, then Girl B, then Girl C, all placing the peg in the block and then hammering on top of the peg. The same editing was done for the train set, placing it next on the tape after the hammer set. Then the same was done for the two sets in the category

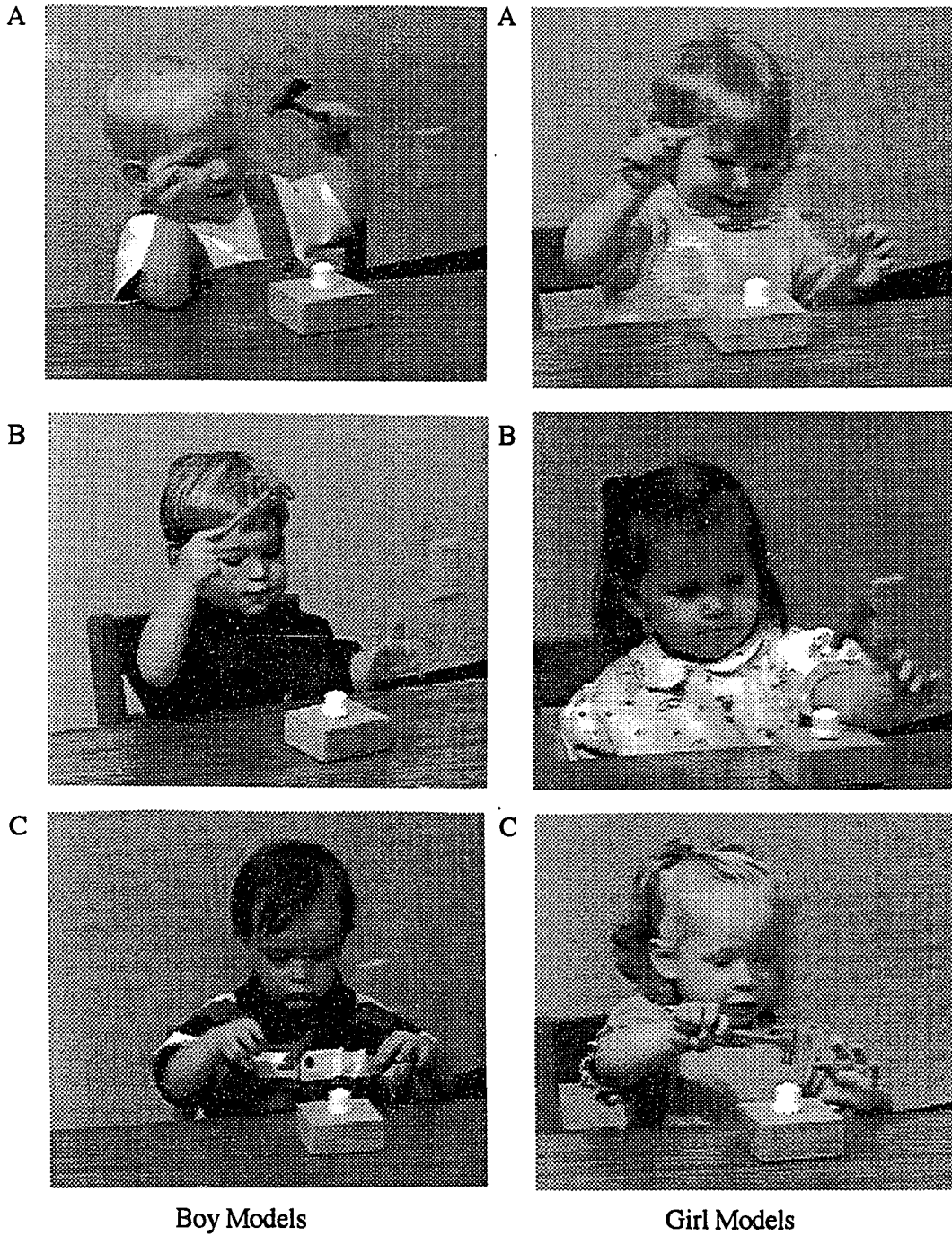


Figure 3. The six toddlers used as models, all performing the target act of hammering on the peg in the block.

of feminine-typed objects (the doll set and the tea set), and then for the neutral objects (the collapsible cup set and the pull-apart toy set). Three seconds of blank space were inserted between each of the six sets of test objects. The entire procedure was repeated on a separate tape for the boys' demonstrations. Each of the two resulting tapes, one with only girls' demonstrations and one with only boys' demonstrations, was then edited into 6 different orders of stimuli presentation. Using the same segments each time, the demonstrations of the two sets of test objects within each category (masculine, feminine, and neutral) were always placed together, alternating which category of test object was presented first, second, or third. Then within each category of test object, each set of test objects alternated being presented first or second. The different orders of presentation of the test objects and models for each videotape are listed in Tables 3 and 4.

The experimenter also edited the audio portion of the tape, removing any comments of the experimenter or parent that named the test objects or described the target acts, but kept in neutral comments, the sounds made by the acts on the test objects, and all vocalizations of the toddlers. Both the boys' and the girls' demonstration tapes were then transferred to 1/2-inch videotape to allow playback on a Panasonic GX4 AG-1950 video cassette recorder.

Duration of videotapes. The duration of the boys' demonstration of all 6 sets of test objects was 2 min, 37.07 s. The duration of their demonstration of the masculine test objects was 55.80 s, the feminine test objects 54.53 s, and the neutral test objects 40.73 s. The duration of their demonstration of the hammer set was 20.77 s, each model's demonstration ranging from 4.20 to 8.43 s. The train set had a duration of 32.03 s, each model's demonstration ranging from 7.53 to 12.87 s. The doll set had a duration of 21.23 s, each model's demonstration ranging from 5.00 to 7.50 s. The tea set had a duration of 30.30 s, each model's demonstration ranging from 7.00 to 11.10 s. The collapsible cup set had a duration of 18.27 s, each model's demonstration ranging from 4.67 to 6.67 s, and the pull-apart toy set had a duration of 19.47 s, each model's demonstration ranging from 5.23 to 6.60 s.

The duration of the girls' demonstration of all sets of test objects was 2 min, 41.83 s. The duration of their demonstration of the masculine test objects was 53.50 s, the feminine

Table 3

Boys' Demonstration Videotape: Orders of Stimuli Presentation

Order	Category	Set	Sequence of models	
Order 1	Neutral	Collapsible cup	Boy A, Boy B, Boy C	
	Masculine	Pull-apart toy	Boy C, Boy B, Boy A	
		Hammer	Boy B, Boy A, Boy C	
		Train	Boy C, Boy A, Boy B	
Feminine	Doll	Boy A, Boy C, Boy B		
	Tea	Boy B, Boy A, Boy C		
	Order 2	Neutral	Pull-apart toy	Boy C, Boy B, Boy A
		Masculine	Collapsible cup	Boy A, Boy B, Boy C
Train			Boy C, Boy A, Boy B	
Hammer			Boy B, Boy A, Boy C	
Feminine	Tea	Boy B, Boy A, Boy C		
	Doll	Boy A, Boy C, Boy B		
	Order 3	Masculine	Hammer	Boy B, Boy A, Boy C
Train			Boy C, Boy A, Boy B	
Feminine		Doll	Boy A, Boy C, Boy B	
		Tea	Boy B, Boy A, Boy C	
Neutral		Collapsible cup	Boy A, Boy B, Boy C	
		Pull-apart toy	Boy C, Boy B, Boy A	
Order 4	Masculine	Train	Boy C, Boy A, Boy B	
		Hammer	Boy B, Boy A, Boy C	
	Feminine	Tea	Boy B, Boy A, Boy C	
		Doll	Boy A, Boy C, Boy B	
	Neutral	Pull-apart toy	Boy C, Boy B, Boy A	
		Collapsible cup	Boy A, Boy B, Boy C	
Order 5	Feminine	Doll	Boy A, Boy C, Boy B	
		Tea	Boy B, Boy A, Boy C	
	Neutral	Collapsible cup	Boy A, Boy B, Boy C	
		Pull-apart toy	Boy C, Boy B, Boy A	
	Masculine	Hammer	Boy B, Boy A, Boy C	
		Train	Boy C, Boy A, Boy B	
Order 6	Feminine	Tea	Boy B, Boy A, Boy C	
		Doll	Boy A, Boy C, Boy B	
	Neutral	Pull-apart toy	Boy C, Boy B, Boy A	
		Collapsible cup	Boy A, Boy B, Boy C	
	Masculine	Train	Boy C, Boy A, Boy B	
		Hammer	Boy B, Boy A, Boy C	

Table 4

Girls' Demonstration Videotape: Orders of Stimuli Presentation

Order	Category	Set	Sequence of models
Order 1	Neutral	Collapsible cup	Girl A, Girl B, Girl C
		Pull-apart toy	Girl B, Girl A, Girl C
	Masculine	Hammer	Girl C, Girl A, Girl B
		Train	Girl A, Girl C, Girl B
	Feminine	Doll	Girl C, Girl B, Girl A
		Tea	Girl B, Girl C, Girl A
Order 2	Neutral	Pull-apart toy	Girl B, Girl A, Girl C
		Collapsible cup	Girl A, Girl B, Girl C
	Masculine	Train	Girl A, Girl C, Girl B
		Hammer	Girl C, Girl A, Girl B
	Feminine	Tea	Girl B, Girl C, Girl A
		Doll	Girl C, Girl B, Girl A
Order 3	Masculine	Hammer	Girl C, Girl A, Girl B
		Train	Girl A, Girl C, Girl B
	Feminine	Doll	Girl C, Girl B, Girl A
		Tea	Girl B, Girl C, Girl A
	Neutral	Collapsible cup	Girl A, Girl B, Girl C
		Pull-apart toy	Girl B, Girl A, Girl C
Order 4	Masculine	Train	Girl A, Girl C, Girl B
		Hammer	Girl C, Girl A, Girl B
	Feminine	Tea	Girl B, Girl C, Girl A
		Doll	Girl C, Girl B, Girl A
	Neutral	Pull-apart toy	Girl B, Girl A, Girl C
		Collapsible cup	Girl A, Girl B, Girl C
Order 5	Feminine	Doll	Girl C, Girl B, Girl A
		Tea	Girl B, Girl C, Girl A
	Neutral	Collapsible cup	Girl A, Girl B, Girl C
		Pull-apart toy	Girl B, Girl A, Girl C
	Masculine	Hammer	Girl C, Girl A, Girl B
		Train	Girl A, Girl C, Girl B
Order 6	Feminine	Tea	Girl B, Girl C, Girl A
		Doll	Girl C, Girl B, Girl A
	Neutral	Pull-apart toy	Girl B, Girl A, Girl C
		Collapsible cup	Girl A, Girl B, Girl C
	Masculine	Train	Girl A, Girl C, Girl B
		Hammer	Girl C, Girl A, Girl B

test objects 67.50 s, and the neutral test objects 34.83 s. The duration of their demonstration of the hammer set was 22.20 s, each model's demonstration ranging from 5.63 to 8.67 s. The train set had a duration of 28.30 s, each model's demonstration ranging from 5.03 to 10.77 s. The doll set had a duration of 34.40 s, each model's demonstration ranging from 3.80 to 17.53 s. The tea set had a duration of 30.10 s, each model's demonstration ranging from 6.63 to 13.60 s. The collapsible cup set had a duration of 15.43 s, each model's demonstration ranging from 4.03 to 5.20 s, and the pull-apart toy set had a duration of 16.40 s, each model's demonstration ranging from 4.47 to 5.37 s.

On both the boys' and the girls' demonstration tapes, the tape faded to black for a one-s interlude between each model's demonstration on a single set of test objects. Between each set of test objects the tape was black for a 3-s interlude.

Design and Procedure

Assignment of Subjects to Conditions

The counterbalancing of subjects across experimental conditions and orders of presentation of the stimuli is demonstrated in Figure 4. The subjects were either 18 months old ($n = 60$) or 24 months old ($n = 60$). Within each age, subjects were randomly assigned to either the experimental conditions ($n = 24$) or the baseline control condition ($n = 12$). Equal numbers of boys and girls participated in all conditions. Subjects in the experimental conditions were randomly assigned to one of two conditions: observing same-sex models (observing the girls' demonstration videotape if the subject was a girl, or observing the boys' demonstration tape if the subject was a boy) or observing opposite-sex models (vice versa). They were also randomly assigned to one of two female experimenters, and to one of six orders of presentation of the stimuli (2 sexes x 2 conditions x 2 experimenters x 6 orders = 48 subjects). Subjects in the baseline control condition were randomly assigned to one of the six orders of presentation (2 sexes x 6 orders = 12 subjects) and were evenly distributed across the two experimenters.

Experimental Procedure

Introduction and warm-up. The subjects were brought to the laboratory by their parents, and were first escorted to a playroom where they were free to play with toys while

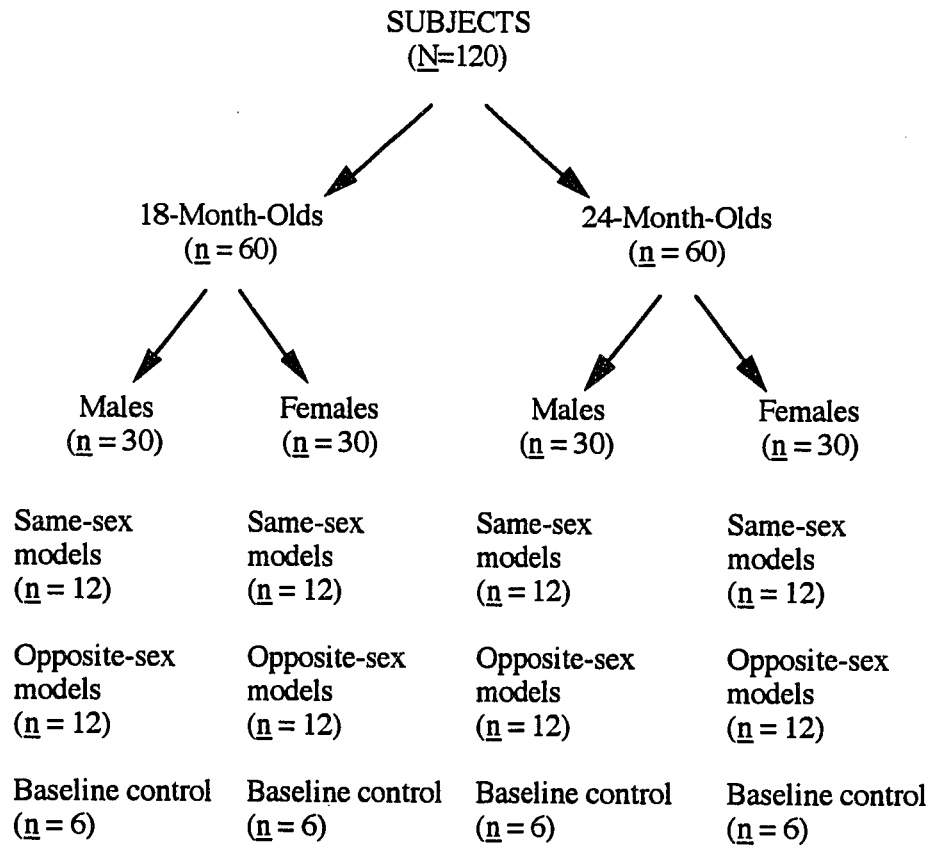


Figure 4. A chart showing the assignment of subjects to conditions.

their parents filled out information and consent forms. The experimenter then explained the procedure to the parents and answered any questions. This took approximately 10 minutes. The subjects and their parents then accompanied the experimenter to the testing room. Subjects sat on a parent's lap across the table from the experimenter, and in the initial warm-up phase, took turns with rubber squeak toys for approximately 3 min to become comfortable with the experimenter and the room before starting the experiment.

Experimental conditions: stimuli presentation. The procedure for subjects is presented in Figure 5. For subjects in the experimental conditions ($n = 96$), the experimenter began the stimulus presentation by turning on the VCR and instructing the subject to watch the TV screen. The VCR was preset to begin one of the videotaped demonstrations (either the boys' or the girls'). In order to underscore the gender-stereotyped categories of test objects, the two sets of test objects within each category were always demonstrated sequentially, and then tested sequentially, before presenting a different category. Thus the experimenter let the tape play through demonstrations of one category of gender-stereotyped objects (e.g., for the masculine category, the hammer set and the train set), and prompted the subject to continue watching the screen during these two displays. Then the experimenter stopped the tape (putting it in a "pause" mode on a black part of the tape) and presented the subject with the first set of test objects they had just observed being demonstrated (e.g., the hammer set). The subjects had a 20-s response period with the set of test objects, then the experimenter requested their return. The experimenter immediately gave the subject the second set of test objects (e.g., the train set), also for a 20-s response period. After the second set of test objects had been put away, the experimenter resumed playing the videotape through the demonstrations of another particular category of gender-stereotyped objects (e.g., for the feminine category, the doll set and the tea set). After watching the demonstrations for this category, the subject was again given each of the two sets of test objects for 20 s each (e.g., the doll set and then the tea set). Then the subject was shown the demonstrations of the last category of test objects (e.g., for the neutral category, the collapsible cup set and the pull-apart toy set), and was given each of those sets for 20 s each.

After the last test objects were put away, the experimenter rewound the tape and paused

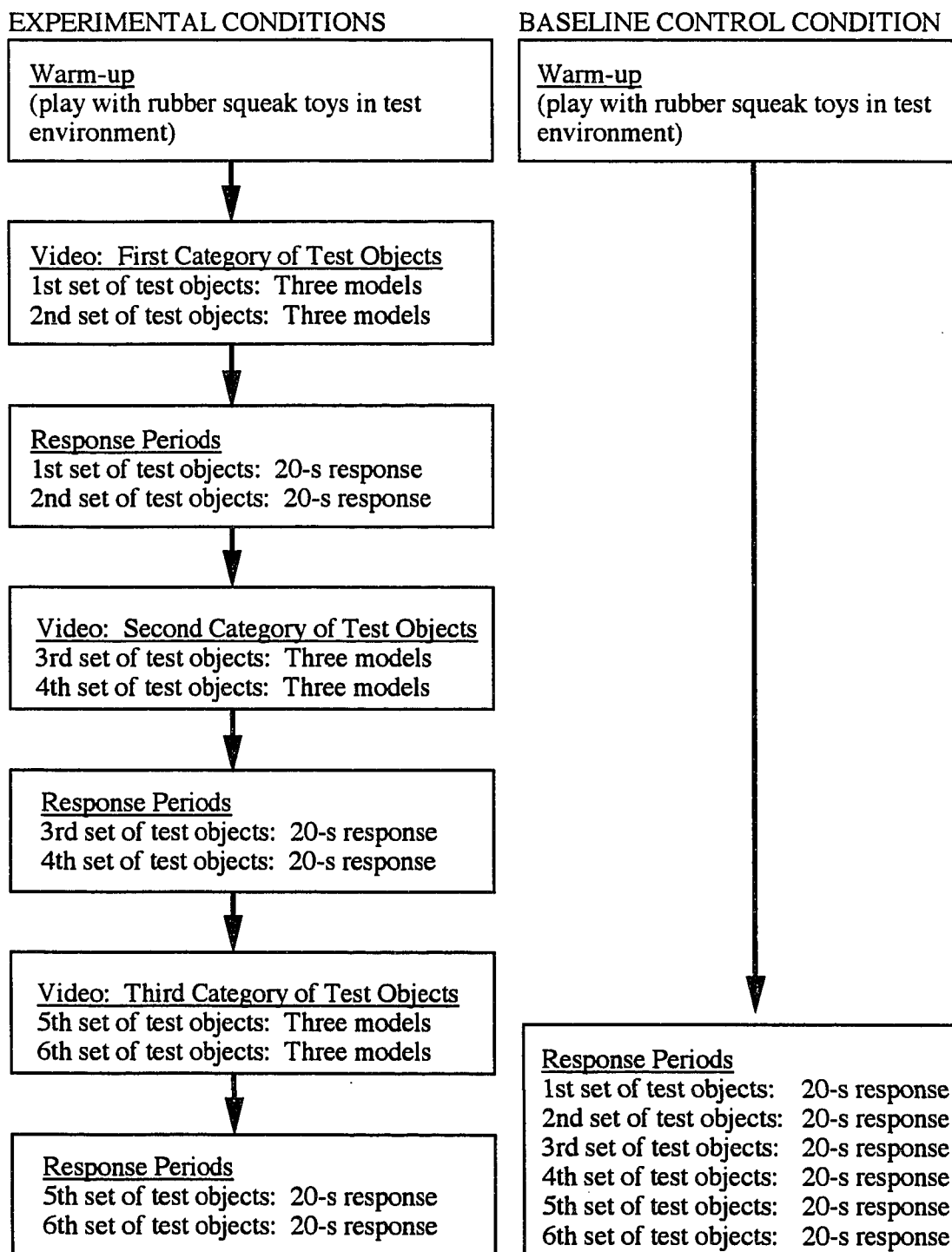


Figure 5. Procedure for experimental and control conditions.

at an image of the toddler model who was the last one the subject had viewed (e.g., Girl C demonstrating the target acts on the pull-apart toy set), and asked the subject, "Is this a boy or a girl?" After the subject's response, or after a pause long enough to determine that the subject was not going to respond, the experimenter rewound to the next toddler model (e.g., Girl B demonstrating the target acts on the pull-apart toy set), and asked, "Is this a girl or a boy?" The third toddler model (e.g., Girl A demonstrating the target acts on the pull-apart toy set) was similarly pictured and the experimenter again switched the order of words and asked, "Is this a boy or a girl?" Subjects were videotaped during both the demonstration phase and response periods for later coding of both their looking behavior and imitative responses.

Baseline control condition: stimuli presentation. In the control condition ($n = 24$), subjects were given the six sets of test objects without having observed any demonstration in order to assess the spontaneous rate of production of the target acts. Because the results of Preliminary Study 4 described in Chapter 2 (using the same sets of test objects) predicted very low rates of such spontaneous production, the number of subjects in the baseline control condition was half the number of subjects in each of the experimental conditions. Subjects in the baseline control condition had a 20-s response period with each of the six sets of test objects, and their responses were videotaped. The baseline procedure is also displayed in Figure 5.

All subjects were encouraged to play with the test objects with neutral comments such as "Look at that" and "What can you do with that?" At no time were subjects told to imitate or given specific instructions of what to do with the test objects.

Scoring of Subjects' Response Periods

General Scoring Procedure

The response periods for all subjects were identical inasmuch as each subject had a series of six 20-s response periods. To ensure blind scoring of the data, a new videotape was made by deleting all the warm-up and video demonstration periods. It contained only the response periods and thus no artifactual clue as to the subject's condition. Thus independent coders were able to score the videotapes without knowledge of which condition the subject had been in. For each 20-s response period, the coders noted whether

the subject produced the target acts, and if so, used the time code on the tapes to determine when they were produced.

Subjects could receive a maximum score of 3 on each set of test objects: production of two target acts (one point each), and performing the two target acts in a target sequence (the third point). Although the target acts were always demonstrated in sequence, it was possible for subjects to produce them in the opposite sequence (e.g., on the tea set, to stir first and then pour). Indeed, many subjects did produce the target acts out of sequence. Thus the third point for the correct sequence represents a higher level of imitation of the demonstrated behavior.

Over the six sets of test objects, subjects received a score of 0-18 for total number of target acts and target sequences combined (3 points for each set x 6 sets = 18 maximum). Production of each target act and sequence was coded yes/no using the following operationalized definitions.

Operationalized Definitions for Coding Target Acts and Sequences

Hammer set. On the hammer set, the first target act was coded yes if the subject placed the peg in the hole of the block, either right side up or upside down. The second target act was coded yes if the subject hammered with the hammer, tapping at least twice on either the peg or the block. The target "sequence" was coded yes if the subject sequentially placed the peg in the hole then touched the peg with the hammer. Thus each subject could receive a score ranging from 0-3 for this set.

Train set. On the train set, the first target act was coded yes if the subject placed the figure in the train engine, either right side up or upside down. The second target act was coded yes if the subject placed the train engine with or without the figure inside on top of the track, either along the track or sideways. The target sequence was coded yes if the subject sequentially placed the figure in the train and then both on the track. Thus each subject could receive a score ranging from 0-3 for this set.

Doll set. On the doll set, the first target act was coded yes if the subject separated the doll from the large cloth in which it was wrapped, either unfolding the cloth or pulling the doll out by its head. The second target act was coded yes if the subject placed the doll and the small cloth together, either by placing or wiping the small cloth on top of the doll or

placing the doll on top of the small cloth. The target sequence was coded yes if the subject sequentially separated the doll from the large cloth and placed the small cloth on top of the doll. Thus each subject could receive a score ranging from 0-3 for this set.

Tea set. On the tea set, the first target act was coded yes if the subject lifted the pitcher and turned it to at least a 45 degree angle within 2-3 inches of the top of the cup, or if the subject lifted the cup and turned it to at least a 45 degree angle within 2-3 inches over the top of the pitcher. The second target act was coded yes if the subject placed the spoon in either the pitcher or the cup (whether or not they had previously "poured"). The target sequence was coded yes if the subject sequentially poured with either the pitcher or the cup and then placed the spoon into whichever container she or he had just poured into. Thus each subject could receive a score ranging from 0-3 for this set.

Collapsible cup set. On the collapsible cup set, the first target act was coded yes if the subject placed the cube inside of the cup. The second target act was coded yes if the subject collapsed the cup in any manner except banging or throwing. The target sequence was coded yes if the subject sequentially placed the cube inside the cup, then collapsed it. Thus each subject could receive a score ranging from 0-3 for this set.

Pull-apart toy set. On the pull-apart toy set, the first target act was coded yes if the subject pulled the toy completely apart. The second target act was coded yes if the subject placed one end of the toy into the hole in the middle of the spool. The target sequence was coded yes if the subject sequentially pulled the toy apart, then inserted the end into the spool. (Because the toy could only be inserted into the spool if it had already been pulled apart, all subjects who scored yes for the second target act also scored yes for the target sequence.) Thus each subject could receive a score ranging from 0-3 for this set.

Total score. For each set of test objects, subjects received a score from 0-3. Therefore, over the six sets of test objects subjects could receive a summary score ranging from 0-18. This score for each subject is hereafter called the "total score."

Scoring Agreement

One coder scored all subjects' response periods, then rescored half to assess intra-coder agreement. A second coder scored half the subjects' response periods to assess inter-coder agreement. The intra-coder agreement and Kappa coefficient for yes/no codes on each

target act and target sequence are presented in Table 5. Intra-coder agreement ranged from 90-100%. Intra-coder agreement on total score (range = 0-18) was 90%, with a Kappa coefficient of .89. Intra-coder correlation coefficients on latency scores (time from when the subject first touched an object to when the subject produced the target acts) ranged from .83-.99 (also presented in Table 5). All Kappa and correlation coefficients on intra-coder agreement were significant ($p < .01$).

The inter-coder agreement and Kappa coefficient for yes/no codes on each target act and target sequence are presented in Table 6. Inter-coder agreement ranged from 93-100%. Intra-coder agreement on total score (range = 0-18) was 86%, with a Kappa coefficient of .85. Inter-coder correlation coefficients on latency scores ranged from .81-1.0 (also presented in Table 6). All Kappa and correlation coefficients on inter-coder agreement were significant ($p < .01$).

Table 5

Intra-Coder Agreement on Each Target Act

Target acts	% agreement yes/no coding	Kappa ($n = 60$) yes/no coding	Correlation (r) latency coding
Hammer set			
First target act	90	.76	.99
Second target act	93	.86	.88
Target sequence	98	.96	.99
Train set			
First target act	97	.84	.99
Second target act	100	1.00	.97
Target sequence	98	.96	.99
Doll set			
First target act	97	.90	.83
Second target act	98	.96	.98
Target sequence	100	1.00	.97
Tea set			
First target act	100	1.00	.96
Second target act	98	.96	.99
Target sequence	97	.90	.99
Collapsible cup set			
First target act	100	1.00	.98
Second target act	100	1.00	.90
Target sequence	100	1.00	.99
Pull-apart toy set			
First target act	98	.96	.96
Second target act	98	.95	.99
Target sequence	98	.95	.99

Table 6

Inter-Coder Agreement on Each Target Act

Target acts	% agreement yes/no coding	Kappa ($n = 60$) yes/no coding	Correlation (r) latency coding
Hammer set			
First target act	98	.96	.99
Second target act	93	.86	.81
Target sequence	100	1.00	.83
Train set			
First target act	100	1.00	.99
Second target act	100	1.00	1.00
Target sequence	100	1.00	.99
Doll set			
First target act	100	1.00	.96
Second target act	100	1.00	.97
Target sequence	100	1.00	.96
Tea set			
First target act	98	.96	.90
Second target act	98	.96	.91
Target sequence	98	.95	.89
Collapsible cup set			
First target act	98	.94	.99
Second target act	100	1.00	.88
Target sequence	100	1.00	.92
Pull-apart toy set			
First target act	100	1.0	.97
Second target act	98	.95	.95
Target sequence	98	.95	.97

Chapter IV: Results

Analysis Plan

The first analyses presented here measured main effects of age, sex, condition, and sets of test objects on the number of target acts produced by all subjects. If age differences between the 18-month-olds and 24-month-olds were found, subsequent analyses examined data from each age separately. If group differences were found between the experimental conditions and the baseline control condition, these were tested within each age. If group differences were found between the experimental conditions and the baseline control condition within each age, data from the baseline control condition was excluded in order to directly assess the effects of observing same-sex versus opposite-sex models.

Different analyses offer differing approaches to examining the three-way interaction of interest: experimental condition (same-sex model versus opposite-sex model), sex of subject, and set of test object. A repeated-measure analyses of variance (ANOVAs) on the score produced by subjects for each set of test objects examined how the amount of imitative behavior was influenced by the three variables. If imitative behavior was influenced by the three-way interaction, then analysis proceeded on individual sets of test objects. Because the 0-3 scoring on individual sets of test objects was a small range (thus the appropriateness of parametric statistics was in question) the data was converted to produce dichotomous scores for each set of test objects. Subjects who produced both target acts on the set of test objects ("high-responding") were compared to those who produced one or none ("low-responding"). Chi-square analyses on contingency tables based on these high/low dichotomous scores assessed the effects of sex of subject and experimental condition. Because the necessity for multiple tables and chi-square tests increased the risk of chance significance, the same data were also analyzed using loglinear analysis (Norusis, 1990). Loglinear analysis offers an alternative to multiple chi-square analyses by being able to measure the effects of sex of subject and experimental condition within one test instead of many (Combs-Orme, 1992).

The other data available for analysis were the latency data, the times in the response period when the subject produced target acts and sequences (from 0-20 seconds). Because traditional ANOVAs (presented in Appendix A) did not give much useful information, the

major analyses on latency scores for target acts were survival analyses. These offer an alternative to both ANOVAs and chi-squares on latency scores for dichotomous variables (measuring an event that either does or does not occur), and offer the advantage of being able to include data from all subjects (Luke, 1993; Norusis, 1990; Singer & Willett, 1993).

Minor analyses discussed at the end of this chapter explored possible effects of looking behavior, siblings, and familiarization with test objects on subjects' responses, and summarized the verbal responses of subjects when asked to identify the sex of the models.

Analysis Across All Subjects

The first analysis of the data was a comparison across all subjects and individual sets of test objects. (Although the sets of test objects were chosen by the adult experimenter to be of one of three categories of gender-stereotyped material, masculine, feminine, or neutral, there is no guarantee that the subjects treated them in such a fashion—therefore this analysis treated the six sets of test objects separately.) This analysis was a 3 (condition: same-sex models/opposite-sex models/baseline control) x 2 (age: 18 months/24 months) x 2 (sex of subject) x 6 (sets of test objects: hammer/train/doll/tea/collapsible cup/pull-apart toy) mixed ANOVA for number of target acts produced (test object set is the repeated measure). Between-subjects effects were significant for condition, $F(2, 108) = 19.03$, $p < .001$, and for age, $F(1, 108) = 21.75$, $p < .001$, with a marginal interaction between condition and age, $F(2, 108) = 2.74$, $p < .07$. No other between-subject main effects or interactions were significant, $ps > .20$. Within-subject effects were significant for test object set, $F(5, 540) = 16.69$, $p < .001$, an interaction between test object set and age, $F(5, 540) = 2.88$, $p < .02$, and the four-way interaction between test object set, condition, age, and sex, $F(10, 540) = 2.66$, $p < .01$.

A Tukey HSD procedure was done on subjects' total score comparing four groups: (a) 18-month-old subjects in the baseline control condition, (b) 18-month-old subjects in the experimental conditions combined, (c) 24-month-old subjects in the baseline control condition, and (d) 24-month-old subjects in the experimental conditions combined. The results indicated that the mean for the 24-month-olds in the experimental conditions combined ($M = 11.69$, $SD = 3.62$) was significantly different from all other groups, $p < .05$. Means and standard deviations for each age and condition are shown in Table 7 and

Figure 6. In general, 24-month-old subjects who observed models produced more target acts than 18-month-old subjects who observed models, and more than both 18- and 24-month-old subjects who did not observe models. In addition, there was a significant difference between the 18-month-olds in the experimental conditions combined ($M = 7.42$, $SD = 3.71$) and the 18-month-olds in the baseline control condition ($M = 4.50$, $SD = 1.98$), $p < .05$. Within each age, subjects who observed models produced more target acts than subjects who did not. The means for the control conditions at 18 and 24 months were not significantly different from one another ($M = 4.50$, $SD = 1.98$ and $M = 5.17$, $SD = 1.95$, respectively).

Table 7

Means and Standard Deviations for Total Scores of 18-Month-Old and 24-Month-Old Subjects in the Experimental and Baseline Conditions

Condition	<u>M</u>	<u>SD</u>
18-month-olds		
Experimental ($n = 48$)	7.42	3.71
Same-sex model ($n = 24$)	7.88	3.07
Opposite-sex model ($n = 24$)	6.96	4.27
Baseline control ($n = 12$)	4.50	1.98
24-month-olds		
Experimental ($n = 48$)	11.69	3.62
Same-sex model ($n = 24$)	10.92	3.72
Opposite-sex model ($n = 24$)	12.46	3.41
Baseline control ($n = 12$)	5.17	1.95

Note. Maximum score = 18.

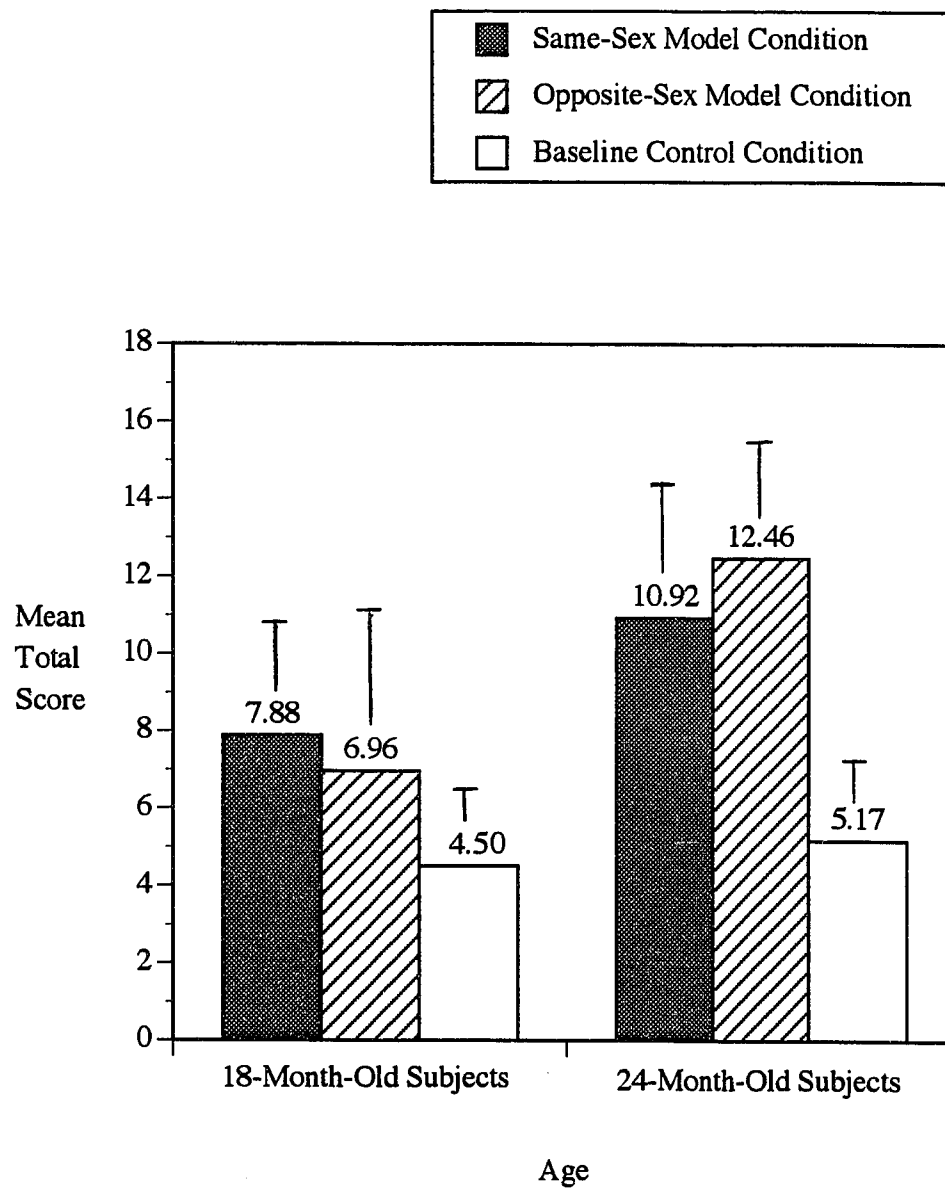


Figure 6. Mean total score (+ 1 SD) of subjects in the same-sex model condition ($n = 24$), the opposite-sex model condition ($n = 24$), and the baseline control condition ($n = 12$), for each age group.

Another Tukey HSD procedure was done on subjects' total score comparing six groups: (a) 18-month-old subjects in the baseline control condition, (b) 18-month-old subjects in the same-sex model condition, (c) 18-month-old subjects in the opposite-sex condition, (d) 24-month-old subjects in the baseline control condition, (e) 24-month-old subjects in the same-sex model condition, and (f) 24-month-old subjects in the opposite-sex model condition. These means are also presented in Table 7 and Figure 6. There were significant differences between the 24-month-old subjects in both the same-sex model and opposite-sex model conditions ($\underline{M} = 10.92$, $\underline{SD} = 3.72$ and $\underline{M} = 12.46$, $\underline{SD} = 3.41$, respectively) compared to all other groups, $p < .05$. Differences between same-sex model and opposite-sex model conditions within each age were not significant.

18-Month-Old Subjects

Analyses on Total Score: Number of Target Acts Sequences Produced (from 0-18)

Experimental conditions versus baseline control condition. Subjects who observed a demonstration videotape produced significantly more of the target acts than subjects who were given the test objects without any demonstration. The mean total score produced by subjects in the two model conditions combined ($\underline{M} = 7.42$, $\underline{SD} = 3.71$) was significantly different from the mean total score produced by subjects in the baseline control condition ($\underline{M} = 4.50$, $\underline{SD} = 1.98$), $t(58) = 2.62$, $p < .02$. In order to directly assess the effects of observing same-sex versus opposite-sex models, the following analysis excluded data from subjects in the baseline control condition.

Same-sex model versus opposite-sex model condition. A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) x 6 (test object set) mixed ANOVA for number of target acts produced (test object set is the repeated measure) revealed no significant between-subject effects, $F_s < 1.0$. Subjects did not perform differently overall based upon whether they observed same-sex versus opposite-sex models (means presented in Table 8) or whether they were a boy or a girl observing same-sex versus opposite-sex models (means presented in Table 9 and graphically in Figure 7).

The difference between means was in the predicted direction, with the mean for the opposite-sex model condition ($\underline{M} = 7.88$, $\underline{SD} = 3.07$) higher than the mean for the same-sex model condition ($\underline{M} = 6.96$, $\underline{SD} = 4.27$), but the variability as evidenced by

Table 8

Means and Standard Deviations for Total Scores of 18-Month-Old Subjects in Each Condition

Condition	<u>M</u>	<u>SD</u>
Experimental (<u>n</u> = 48)	7.42	3.71
Same-sex model (<u>n</u> = 24)	7.88	3.07
Opposite-sex model (<u>n</u> = 24)	6.96	4.27
Baseline control (<u>n</u> = 12)	4.50	1.98

Note. Maximum score = 18.

Table 9

Means and Standard Deviations for Total Scores of 18-Month-Old Boy and Girl Subjects in Each Condition

Condition	Sex of subject			
	Boys		Girls	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Same-sex model (<u>n</u> = 24)	8.42	2.75	7.33	3.39
Opposite-sex model (<u>n</u> = 24)	6.92	4.93	7.00	3.72
Baseline control (<u>n</u> = 12)	4.67	1.75	4.33	2.34

Note. Maximum score = 18. There were equal numbers of boys (n = 12) and girls (n = 12) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys (n = 6) and girls (n = 6) in the baseline control condition.

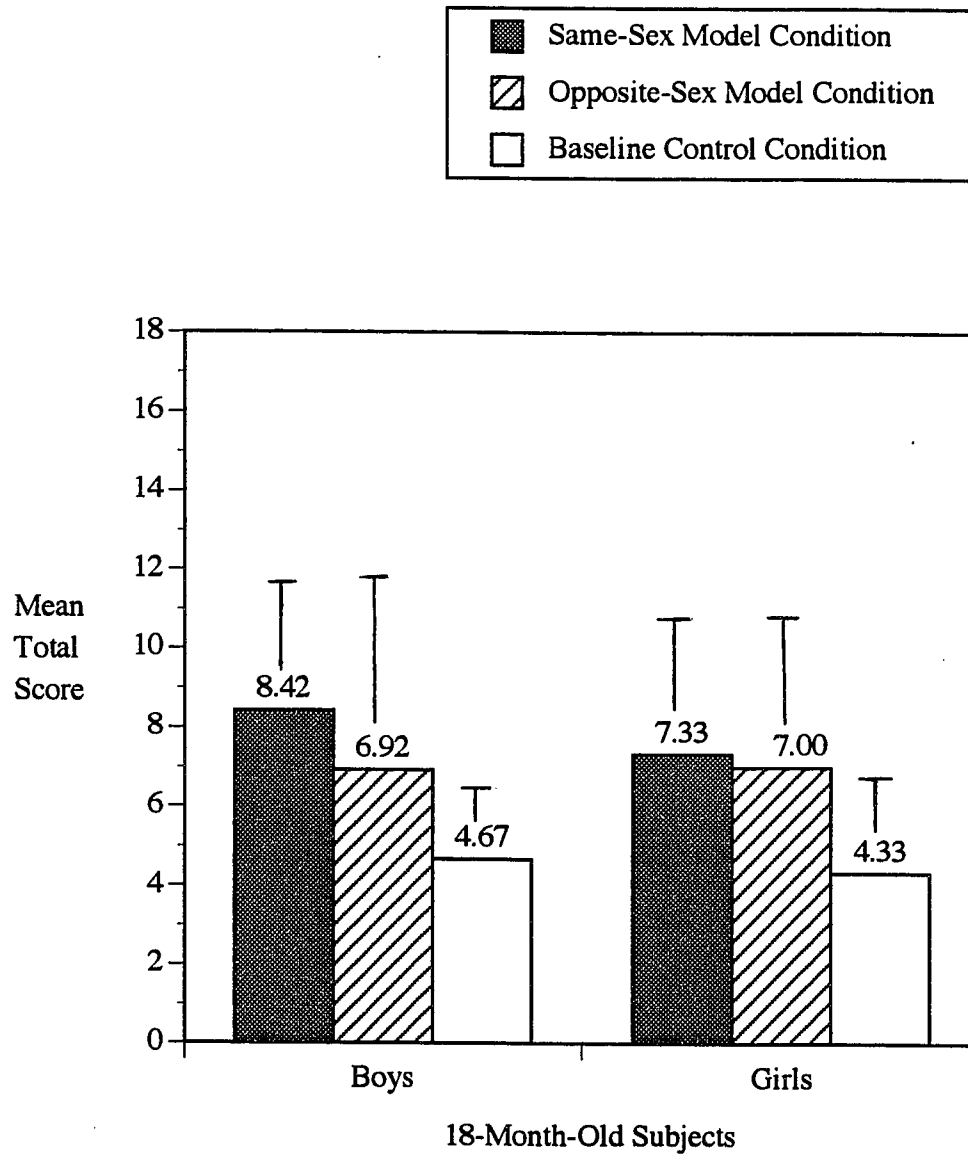


Figure 7. Mean total score (+ 1 SD) for 18-month-old subjects. There were equal numbers of boys ($\underline{n} = 12$) and girls ($\underline{n} = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($\underline{n} = 6$) and girls ($\underline{n} = 6$) in the baseline control condition.

the large standard deviations overwhelmed the group differences. Within-subject effects were significant for test object set, $F(5, 220) = 12.97$, $p < .001$, indicating that subjects performed differently on individual sets of test objects. There was also a significant three-way interaction between experimental condition, sex, and test object set, $F(5, 220) = 4.09$, $p < .01$. This finding suggests that subjects performed differently on test object sets based upon their sex and whether they observed same- or opposite-sex models.

Chi-Square Analyses on Dichotomous Scores on the Sets of Test Objects

Same-sex model versus opposite-sex model condition. Table 10 presents the yes/no data for all target acts on each test object set across experimental conditions for 18-month-old subjects. (Data from subjects in the baseline control condition are included in the table for comparison, but the size difference between the experimental conditions and the baseline control condition precluded analysis against baseline. See the discussion of survival analyses for an alternative method at this level.) In order to examine each set of test objects as a whole, the yes/no coding for individual target acts and sequences was combined across the set of test objects, and a dichotomous score created by comparing "low-responding" subjects who produced none or only one of the target acts to "high-responding" subjects who produced both target acts. The high-responding group automatically contained those who produced the target sequence as a subset, because producing the target sequence relied on producing both target acts. The chi-square analyses presented here involved three separate analyses for this dichotomous high/low score on each set of test objects: (a) a comparison of subjects in the same-sex model condition versus those in the opposite-sex model condition, (b) a comparison of boys in the same-sex model condition versus boys in the opposite-sex model condition, and (c) a comparison of girls in the same-sex model condition versus girls in the opposite-sex model condition.

Table 11 presents the dichotomous data for each set of test objects comparing subjects in the same-sex model condition versus those in the opposite-sex model condition, and Figure 8 presents the data graphically. The analyses showed significant effects for two sets: the hammer set, $\chi^2(1, N = 48) = 5.37$, $p < .05$, and the collapsible cup set, $\chi^2(1, N = 48) = 4.55$, $p < .05$. The difference on the doll set approached significance, $\chi^2(1, N = 48) = 2.95$, $p < .09$, and differences on the other test object sets were not significant, $ps > .20$.

Table 10

Number of 18-Month-Old Subjects in Each Condition Producing Individual Target Acts and Sequences

Target acts and sequences	Sex of subject					
	Boys			Girls		
	SS ^a <u>n</u> (%)	OS ^b <u>n</u> (%)	B ^c <u>n</u> (%)	SS ^a <u>n</u> (%)	OS ^b <u>n</u> (%)	B ^c <u>n</u> (%)
Hammer set						
First	11 (92)	8 (67)	2 (33)	9 (75)	7 (58)	4 (67)
Second	12 (100)	9 (75)	3 (50)	7 (58)	6 (50)	3 (50)
Sequence	6 (50)	5 (42)	0 (0)	6 (50)	2 (17)	2 (33)
Train set						
First	12 (100)	9 (75)	3 (50)	11 (92)	12 (100)	5 (83)
Second	3 (25)	4 (33)	0 (0)	3 (25)	2 (17)	1 (17)
Sequence	3 (25)	3 (25)	0 (0)	2 (17)	2 (17)	0 (0)
Doll set						
First	7 (58)	7 (58)	5 (83)	9 (75)	11 (92)	4 (67)
Second	1 (8)	4 (33)	1 (17)	2 (17)	4 (33)	0 (0)
Sequence	0 (0)	3 (25)	0 (0)	2 (17)	1 (8)	0 (0)
Tea set						
First	7 (58)	3 (25)	1 (17)	6 (50)	5 (42)	0 (0)
Second	8 (67)	8 (67)	6 (100)	9 (75)	9 (75)	4 (67)
Sequence	3 (25)	1 (8)	0 (0)	3 (25)	2 (17)	0 (0)
Collapsible cup set						
First	12 (100)	7 (58)	5 (83)	11 (92)	11 (92)	3 (50)
Second	6 (50)	1 (8)	1 (17)	2 (17)	1 (8)	0 (0)
Sequence	6 (50)	1 (8)	0 (0)	2 (17)	1 (8)	0 (0)
Pull-apart toy set						
First	2 (17)	6 (50)	1 (17)	2 (17)	4 (33)	0 (0)
Second	1 (8)	2 (17)	0 (0)	1 (8)	2 (17)	0 (0)
Sequence	1 (8)	2 (17)	0 (0)	1 (8)	2 (17)	0 (0)

^aSS = same-sex model, (n = 12). ^bOS = opposite-sex model, (n = 12). ^cB = baseline control, (n = 6).

Table 11

Number of 18-Month-Old Subjects in Each Experimental Condition (n = 24) Who Produced Both Target Acts For Each Set of Test Objects

Condition	Test objects					
	Hammer	Train	Doll	Tea	Cup	Pull
Same-sex model	17	5	3	11	8	2
Opposite-sex model	9	6	8	7	2	4
$\chi^2(1, N = 48)$	5.37*	0.12	2.95	1.42	4.55*	0.76

* $p < .05$.

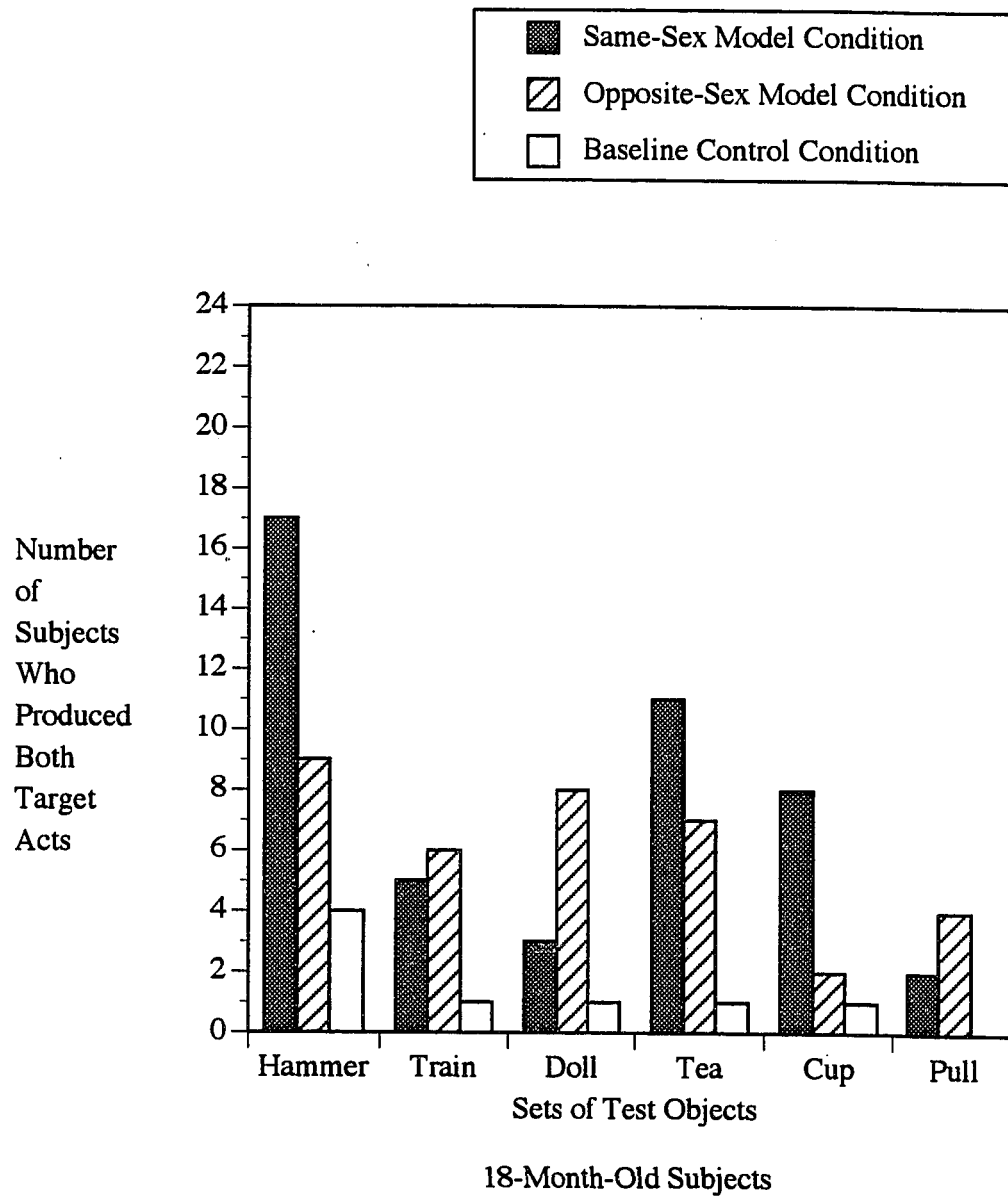


Figure 8. Number of 18-month-old subjects who produced both target acts for each set of test objects in the same-sex model condition ($n = 24$), the opposite-sex model condition ($n = 24$), and the baseline control condition ($n = 12$).

Table 12 and Figure 9 present the dichotomous data for each test object set comparing boys in the same-sex model condition versus boys in the opposite-sex model condition, and girls in the same-sex model condition versus girls in the opposite-sex model condition. Analyses of 2 x 2 contingency tables revealed significant differences in the predicted direction between same-sex versus opposite-sex conditions for boy subjects only, again on the hammer set, $p < .05$, Fisher's Exact Test, one-tailed, and the collapsible cup set, $p < .05$, Fisher's Exact Test, one-tailed. Differences on the other test object sets were not significant for the boys, and none of the comparisons for the girls reached significance, $ps > .15$.

Table 12

Number of 18-Month-Old Boy (n = 12) and Girl (n = 12) Subjects in Each Experimental Condition Who Produced Both Target Acts For Each Set of Test Objects

Condition	Test objects					
	Hammer	Train	Doll	Tea	Cup	Pull
Boys						
Same-sex model	11	3	1	5	6	1
Opposite-sex model	6	4	4	3	1	2
Girls						
Same-sex model	6	2	2	6	2	1
Opposite-sex model	3	2	4	4	1	2

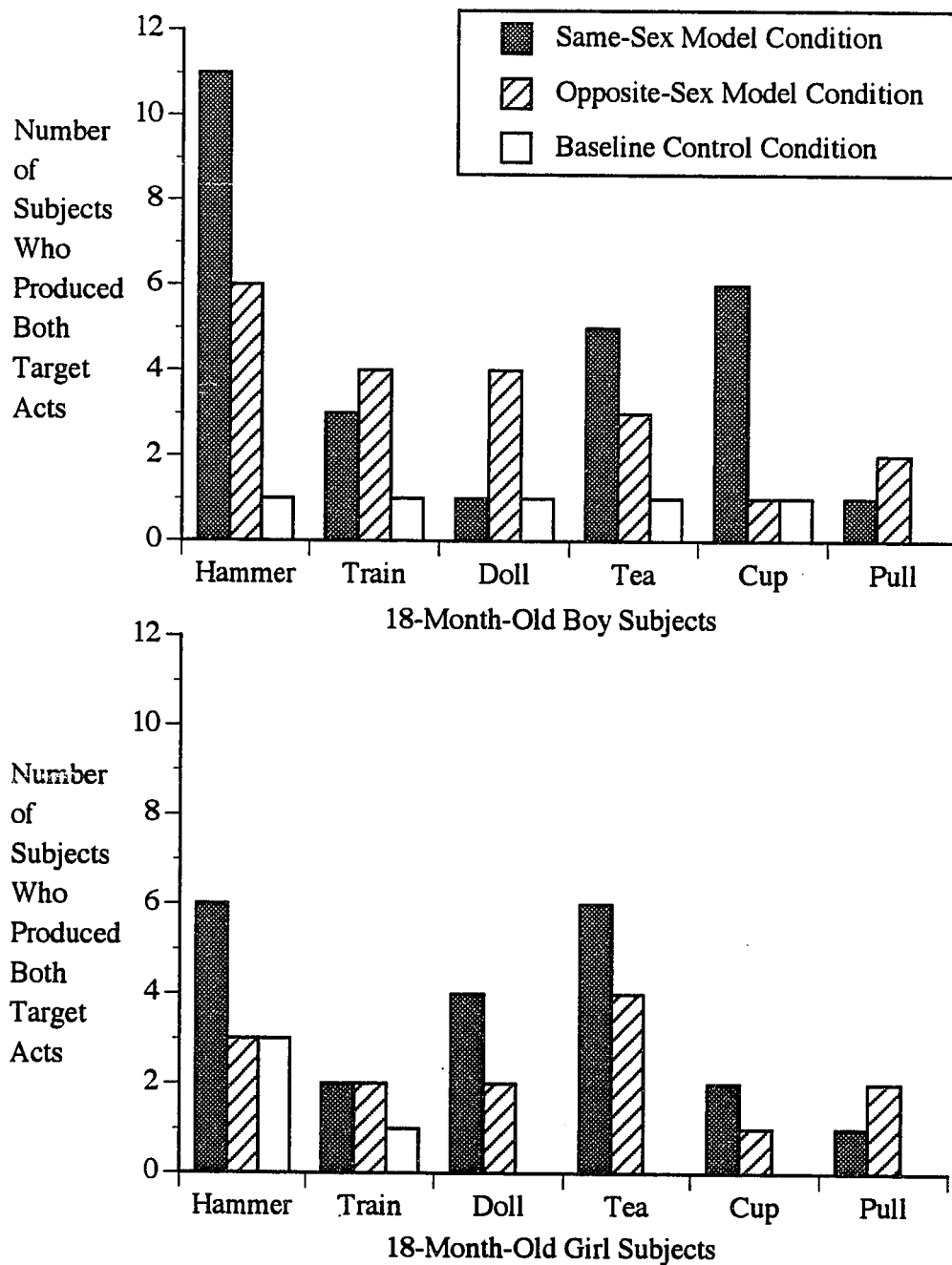


Figure 9. Number of 18-month-old boys and girls who produced both target acts for each set of test objects. There were equal numbers of boys ($n = 12$) and girls ($n = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($n = 6$) and girls ($n = 6$) in the baseline control condition.

Loglinear Analyses on Dichotomous Data for Each Set of Test Objects

The number of separate tests involved in the chi-square analyses increased the possibility that the significant findings (4 out of 18 over all sets of test objects) might be due to chance. Another approach to analyzing categorical data as a function of dichotomous independent variables is loglinear modeling, which like the chi-square analyses compares an expected versus observed frequency table, but transforms the data into log odds ratios to produce a linear equation similar to linear regression (Combs-Orme, 1992; Norusis, 1990). The resulting models give information on the relative influence of each independent variable with lambda coefficients, which show the associated increase or decrease in the log odds ratio. Models with different terms can be tested against one another to see if they offer a significant improvement in their fit to the data by comparing their Likelihood Ratio Chi-Square statistics (the difference between the Likelihood Ratio Chi-Squares is also tested as a chi-square statistic). In the case of a dichotomous dependent variable such as the yes/no code of producing both target acts on a test object set, a loglinear analysis using experimental condition and sex of subjects as the independent variables can provide similar results as the chi-square analyses while avoiding increased error possibilities. If significant results (showing the same patterns as the previously reported analyses) are also provided by the loglinear analyses, the findings will have additional strength.

Loglinear models for the hammer set. Because the chi-square analyses on the hammer set yielded the highest significance levels, I will begin with the hammer set and describe the process of analysis. The first step in loglinear analysis was to test the data for independence. Thus the first model in the table (the independence model) distributed the frequency of yes/no codes (on producing both target acts on the hammer set) as a function of experimental conditions (same-sex models, opposite-sex models) and sex of subject, and predicted that performance on the hammer set was not associated with either of the independent variables. The results of testing the independence model against observed frequencies (predicting that imitative behavior was independent of experimental condition or sex of subject) is presented in Table 13 as a Likelihood Ratio Chi-square statistic (a chi-square test on the contingency table of expected versus observed frequencies). There was

Table 13

Loglinear Models for Predicting 18-Month-Old Subjects' Production of Both Target Acts on the Hammer Set as a Function of Experimental Condition and Sex of Subject

Models	For variables		For models	
	Lambda	z score	LR chi-square	p value
Independence model: Hammer unrelated to variables			12.56	.01
Model 1: Hammer as a function of experimental condition	.32	2.19	6.26	.04
Model 2: Hammer as a function of sex of subject	.35	2.27	7.08	.03
Model 3: Hammer as a function of both sex of subject experimental condition	.41 .41	2.36 2.36	0.82	.37
Saturated model: Hammer as a function of sex of subject experimental condition Sex of Subject x Condition interaction	.38 .38 -.13	2.29 2.29 -0.78	0.00	1.00

Note. The higher the p values, the better the model fits the data. The higher the z scores, the more the particular variable contributes to the model.

a significant difference between the predicted frequencies and the observed frequencies, $p = .01$, indicating that the independence model was a poor fit to the data. Therefore it should not be assumed that performance on the hammer set was unrelated to experimental condition or sex of subject.

The next step in building a model to fit the data with the most parsimonious description was to compare models with and without one or the other of the independent variables. Table 13 also presents the statistics from different models for the hammer set. Model 3, which predicted a relationship with both experimental condition and sex of subject, fit the data well, $p = .37$. (The higher the p values, the better the model fits the data.) Table 13 lists the lambda coefficients for each independent variable, which show the associated increase or decrease in the log odds ratio of producing both target acts. The lambdas for both variables in Model 3 were significantly greater than zero, z -scores = 2.36. (The lambdas are the same for both variables because they are based on the same numbers: 17 subjects in the same-sex model condition versus 9 subjects in the opposite-sex model condition produced both target acts on the hammer set, and 17 boys versus 9 girls produced both target acts on the hammer set.)

Simpler models predicting a relationship with only experimental condition (Model 1) or only sex of subject (Model 2) did not fit the data well, $p = .04$ and $p = .03$, respectively. A more complex model predicting relationships of both variables and their interaction produced a saturated model, which fit the data perfectly, $p = 1.00$. (Because a saturated model reproduces the observed cell frequencies, it will always fit the data perfectly.) However, the difference between the saturated model and Model 3 which did not include the interaction term was not significant, $\chi^2(1, N = 48) = 0.82$, $p = .37$. (Because the chi-square for the saturated model is 0.00, the difference chi-square is the same as the Model 3 likelihood-ratio chi-square.) Thus Model 3 is sufficient to explain the data. On the hammer set, subjects in the same-sex model condition and subjects who were boys were more likely to produce both target acts. This can be seen in the data in Table 12, where both more boys and more girls in the same-sex model condition than boys and girls in the opposite-sex model condition produced both target acts (11 versus 6 for boys; 6 versus 3 for girls). These numbers also show that more boys in both conditions produced both target acts than

the girls in those conditions. The loglinear model accurately described the data by yielding main effects for both experimental condition and sex of subject.

Loglinear models for the collapsible cup set. The other test object set which had significant results from the chi-square analyses was the collapsible cup set. Table 14 presents statistics on models for the collapsible cup set. The independence loglinear model was also significantly different from the observed data, $p = .05$. Model 3, which predicted relationships with experimental condition and sex of subject, did fit the data well, $p = .37$. But Model 1, which predicted a relationship with only experimental condition, also fit the data, $p = .25$, and the difference in the Likelihood Ratio Chi-square between Model 1 and Model 3 was not significant, $\chi^2(1, N = 48) = 1.97, p > .20$. Thus the simplest and best-fitting model to explain performance on the cup was an effect for experimental condition: Subjects in the same-sex condition were more likely to produce both target acts on the cup set than subjects in the opposite-sex condition. This conclusion was also supported by the lambda coefficients for each of the independent variables. In the model with only experimental condition (Model 1) the contribution of the variable (z -score = 1.89) was below the two-tailed criterion of 1.96, but still above a one-tailed criterion of 1.64 in the predicted direction. In the model using both variables (Model 3), only the lambda for experimental condition was significantly different from zero, z -score = 2.03, $p < .025$.

Loglinear models for the other sets of test objects. The independence models did fit the data for the other test object sets, as indicated by the non-significant chi-square values in Table 15. These results are equivalent to what was produced by the chi-square analyses. Behavior on the train set, the tea set, the pull-apart-toy set, and the doll set, did not seem to vary as a function of observing same-sex versus opposite-sex models or as a function of sex of subject. This can be seen as well in the data in the frequency distributions reported in Table 12.

Although the independence model for the doll set fit the data well, alternative models are presented in Table 15 as another example of how loglinear modeling can illustrate the relationship between variables. The model with both experimental condition and sex of subject as predictive variables and the model with only experimental condition as a predictive variable both showed a similar amount of improvement over the independence

Table 14

Loglinear Models for Predicting 18-Month-Old Subjects' Production of Both Target Acts on the Collapsible Cup Set as a Function of Experimental Condition and Sex of Subject

Models	For variables		For models	
	Lambda	z score	LR chi-square	p value
Independence model: Cup unrelated to variables			7.91	.05
Model 1: Cup as a function of experimental condition	.35	1.89	2.79	.25
Model 2: Cup as a function of sex of subject	.22	1.30	5.07	.08
Model 3: Cup as a function of sex of subject experimental condition	.29 .45	1.45 2.03	0.82	.37
Saturated Model: Cup as a function of sex of subject experimental condition Sex of Subject x Condition interaction	.20 .40 -.20	0.91 1.81 -0.91	0.00	1.00

Note. The higher the p values, the better the model fits the data. The higher the z scores, the more the particular variable contributes to the model.

Table 15

Loglinear Models for Predicting 18-Month-Old Subjects' Production of Both Target Acts on the Train, Tea, Pull-Apart Toy, and Doll Set as a Function of Experimental Condition and Sex of Subject

Models	For variables		For models	
	Lambda	<u>z</u> score	LR chi-square	<u>p</u> value
Train independence model: Train unrelated to variables			1.27	.735
Tea independence model: Tea unrelated to variables			1.80	.615
Pull independence model: Pull unrelated to variables			0.77	.855
Doll independence model: Doll unrelated to variables			3.42	.331
Doll model 1: Doll as a function of experimental condition	-.27	-1.57	0.30	.86
Doll model 2: Doll as a function of sex of subject experimental condition	-.06 -.31	-0.35 -1.66	0.26	.61

Note. The higher the p values, the better the model fits the data. The higher the z scores, the more the particular variable contributes to the model.

model, with Likelihood Ratio chi-squares of 0.26 and 0.30, respectively. The lambda coefficients for experimental condition in both models were negative, indicating that subjects in the same-sex condition may have been somewhat less likely (not significantly so) than subjects in the opposite-sex condition to produce both target acts on the doll set (note that the coefficient for sex of subject was also negative, reflecting the fact that fewer boys produced both target acts on the doll set than girls).

Summary of loglinear analyses. As with the chi-square analyses on the dichotomous scores, loglinear analyses found significant effects for watching same-sex models versus opposite-sex models on the hammer set and the collapsible cup set. The loglinear analyses also found the effect more strongly in boys than in girls, which again is in agreement with the results of the chi-square analyses. Watching same-sex models significantly increased the likelihood of producing both target acts on the hammer set and the collapsible cup set, and being a boy also increased the likelihood of producing both target acts on the hammer set. This is reflected in the data for the hammer set, where 11 of the 12 boys who observed same-sex models produced both target acts, compared to 6 of the 12 boys who observed opposite-sex models, and 6 of the 12 girls who observed same-sex models.

Further informative results of the loglinear analyses (which again were similar to the chi-square results) were the values assigned to variables for performance on the doll set. Although neither experimental condition nor sex of subject significantly effected performance, both variables received negative values. These negative values indicate that, for the doll set, observing same-sex models decreased (nonsignificantly so) the likelihood of producing both target acts. In addition, being a boy decreased the likelihood of producing both target acts on the doll set.

Survival Analyses

Survival analysis is another approach for analyzing data with a dichotomous outcome. Its advantages over the other tests are that it can analyze both yes and no codes, and it can take the latency to produce the target acts into account. This technique computes probabilities for an event's occurrence or non-occurrence for each interval in a response period by dividing the number of events occurring in that interval by the number of subjects in the sample who have not yet experienced the event (Luke, 1993; Norusis, 1990; Singer

& Willett, 1993). For different groups, survival analysis can compute probability functions for the entire response period, and compare functions from each group. For the data in this experiment, survival analysis is helpful by taking into account how many subjects did or did not produce particular target acts as well as when in the response period any were produced. All subjects who did not perform the target act during the 20-s response period are still part of the analysis as having "survived" and a median "survival" time can be computed. The survival functions produced by subjects within each experimental condition or sex of subject can be compared using a non-parametric rank test (Lee-Desu Statistic in SPSS). Scores are rank-ordered across the two groups, then tested to see if they come from the same distribution (Norusis, 1990).

Experimental conditions versus baseline control condition. The first set of survival analyses compared the responses of subjects in both the experimental conditions to the responses of subjects in the baseline control condition across all target acts. The number of subjects producing the target acts in each condition was presented previously in Table 10. These survival analyses used both the number of subjects producing the acts and the time in the response period that the acts were produced to test for differences across conditions. Differences were found on four of the six sets of test objects: the hammer set, the train set, the tea set, and the collapsible cup set. The first target act on the hammer set (inserting the peg into the hole of the block), the first target act on the train set (placing the figure in the engine), and the first target act on the tea set (pouring) were all produced significantly more often and earlier in the response period by subjects who had viewed the demonstration videotapes than those who had not, Lee-Desu Statistic (1), $p_s < .05$. The target sequence on the collapsible cup set also appeared to differentiate between the experimental conditions and the baseline condition, Lee-Desu Statistic (1) = 2.92, $p < .09$.

Same-sex model versus opposite-sex model condition. The four target acts that seemed to discriminate between subjects in the experimental conditions versus the baseline control condition were selected for survival analyses comparing the experimental conditions: the first target act on the hammer set, the first target act on the train set, the first target act on the tea set, and the second target act on the collapsible cup set (collapsing the cup). (Although the target sequence on the collapsible cup rather than the target act was different

from baseline data, the act was selected instead of the sequence because timing of the response on a sequence is more difficult to interpret. The data were equivalent: All subjects in experimental conditions who collapsed the cup did so after dropping the cube into the cup.) Survival analyses comparing functions across the two experimental conditions (same-sex models, opposite-sex models) yielded differences in the predicted direction for the hammer set, Lee-Desu Statistic (1) = 8.07, $p < .01$, the train set, Lee-Desu Statistic (1) = 4.92, $p < .05$, the collapsible cup set, Lee-Desu Statistic (1) = 4.14, $p < .05$, and the tea set, $p < .06$. Subjects who observed same-sex models produced these target acts significantly more often and earlier in the response period than subjects who observed opposite-sex models.

Separate survival analyses within each sex of subject found that the significant effects were the result of 18-month-old boys on the hammer set, the train set, and the collapsible cup set, Lee-Desu Statistic (1), $ps < .05$, with a marginal effect on the tea set as well, $p < .07$. Boys who observed same-sex models produced these target acts significantly more often and earlier in the response period than boys who observed opposite-sex models. Analyses on the girls' data revealed an effect only on the hammer set, $p < .06$, all other $ps > .30$.

Survival graphs: Figures 10-13. The cumulative proportion functions of boys and girls for producing these target acts in each experimental condition can be seen in Figures 10 through 13. Figures 10-13 all contain inverted cumulative proportion survival functions, demonstrating the proportion of subjects in each group who produced the target act for each second of the 20-s response period. Each time the line rises, one or more subjects in that group have produced the target act. Thus how quickly the line rises, as well as how high it goes, demonstrates the behavior of the different groups. Figure 10 demonstrates how the functions on the first target act on the hammer set for boys and girls in the same-sex model condition were different from the functions for boys and girls in the opposite-sex model condition. Figure 11 demonstrates how the function on the first target act on the train set for boys in the same-sex model condition was different from the function for boys in the opposite-sex model condition, while the functions for the girls were relatively similar to one another. Figure 12 shows a similar picture on the first target act on the tea set, with the

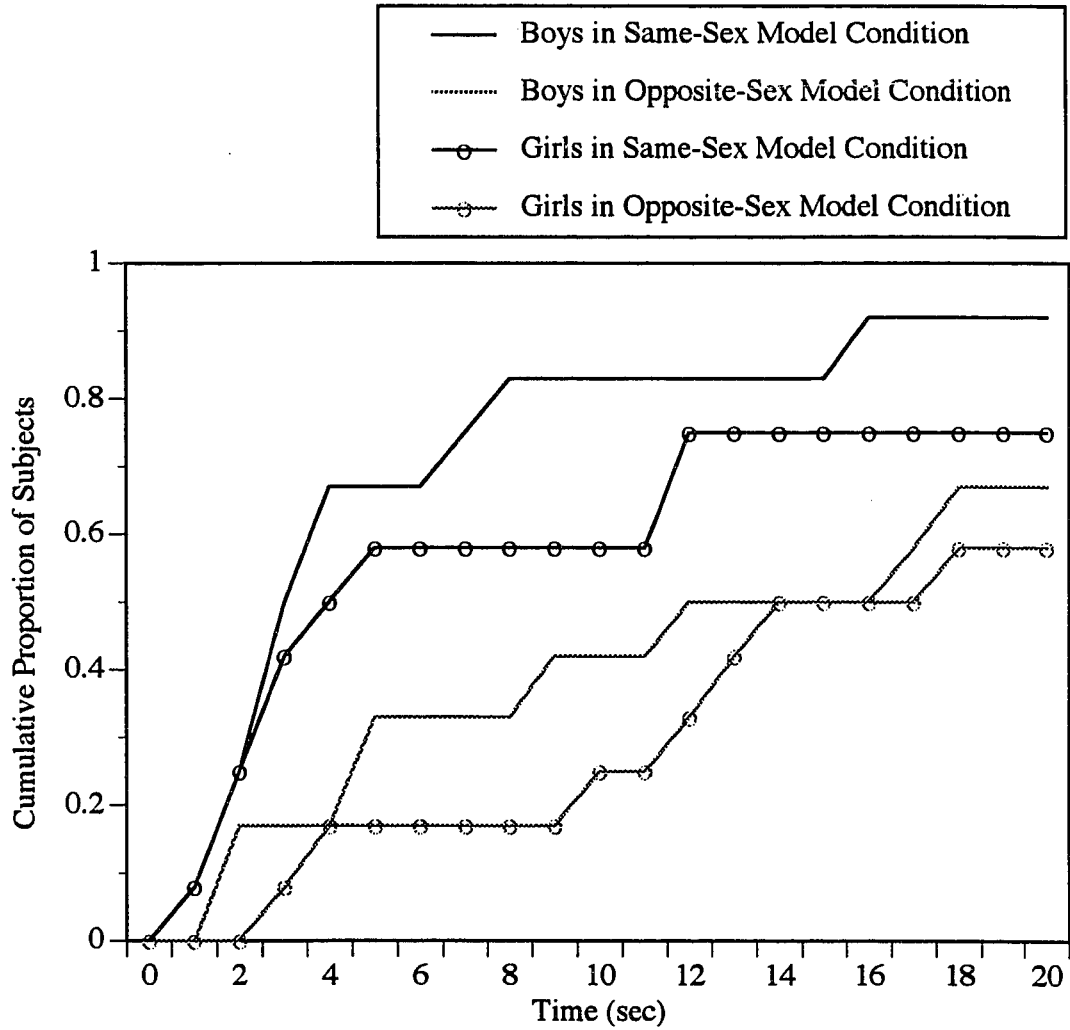


Figure 10. Survival functions for the hammer set.

Cumulative proportion functions show the cumulative proportion of 18-month-old boys and girls in each experimental condition who produced the target act of placing the peg in the block for each second of the response period.

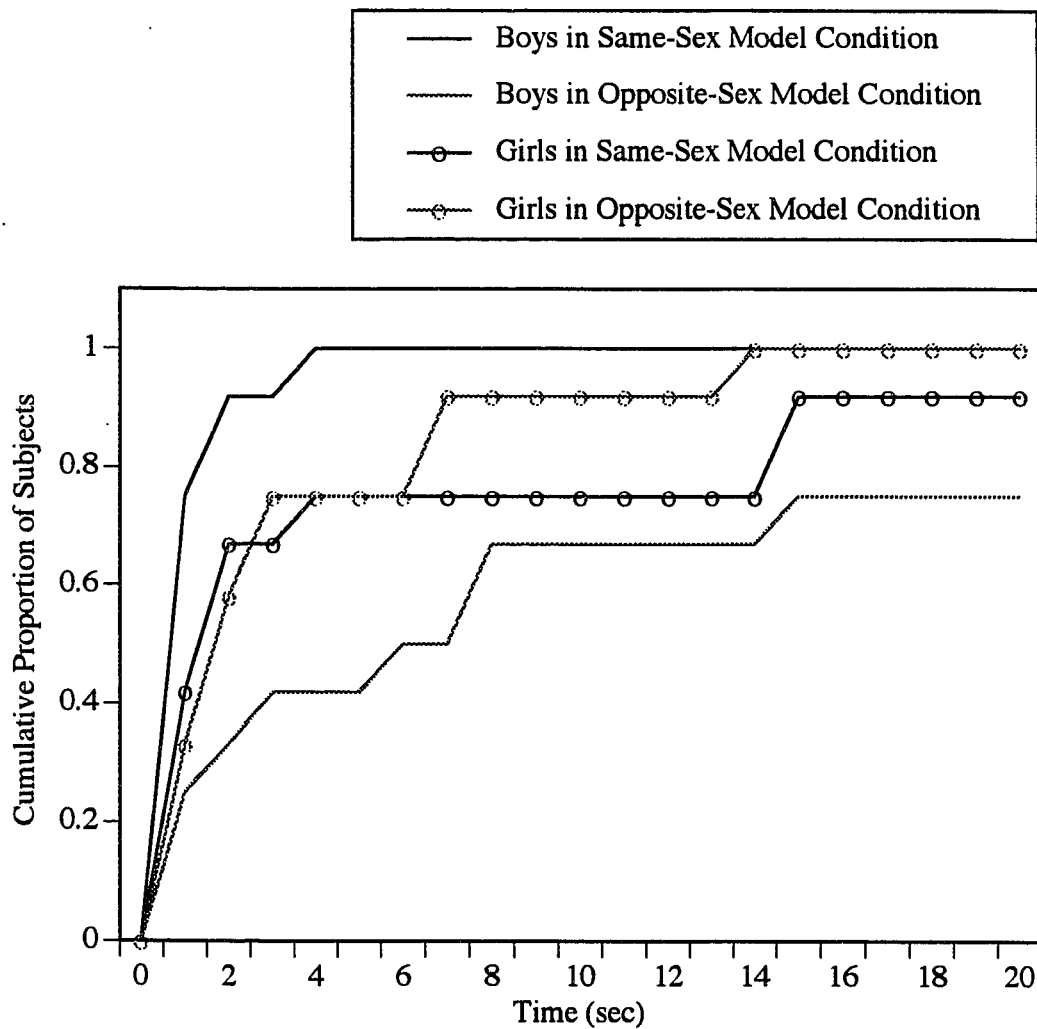


Figure 11. Survival functions for the train set.

Cumulative proportion functions show the cumulative proportion of 18-month-old boys and girls in each experimental condition who produced the target act of placing the figure in the train for each second of the response period.

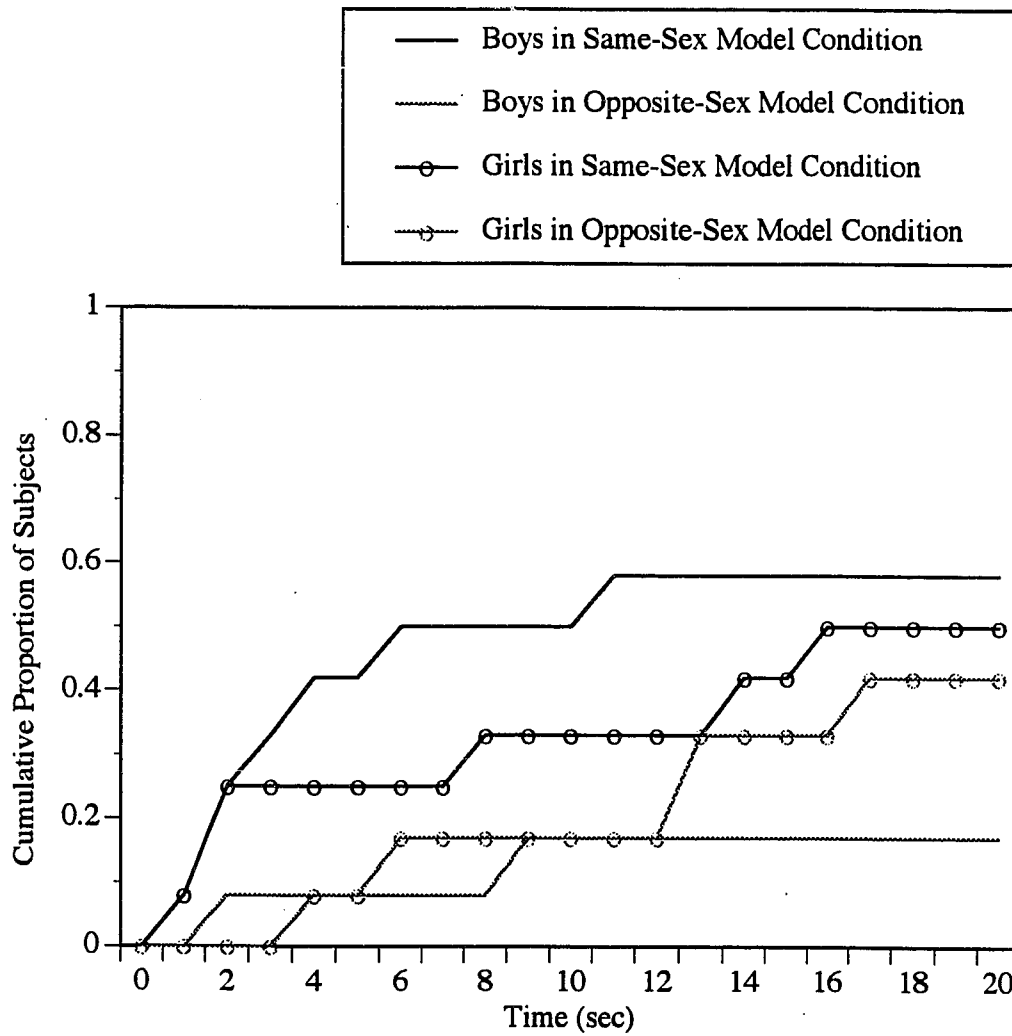


Figure 12. Survival functions for the tea set.

Cumulative proportion functions show the cumulative proportion of 18-month-old boys and girls in each experimental condition who produced the target act of pouring for each second of the response period.

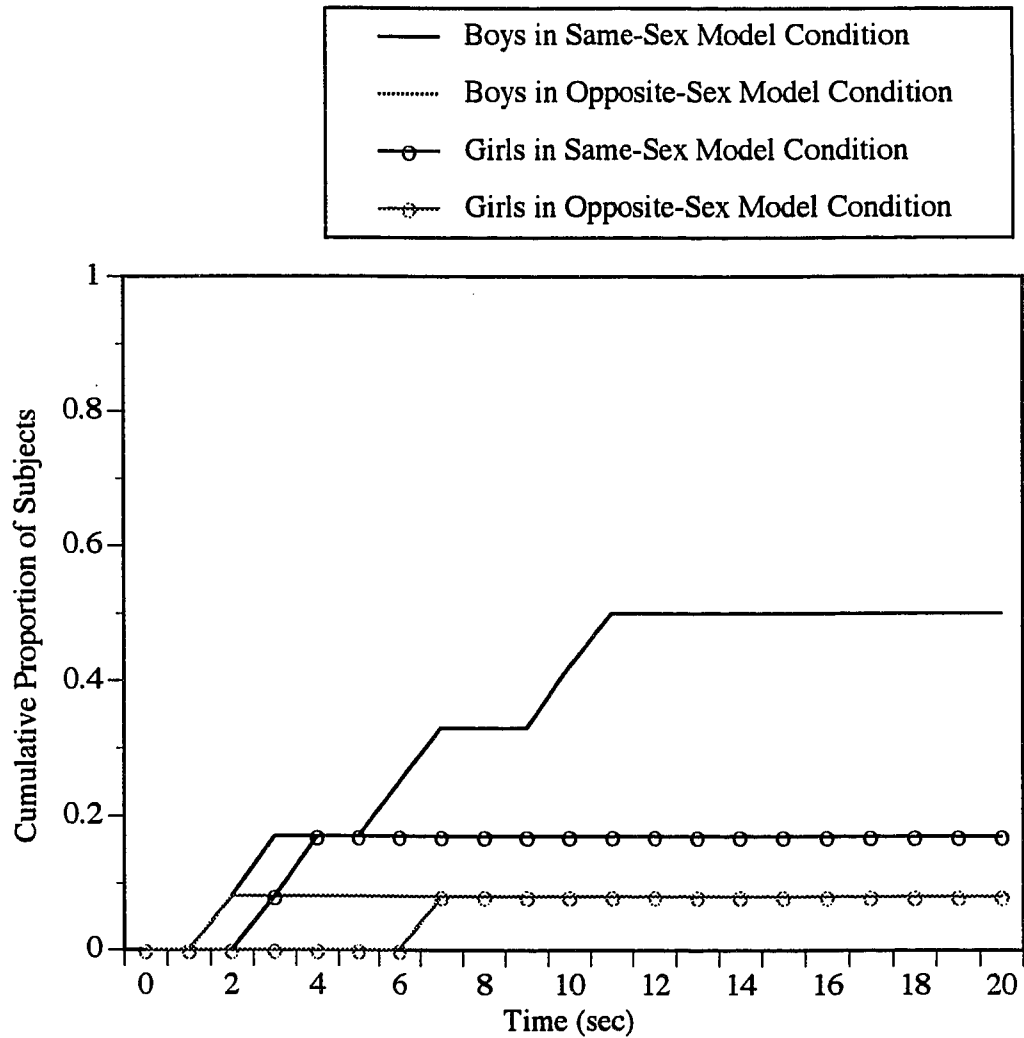


Figure 13. Survival functions for the collapsible cup set.

Cumulative proportion functions show the cumulative proportion of 18-month-old boys and girls in each experimental condition who produced the target act of collapsing the cup for each second of the response period.

functions for the boys the most disparate. Figure 13 shows how the function for the boys in the same-sex model condition on the second target act on the collapsible cup set was different from all the others.

Summary of survival analyses. The survival analyses conducted on the 18-month-olds' data yielded the strongest results supporting an effect of observing same-sex models versus opposite-sex models. Consistent with the chi-square and loglinear analyses, the results were stronger for boys than for girls. The ability of the comparisons to take into account both yes/no codes and latency discriminated between boys who observed same-sex models and boys who observed opposite-sex models on additional sets of test objects that the other analyses had not uncovered. On four of the six sets of test objects, boys who observed same-sex models produced the more "imitative" acts (as compared to the low spontaneous rates of production in baseline) significantly more often and earlier in the response period than boys who observed opposite-sex models. This is reflected in the cumulative proportion graphs of Figures 10-13, where the data of the boys who observed boys form the highest lines on all four graphs.

Conclusions of Results for 18-Month-Old Subjects

The results for the 18-month-old subjects consistently showed differences in the behavior of boys who observed same-sex models versus boys who observed opposite-sex models. The boys who observed same-sex models were more likely to imitate specific target acts (such as placing a peg in a block and hammering, pouring with a pitcher, or collapsing a cup), and they were faster at imitating what they observed than boys who observed opposite-sex models. Girls who observed same-sex models showed a difference on only one of the test object sets used in this experiment (the hammer set), being marginally more likely to produce the target act of placing the peg in the block and produce it earlier in the response period than girls who observed opposite-sex models. Without other evidence for the girls' behavior being influenced by same-sex versus opposite-sex models, this finding is not enough to conclude an effect for girls. The boys' data is stronger, and supported by a variety of analyses. It is clear that the 18-month-old boys were influenced by the sex of the models they observed.

24-Month-Old Subjects

Analyses on Total Score: Number of Target Acts Produced (from 0-18)

Experimental conditions versus baseline control condition. The total score of subjects in the two model conditions combined ($M = 11.69$, $SD = 3.62$) was significantly different from the total score of subjects in the baseline control condition ($M = 5.17$, $SD = 1.95$), $t(58) = 6.01$, $p < .01$. The means for the total scores of the 24-month-old subjects in each condition can be seen in Table 16. In order to directly assess the effect of observing same-sex versus opposite-sex models, the following analysis excluded data from subjects in the baseline control condition (although their data are included in Tables and Figures for comparison).

Table 16

Means and Standard Deviations for Total Scores of 24-Month-Old Subjects in Each Condition

Condition	<u>M</u>	<u>SD</u>
Experimental ($n = 48$)	11.69	3.62
Same-sex model ($n = 24$)	10.92	3.72
Opposite-sex model ($n = 24$)	12.46	3.41
Baseline control ($n = 12$)	5.17	1.95

Note. Maximum score = 18.

Same-sex model versus opposite-sex model condition. A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) x 6 (test object set) mixed ANOVA for number of target acts produced (test object set is the repeated measure) found a significant within-subjects effect for test object set, $F(5, 220) = 7.09$, $p < .001$, with no other significant effects or interactions, $ps > .10$. This indicates that subjects behaved differently on individual test object sets, but not based on their sex or the sex of the models

they observed. The means for the total scores of the 24-month-old boys and girls in each condition can be seen in Table 17, and in Figure 14.

Table 17

Means and Standard Deviations for Total Scores of 24-Month-Old Boy and Girl Subjects in Each Condition

Condition	Sex of subject			
	Boys		Girls	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Same-sex model ($\underline{n} = 24$)	12.08	3.09	9.75	4.05
Opposite-sex model ($\underline{n} = 24$)	12.50	3.42	12.42	3.55
Baseline control ($\underline{n} = 12$)	5.67	1.37	4.67	2.42

Note. Maximum score = 18. There were equal numbers of boys ($\underline{n} = 12$) and girls ($\underline{n} = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($\underline{n} = 6$) and girls ($\underline{n} = 6$) in the baseline control condition.

Chi-Square Analyses on Dichotomous Scores on the Sets of Test Objects

Experimental conditions versus baseline control condition. Table 18 presents the yes/no data for all target acts and sequences on each test object set across conditions for 24-month-old subjects. Chi-square analyses comparing the experimental conditions to the baseline control condition yielded significant effects for the majority of the target acts. There were only five target acts that were not produced by significantly more subjects in the experimental conditions than subjects in the baseline condition: the first target act on the collapsible cup set, the first target act on the train set, the second target act and the target sequence on the doll set, and the second target act on the tea set, $ps > .10$.

In order to examine each set of test objects as a whole, the yes/no coding for individual

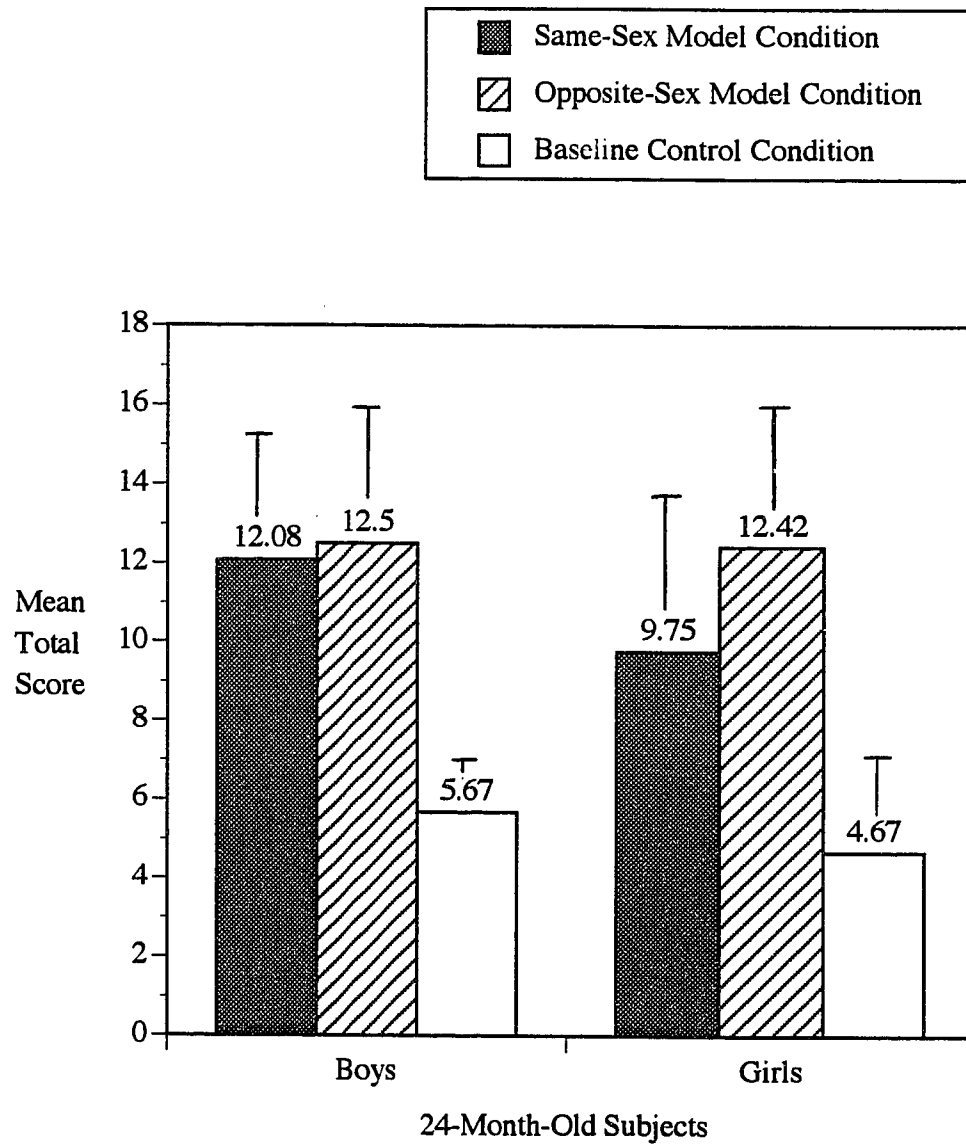


Figure 14. Mean total score (+ 1 SD) for 24-month-old boy and girl subjects. There were equal numbers of boys ($n = 12$) and girls ($n = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($n = 6$) and girls ($n = 6$) in the baseline control condition.

Table 18

Number of 24-Month-Old Boy and Girl Subjects in Each Condition Producing Individual Target Acts and Sequences

Target acts and sequences	Sex of subject					
	Boys			Girls		
	SS ^a <u>n</u> (%)	OS ^b <u>n</u> (%)	B ^c <u>n</u> (%)	SS ^a <u>n</u> (%)	OS ^b <u>n</u> (%)	B ^c <u>n</u> (%)
Hammer set						
First	10 (83)	10 (83)	3 (50)	10 (83)	12 (100)	1 (17)
Second	10 (83)	11 (92)	4 (67)	7 (58)	11 (92)	2 (33)
Sequence	8 (67)	9 (75)	2 (33)	7 (58)	10 (83)	0 (0)
Train set						
First	12 (100)	12 (100)	5 (83)	10 (83)	12 (100)	5 (83)
Second	10 (83)	9 (75)	2 (33)	6 (50)	10 (83)	2 (33)
Sequence	10 (83)	9 (75)	1 (17)	6 (50)	10 (83)	1 (17)
Doll set						
First	10 (83)	11 (92)	5 (83)	10 (83)	12 (100)	3 (50)
Second	3 (25)	7 (58)	2 (33)	6 (50)	6 (50)	3 (50)
Sequence	3 (25)	6 (50)	1 (17)	5 (42)	5 (42)	1 (17)
Tea set						
First	9 (75)	7 (58)	0 (0)	6 (50)	5 (42)	1 (17)
Second	8 (67)	8 (67)	3 (50)	4 (33)	9 (75)	4 (67)
Sequence	3 (25)	6 (50)	0 (0)	3 (25)	4 (33)	0 (0)
Collapsible cup set						
First	9 (75)	12 (100)	4 (67)	10 (83)	12 (100)	5 (83)
Second	7 (58)	8 (67)	0 (0)	8 (67)	8 (67)	0 (0)
Sequence	5 (42)	7 (58)	0 (0)	7 (58)	8 (67)	0 (0)
Pull-apart toy set						
First	10 (83)	6 (50)	2 (33)	4 (33)	5 (42)	0 (0)
Second	9 (75)	6 (50)	0 (0)	4 (33)	5 (42)	0 (0)
Sequence	9 (75)	6 (50)	0 (0)	4 (33)	5 (42)	0 (0)

^aSS = same-sex model, (n = 12). ^bOS = opposite-sex model, (n = 12). ^cB = baseline control, (n = 6).

target acts and sequences was combined across the set of test objects, and a dichotomous score created by comparing low-responding subjects who produced none or only one of the target acts on the set to high-responding subjects who produced both target acts (this group automatically contained those who produced the target sequence as well, because producing the target sequence relied on producing both target acts). Comparing this low/high dichotomous data of 24-month-old subjects from both experimental conditions to data of 24-month-old subjects in the baseline condition, chi-square analyses for each set of test objects yielded significant differences on all sets, $\chi^2(1, N = 60)$, $p_s < .01$, except for the doll set, $\chi^2(1, N = 60) = 0.43$, $p > .50$. The baseline data is presented along with the data for each condition in Table 19. In general, the 24-month-old subjects showed a strong effect of observing the videotape demonstration.

Same-sex model versus opposite-sex model condition. Table 19 and Figure 15 present the data for subjects in the same-sex model condition versus those in the opposite-sex model condition. Chi-square analyses on the dichotomous data of whether or not subjects produced both target acts for each set of test objects as a function of observing same-sex versus opposite-sex models found no significant effects, $p_s > .10$.

Table 19

Number of 24-Month-Old Subjects in Each Condition Who Produced Both Target Acts For Each Set of Test Objects

Condition	Test objects					
	Hammer	Train	Doll	Tea	Cup	Pull
Same-sex model ($n = 24$)	15	16	8	12	12	13
Opposite-sex model ($n = 24$)	20	19	13	12	16	11
Baseline control ($n = 12$)	3	3	4	1	0	0

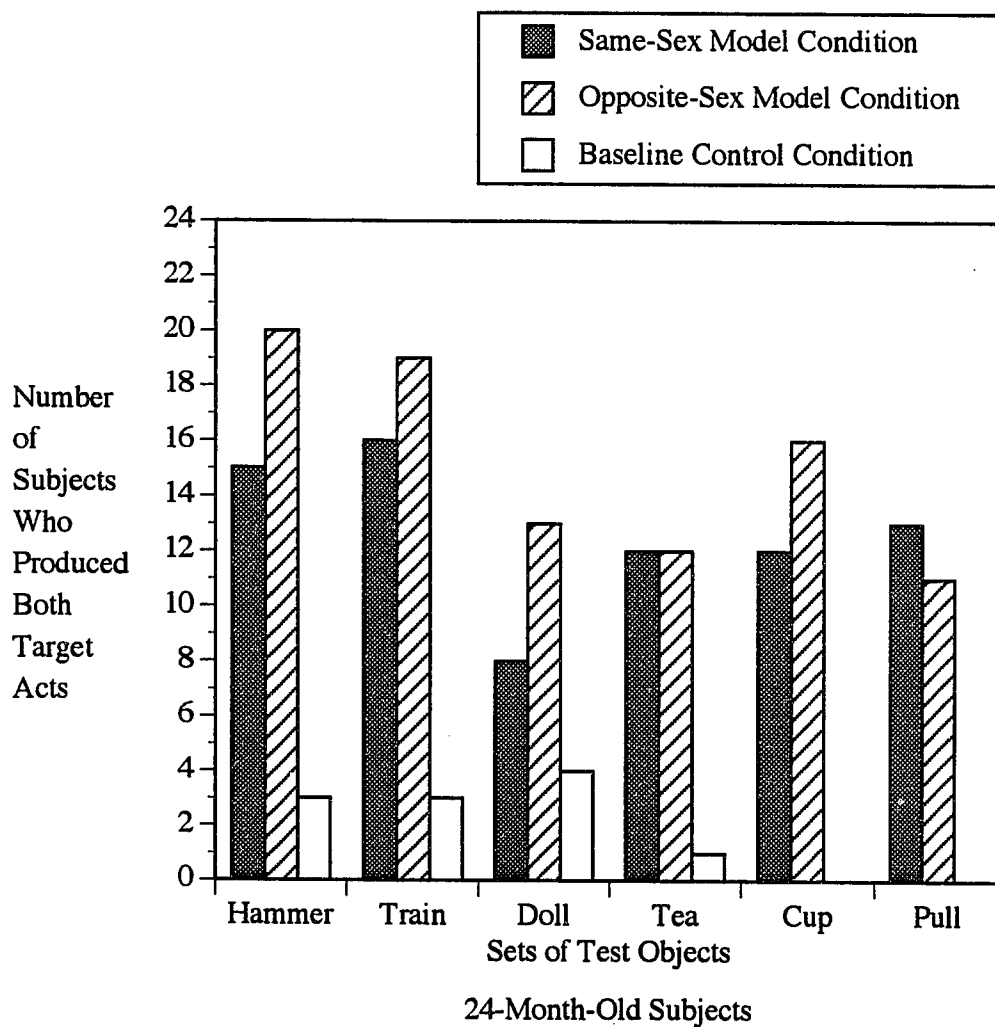


Figure 15. Number of 24-month-old subjects who produced both target acts for each set of test objects in the same-sex model condition ($n = 24$), the opposite-sex model condition ($n = 24$), and the baseline control condition ($n = 12$).

Table 20 and Figure 16 present the dichotomous data for each test object set for the boys and girls in each experimental condition. Chi-square analyses revealed no significant differences in the same-sex versus opposite-sex conditions for either the girls or the boys, $p_s > .15$, with only one trend toward a significant difference for boys on the doll set, $\chi^2(1, N = 24) = 2.74, p < .10$, in the opposite direction from what was predicted.

Table 20

Number of 24-Month-Old Boy (n = 12) and Girl (n = 12) Subjects in Each Condition Who Produced Both Target Acts For Each Set of Test Objects

Condition	Test objects					
	Hammer	Train	Doll	Tea	Cup	Pull
Boys						
Same-sex model	8	10	3	8	5	9
Opposite-sex model	9	9	7	7	8	6
Girls						
Same-sex model	7	6	5	4	7	4
Opposite-sex model	11	10	6	5	8	5

Loglinear Analyses on Dichotomous Data for Each Set of Test Objects

Independence models which predicted that producing both target acts on each test object set was unrelated to experimental condition (same-sex models, opposite-sex models) or sex of subject all fit the data well, as shown in the Likelihood Ratio Chi-square statistics in Table 21. Adding in the effects of experimental condition and sex of subject did not significantly improve the fit. Again the loglinear analyses confirm the findings of the chi-square analyses, both producing no significant results to indicate that the behavior of the 24-month-olds (of either sex) was influenced by the sex of the model they observed.

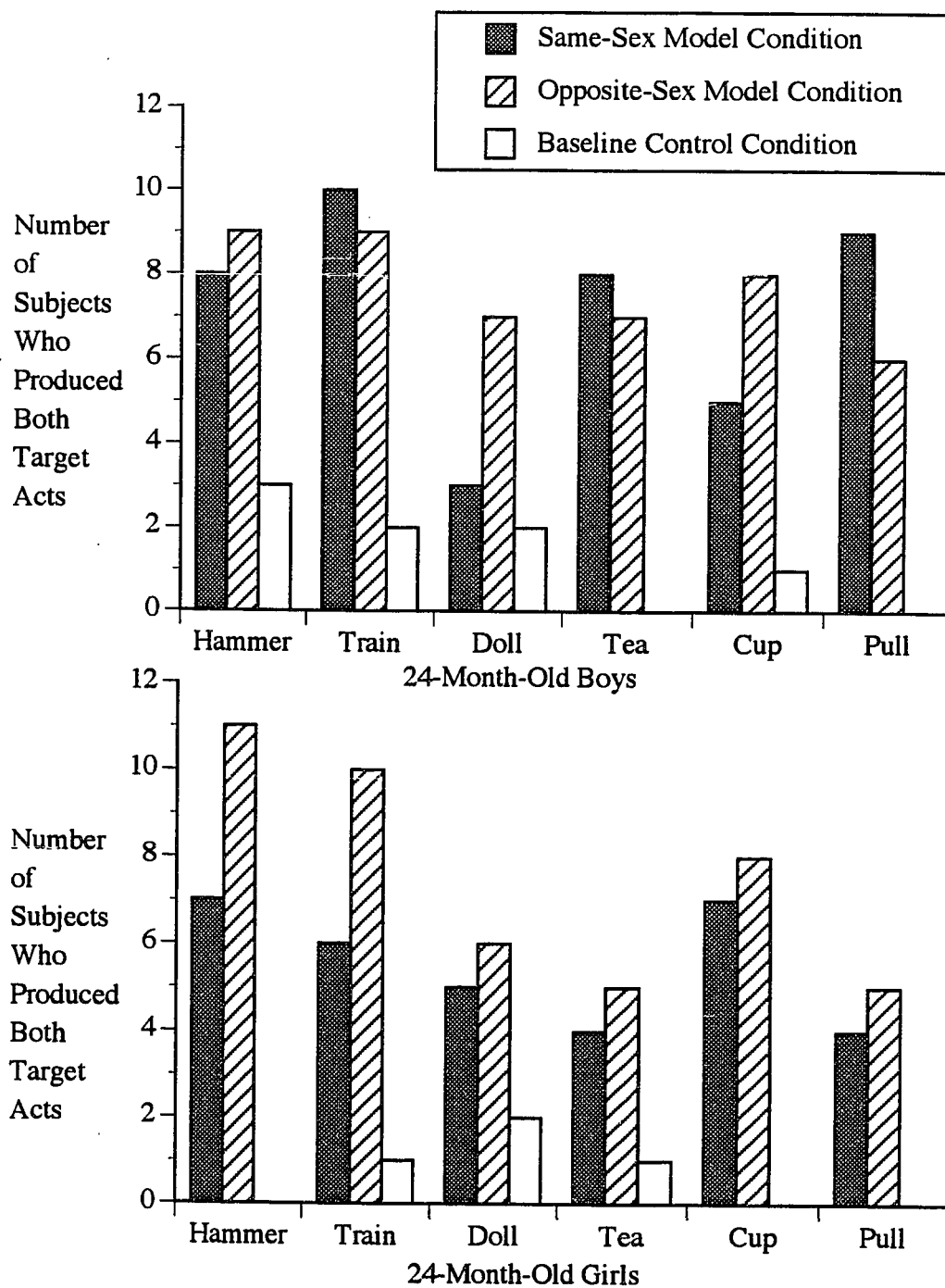


Figure 16. Number of 24-month-old boys and girls who produced both target acts for each set of test objects. There were equal numbers of boys ($n = 12$) and girls ($n = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($n = 6$) and girls ($n = 6$) in the baseline control condition.

Table 21

Loglinear Independence Models on 24-Month-Old Subjects' Data Predicting Production of Both Target Acts on the Sets of Test Object

Sets of test objects	LR chi-square	p value
Hammer	4.12	.249
Train	4.31	.230
Doll	3.06	.383
Tea	3.39	.336
Collapsible cup	2.05	.562
Pull-apart toy	4.83	.184

Note. The higher the p values, the better the model fits the data.

Table 22 presents lambda coefficients for the highest contributing variables in saturated models (models that contained both independent variables and their interaction) for each test object set. Although there were no significant effects for experimental condition or sex of subject, these lambda coefficients reflect the pattern in the data found in other analyses. The lambdas for experimental condition or interactions with experimental condition were all negative, indicating that subjects in the same-sex model condition were somewhat less likely (nonsignificantly so) to produce both target acts on the test object sets than subjects in the opposite-sex model condition. The two lambdas presented for sex of subject (in models for the tea set and the pull-apart toy set) had positive values, indicating that boys may have been more likely than girls to produce both target acts on the tea set and the pull-apart toy set. The frequency data in Tables 19 and 20 also show this pattern.

Table 22

Loglinear Saturated Models on 24-Month-Old Subjects' Data: Highest Contributing Variables

Set of test objects	Variable	Lambda	z score
Hammer	experimental condition	-.31	-1.64
Train	Sex of Subject x Condition interaction	-.27	-1.51
Doll	experimental condition	-.22	-1.46
Tea	sex of subject	.26	1.72
Collapsible cup	experimental condition	-.16	-1.11
Pull-apart toy	sex of subject	.27	1.74

Note. The higher the z scores, the more the particular variable contributes to the model.

Survival Analyses

Survival analyses on latency data of all target acts from the 24-month-old subjects comparing survival functions of the two experimental conditions (same-sex models, opposite-sex models) yielded only one instance of a significant difference: on the first target act on the doll set, the act of unwrapping the baby doll, Lee-Desu Statistic (1) = 4.13, $p < .05$, with median survival times of 4.75 for subjects in the same-sex model condition and 2.83 for subjects in the opposite-sex model condition. There was a marginal difference on the second target act on the hammer set, hammering with the hammer, Lee-Desu Statistic (1) = 3.77, $p < .06$, with median survival times of 8.00 for subjects in the same-sex model condition and 4.67 for subjects in the opposite-sex model condition. In both of these cases, the difference was in the opposite direction from what was predicted. 24-month-old subjects may have been more likely to produce these target acts and to produce them earlier in the response period after observing opposite-sex models compared to same-sex models.

Survival analyses comparing functions of same-sex versus opposite-sex model conditions within each sex of subject found one significant difference for 24-month-old

girls on the second target act on the tea set (stirring with the spoon), Lee-Desu Statistic (1) = 4.54, $p < .05$, and one marginal difference for 24-month-old boys on the first target act on the doll set (unwrapping the doll), Lee-Desu Statistic (1) = 3.25, $p < .08$. Again, in both of these cases, the difference was in the opposite direction from what was predicted, with subjects who observed opposite-sex models having shorter median survival times than subjects who observed same-sex models.

Conclusions of Results for 24-Month-Old Subjects

The 24-month-old subjects clearly showed an effect of observing models—on almost all measures, the data of subjects in the experimental conditions was significantly different from data of subjects in the baseline control condition. However, comparisons on the data from the 24-month-old subjects in the same-sex model condition versus the opposite-sex model condition found few effects. Possible reasons for the lack of preferential same-sex imitation in the 24-month-olds' data will be offered in the Discussion section.

Analyses of Looking Behavior, Siblings, Day Care, Toys at Home, and Verbal Labeling

Looking Behavior

Some of the researchers of gender role development discussed in Chapter 1 (e.g., Slaby & Frey, 1975) hypothesize that preferential same-sex imitation is a result of preferential same-sex attention, i.e., that children imitate more of one sex than the other because they look more at that sex. In order to answer questions about the effect in the current study of the subjects' looking behavior on their subsequent imitative responses, a sample of subjects' videotapes were selected to ascertain the amount of the demonstration that they had actually watched. An independent coder (who was blind to subjects' assignment to condition) examined videotapes of 10 subjects, counterbalanced across experimental conditions and sex of subject. For each of the three separate time segments (each containing demonstrations of two sets of test objects—see Figure 5 in Chapter 3) that the demonstration videotape was playing for each subject, she coded the time (in 0.03-s increments) of eye movements on and off the television screen. Eye movements off the screen were operationalized as horizontal eye or head movements that moved the subject's plane of vision entirely away from the television screen. Eye movements on the screen were operationalized as movements that returned the plane of vision to the television

screen. Duration of looks away from the screen was computed by taking the difference between when a subject's eyes first left the screen and when they returned to the screen. Total looking time was then computed by summing duration of all looks away and subtracting this sum from the duration of the segments of video demonstration. A second coder repeated the coding on the same 10 subjects to allow for assessment of inter-coder agreement. Agreement between coders for total looking time, measured in frames (0.03-s increments) was 99%, with a Kappa coefficient of .83, $N = 44,109$, $p < .001$. Agreement between coders for frequency of looks away from the screen during the segments of the videotape demonstration was 90%, with a Kappa coefficient of .80, $N = 254$, $p < .001$.

The 10 subjects sampled for looking time at the screen had a mean total looking time per segment of videotape demonstration of 42.38 s, $SD = 10.13$. Calculating in the mean amount of time that there was a picture on the screen, $M = 43.82$ s, $SD = 10.83$ (accounting for the times that the screen faded to black), these subjects looked at the screen on average 97% of the time while a stimulus was on ($SD = 3\%$). The range across the 10 subjects was 93%-99%. The mean total time that subjects looked away from the screen while a stimulus was on was 1.44 s, $SD = 1.88$, range = 0.00-7.30, and the mean number of times that subjects looked away from the screen while a stimulus was on was 3.50, $SD = 1.99$, range = 1-7. The mean duration of a single look away from the screen regardless of whether or not the stimulus was on the screen was less than 1 s ($M = 0.87$ s). If a subject is only looking away from the screen for less than a second at a time, it is unlikely that this variable will affect imitative behavior. This will be discussed again in the next chapter.

Siblings

Over all the subjects in this experiment, 48% had no older siblings, 25% had only older brothers, 17% had only older sisters, and 10% had both older brothers and older sisters. (These percentages were equivalent across each age group.) Because having an older same-sex or opposite-sex sibling may influence toddlers' responses to peers, it was necessary to test for effects of older siblings. Correlational analyses within each age, within each experimental condition, and within each sex of subject between subjects' total scores with the number of their older brothers or sisters yielded only one significant result.

The correlation coefficient for the total scores of 18-month-old girls in the same-sex model condition with the number of their older brothers was significant, $r = -.72$, $p < .01$. This was the result of 2 of the 12 girls both having 3 older brothers, and both producing the lowest number of target acts and sequences in the group (only one other girl in this group had an older brother).

Another way to analyze effects of siblings is to look at whether significant results change when subjects with older siblings are compared to subjects without older siblings. The significant differences presented earlier in this Chapter were virtually all between 18-month-old boys who observed same-sex models versus 18-month-old boys who observed opposite-sex models. These results did not appear to be influenced by the presence or absence of older siblings. On the collapsible cup set, for example, in the same-sex model condition, 3 of the 7 boys who had no older siblings and 3 of the 5 boys who did have older siblings produced both target acts. In the opposite-sex model condition, 0 of the 5 boys who had no older siblings and 1 of the 7 who did have older siblings produced both target acts.

Day Care

The majority of the subjects in this sample did not participate in group care settings (64%); of those who did, the majority spent three days a week or more in such settings (26% of all subjects). These percentages were equivalent across age groups. Correlations between total score with amount of day care experience were not significant, $p > .20$.

Again looking at the 18-month-old boys, a comparison of subjects who participated in day care versus those who did not found no meaningful influence. On the collapsible cup set, for example, in the same-sex model condition, 3 of the 4 boys who had day care experience and 3 of the 8 who did not have day care experience produced both target acts. In the opposite-sex model condition, 0 of the 3 boys who had day care experience and 1 of the 9 boys who did not have day care experience produced both target acts.

Toys at Home

Analyses of the effect of toys that subjects had experience with at home which may have been similar to the experimental stimuli found no significant results. Virtually all the parents of the subjects reported that their children played with trains, tools, and kitchen

items at home. Dolls were the only item that were reported to be different (with boys less likely to have dolls than girls) but it was unrelated to imitation scores. For example, boys who had a baby doll at home were no more likely to imitate target acts on the doll set than those who didn't, $p > .20$.

Verbal Labeling

Analyses of the responses subjects made when asked if the models on the videotape were boys or girls included only those subjects who were correct at least two out of three times, and were correct to both of the different wordings of "is this a boy or a girl?" and "is this a girl or a boy?" (The experimenter switched the wording for each question because preliminary testing had shown that subjects this age tended to repeat the last word they had heard.) None of the 18-month-olds met this criterion. Only 9 gave verbal responses to the question: 4 repeated the last word the experimenter said (i.e., switched their reply when the experimenter switched wordings), 3 gave other responses ("here you go", "oh", and "more"), one responded with "guy" (for girl models), and one subject gave his own name, then responded correctly to the next question. Of the 24-month-olds, 24 gave verbal responses, and 5 met the criterion of being correct at least twice. (Eleven repeated the last words the experimenter said, 5 gave other responses such as "baby" or "yeah", 2 called the girl models "boys", and 1 was correct only once.) Of the 5 (out of 48) who appeared able to identify the sex of the models, 2 were girls, 3 were boys; 4 observed boy models, and 1 observed girl models. The number of 24-month-old subjects who clearly demonstrated their ability to identify the sex of their peers was too small to indicate any influence it might have had on preferential imitation of same-sex models.

Chapter V: Discussion

Introduction

This Chapter begins by summarizing the major findings of the main study in three sections: (a) evidence for preferential same-sex imitation, (b) evidence for general imitation from television, and (c) development of imitation from television from 18 months to 24 months of age. Then implications of the primary findings—those of preferential same-sex imitation in 18-month-old boys—will be discussed in terms of consistency with other research on gender role development and possible explanations. Limitations of the findings are explored by sections on the lack of findings for preferential same-sex imitation in 18-month-old girls and 24-month-old boys and girls. The Chapter ends with suggestions for further research, and a general conclusion.

Summary of Results

Preferential Same-Sex Imitation: Same-Sex Model versus Opposite-Sex Model Condition.

In the main experiment reported here, 18- and 24-month-old toddlers observed a videotape of either same-sex or opposite-sex peers demonstrating target acts on six sets of test objects. The subjects were then given the test objects and coded for how many of the target acts they produced. Overall analyses on the total number of target acts produced by subjects found no significant differences between observing same-sex models and observing opposite-sex models. However, in subsequent analyses on individual sets of test objects, clear differences were found. Analyses comparing the responses of subjects who observed same-sex models versus those who observed opposite-sex models found that, for 18-month-old boys, observing same-sex peers increased the likelihood of producing particular target acts significantly more often and earlier in the response period. These results indicate that preferential same-sex imitation is present at 18 months in boys, and is influenced by the nature of the stimuli involved.

For two sets of test objects, the hammer set and the collapsible cup set, there were significant differences between the production of target acts by the 18-month-old boys who observed boy models and the production of target acts by the 18-month-old boys who observed girl models. On the hammer set, the boys who observed other boys were more likely to put the peg in the hole of the block and then also hammer on it, and on the

collapsible cup set, they were more likely to collapse the cup. Eleven of the 12 boys in the same-sex model condition produced both of the target acts on the hammer set, compared to 6 of the 12 boys in the opposite-sex model condition ($p < .05$). Six of the boys in the same-sex model condition produced both of the target acts on the collapsible cup set, compared to one of the boys in the opposite-sex model condition ($p < .05$). These differences were significant in both Chi-Square and Loglinear analyses. Less than half of the boys in both conditions produced both of the target acts on the other four sets of test objects.

The 18-month-old boys who observed boy models also produced several target acts both more often and earlier in the response period than the boys who observed girls. Using survival analysis to take into account both if and when certain target acts were produced, significant differences were found for four out of the six sets of test objects: the hammer set, the train set, the tea set, and the collapsible cup set. On the hammer set, the train set, and the tea set, the boys who observed boy models produced the first target act both more often and earlier in the response period than boys who observed girl models. On the collapsible cup set, the boys who observed boy models produced the second target act—collapsing the cup—more often and earlier in the response period than boys who observed girls. (The target acts mentioned here—those produced significantly more often by boys observing boys versus boys observing girls—are also the target acts that were produced more often and earlier in the response period by subjects in the experimental conditions versus subjects in the baseline control condition.) The only sets that did not elicit this higher imitation by boys in the same-sex model condition were the pull-apart toy set (whose target acts had extremely low rates of production over all subjects) and the doll set.

Both 18- and 24-month-old boys who observed boy models produced fewer target acts on the doll set than those who observed girl models. The preliminary research reported in Chapter 2 found that 19-month-old boys were less likely to play spontaneously with a doll than were girls. Therefore it may be that dolls elicit a less positive reaction from boys at 18 months of age. Observing another boy playing with a counterstereotyped toy may provoke a negative response similar to that of the 3- to 4-year-old boys in the study of Bussey and

Bandura (1992), who went so far as to yell at the boys they observed on television playing with dolls.

Thus several analyses confirmed that 18-month-old boys were demonstrating same-sex preferential imitation. The same analyses found virtually no significant effect for preferential same-sex imitation in 18-month-old girls, and no significant effect for preferential same-sex imitation in 24-month-old boys and girls.

General Imitation: Experimental Conditions versus Baseline Control

An additional, independent group of 18- and 24-month-old toddlers participated in a control condition, in which they were presented with the sets of test objects without observing any demonstration. Analyses comparing the responses of these subjects to the responses of subjects in the experimental groups found that subjects who observed the videotapes produced significantly more of the target acts than the subjects in the control condition. 18-month-old toddlers in the experimental conditions produced 41% of the target acts, compared to 25% for 18-month-old toddlers in the control condition. 24-month-old toddlers in the experimental conditions produced 65% of the target acts, compared to 29% for 24-month-old toddlers in the control condition. The toddlers in the experimental conditions clearly demonstrated their ability to pick up, remember, and act upon information provided on a television screen.

Certain target acts were imitated more than others. The hammer set, tea set, doll set, and collapsible cup set all elicited higher rates of production of target acts from subjects in the experimental groups than from subjects in the control groups. However, there were low rates of production of target acts on the pull-apart toy set (for both 18- and 24-month-olds), and the train set (for 18-month-olds). It is possible that the use of neutral colors on parts of both sets made it more difficult for the toddlers to see the demonstration of the target acts on the television screen. For example, the pull-apart toy contains blocks of unpainted wood, and the train track is also unpainted wood. For very young viewers, these pieces of the stimuli may not have stood out against the background of the table in the videotape. There is reason to believe that some such account is true because of the high rate of imitation (over 75%) of a live demonstration of the same target acts by 18-month-old toddlers in the preliminary research reported in Chapter 2.

Development of Imitation: 18-Month-Old Subjects versus 24-Month-Old Subjects

The use of two age groups in this experiment allowed for examination of developmental effects. Analyses comparing the responses of 18-month-old subjects to those of 24-month-old subjects found that the 24-month-old subjects in the experimental conditions produced significantly more of the target acts than the 18-month-old subjects ($M = 11.69$ versus $M = 7.42$, $t[94] = 5.71$, $p < .001$). On four of the six sets of test objects, the number of 24-month-olds in the experimental conditions who produced both target acts was significantly greater than the number of 18-month-olds, $p < .001$ (the other two sets were the hammer set, $p = .056$, and the tea set, $p > .20$). The 24-month-old subjects in the control condition produced an equivalent amount of target acts to the 18-month-old subjects in the control condition ($M = 5.17$ versus $M = 4.50$, $t[22] = 0.83$, $p > .40$). Also, on each of the six sets of test objects, the number of 24-month-olds in the control condition who produced both target acts was not significantly different from the number of 18-month-olds in the control condition, $p > .20$. Thus the results indicate an increase with age in imitation from a television screen.

Implications

How Preferential Same-Sex Imitation in 18-Month-Old Boys Concurs with Other Research on Early Sex-Role Development

Research on gender schemas. As discussed in Chapter 1, researchers studying gender schemas or memory for gender information consistently report stronger effects for boys than for girls. Boys demonstrated selective recall of gender-consistent over gender-inconsistent information at 25 months, but girls did not (Bauer, 1993). Boys had more difficulty than girls sorting pictures of children with toys correctly at 18 to 26 months when they contained counterstereotyped information (Etaugh & Duits, 1990). Boys recalled more than girls of own-sex scripts over opposite-sex scripts at 36 months (Levy & Fivush, 1993). Thus it is consistent that this research also found an effect on boys' rather than girls' recall of information from same-sex versus opposite-sex models.

Research on sex-typed preferences and behavior. Also as discussed in Chapter 1, researchers consistently find stronger sex-typed preferences in boys than in girls, beginning in preschool and throughout grade-school (Marcus & Overton, 1978; Serbin et.

al., 1993; Turner et al., 1993). They find much stronger avoidance and disapproval of cross-typed toys and activities in boys beginning at 2 years of age (Bussey & Perry, 1982; O'Brien et al., 1983; Perry & Bussey, 1979). Boys are the first to show preferences for sex-typed toys as early as 15 months of age (Fagot et al., 1986; O'Brien & Huston, 1985; Perry et al., 1984), and alone develop the distinctive rough-and-tumble play at 18 to 24 months of age (Lloyd & Duveen, 1989). There is no comparable distinctive behavior for girls that appears at this age. Girls may be the first to show affiliation with same-sex peers, but boys rise to higher levels of same-sex affiliation by 66 months (LaFreniere et al., 1984). (Indeed, Maccoby [1988] has suggested that the initial same-sex affiliation of girls may be an avoidant response to the increase in aggressiveness in boys around the age of 18 to 24 months.) In the preliminary research discussed in Chapter 2, it was also only the boys who showed differences in their spontaneous play compared to their imitative play. These 19-month-old boys appeared to avoid dolls when given a choice of toys to play with, whereas girls played with all toys. They fed a baby doll with a bottle only after observing a demonstration, whereas the majority of girls did so both before and after. Thus, it is also consistent that this research found a difference between boys and girls in their responses to different target acts and test objects (e.g., 18-month-old boys in both conditions produced more target acts on the hammer set than girls in the same conditions), and that this differential response was further influenced by the sex of the model.

Research on self-categorization. Girls often demonstrate knowledge of labels at younger ages and at greater levels than boys (3-year-olds and genital knowledge, Bem, 1989; 2-year-olds and verbal labels, Lloyd, 1987; 2-year-olds and verbal labeling, Weinraub et al., 1984). It is possible that this early verbal labeling leads to early affiliation. However, the findings of same-sex preferential looking at 12 months of age (Kujawski & Bower, 1993; Lewis & Brooks, 1974) may place self-categorization (as measured by visual preference) well before the development of verbal labeling abilities and even pictorial sorting. Interestingly, the findings of Kujawski and Bower were stronger for girls than for boys—it was only the girls who showed a significant increase in the duration of the first look towards a same-sex peer (although the difference for boys was in the same direction). Lewis and Brooks reported a similar result: Their findings of preferential-looking towards

same-sex peers were also stronger for girls than for boys (at 9 to 18 months). It may be that girls show a perceptual preference for same-sex peers before boys, but because of cultural differences in the importance of sex-appropriate behavior for boys and for girls (e.g., Jacklin et al., 1984), boys may be the first to show self-categorization in such overt nonverbal behavior as preferential same-sex imitation.

Research on same-sex preferential imitation. The majority of the studies that have looked at same-sex versus opposite-sex imitation find stronger effects for boys than for girls, in subjects as young as 3 years of age (Bussey & Perry, 1982; Grusec & Brinker, 1972; Perry & Bussey, 1979; Slaby & Frey, 1975). Thus the present finding of preferential same-sex imitation only in boys is consistent with the literature. Whatever it is that creates the motivation to take on the behavior of same-sex others, it seems to be present in 18-month-old boys.

The motivation to imitate others may be explained as a recognition of similarity. Just as Kujawski and Bower (1993) hypothesized that same-sex preferential looking in 12-month-olds is driven by a recognition of similarity between self and other, imitation in toddlers is also hypothesized to be a recognition of similarity with others in general (Meltzoff & Gopnik, 1993), or even a declaration of similarity with other toddlers (as in the work of Eckerman and Stein, 1982, 1990, on peer imitation as nonverbal conversation). As Bower states, "Imitation itself could be driven by a desire for the comfort of familiarity" (1989, pp. 138). Meltzoff (1990a) found that 14-month-old toddlers were more likely to look and smile at adults who were imitating them, indicating that the detection of similarity is active even before toddlers recognize the features of their own face in a mirror. Movement seems to play a key role in detecting similarity in the imitation research of both Bower (1989) and Meltzoff (1990a, 1993). Thus the use of videotaped demonstrations of the behavior of boys versus girls, which contain posture and movement in addition to feature cues to indicate the sex of the model, may lead to early identification with one sex over another for 18-month-old boys. This research supports the hypothesis that an overt behavioral manifestation of gender identification is present in 18-month-old boys. Boys, but not girls, demonstrated early gender identity by imitating same-sex peers. This might derive from the fact that males have higher status than females in our culture.

Possible Explanations

Selective attention hypothesis. In Bandura's (1986) model of observational learning, he places a central emphasis on the role of attention. People exert control over who and what they pay attention to. What they imitate depends at least in part on what they choose to attend to. In line with research on gender schemas and effects on the processing of gender-consistent versus gender-inconsistent information, researchers have theorized that children develop selective attention to same-sex models just as they seem to develop selective attention to gender-consistent information, and differential imitation is the result (e.g., Slaby & Frey, 1975). Using this explanation, children showing more imitation of same-sex peers are still imitating everything they observed—the limitation is on what they choose to observe. The implication for the current findings would be that the 18-month-old boys who observed boy models were not more motivated to imitate what they had observed. Instead the boys who observed girl models simply observed less of what was going on and so did not learn the target acts.

As discussed in Chapter 1, researchers have directly tested the selective attention hypothesis in older children using videotaped recordings of eye movements and EEG recordings (compared to the live recording of eye movements of Slaby & Frey, 1975). Their results have shown little or no difference in what children pay attention to when simultaneously shown videotapes of models of both sexes (Bryan & Luria, 1978; Grusec & Brinker, 1972). These researchers hypothesize that the schematic processing effect is located in recall or output of information rather than the input. Children learn what behavior is appropriate for both sexes, because part of the process of identification with one category is rejection of the other (Bussey & Perry, 1982; Bandura, 1986; Perry & Bussey, 1979). Children must know which behaviors are appropriate for themselves as well as which behaviors are inappropriate. However, the research on same-sex preferential looking in infants (Kujawski & Bower, 1993; Lewis & Brooks, 1974) suggests that selective attention may function at very young ages.

The current experiment was not designed to test the selective attention hypothesis (subjects were not given a choice of which to watch—they observed models of only one sex—and their looking behavior was not completely voluntary in that they were

periodically reminded to watch the television screen). However, to try to address the idea that selective attention may have played a role in producing differential imitation in the 18-month-old boys, an independent coder examined the looking behavior (eye movements on and off the television screen) of a subsample of subjects. The results, as discussed in Chapter 4, show an extremely high percentage of looking time while the stimuli were on the screen, over all the different conditions. Subjects looked at the screen on average 97% of the time while a stimulus was on, with a standard deviation of 3% across subjects. The high percentage of time spent looking at the stimuli and the low variability across subjects lead to the conclusion that the subjects in this experiment were not demonstrating selective attention (by selectively looking away from the one model present). It seems clear from the looking behavior of subjects in this research that they observed enough behavior of both sexes of models to permit encoding.

Parental sex-typing. There is evidence that parents are fostering the acquisition of gender-appropriate behavior and knowledge in toddlers (Fagot & Leinbach, 1989; Caldera et al., 1989). Thus it is reasonable to hypothesize that preferential same-sex imitation may be a result of parental pressure to respond differentially to same-sex peers. It is possible that parents label gender for their children when in the company of peers, and also possible that parents seek out same-sex companions for their children. This may be even more true for boys than for girls, given the findings that parents generally engage in greater sex-typing with boys than with girls as young as 18 months (Jacklin et al., 1984; Caldera et al., 1989). Thus when boys observe boy models demonstrating target acts, they may recognize them as members of a particular category that parents have stressed as important. This does not necessarily imply that they are placing themselves in the category as well.

This research did not include any measures of parents' behaviors or attitudes, except one brief assessment of the kind of toys parents provided for their children (which did not differ across gender). Thus analyses relating subjects' responses to parental attitudes cannot be undertaken (for example, to ascertain whether boys who had the highest rates of production of target acts after watching boy models also had parents with stronger gender-stereotyped attitudes). Informal conversations with parents usually elicited comments of a more flexible nature, such as a prediction that their child would not differentiate between

same-sex and opposite-sex peers, or that their child had companions of both sexes, or, frequently, that the parents themselves did not yet refer to other children as boys and girls but rather called them "babies." (This was usually mentioned after the subject had failed to verbally identify the boys and girls on the videotapes—parents would suggest alternatives, such as "sister" or "brother" if there were older siblings.) Although some research has reported effects for parental sex-typing on early labeling or toy preferences, other research found none, especially for toddlers under 2 years of age (for reviews see Maccoby, 1988; Stern & Karraker, 1989). It may well be that parents are fostering preferential same-sex imitation in their young sons. However, this research does not supply evidence to either support or refute such a claim.

Limitations

Lack of Preferential Same-Sex Imitation for 18-Month-Old Girls

There were no findings of preferential imitation in 18-month-old girls. Girls who observed same-sex models produced about the same number of target acts ($M = 7.33$) as those who observed opposite-sex models ($M = 7.00$). There was one difference on a particular set of test objects (the hammer set), which is not enough to counter the general lack of significance. The conclusion for girls is that sex of model had little effect on imitative behavior.

This result is consistent with the literature in the field, fitting in with other research that shows reduced effects of experimental manipulations for girls (as discussed in terms of stronger effects for boys in Chapter 1 and a previous section of this chapter). The less stereotyped behavior of girls in toy and activity preferences, combined with the less rigid expectations of appropriate behavior from parents, support the conclusion that girls are less affected than boys by sex of model. As mentioned earlier, the research directly testing imitation of same-sex versus opposite-sex models in 3- to 5-year-old children reported lower effects of sex of model for girls than for boys (Barkley et al., 1977; Bussey & Bandura, 1984). Thus, a lack of findings for girls is compatible with the significant effects for 18-month-old boys.

Lack of Preferential Same-Sex Imitation in 24-Month-Olds

There were no significant findings of preferential imitation in the 24-month-old data,

for either boys or girls. None of the measures—amount of imitation overall, imitation on one particular set of test objects versus another, and latency measures of imitation—showed any effect of observing same-sex models versus opposite-sex models for these subjects. The few marginal differences in the results all indicated that the 24-month-olds may have been less likely to imitate same-sex models than opposite-sex models in this experiment.

One possible reason for the lack of preferential same-sex imitation in the 24-month-olds may be the age of the models. The models used in the demonstration videotapes had an average age of 19 months. None were older than 20 months. To the 24-month-old subjects, the models on the television may have been perceived as considerably younger (or less competent) than themselves. Although a difference of 4 to 5 months may not change peer status for older children, it is plausible that it makes a sizable difference to a 2-year-old. Consider the difference in the standardized Mental Development Index (MDI) from the Bayley Scales of Infant Development (Bayley, 1969) for the same score for a 19-month-old and a 24-month-old: a score of 128 yields an MDI of 100 for a 19-month-old, an MDI of 72 for a 24-month-old. Thus the same behavior that is "average" for a 19-month-old would be 4 points away from "delayed" for a 24-month-old (using the standard deviation of 16 for the MDI, and a classification of scores more than 2 standard deviations below the mean indicating developmental delay).

There is a sizable field of research on peer imitation in older children that discusses the effects of the age of the model (e.g., Brody & Stoneman, 1985; Hartup & Lougee, 1975; Musser, Graziano, & Moore, 1987; Schunk, 1987). In general, children are less likely to imitate models younger than themselves compared to same-age or older models. However, both age and sex of model effects interact with the perceived competency or status of the model. When models are perceived as more competent than the subject, or of elevated status, sex and age effects attenuate. Because of the nature of the demonstration videotapes—models demonstrating target acts that neither 18-month-olds nor 24-month-olds were likely to produce on their own—it is possible that subjects perceived the models as competent. This may explain why there was an overall high level of imitative responses from the 24-month-olds to models who were actually younger than themselves. But if the

age information was attenuated by the perceived competency of the models, then sex information may have been attenuated also. Evidence supporting attenuation of sex of model effects by status effects can be seen in Bussey and Bandura's (1984) exploration of the effects of social power and sex of model with 3- to 5-year-olds. They found that when female models were portrayed as in power over a social situation (in comparison to a males-in-power and a no-power condition), both boy and girl subjects imitated female and male models equally. It is possible that the interaction of age, status, and sex of model in relation to the 24-month-olds dampened preferential same-sex imitation for these subjects.

Another possible reason why there was no preferential same-sex imitation in the 24-month-old data may lie in the high imitative responses and relative ease at which these subjects produced target acts compared to the 18-month-olds. The mean number of target acts produced by the 18-month-olds in both experimental conditions was 7.42; the mean for the 24-month-olds was 11.69 (maximum score = 18). Possible ceiling effects thus may have dampened the individual variability necessary to find preferential imitation.

Future Directions and Conclusions

Future Directions

Several questions remain to be answered in the areas of stimuli, developmental progression, and sex differences. First, it is difficult to ascertain whether the toddler subjects perceived the test objects and target acts as belonging to the same gender-stereotyped categories as adults do. Some objects placed in different categories by adults did not elicit any differential response from either boys or girls overall (e.g., the train set and the tea set). Another categorized by adults as neutral elicited differential responses from boys, depending on whether they observed same-sex models or opposite-sex models (the collapsible cup set). Reactions to the doll set seemed to be in the opposite direction from the main findings (i.e., less imitation after observing same-sex models than after observing opposite-sex models). Future research in this area should add additional measures of enjoyment or length of voluntary play, as well as assessments of gender-stereotyped acts, to gain a better understanding of toddlers' perceptions and categorizing of acts and objects.

Another major question about the nature of the stimuli is determining what cues

communicate the sex of the model to the subject. Detailed analyses of the movements of the toddler models on the videotapes might yield interesting sex differences in physical behavior. In addition, manipulation of featural cues such as hairstyle and clothing might shed light on the use of such cues by the subjects to determine sex.

In addition, the developmental progression of gender identification cannot be established by the results of this research. The lack of differential same-sex imitation for 24-month-olds may be accounted for by a possible interaction with the age of the model. Future research should explore same-sex imitation at various ages in the toddler and preschool years by varying the age of the model in relation to the subjects.

The question of why sex differences appeared in the results of this research is important to answer. Based on the evidence of girls showing visual preferences for same-sex peers at 12 months of age (Kujawski & Bower, 1993; Lewis & Brooks, 1974), and equal abilities to boys in gender labeling and stereotype knowledge by 3 years of age (e.g., Thompson, 1975), the lack of preferential same-sex imitation in 18-month-old girls in the current findings cannot be seen as a lack in ability for girls. It may be possible to find a procedure that motivates girls as well as boys to use imitation to identify with one sex over the other.

Conclusions

The major finding of this research is that 18-month-old boys who observed boy models showed higher amounts and faster speeds of imitative acts than 18-month-old boys who observed girl models, thus demonstrating the ability to identify with their own sex. Consistent with the literature of the field, the boys in the same-sex model condition were also affected by the types of objects they were given, producing more responses with objects such as a hammer and fewer responses with a doll. And consistent with the literature, 18-month-old girls demonstrated little effect of observing same-sex models over opposite-sex models.

This research provides new information important to understanding the development of gender identification in toddlers. By 18 months of age, boys are starting to preferentially use the acts of same-sex peers as a guide to behavior. The fact that 18-month-old boys tend to imitate the actions of other boys more than girls raises the possibility that this imitative process may play an early role in the formation of gender identity and sex differences.

List of References

- Baillargeon, R. (1987). Object permanence in 3 1/2- and 4 1/2-month-old infants. Developmental Psychology, 23, 655-664.
- Bandura, A. (1969). Social-learning theory of identificatory processes. In D. A. Goslin (Ed.), Handbook of socialization theory and research (pp. 213-262). Chicago: Rand McNally.
- Bandura, A. (1986). Social foundations of thought and action: A social-cognitive theory. Englewood Cliffs, NJ: Prentice Hall.
- Barkley, R. A., Ullman, D. G., Otto, L., & Brecht, J. M. (1977). The effects of sex typing and sex appropriateness of modeled behavior on children's imitation. Child Development, 48, 721-725.
- Barnat, S., Klein, P., & Meltzoff, A. N. (1995). Manuscript submitted for publication.
- Bauer, P. J. (1993). Memory for gender-consistent and gender-inconsistent event sequences by twenty-five-month-old children. Child Development, 64, 285-297.
- Bayley, N. (1969). Bayley scales of infant development. Berkeley, CA: The Psychological Corporation.
- Bearman, D. L. (1993, March). Snips and snails or sugar and spice: Gender-based schematic processing in 24-month-old children. Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.
- Bell, N., & Carver, W. (1980). A reevaluation of gender label effects: Expectant mothers' responses to infants. Child Development, 51, 925-927.
- Belsky, J., & Most, R. K. (1981). From exploration to play: A cross-sectional study of infant free play behavior. Developmental Psychology, 17, 630-639.
- Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. Psychological Review, 88, 354-364.
- Bem, S. L. (1989). Genital knowledge and gender constancy in preschool children. Child Development, 60, 649-662.
- Berefelt, G. (1987). Sex differences in scribbles of toddlers: Graphic activity of 18-month-old children. Scandinavian Journal of Educational Research, 31, 23-30.
- 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.
- Bloch, M. N. (1987). The development of sex differences in young children's activities at home: The effect of the social context. Sex Roles, 16, 279-301.

- Bower, T. G. R. (1989). The rational infant: Learning in infancy. New York: W. H. Freeman and Co.
- Brody, G. H., & Stoneman, Z. (1985). Peer imitation: An examination of status and competence hypotheses. Journal of Genetic Psychology, *146*, 161-170.
- Bryan, J. W., & Luria, Z. (1978). Sex-role learning: A test of the selective attention hypothesis. Child Development, *49*, 13-23.
- Bussey, K. (1993, March). Sociocognitive correlates of gender-linked conduct. Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.
- 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.
- Bussey, K., & Bandura, A. (1992). Self-regulatory mechanisms governing gender development. Child Development, *63*, 1236-1250.
- Bussey, K., & Perry, D. G. (1982). Same-sex imitation: The avoidance of cross-sex models or the acceptance of same-sex models? Sex Roles, *8*, 773-784.
- Caldera, Y. M., Huston, A. C., & O'Brien, M. (1989). Social interactions and play patterns of parents and toddlers with feminine, masculine, and neutral toys. Child Development, *60*, 70-76.
- Carli, L. L. (1989). Gender differences in interaction style and influence. Journal of Personality and Social Psychology, *56*, 565-576.
- Charlesworth, W. R., & Dzur, C. (1987). Gender comparisons of preschoolers' behavior and resource utilization in group problem solving. Child Development, *58*, 191-200.
- Combs-Orme, T. (1992). Loglinear analysis in social work research. Journal of Social Service Research, *16*, 105-122.
- Crombie, G., & Desjardins, M. J. (1993, March). Predictors of gender: The relative importance of children's play, games and personality characteristics? Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.
- DeLucia, L. A. (1963). The toy preference test: A measure of sex-role identification. Child Development, *34*, 107-117.
- Dunn, J., & Kendrick, C. (1982). Siblings: Love, envy, and understanding. Cambridge, MA: Harvard University Press.
- Eckerman, C. O., & Stein, M. R. (1982). The toddlers' emerging interactive skills. In K. H. Rubin & H. S. Ross (Eds.), Peer relationships and social skills in childhood (pp. 41-71). New York: Springer-Verlag.
- Eckerman, C. O., & Stein, M. R. (1990). How imitation begets imitation and toddlers' generation of games. Developmental Psychology, *26*, 370-378.

Etaugh, C., & Duits, T. (1990). Development of gender discrimination: Role of stereotypic and counterstereotypic gender cues. Sex Roles, 23, 215-222.

Etaugh, C., Grinnell, K., & Etaugh, A. (1989). Development of gender labeling: Effect of age of pictured children. Sex Roles, 21, 769-773.

Fagan, J. F. (1982). New evidence for the prediction of intelligence from infancy. Infant Mental Health Journal, 3, 219-228.

Fagan, J. F., & Shepherd, P. A. (1982). Theoretical issues in the early development of visual perception. In M. Lewis & L. T. Taft (Eds.), Developmental disabilities: Theory, assessment and intervention (pp. 9-34). New York: SP Medical and Scientific Books.

Fagan, J. F., & Singer, L. T. (1979). The role of simple feature differences in infants' recognition of faces. Infant Behavior and Development, 2, 39-45.

Fagot, B. I. (1985). Changes in thinking about early sex role development. Developmental Review, 5, 83-98.

Fagot, B. I., & Leinbach, M. D. (1989). The young child's gender schema: Environmental input, internal organization. Child Development, 60, 663-672.

Fagot, B. I., & Leinbach, M. D. (1993). Gender-role development in young children: From discrimination to labeling. Developmental Review, 13, 205-224.

Fagot, B. I., Leinbach, M. D., & Hagan, R. (1986). Gender labeling and the adoption of sex-typed behaviors. Developmental Psychology, 22, 440-443.

Fein, G. G. (1981). Pretend play in childhood: An integrative review. Child Development, 52, 1095-1118.

Fein, G., Johnson, D., Kosson, N., Stork, L., & Wasserman, L. (1975). Sex stereotypes and preferences in the toy choices of 20-month-old boys and girls. Developmental Psychology, 11, 527-528.

Fenson, L. (1984). Developmental trends for action and speech in pretend play. In I. Bretherton (Ed.), Symbolic play: The development of social understanding (pp. 249-270). New York: Academic Press.

Field, T. (1982). Same-sex preferences of preschool children: An artifact of same-age grouping? Child Study Journal, 12, 151-159.

Freud, S. (1953). Three essays on the theory of sexuality. In J. Trachey (Ed. and Trans.), The standard edition of the complete psychological works of Sigmund Freud (Vol. 7, pp. 125-245). London: Hogarth Press. (Original work published 1905)

Frey, K. S., & Ruble, D. N. (1992). Gender constancy and the "cost" of sex-typed behavior: A test of the conflict hypothesis. Developmental Psychology, 28, 714-721.

Gelman, S. A., Collman, P., & Maccoby, E. E. (1986). Inferring properties from categories versus inferring categories from properties: The case of gender. Child Development, 57, 396-404.

Grusec, J. E., & Brinker, D. B., Jr. (1972). Reinforcement for imitation as a social learning determinant with implications for sex-role development. Journal of Personality and Social Psychology, 21, 149-158.

Hanna, E., & Meltzoff, A. N. (1993). Peer imitation by toddlers in laboratory, home, and daycare contexts: Implications for social learning and memory. Developmental Psychology, 29, 701-710.

Hartup, W. W., & Lougee, M. D. (1975). Peers as models. School Psychology Digest, 4, 11-21.

Hay, D. F., Caplan, M., Castle, J., & Stimson, C. A. (1991). Does sharing become increasingly "rational" in the second year of life? Developmental Psychology, 27, 987-993.

Holman, J., & Williamson, A. (1979). Sex labeling: Adult perceptions of child behavior. Australian Journal of Early Childhood, 4, 41.

Howes, C. (1988). Same- and cross-sex friends: Implications for interaction and social skills. Early Childhood Research Quarterly, 3, 21-37.

Humphreys, A. P., & Smith, P. K. (1987). Rough and tumble friendship and dominance in school children: Evidence for continuity and change with age in middle childhood. Child Development, 58, 201-212.

Huston, A. C. (1985). The development of sex typing: Themes from recent research. Developmental Review, 5, 1-17.

Jacklin, C. N., DiPietro, J. A., & Maccoby, E. E. (1984). Sex-typing behavior and sex-typing pressure in child/parent interaction. Archives of Sexual Behavior, 13, 413-425.

Kohlberg, L. (1966). A cognitive-developmental analysis of children's sex-role concepts and attitudes. In E. E. Maccoby (Ed.), The development of sex differences (pp. 82-173). Stanford, CA: Stanford University Press.

Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In D. A. Goslin (Ed.), Handbook of socialization theory and research (pp. 347-480). Chicago: Rand McNally.

Kuhn, D., Nash, S. C., & Brucken, L. (1978). Sex role concepts of two- and three-year-olds. Child Development, 49, 445-451.

Kujawski, J. H., & Bower, T. G. R. (1993). Same-sex preferential looking during infancy as a function of abstract representation. British Journal of Developmental Psychology, 11, 201-209.

La Freniere, P., Strayer, F. F., & Gauthier, R. (1984). The emergence of same-sex affiliative preferences among preschool peers: A developmental/ethological perspective. Child Development, 55, 1958-1965.

Lamb, M. E., & Roopnarine, J. L. (1979). Peer influences on sex-role development in preschoolers. Child Development, 50, 1219-1222.

Langlois, J. H., Gottfried, N. W., & Seay, B. (1973). The influence of sex of peer on the social behavior of preschool children. Developmental Psychology, 8, 93-98.

Leinbach, M. D. (1993, March). Which one is the daddy? Children's use of conventionally and metaphorically gendered features to assign gender to animal figures. Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.

Leinbach, M. D., & Fagot, B. I. (1986). Acquisition of gender labels: A test for toddlers. Sex Roles, 15, 655-666.

Leinbach, M. D., & Fagot, B. I. (1993). Categorical habituation to male and female faces: Gender schematic processing in infancy. Infant Behavior and Development, 16, 317-332.

Levy, G. D. (1992, April). Developmental and individual differences in categorization: Implications for early gender-role development. Paper presented at the International Conference on Infant Studies, Miami, FL.

Levy, G. D., & Fivush, R. (1993). Scripts and gender: A new approach for examining gender-role development. Developmental Review, 13, 126-146.

Lewis, M., & Brooks, J. (1974). Self, other, and fear: Infants' reactions to people. In M. Lewis & L. Rosenblum (Eds.), The origins of fear (pp. 195-227). New York: Wiley.

Liben, L. S., & Signorella, M. L. (1993). Gender-schematic processing in children: The role of initial interpretations of stimuli. Developmental Psychology, 29, 141-149.

Lloyd, B. (1987). Social representations of gender. In J. Bruner & H. Haste (Eds.), Making sense: The child's construction of the world (pp. 147-162). New York: Methuen.

Lloyd, B., & Duveen, G. (1989). The reconstruction of social knowledge in the transition from sensorimotor to conceptual activity: The gender system. In A. Gellatly (Ed.), Cognition and social worlds (pp. 83-98). Oxford, England: Oxford University Press.

Lowe, M. (1975). Trends in the development of representational play in infants from one to three years: An observational study. Journal of Child Psychology and Psychiatry, 16, 33-47.

Luke, D. A. (1993). Charting the process of change: A primer on survival analysis. American Journal of Community Psychology, 21, 203-246.

Maccoby, E. E. (1988). Gender as a social category. Developmental Psychology, 24, 755-765.

Maccoby, E. E. (1990). Gender and relationships: A developmental account. American Psychologist, 45, 513-520.

Maccoby, E. E. (1993, March). Trends and issues in the study of gender role development. Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.

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

Maccoby, E. E., & Jacklin, C. N. (1987). Gender segregation in childhood. In H. W. Reese (Ed.), Advances in child development and behavior (Vol. 20, pp. 239-287). New York: Academic Press.

Maltz, D. N., & Borker, R. A. (1983). A cultural approach to male-female miscommunication. In J. A. Gumperz (Ed.), Language and social identity (pp. 195-216). New York: Cambridge University Press.

Mandler, J. M. (1990). Recall of events of preverbal children. In A. Diamond (Ed.), The development and neural bases of higher cognitive functions. New York: Annals of the New York Academy of Sciences, 608, 485-516.

Marcus, D. E., & Overton, W. F. (1978). The development of cognitive gender constancy and sex role preferences. Child Development, 49, 434-444.

Martin, C. L. (1989). Children's use of gender-related information in making social judgments. Developmental Psychology, 25, 80-88.

Martin, C. L. (1993). New directions for investigating children's gender knowledge. Developmental Review, 13, 184-204.

Martin, C. L., & Halverson, C. F. (1983). Gender constancy: A methodological and theoretical analysis. Sex Roles, 9, 775-790.

Martin, C. L., & Little, J. K. (1990). The relation of gender understanding to children's sex-typed preferences and gender stereotypes. Child Development, 61, 1427-1439.

McCall, R. B., Parke, R. D., & Kavanaugh, R. D. (1977). Imitation of live and televised models by children one to three years of age. Monographs of the Society for Research in Child Development, 42 (5, Serial No. 173).

Meltzoff, A. N. (1985). Immediate and deferred imitation in fourteen- and twenty-four-month-old infants. Child Development, 56, 62-72.

Meltzoff, A. N. (1988a). Imitation of televised models by infants. Child Development, 59, 1221-1229.

Meltzoff, A. N. (1988b). Infant imitation after a 1-week delay: Long-term memory for novel acts and multiple stimuli. Developmental Psychology, 24, 470-476.

Meltzoff, A. N. (1990a). Foundations for developing a concept of self: The role of imitation in relating self to other and the value of social mirroring, social modeling, and self practice in infancy. In D. Cicchetti & M. Beeghly (Eds.), The self in transition: Infancy to childhood (pp. 139-164). Chicago: University of Chicago Press.

Meltzoff, A. N. (1990b). Towards a developmental cognitive science: The implications of cross-modal matching and imitation for the development of representation and memory in infancy. In A. Diamond (Ed.), The development and neural bases of higher cognitive functions. New York: Annals of the New York Academy of Sciences, 608, 1-31.

Meltzoff, A. N. (1993). The centrality of motor coordination and proprioception in social and cognitive development: From shared actions to shared minds. In G. J. P. Savelsbergh (Ed.), Advances in Psychology Series: The development of coordination in infancy (pp. 463-496). Amsterdam: Elsevier Science Publishers B.V. (North Holland).

Meltzoff, A. N. (In press). What infant memory tells us about infantile amnesia: Long-term recall and deferred imitation. Journal of Experimental Child Psychology.

Meltzoff, A. N., & Gopnik, A. (1993). The role of imitation in understanding persons and developing a theory of mind. In S. Baron-Cohen, H. Tager-Flusberg, & D. Cohen (Eds.), Understanding other minds: Perspectives from autism (pp. 335-366). Oxford: Oxford University Press.

Meltzoff, A. N., & Moore, M. K. (1992). Early imitation within a functional framework: The importance of person identity, movement, and development. Infant Behavior and Development, 15, 479-505.

Mischel, W. (1966). A social-learning view of sex differences in behavior. In E. E. Maccoby (Ed.), The development of sex differences (pp. 56-81). Stanford, CA: Stanford University Press.

Moller, L. C. (1993, March). Toddler peer preferences: Do opposites attract or do birds of a feather flock together? Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.

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

Money, J., Hampson, J. G., & Hampson, J. L. (1957). Imprinting and the establishment of gender role. Archives of Neurology and Psychiatry, 77, 333-336.

Musser, L. M., Graziano, W. G., & Moore, J. S. (1987). Developmental and contextual influences on the processing of information about peers. Journal of Psychology, 121, 387-400.

Norusis, M. J. (1990). SPSS/PC+ Advanced Statistics 4.0. Chicago, IL: SPSS, Inc.

O'Brien, M., & Huston, A. C. (1985). Development of sex-typed play behavior in toddlers. Developmental Psychology, 21, 866-871.

O'Brien, M., Huston, A. C., & Risley, T. R. (1983). Sex-typed play of toddlers in a day care center. Journal of Applied Developmental Psychology, 4, 1-9.

Pakizegi, B. (1985). Gender classification by infants. The Journal of Genetic Psychology, 146, 135-136.

- Patrick, K., & Richman, C. L. (1985). Imitation in toddlers as a function of motor and verbal aspects of modeling. The Journal of Genetic Psychology, *146*, 507-518.
- Perry, D. G., & Bussey, K. (1979). The social learning theory of sex differences: Imitation is alive and well. Journal of Personality and Social Psychology, *37*, 1699-1712.
- Perry, D. G., White, A. J., & Perry, L. C. (1984). Does early sex typing result from children's attempts to match their behavior to sex role stereotypes? Child Development, *55*, 2114-2121.
- Piaget, J. (1952). The origins of intelligence in children. New York: International Universities Press.
- Poulin-DuBois, D., Serbin, L. A., Kenyon, B., & Derbyshire, A. (1994). Infants' intermodal knowledge about gender. Developmental Psychology, *30*, 436-442.
- Powlishta, K. K., & Maccoby, E. E. (1990). Resource utilization in mixed-sex dyads: The influence of adult presence and task type. Sex Roles, *23*, 223-240.
- Rovee-Collier, C. (1990). The "memory system" of prelinguistic infants. In A. Diamond (Ed.), The development and neural bases of higher cognitive functions. New York: Annals of the New York Academy of Sciences, 608, 517-542.
- Rovee-Collier, C. K., & Sullivan, M. W. (1980). Organization of infant memory. Journal of Experimental Psychology, *6*, 798-807.
- Ruble, D. N., Balaban, T., & Cooper, J. (1981). Gender constancy and the effects of sex-typed televised toy commercials. Child Development, *52*, 667-673.
- Savin-Williams, R. C. (1979). Dominance hierarchies in groups of early adolescents. Child Development, *50*, 923-935.
- Schunk, D. H. (1987). Peer models and children's behavioral change. Review of Educational Research, *57*, 149-174.
- Serbin, L. A., Connor, J. M., Burchardt, C. J., & Citron, C. C. (1979). Effects of peer presence on sex-typing of children's play behavior. Journal of Experimental Child Psychology, *27*, 303-309.
- Serbin, L. A., Moller, L., Powlishta, K., & Gulko, J. (1991, April). The emergence of gender segregation and behavioral compatibility in toddlers' peer preferences. Paper presented at the meeting of the Society for Research in Child Development, Seattle, WA.
- Serbin, L. A., Powlishta, K. K., & Gulko, J. (1993). The development of sex typing in middle childhood. Monographs of the Society for Research in Child Development, *58*, (2, Serial No. 232).
- Serbin, L. A., & Sprafkin, C. (1986). The salience of gender and the process of sex typing in three- to seven-year-old children. Child Development, *57*, 1188-1199.

Signorella, M. L., Bigler, R. S., & Liben, L. S. (1993). Developmental differences in children's gender schemata about others: A meta-analytic review. Developmental Review, *13*, 147-183.

Singer, J. D., & Willett, J. B. (1993). It's about time: Using discrete-time survival analysis to study duration and the timing of events. Journal of Educational Statistics, *18*, 155-195.

Slaby, R. G., & Frey, K. S. (1975). Development of gender constancy and selective attention to same-sex models. Child Development, *46*, 849-856.

Smith, A. B., & Inder, P. M. (1993). Social interaction in same and cross gender preschool peer groups: A participant observation study. Educational Psychology, *13*, 29-42.

Stern, M., & Hildebrandt, K. (1984). Prematurity stereotype: Effects of labeling on adults' perceptions of infants. Developmental Psychology, *20*, 360-362.

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

Thompson, S. K. (1975). Gender labels and early sex role development. Child Development, *46*, 339-347.

Turner, P. J., Gervai, J., & Hinde, R. A. (1993). Gender-typing in young children: Preferences, behaviour and cultural differences. British Journal of Developmental Psychology, *11*, 323-342.

Vogel, D. A., Lake, M. A., Evans, S., & Karraker, K. H. (1991). Children's and adults' sex-stereotyped perceptions of infants. Sex Roles, *24*, 605-616.

Walker-Andrews, A. S., Bahrick, L. E., Raglioni, S. S., & Diaz, I. (1991). Infants' bimodal perception of gender. Ecological Psychology, *3*, 55-75.

Wasserman, G. A., & Stern, D. N. (1978). An early manifestation of differential behavior toward children of the same and opposite sex. The Journal of Genetic Psychology, *133*, 129-137.

Watson, M. W., & Fischer, K. W. (1977). A developmental sequence of agent use in late infancy. Child Development, *48*, 828-836.

Weinraub, M., Clemens, L. P., Sockloff, A., Ethridge, T., Gracely, E., & Myers, B. (1984). The development of sex role stereotypes in the third year: Relationships to gender labeling, gender identity, sex-typed toy preference, and family characteristics. Child Development, *55*, 1493-1503.

Whiting, B., & Edwards, C. P. (1973). A cross-cultural analysis of sex differences in the behavior of children aged three through 11. The Journal of Social Psychology, *91*, 171-188.

Appendix A: Latency Analyses

Introduction

This appendix presents analyses on the latency with which subjects produced target acts: the time in the response period from when the subject first touched the objects to when the target act is produced. Latency proved to be difficult to analyze as a separate measure when few subjects produced particular target acts, and difficult to interpret when analyzed as means. However, these analyses offer supporting evidence to the analyses in Chapter 4 by also finding differences between the behavior of 18-month-old boys in the same-sex model condition versus boys in the opposite-sex model condition.

18-Month-Old Subjects

Analyses on Latency to Produce Target Acts

Experimental conditions versus baseline control condition: Individual target acts. The latency data were the length of time from the beginning of the response period to when subjects produced the target acts (using data only from those subjects who actually produced the target act), measured in 0.03-s increments. These provided another way of comparing imitation in one group versus another. This was demonstrated in the data from this research by comparing latency for a target act that had a high baseline rate of production, such as the first target act on the collapsible cup set (dropping the cube in the cup). The mean latencies for the first target act on the collapsible cup set in the experimental conditions were 2.52, SD = 2.39, and 2.56, SD = 2.36, (for the same-sex model condition and the opposite-sex model condition respectively), which were clearly similar to one another, but the mean latency for the baseline control condition was 5.88, SD = 6.73. An ANOVA comparing the three groups found a significant effect for condition, $F(2, 46) = 3.20, p = .05$.

Target acts that had low baseline rates of production or low imitative rates of production were difficult to analyze in this way. For example, the second target act on the collapsible cup set, collapsing the cup, was produced by only one subject in the baseline control condition, and by only two subjects in the opposite-sex model condition. Without enough subjects in the analysis to provide an estimate of variability, standard parametric tests could not be conducted. Inadequate numbers of subjects thus eliminated tests for the target

sequence on the hammer set, the second target act and the target sequence on the collapsible cup set, the second target act and the target sequence on the train set, the second target act and the target sequence on the doll set, the first target act and the target sequence on the tea set, and both target acts and sequences on the pull-apart-toy set (see Table 10 for the comparison of rates of production in experimental conditions versus baseline control). Of the remaining target acts, the only one besides the first target act on the collapsible cup set that showed a difference was the first target act on the hammer set (placing the peg into the block), $F(2, 38) = 5.74, p < .01$. The latency for the same-sex model condition ($M = 4.85, SD = 4.12$) was significantly different from the latencies for the opposite-sex model condition ($M = 9.60, SD = 5.80$) and the baseline control condition ($M = 11.33, SD = 6.02$), $p < .05$, Tukey's honestly significant difference comparison.

Experimental conditions versus baseline control condition: Mean latencies. When examining mean latencies across target acts in order to increase the numbers of subjects in the analysis, it is difficult to interpret a shorter latency as more imitative behavior. Because of the sequential nature of the target acts, it could be that a subject who produced more target acts (thus classified as more imitative on the basis of his or her score) had a slower mean latency than a subject who produced only the first target act on the sets of test objects. Table 23 presents the mean latencies across all target acts for boy and girl subjects in each condition, and it is clear that the experimental conditions did not differ from the baseline control condition on this measure.

As discussed above, almost all of the first target acts on each set of test objects were produced in sufficient numbers in each condition for latency to be analyzed. Thus a mean latency across the first target acts may be more informative. Table 24 presents the mean latencies across the first target acts of all six sets of test objects for boy and girl subjects in each condition. The means for the experimental conditions were not significantly different from the means for the baseline control condition, $p > .20$.

Same-sex model versus opposite-sex model condition: Individual target acts. The target acts that were produced in sufficient quantity to analyze for latency differences between the experimental conditions were the first target acts on the collapsible cup set and the pull-apart toy set, both target acts on the doll set, and both target acts and the target

Table 23

Mean Latency in Seconds to Produce Target Acts by 18-Month-Old Boy and Girl Subjects in Each Condition

Condition	Sex of subject			
	Boys		Girls	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Same-sex model ($\underline{n} = 24$)	5.44	2.20	6.61	3.31
Opposite-sex model ($\underline{n} = 24$)	7.96	3.45	6.08	2.55
Baseline control ($\underline{n} = 12$)	6.35	4.90	7.82	2.22

Note. Maximum score = 19.99. There were equal numbers of boys ($\underline{n} = 12$) and girls ($\underline{n} = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($\underline{n} = 6$) and girls ($\underline{n} = 6$) in the baseline control condition.

Table 24

Mean Latency in Seconds to Produce the First Target Acts on the Sets of Test Objects by 18-Month-Old Boy and Girl Subjects in Each Condition

Condition	Sex of subject			
	Boys		Girls	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Same-sex model ($\underline{n} = 24$)	3.50	1.42	5.12	3.74
Opposite-sex model ($\underline{n} = 24$)	6.70	4.21	5.34	2.62
Baseline control ($\underline{n} = 12$)	6.03	4.91	5.96	3.32

Note. Maximum score = 19.99. There were equal numbers of boys ($\underline{n} = 12$) and girls ($\underline{n} = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($\underline{n} = 6$) and girls ($\underline{n} = 6$) in the baseline control condition.

sequences on the hammer set, the train set, and the tea set. As stated above, the latency from the same-sex model condition ($M = 2.52$, $SD = 2.39$) did not differ from the latency from the opposite-sex model condition ($M = 2.56$, $SD = 2.36$) on the first target act on the collapsible cup set ($p > .90$). Also as stated above, the latency from the same-sex model condition on the first target act on the hammer set ($M = 4.85$, $SD = 4.12$) was significantly shorter than the latency from the opposite-sex model condition ($M = 9.60$, $SD = 5.80$). A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) ANOVA for latency to produce the first target act on the hammer set yielded a significant effect for condition, $F(1, 31) = 7.62$, $p = .01$, with no effect of sex, and no interaction, $ps > .60$. This was the only target act to show a significant difference between experimental groups. (Although there was a marginal difference on the first target act on the tea set, $t(19) = 1.92$, $p = .07$.)

Same-sex model versus opposite-sex model condition: Mean latencies. Table 23 presents the mean latencies at which boy and girl subjects in the two experimental conditions produced target acts across all sets of test objects. A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) ANOVA for average latency to produce target acts yielded no significant effects, $ps > .10$. As discussed in the previous section, a mean latency across all target acts may not be an appropriate measure to test for group differences. However, mean latency for the first target acts on each set of test objects is more meaningful. Table 24 presents the mean latencies across the six sets of test objects to produce the first target act for each test object set. A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) ANOVA on average latency to produce the first target act across the sets of test objects found a marginal effect for experimental condition, $F(1,44) = 2.93$, $p < .10$, with no other significant effects or interactions, $ps > 1.0$. Examining the means in Table 24, though, raises an interesting comparison: The mean for the boys in the same-sex condition, 3.50, $SD = 1.42$, was almost half the mean for boys in the opposite-sex model condition, 6.70, $SD = 4.21$. The similarity between the girls' means and the large standard deviations may have masked a significant difference between the boys' means. Another way to analyze this difference and lessen the influence of individual variability is to create a dichotomous score of shorter

versus longer latencies by using a cut-off of 5 s (the first quarter of the response period). A comparison of shorter mean latencies for first target acts (under 5 s) versus longer mean latencies (5 s or more) as a function of experimental conditions found a marginal difference in distributions, $\chi^2(1, N = 48) = 3.67, p < .06$: 18 of the 24 subjects who observed same-sex models produced the first target act on each test object set on average under 5 s, compared to 11 of those who observed opposite-sex models. Chi-square analyses within each sex of subject found no significant difference for girls, $\chi^2(1, N = 24) < 1.0$, but did find a significant difference for boys, $p < .05$, Fisher's Exact Test, two-tailed. Ten of the 12 boys in the same-sex model condition had an mean latency for the first target acts on each test object set under 5 s, compared to only 4 of the boys in the opposite-sex model condition.

The analyses of latency data yielded slight effects, but contributed to other analyses by offering supportive evidence. As with the ANOVAs on total score and the chi-square and loglinear analyses, the general findings were of a difference between the behavior of boys in the same-sex model condition versus boys in the opposite-sex model condition, and on only some of the sets of test objects (specifically the hammer set and the collapsible cup set) rather than all.

24-Month-Old Subjects

Analyses on Latency to Produce Target Acts.

Experimental conditions versus baseline control condition: Individual target acts. The following target acts and sequences were produced in sufficient quantity to be analyzed for group differences (see Table 18): both target acts on the hammer set, both target acts and the target sequence on the train set, both target acts and the target sequence on the doll set, the second target act on the tea set, and the first target act on the collapsible cup set. Of these, the only target act that showed a difference in latency between subjects in the experimental conditions and subjects in the baseline control condition was the first target act on the train set, $F(2, 53) = 10.35, p < .001$. The mean for the subjects in the baseline control condition was 6.40 ($SD = 5.95$), compared to 1.77 ($SD = 2.14$) for subjects in the same-sex model condition, and 1.63 ($SD = 1.50$) for subjects in the opposite-sex model condition.

Experimental conditions versus baseline control condition: Mean latencies. Table 25 presents the mean latencies across all target acts for boy and girl subjects in all conditions. It is clear from the data that the means of the subjects in the experimental conditions were not significantly different from the means of the subjects in the baseline control condition, $p > .20$. As discussed in the section on latency measures for the 18-month-old subjects, mean latency across all target acts and sequences may not be an appropriate measure to use to examine group differences. Table 26 presents the mean latency to produce the first target acts for the six sets of test objects for boy and girl subjects in each condition. There was an effect for condition when comparing subjects in the experimental conditions to subjects in the baseline control condition, $F(2, 57) = 5.10$, $p < .05$. The mean for the subjects in the opposite-sex model condition ($M = 2.89$, $SD = 1.63$) was significantly different from the mean for the subjects in the same-sex model condition ($M = 4.62$, $SD = 2.91$), and the mean for the subjects in the baseline control condition ($M = 4.81$, $SD = 2.47$), $p < .05$, Tukey's honestly significant difference comparison.

Same-sex model versus opposite-sex model condition: Individual target acts. All target acts were produced in sufficient quantity by the 24-month-old subjects in the experimental conditions to analyze for latency differences. The only target act that showed a difference between groups was the first target act on the tea set (pouring). A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) ANOVA for latency to produce the first target act on the tea set yielded a significant effect for condition, $F(1, 23) = 7.60$, $p = .01$, with no effect of sex, and no interaction, $ps > .20$.

Same-sex model versus opposite-sex model condition: Mean latencies. A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) ANOVA on the mean latency to produce all target acts found no significant effects, $ps > .10$ (see Table 25).

A 2 (experimental condition: same-sex models/opposite-sex models) x 2 (sex of subject) ANOVA on the mean latency to produce the first target acts across the sets of test objects found a significant effect for experimental condition, $F(1,44) = 6.54$, $p < .05$, with no other significant effects or interactions, $ps > .10$ (see Table 26). A comparison of shorter latencies for first target acts (under 5 s) versus longer latencies (5 s or more) across

experimental conditions did find a significant difference in distributions, $\chi^2(1, N = 48) = 5.17, p < .05$: 14 of the 24 subjects who observed same-sex models produced first target acts on average under 5 seconds, compared to 21 of the 24 who observed opposite-sex models. Chi-square analyses within each sex of subject found no significant difference for girls, $p > .5, \chi^2(1, N = 24)$, but did find a significant difference for boys, $p < .05$, Fisher's Exact Test, two-tailed. Six of the 12 boys in the same-sex model condition had a mean latency for the first target act on each test object set under 5 seconds, compared to all 12 of the boys in the opposite-sex model condition. Note that all these differences were in the opposite direction from what was predicted: 24-month-old boys were faster at producing the first target acts of the sets of test objects after observing opposite-sex models.

Table 25

Mean Latency in Seconds to Produce Target Acts by 24-Month-Old Boy and Girl Subjects in Each Condition

Condition	Sex of subject			
	Boys		Girls	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Same-sex model ($n = 24$)	6.15	2.43	6.92	3.36
Opposite-sex model ($n = 24$)	4.96	2.22	5.76	1.73
Baseline control ($n = 12$)	7.28	2.99	4.99	2.50

Note. Maximum score = 19.99. There were equal numbers of boys ($n = 12$) and girls ($n = 12$) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys ($n = 6$) and girls ($n = 6$) in the baseline control condition.

Table 26

Mean Latency in Seconds to Produce the First Target Acts on the Sets of Test Objects by
24-Month-Old Boy and Girl Subjects in Each Condition

Condition	Sex of subject			
	Boys		Girls	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Same-sex model (<u>n</u> = 24)	4.18	1.75	5.05	3.76
Opposite-sex model (<u>n</u> = 24)	2.23	0.74	3.55	2.01
Baseline control (<u>n</u> = 12)	5.71	2.87	3.90	1.80

Note. Maximum score = 19.99. There were equal numbers of boys (n = 12) and girls (n = 12) in both the same-sex model and the opposite-sex model conditions, and equal numbers of boys (n = 6) and girls (n = 6) in the baseline control condition.

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EDUCATION

University of Washington, Seattle, WA

Ph.D., Developmental Psychology (Minor: Child Clinical Psychology), June, 1995

Dissertation: "Preferential same-sex imitation by toddlers."

Advisor: Dr. Andrew N. Meltzoff

Fellowships: NIH Perceptual Development Traineeship 1987-1988, 1989-1993

Oberlin College, Oberlin, Ohio

B.A., Major: Theater Arts, 1982

RESEARCH EXPERIENCE

Graduate Research Assistant, University of Washington: Office of the Ombudsman, 1995. Principal Investigator: Dr. Lois Price Spratlen.

Designed and performed statistical analyses (SPSS/PC+, DOS version) on survey and client data of workplace mistreatment, contributed to and edited manuscripts for publication, conducted literature reviews.

Graduate Research Assistant, University of Washington: Infant Studies Laboratory, 1987-1994. Principal Investigator: Dr. Andrew N. Meltzoff.

Designed and executed studies of memory, learning, and peer interaction in toddlers. Additional responsibilities included statistical analysis (EXCEL, SPSS/PC+, DOS and Macintosh), written and oral presentations, and training of graduate and undergraduate research assistants.

Psychometrist, University of Washington: Nursing Research Programs, Summer, 1994. Principal Investigator: Dr. Kathryn E. Barnard.

Coded and scored Bayley Scales of Infant Development from videotapes.

Psychometrist, University of Washington: Febrile Seizures Study, 1990-1991.

Principal Investigator: Dr. Stephen I. Sulzbacher.

Administered Stanford-Binet Intelligence Test, Form L-M, WRAT-R, and other assessment measures to a sample of 7-9-year-old children. Responsible for writing test reports.

Undergraduate Research Assistant, University of Washington: Infant Vision Laboratory, 1985-1987. Principal Investigator: Dr. Dominic Finocchio.

Duties included general laboratory support and data analyses on eye movement recordings of 2-month-old infants.

TEACHING EXPERIENCE

Instructor, Department of Psychology, University of Washington: Summer, 1994 and Autumn, 1991.

Psychology 306: Developmental Psychology

Instructor, University of Washington Extension: Winter, 1994 and Summer, 1992.

Psychology 306: Developmental Psychology

Teaching Assistant, Department of Psychology, University of Washington: 1988-1989.

Psychology 217: Probability and Statistics

Psychology 218: Inferential Statistics

Psychology 306: Developmental Psychology

NON-ACADEMIC EXPERIENCE

Head Teacher, Seattle Infant Development Center, Seattle, WA, 1985-1987.

Director: Vikki Pierson.

Supervised care for infants aged 6 weeks through 12 months, helped to design and carry out program policies.

Preschool Teacher, Pike Place Market Child Care Center, Seattle, WA, 1983-1984. Director: Curt Ledford.

Developed and implemented a curriculum for children aged 2-5 years.

MEMBERSHIPS

American Psychological Association

Society for Research in Child Development

International Society for Infant Studies

PUBLICATIONS AND PRESENTATIONS

Hanna, E. (1993). Sex differences in play and imitation in toddlers. Poster presented at the Meeting of the Society for Research in Child Development, New Orleans, LA.

Hanna, E., & Barnat, S. (1994). Sex-role identification in toddlers: Imitation of same-sex versus opposite-sex peers. Poster presented at the 9th International Conference on Infant Studies, Paris, France.

Hanna, E., & Barnat, S. (1995). An example of survival analysis with behavioral data: Computing the hazards of same-sex imitation in toddlers. Poster presented at the Meeting of the Society for Research in Child Development, Indianapolis, IN.

Hanna, E., & Meltzoff, A. N. (1993). Peer imitation by toddlers in laboratory, home, and daycare contexts: Implications for social learning and memory. Developmental Psychology, 29, 701-710.

- Hanna, E., & Meltzoff, A. N. (1991). Learning from others in infant daycare: Remembering and imitating the actions of another. Poster presented at the Meeting of the Society for Research in Child Development, Seattle, WA.
- Hanna, E., & Meltzoff, A. N. (1990). Deferred imitation of peers by 14-month-olds. Paper presented at the 7th International Conference on Infant Studies, Montreal, Quebec.
- Hanna, E., & Meltzoff, A. N. (1989). Peer imitation in the second year of life. Poster presented at the Meeting of the Society for Research in Child Development, Kansas City, MO.