Two-Year-Olds' Discrimination of Gender-Stereotyped Activities

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TWO-YEAR-OLDS’ DISCRIMINATION OF GENDER STEREOTYPED ACTIVITIES

By

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A thesis submitted to the faculty of

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This thesis has been read by each member of the following graduate committee and by majority vote has been found to be satisfactory.

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ABSTRACT

TWO-YEAR-OLDS’ DISCRIMINATION OF GENDER-STEREOTYPED ACTIVITIES

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Master of Science

Two-year-olds’ knowledge of gender-stereotyped tasks was assessed in an experiment that utilized the preferential looking paradigm. The looking times of toddlers’ (N = 18) gazes towards gender-consistent and gender-inconsistent activities were measured and assessed. In the procedure, toddlers viewed either a male or female actor on two displays performing a masculine stereotyped activity (shaving, putting on a tie) on one screen and a feminine stereotyped activity (putting on lipstick, putting on nail-polish) on the other screen. Infants also viewed male and female actors performing gender-neutral activities (eating, drinking water) side by side in control trials. Consistent with our predictions and previous research, the toddlers looked longer at the gender-inconsistent events than the gender-consistent or gender-neutral activities. The results suggest that children have developed some knowledge of gender-stereotyped events by 24 months of age.
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Introduction

The issue of gender stereotyping has received growing attention in the social sciences in the last several decades. Some have argued that the topic cannot be exhausted as the implications of gender stereotyping, sex differences and sex roles are ubiquitous in today’s society, playing a part in a person’s conception of him/herself, the roles society deems acceptable for each gender and the valuation of one gender (and all of the roles associated with it) over the other (Bussey & Bandura, 1999).

As this topic has gained momentum, researchers in the fields of gender research and child development have sought to find answers to the questions surrounding the acquisition and development of gender knowledge. An experiment was conducted to address the issue of whether 2-year-olds possess some knowledge of gender stereotyped behavior. It is believed that the current study provides a meaningful contribution to the fields of gender research and child development by presenting additional evidence of two-year-olds’ knowledge of gender stereotypes.

*Infant studies methodology*

One of the difficulties researchers have faced within the area of infant development is trying to decipher the knowledge, preferences and abilities of an infant, who may have capabilities beyond researches’ ability to detect them. Several methodologies have enabled researchers to more precisely capture what a preverbal infant may know, but does not have the ability to articulate. I believe it is beneficial to
discuss these types of methodologies as a preview to the literature review of infants’ knowledge of gender.

*Habituation: Discrimination*

The habituation study is commonly used in the area of infant research. This methodology is based on the finding that infants will increase their visual fixation in the presence of novelty (Fantz, 1964). A habituation study presents a visual stimulus several times to a subject until he/she becomes habituated (i.e. bored) as evidenced by a decline in looking towards later trials relative to the initial trials. Typically, a 50% decline in initial looking times must be reached in order to consider the infant habituated. Following habituation, the infant is presented with a novel stimulus and dishabituation is assumed when a subject looks at a novel stimulus for a longer period of time than the event of habituation. The inference being made is that an infant can discriminate between the two stimuli, as evidenced by a longer looking time towards the novel stimuli. This methodology was used to assess infants’ ability to discriminate between two stimuli (see Cornell, 1974 and Leinbach & Fagot, 1993 for examples of male/female face discrimination).

*Preferential Looking Paradigm: Preference*

Another type of methodology used is the preferential looking paradigm. In a preferential looking study, an infant is placed in front of two displays and has the option of looking at one of two displays. Through timing the duration of the infant’s gazes towards each display, a researcher can determine which display/event an infant prefers.
The logic behind this type of study is that an infant can indeed discriminate between the two stimuli, as well as show a preference for one of them by looking proportionally longer at one display compared to another. This technique has been used to assess infants’ “knowledge” in a variety of domains, and has been extremely beneficial in the area of gender research. For example, Serbin, Poulin-Dubois, Colburne, Sen, & Eichstedt (2001) used this procedure in assessing toddlers’ preferences for gender stereotyped toys by presenting pictures of dolls and toy vehicles, and found that at 18 months of age girls looked longer at pictures of dolls and boys looked longer at toy vehicles. This methodology can also be used to assess what event an infant finds unfamiliar, as research shows infants increase their looking times at a novel stimulus (Fantz, 1964). One study that used this type of methodology was also conducted by Serbin, Poulin-Dubois & Eichstedt (2002) which measured toddlers’ preferences for gender stereotyped events.

Intermodal Matching

Another type of methodology which utilizes the preferential looking paradigm is that of intermodal matching, which presents an auditory stimulus as well as a visual stimulus, and the infant has the option of looking at the visual display that corresponds with the auditory cue or the visual display on the other screen which does not match. Research has shown that children tend to “match” the auditory and visual stimuli. For example, Poulin-Dubois, Serbin, & Derbyshire (1998) found that 18-month olds looked longer at a visual event (i.e. a face) when the auditory stimulus (i.e. a voice) matched the gender of the visual display. To reiterate, in a simple preferential looking paradigm task, infants tend to look longer at a novel stimulus when presented with two different visual
displays, but in an intermodal matching task, infants look longer at visual displays which match the auditory cue.

**Review of Literature**

**Infant’s Discrimination of Gender**

Research on infants’ discrimination abilities suggests that infants have the ability to develop basic gender categories within the first year of life as infants can distinguish between genders at a very young age. For example, infants are able to distinguish between male and female voices as early as 6 months of age (Miller, 1983). In this study, infants were habituated to the voice of a male or female and were tested to see if they could distinguish between a different voice in the same or other gender category. Infants displayed between-category discrimination (male and female voices), but not within category discrimination (two different female voices) providing evidence that infants have already begun to divide males and females into separate groupings. Infants also begin to discriminate between male and female faces between seven and nine months of age. In a habituation/dishabituation task, nine-month-old infants have been shown to consistently habituate to a series of faces of one sex and generalize habituation to a new face of the same sex but dishabituate to a face of the opposite sex (Cornell, 1974; Leinbach & Fagot, 1993). Similarly, Levy and Haaf (1994) demonstrated that 10-month-olds are able to detect correlations between objects and gender and are thus able to form gender-related categories of social information. In this habituation task, infants were habituated to a male or female face paired with objects associated with the specific gender (hammers and football with males, blow-dryers and frying pans with females). The person-object pairings that followed maintained the pattern of features established in
the habituation stimuli. The novel test stimulus was a person object pair that violated the pattern of features established (e.g., a female face paired with a football) in the habituation stimuli.

In addition to these discrimination tasks, infants show intermodal knowledge of gender between 9 and 12 months of life by matching male/female voices with the corresponding male or female face. In this experiment, infants were shown side-by-side pictures of a male and female face, while a male or female vocal audio prompt was played. Infants spent proportionally more time looking at the faces matching the voice than at the same pictures paired with mismatching gendered voice (Poulin-Dubois, Serbin, Kenyoun, & Derbyshire, 1994). Thus, infants show the ability match genders on the basis of vocal and facial features in the first year of life. This ability to discriminate and match across different sense modalities may serve as a foundation for creating categories of gender.

Another step in the acquisition of gender knowledge is the ability to attach a gendered label to a person. Leinbach and Fagot (1986) demonstrated that toddlers between the ages of 24 months and 30 months were able to provide labels for stereotypically masculine and feminine children and adults in a discrimination task. Toddlers seemed to rely on physical cues such as hair length and clothing style to make the distinction, which could be an indication that the beginnings of gender stereotypes are forming at this age. Other research by Etaugh, Grinnell and Etaugh (1989) argues that children showed a marked increase in gender-labeling ability at 29 months of age. In this preferential looking task toddlers were shown pairs of photographs of girls and boys and subject’s task was to point to the designated target (boy or girl) on each trial and the
majority of children at 29 months of age or older were able to perform this task correctly. In another experiment, females were able to perform a gender-labeling task even earlier (Poulin-Dubois, Serbin, & Derbyshire, 1998). This study presented 18-month-olds with photos of adult male and female faces paired with a female or male voice, or with the labels lady and man. Children spent more time looking at the pictures matching the voices than at the same pictures paired with mismatching voices. However, only girls could match the gender labels to the appropriate faces.

Although infants can distinguish between genders at a young age, it has been a challenge among researchers to determine exactly when gender stereotypes begin to emerge. Some have argued that gender identity, or a person’s personal experience and knowledge of being male or female precedes any knowledge of gender stereotypes or gender-linked preferences and behaviors, but there is much argument in the field about when gender identity emerges (Weinraub, Clemens, Sockloff, Etheridge, Gracely, & Myers, 1984; Thompson, 1975). Gender constancy, or the understanding that gender is something that is stable and cannot be changed according to context, emerges between the ages of 3 and 5 (Lips, 2005). Slaby and Frey (1975) (as cited in Lips, 2005) describe the emergence of gender constancy happening in stages: first, a person must have an understanding of the two genders and the idea of belonging to one of them; next, a knowledge that gender remains stable throughout time; and finally a concept of gender remaining constant across situations and behaviors. Some theorists argue that a child must have incorporated a fully developed notion of gender identity and gender constancy (again between the ages of 3 and 5) into their thought processes before any inferences can be made about what a child knows about gender and gender-stereotyping. However,
more recent research is putting that notion in jeopardy with children in some studies showing preferences for those activities and behaviors that correspond with a child’s gender much earlier than previously thought. In a sequential touching task that measured toddlers’ awareness of gender-typed categories, toddlers who showed the ability to label sex (i.e., gender label) did not demonstrate greater sequential touching of a masculine or feminine gender-typed category than toddlers who could not gender label, thus suggesting that toddlers possess an awareness of gender-typed categories even without the ability to label gender (Levy, 1999).

Some of the earliest evidence of gender stereotyping among infants is displayed through their play behavior and choice of toys. Specifically, early gender differentiation is often expressed as females’ preferences for dolls and males’ preferences for transportation toys (Caldera, Huston, & O’Brien, 1989). Indications of gender stereotyped play can begin as early as 10 months, with girls showing a preference for playing with dolls with their parents (Roopnarine, 1986). In a study conducted by Serbin, Poulin-Dubois, Colburne, Sen, & Eichstedt, (2001) children at 18 months of age showed a preference for looking at gender-stereotyped toys with girls looking longer at pictures of dolls and boys looking longer at toy vehicles. In the same study, 18-month-old females were able to match gender-stereotyped toys with boys’ and girls’ faces,

Researchers have also shown that infants have some knowledge of metaphorical gender-stereotypes at 18 months of age (Eichstedt, Serbin, Poulin-Dubois, & Sen, 2002). In this experiment, infants were shown items that were either conventionally (hammers with males, dresses with females) or metaphorically (bears with males, cats with females) associated with one gender or the other, followed by a picture of a male or female. The
results indicated that 18-month-olds “matched” both the conventional-associated items and metaphorically associated items with the correct gender.

Research has also shown that toddlers have the ability to associate certain activities and tasks with gender by age 2, although their grasp of the concept has increased substantially by age 3 (Kuhn, Nash, & Brucken, 1978). More recent research has evaluated this same concept, and through different methodological strategies provided more substantial evidence of toddlers’ knowledge of the gender stereotyping of household activities (Poulin-Dubois, Serbin, Eichstedt, Sen, & Beissel, 2002). In this study, children were asked to choose a male or female doll to use to imitate gender stereotyped tasks. Females demonstrated knowledge of “feminine” and “masculine” activities at 24 months of age, but males not until 31 months of age.

Utilizing the preferential looking paradigm, one recent study examined children’s acquisition of gender stereotypes. Conducted by Serbin, Poulin-Dubois and Eichstedt (2002), this experiment measured the responses of toddlers to gender-inconsistent events. In an effort to shed more light on the subject of gender-stereotype development, these researchers designed a study displaying an actor performing a gender-consistent activity adjacent to a display with another actor of the opposite gender performing the same activity (a gender-inconsistent activity). The researchers used still photos of a male and female actor performing nine different events: three masculine stereotyped activities (fixing a toy car, taking out the garbage and hammering), three feminine stereotyped activities (putting on make-up, ironing, and feeding a baby) and three neutral activities (reading, putting on shoes and turning on a lamp). Parents of the participants filled out a questionnaire prior to the study indicating whether or not the toddler had seen the
activities and which parent most often performed them. Each of these activities were shown to a toddler on two monitors placed side by side with a male actor on one screen and a female actor on the other. Two audio prompts were used with each event, one male and one female voice asked each toddler “Who is (performing each activity)?” and was repeated for each activity presented during the experiment. The researchers predicted that toddlers would look longer toward the gender-inconsistent activity. The mean looking times for the actors on each activity were then compared. The toddlers showed, as predicted, a preference for looking at a male performing the feminine stereotyped activities. Surprisingly, no significant difference was found in the looking times for the masculine activities as well as a preference for looking at the female during the neutral activities. Thus, the researchers concluded that children have some knowledge of feminine stereotyped activities by 24 months of age. The questionnaires filled out by the parents of the toddlers revealed that the toddlers rarely saw the feminine activities that were used performed by a male, but the children saw males and females perform the task equally in two of the three masculine typed activities.

Statement of Problem

The results yielded by Serbin et al.’s (2002) research are thought provoking, providing evidence that toddlers have some knowledge of gender-stereotypes by age 2, but there are some issues with the methodology/procedure used that warrant empirical scrutiny if we are to accept these findings. Thus, an experiment was conducted to improve upon the methodology of Serbin et al (2002) to more adequately evaluate toddlers’ preference for gender-consistent or gender-inconsistent events.
Proportion of total looking time

Serbin et al. (2002) used a somewhat unconventional method of analysis in examining infants’ preferences for gender-consistent and gender-inconsistent events. Specifically, they used the raw seconds of the looking times towards the events in computing the results. In the majority of studies using the preferential looking method the researcher uses the proportion of total looking time to the event as the dependent variable. This is significant because when the results from Serbin et al.’s (2002) study are converted to a proportion of total looking time, they seem to approach chance. During the feminine-typed activities, toddlers spent 3.62 seconds looking at the male actor and 3.42 seconds looking at the female actor. Taken as a percentage from the total looking time (7.04 seconds) the toddlers looked at the male actor 51% of the time and looked at the female actor 49% of the time. A secondary advantage to using percentages or proportions of total looking times is that as they are standardized they can be more easily compared across studies with different total trial looking times.

Thus, one modification in the current experiment was the use of proportion of total looking time in examining the infants’ preferences for the gender-consistent or gender-inconsistent events. Proportions were derived for each trial/activity separately by dividing the time spent looking to the gender-inconsistent and consistent event by the total time spent looking at both events. Given that chance is equivalent to looking at any one event 50% of the time; toddlers’ looking behavior was compared to the consistent and inconsistent event against chance for each activity.
Dynamic vs. Static Display

Within the area of infant cognition, research shows that infants discriminate between various events at an earlier age in dynamic displays as opposed to static displays (Arterberry & Bornstein, 2002). In the context of gender, infants begin to show intermodal correspondence between the gender of a face and voice in a dynamic display at age 6 months (Walker-Andrews, Bahrick, Raglioni, & Diaz, 1991), but not until 9-to-12-months of age do infants make the association between the gender of a static frame of a face and a matching voice (Poulin-Dubois et al., 1994). Infants also exhibit more reliable discrimination and memory retention of an event when the displays used are dynamic rather than static. That is, infants will attend to a change in faces in a static display, but not in a dynamic display, and attend more reliably to the event or activity being performed in a dynamic display rather than a static frame (Bahrick, Gogate, & Ruiz, 2002). Thus, the participants in Serbin et al. (2002)'s study (which used a static display) may have been attending more to the differing faces of the actors as opposed to the activity being shown. Given that information for an event is more readily perceived by infants viewing a dynamic display (compared to a static display), the current experiment utilized dynamic displays of actors performing activities rather than the still frames (i.e. static display) used by Serbin et al. (2002).

Events/tasks used

The current experiment also set out to modify the events used. Questionnaires filled out by the parents in Serbin et al. (2002)'s study revealed that the masculine stereotyped tasks used were not seen performed by the male parent significantly more
than the female parent. In the task of fixing a toy, 22% of the children saw the act performed mostly by the female parent, 31% saw the act performed mostly by the male parent and 47% of the children observed the activity being performed by both parents equally. The “masculine” activity of taking out the garbage also had similar observation percentages. Thus, the types of “masculine” tasks used may not have been masculine stereotyped enough for the toddlers to find it novel to see a female performing them. In the current study, activities were chosen which were deemed to be more stereotypically associated with one gender or the other. The current experiment used the tasks of putting on lipstick and nail polish (an expansion of one task in Serbin’s et al.’s (2002) study where 97% children observed the activity of putting on makeup being performed mostly by the mother) as the feminine stereotyped activities. The tasks of putting on a necktie and shaving one’s face were used as the masculine stereotyped activities. Pilot testing revealed that these new activities are observed with roughly equal frequency in the homes of the toddlers and are more strongly gender stereotyped (the toddlers will have seen them performed much more by one gender than the other) than the tasks that Serbin et al. (2002) used.

**Voice Cue**

In the experiment conducted by Serbin et al. (2002) a voice cue was used to prompt the toddler to look at the displays (e.g. when the pictures of the actors putting on lipstick were displayed, a voice asking, “Who is putting on make-up?” was played). Two separate trials alternated a male and female voice giving the prompt. Research by Poulin-Dubois et al. (1994) showed that toddlers tend to “match” gendered voices to a gendered
picture, looking longer at female face when a female voice was played. To rule out this potential confound, no audio prompt (i.e. voice cue) was used in the current study.

Bias for looking at females

The final issue addressed within Serbin et al. (2002)’s methodology is the fact that the subject viewed both males and females in each trial. This is significant because in their experiment, the toddlers showed a preference for the female actor (compared to the male actor) on the neutral tasks thus it is unclear whether toddlers’ looking behavior on the gender stereotyped events is affected by the gender consistency/inconsistency or a preference for a female/male actor. The current experiment was designed to control for this possible confound by having the same actor present on both monitors, performing different tasks. This procedure isolated the activity, giving the subject the choice of looking at a gender-inconsistent activity or gender-consistent activity, while controlling for the gender of the actor.

Based on the research of Serbin et al., (2002) it was predicted that the toddlers would spend more time looking at the actor performing the gender-inconsistent event, which arguably is more novel rather than the (commonplace) gender-consistent event. In addition, research shows that infants tend to look longer at “impossible” vs. “possible” events (Baillargeon, 1995). Because a child rarely sees an “impossible” task, it is assumed that its novelty accounts for the fact that they gaze longer at this type of event. Indeed, infants tend to favor looking at a novel stimulus when given the option of familiar or unfamiliar displays (Fantz, 1964).
Purpose

The purpose of this experiment was to assess toddlers’ preference for actors performing gender-consistent or inconsistent events. To control for gender bias (i.e., the toddler looking at the actor of one gender more than the actor of the other gender) which occurred in Serbin et al.’s (2002) study, the toddlers in the current experiment saw either 2 males or 2 females on each trial, where one video event depicted the actor performing a gender-consistent activity and the adjacent monitor presented the same actor performing a gender-inconsistent activity. That is, in Serbin et al.’s (2002) study the activity (masculine or feminine) was held constant across the two monitors, the current experiment held the actor (male or female) constant across the two monitors and what varied across the two monitors is the activity (gender consistent or inconsistent). The toddlers’ looking times towards the gender-consistent or gender-inconsistent event was assessed as a proportion of total looking time.

Hypotheses

Based on the results of Serbin et al. (2002) it was predicted that toddlers would look longer at the inconsistent actor/event pairing compared to the consistent actor/event pairing. It was also predicted that the toddlers looking times would not reliably differ when the actor performed two gender-neutral activities side by or side. Finally, based on previous research documenting females tend to show “knowledge” of gender and gender stereotypes at an earlier age (e.g., Poulin-Dubois et al., 2001 & Poulin-Dubois et al. 2002) it was predicted that females’ looking times to the gender-inconsistent events would be greater than the males looking times toward the gender-inconsistent events.
Method

Participants

Participants were eighteen 24-month olds (9 males and 9 females) whose mean age was 745 days. 100% of the participants were Caucasian. All were healthy, normal, full-term infants. An additional 10 infants participated in the study, but were excluded in the final analysis due to computer failure (n = 2); experimental error (n = 6); fussiness (n = 1); or because of side bias (n = 1). Side bias was defined as infants spending 95% or more of total looking time, across trials on either the left or right screen. Parents of the participants were initially contacted by telephone using a list of birth records obtained from Department of Vital Statistics. The purpose of the experiment was explained to the parent prior to their giving verbal consent for their toddler. Upon arrival at the laboratory the procedures were explained to the parent and the parent had opportunity to ask any questions before providing written consent. All participants were healthy, normal, full term toddlers, as reported by their parents.

Stimuli

Color video displays of two actors, one male and one female, performing six activities were created and filmed specifically for this experiment. The actors have similar hair coloring and complexions, were of the same age range (22-24 years) and dressed similarly, each wearing a white, collared, button up shirt with black slacks for the male and a black skirt for the female. The actors were displayed against a dark blue background. Each actor was filmed performing six activities: two masculine-stereotyped, two feminine-stereotyped, and two gender-neutral activities. The masculine-stereotyped activities consisted of the actors shaving their face with a razor and putting on a necktie
over a white, collared shirt. The feminine-stereotyped activities consisted of the actors putting on lipstick and putting on nail polish. The gender-neutral activities displayed the actors having a drink of water and eating a piece of a bagel. The actors were filmed performing these events for approximately 2 minutes and each event was edited to produce uniformity of activity 15 seconds in duration. Examples of the stimuli are presented in Figure 1.

Apparatus

The stimulus events were videotaped with a Sony digital video camera. The events were edited using Apple’s iMovie digital video editing system. The events were presented using Panasonic (VHS NV-A500) edit controller that is connected to four Panasonic video decks (AG-6300 and AG 7500). The video decks are connected to two 19-inch (48 cm) color monitors (Sony KV-20M10). A computer connected to two video-game controllers were used to record children’s looking times to each event.

Questionnaire

In determining which activities to use in the current experiment I recruited (N = 32) parents of 24-month-olds whose children were participants in another study to complete a questionnaire assessing their toddlers’ familiarity in observing various household activities. For each activity the parent was asked whether or not their child had observed the activity, and whether the child observed this activity being performed
primarily by the mother, the father, or whether the toddler observed the activity being performed equally by both the mother and father. Those activities receiving the highest nominations, and being performed primarily by the mother or father, were chosen as the gender stereotyped stimuli for the current experiment. In addition, the parents of those toddlers who participated in the current experiment also completed a questionnaire that assessed whether their child had observed each of the activities used in the current study and who the child observed performing each activity.

Procedure

Each child was seated in either an infant chair on top of a table or on the parent’s lap depending on the size and preference of the child. The child sat facing two video screens approximately 100 cm away. The two video monitors were surrounded by a three-panel display covered in black cloth in order to prevent the toddler from seeing the observers, and reduce their looking toward other stimuli. The video monitors were separated by 50cm. Two slots cut into the black cloth surrounding the monitors allowed the observers to record the children’s visual fixations without being seen by the toddler. The observers, blind to conditions and events being presented, depressed a button for each right and left gaze the child made, and released the button each time the child looked away. The observers’ button boxes are connected to a computer that recorded the toddler’s visual fixations. The observations of the primary observer were used in the data analyses and the observations of the secondary observers were used in the computation of interobserver reliability.

Each testing session began with the two television screens blank and started with two warm-up trials. The warm-up trials consisted of a moving toy frog on the left screen
for 7 seconds and then repeated on the right screen for 7 seconds. These first two trials were used to alert the child of stimuli appearing on both screens. Following the two warm up trials, each child received then received 12 test trials. The first three test trials consisted of either a male or female actor performing one of three activity pairings (putting on lipstick/shaving; eating a bagel/drinking; putting on nail polish/tying a necktie) in a random order. The second set of three trials were identical to the first three trials with the exception that other actor was seen performing the three activities. The last six trials were identical to the first six trials with the exception that the left/right position of the activity was switched. Thus infants saw each event pairing four times, twice with a male actor and twice with a female actor where the lateral position of the event was presented once on the infants’ left and right for each actor.

The observers were blind to the purpose of the experiment, the lateral position of the activity and the gender of the actor performing the activity. The observers monitored the duration of time (in seconds) that the toddlers looked toward each event. A secondary observer recorded looking times for 72% of the infants. Interobserver reliability was expressed as a Pearson product-moment correlation between the looking proportions of the primary and secondary observers and was .93 ($SD = .04$).

**Results**

The purpose of the experiment was to assess whether 24-month-olds would look longer toward a gender-inconsistent activity (e.g., a male putting on lipstick) when paired with a gender-consistent activity (e.g., a male shaving his face). Toddlers’ looking time to each activity was recorded in seconds and converted to a proportion of total looking time. Proportions were derived for each trial/activity separately by dividing the time spent
looking to the gender-inconsistent and consistent event by the total time spent looking at both events. An overall PTLT was also derived by averaging across all trials for each infant, and then averaging over all infants. Given that chance is equivalent to looking at any one event 50% of the time, toddlers’ looking behavior to the consistent and inconsistent event was compared against chance for each activity (see Figure 2).

Using a single-sample t-test, our results indicated that the 2-year-olds looked longer toward a male actor performing a feminine activity compared to a masculine activity \((t(17) = 4.82, p = .001, \text{Cohen's} \ d \text{ effect size} = .63)\) as well as a significant visual preference for a female actor performing a masculine activity compared to a feminine activity \((t(17) = 2.57, p = .020, d = .42)\). The results revealed no significant evidence of a preference for either a female or male actor performing a neutral activity \((t(17) = .591, p = .56)\).

I also examined toddlers’ preference for the consistent or inconsistent event as a function of subject gender. The results for the female subjects \((n = 9)\) revealed a significant preference for the male actor performing a feminine activity compared to a masculine activity \((M = .57, SD = .08; t(8) = 2.65, p = .029, d = .70)\), as well as a significant preference for a female actor performing a masculine activity compared to a feminine activity \((M = .59, SD = .11; t(8) = 2.41, p = .043, d = .54)\) and a non-significant preference for either the male or female actor performing a gender neutral
activity ($p > .1$). For the male subjects ($n = 9$) the results revealed a significant preference for the male actor performing a feminine activity compared to a masculine activity ($M = .59, SD = .06; t (8) = 4.32, p = .003, d = .81$). However, the results failed to reveal a significant preference for a female actor performing a masculine activity compared to a feminine activity ($M = .55, SD = .12; t (8) = .12, p = .257$) or the male or female actor performing a gender neutral activity ($p > .1$).

These results demonstrate that by 24-months of age children will look longer at a male actor performing a feminine activity thus providing a replication of Serbin, Poulin-Dubois, and Eichstedt (2002). Unlike Serbin et al. (2002), however, our results also indicate that 24-month-olds will look significantly longer toward a female actor performing a masculine activity where Serbin et al. (2002) failed to find significant evidence of a gender preference for the masculine activities. As predicted, male and female subjects showed no significant preference for a male or female actor performing gender neutral activities (i.e., eating or drinking).

In order to more carefully examine toddlers’ preference for gender-inconsistent events a 2 x 3 x 2 mixed model analysis of variance (ANOVA) using toddlers’ proportion of total looking time (PTLT) as the dependent variable was performed. The between subjects factor was gender of the subject (male and female). The within subjects factors were activity (masculine, feminine and neutral) and actor (male and female). The results
revealed a non-significant effect of subject gender \( (F(1, 16) = .211, p = .653) \), a non-significant effect of activity \( (F(2, 15) = .278, p = .761) \), and a non-significant effect of actor \( (F(1, 16) = .111, p = .744) \). Important to our hypotheses, however, the results of this ANOVA revealed a significant actor by activity interaction \( (F(2, 15) = 9.55, p = .002, \text{Partial eta squared } \eta^2_p = .56) \). No other interactions approached significance \( (all \ p’s > .1) \). While there are no apriori reasons to expect a significant overall preference for a female or male actor, masculine, feminine or neutral activity, I did, however, predict and find evidence for a significant interaction between actor and activity. The results of this interaction indicate that toddlers look preferentially longer toward a male actor performing a feminine activity compared to a masculine activity \( (t(17) = 4.6, p < .001) \), and female actor performing a masculine activity compared to a feminine activity \( (t(17) = 2.67, p = .016) \). Thus the results of toddlers’ preference for an actor performing a gender stereotyped inconsistent event as assessed by a single sample t-tests were confirmed by the results of our mixed-model ANOVA.

A secondary analysis examined whether infants’ proportions differed as a function of event pairing (lip stick/shaving and tying a tie/nail polish) and did not reach significance \( (t(34) = .314, p > .1) \). A non-parametric binomial test was also conducted to determine whether a few subjects who exhibited large preferences are carrying the significant results. Of the 18 toddlers in this experiment, 14 preferred the gender-inconsistent event (8 females and 6 males; 2-tailed binomial test, \( p = .031 \)). Thus it seems unlikely the results are carried by a few toddlers with strong dichotomous looking times towards the gender-inconsistent events.
The results of the questionnaires filled out by the parents (presented in Table 1) revealed that 83% to 100% all of the children had previously observed the gender stereotyped and neutral activities chosen for the experiment. One exception, however, was the event of putting on nail polish, where only 39% of the children had observed the activity. The questionnaires also revealed that the activities chosen were seen as performed primarily by one gender. For example, the feminine-stereotyped activity of putting on lipstick was reported as being performed 93% of the time by the mother of those toddlers who have seen the activity. The masculine activities of shaving and putting on a necktie were also seen as masculine-stereotyped, with reports of the toddler viewing the father performing these activities in 100% of the participants who observed the activities. Finally, the neutral activities of eating and drinking were reported as being performed by both parents equally by all of the participants. Thus as reported by their parents, the toddlers had roughly equal exposure to each of the activities, and were exposed to role differentiation for the masculine and feminine activities.

Discussion

Overall, the results of this experiment provide additional evidence of toddlers’ knowledge of gender-stereotyping by 24 months of age. As predicted, toddlers looked longer at the gender-inconsistent events (e.g., a male putting on lipstick or nail polish).
than the gender-consistent events (e.g., a male shaving or putting on a necktie). While there were not significant differences between male and female subjects, where previous research (e.g., Poulin-Dubois et al., 2001 & Poulin-Dubois et al. 2002) has demonstrated that female subjects show a preference for gender-inconsistent events developmentally earlier than male subjects, these results are suggestive that this ability may emerge earlier in females. Specifically, the female subjects in the current experiment looked proportionately longer toward both male and female actors performing gender-inconsistent events, whereas the male subjects looked longer toward male, but not female, actors performing gender-inconsistent events. Finally, these results demonstrated that 14 of the 18 toddlers looked preferentially longer toward the gender-inconsistent event compared to the gender-consistent event. Together these results provide additional evidence that by 24-months of age toddlers will look proportionately longer toward a male or female actor performing a gender-inconsistent activity.

The results of this study also expand upon Serbin et al.’s (2002) study, by demonstrating that longer looking times were found for both masculine and feminine activities where Serbin et al. only found significance with the feminine activities. One possibility for the discrepancy between the masculine and feminine activities across the two experiments may be a result of the methodological modifications made in current experiment. These modifications included placing the same actor side by side to isolate the event, using a dynamic rather than static display from which it has been argued that infants glean more information (Arterberry & Bornstein, 2002), and using infants’ proportion of total looking times.
One other marked difference between this study and the study conducted by Serbin et al. (2002), however, was the types of events used as gender stereotyped events. As the results of the questionnaires indicated, all masculine stereotyped events were seen as being performed exclusively by the father and all feminine stereotyped events were seen as being performed mostly by the mother. Thus, it can be inferred that the toddlers connected the tasks with one gender and are therefore seen as gender stereotyped. The only issue with the tasks chosen was that the event of putting on nail polish had a smaller viewing frequency (only 39% of the participants saw this activity in the home). But among the toddlers who did view the activity at home, it was seen as being performed exclusively by the mother. Given that no significant difference between the viewing times of the specific events was found, it seems likely that children have some knowledge of this event being feminine-stereotyped, perhaps through another source (e.g., the media).

The limitations of this study lie in the relatively homogenous population from which the sample of participants was taken. All of our participants were Caucasian, and all came from a home where at least one of the parents was home during the day to bring the child into the lab. Perhaps this sample is too specific to be generalized to toddlers in general. Another limitation within the study is that the sample size only consisted of eighteen subjects. Perhaps the use of a larger sample size would have yielded more interesting results.

The possible implications of this study pose a challenge to the recognized developmental timeline of children’s gender schemas, being that children recognize some aspects of gender-stereotypes even before they develop a sense of gender constancy and
gender identity. The early age at which infants display knowledge of gender differentiation is suggestive of a several possible scenarios, one being that there is an innate, biological component that frames and shapes the infant’s awareness of gender and another being simply that infants and toddlers are more perceptive to social stimuli than previously thought. If we were to follow the latter scenario, it would be tempting to address some of the possible social implications of the study, although these issues would be purely speculative and beyond the scope of this study.

In conclusion, the current experiment offers further support to the notion that children have gained some knowledge of gender stereotyping of common adult activities by 2 years of age. These findings add to the growing body of literature determining the timeline of children’s development of gender-based knowledge and stereotypes. The current study, when coupled with the literature on children’s knowledge of gender categories, stereotyped activities and preferences for gender stereotyped play and toys (Serbin et al., 2002; Poulin-Doubois et al., 2002; Serbin et al., 2001), offers further support to the theory that gender categories and gender schemas are forming at a much earlier stage of development than previously thought.
References


Figure 1

Monitor 1

Monitor 2

Trial 1

Trial 2

Trial 3
Figure 2: Proportion of total looking time (PTLT) in seconds (standard deviation) to the masculine and feminine activities for the male and female actors. Proportion of total looking time (PTLT) in seconds (standard deviation) is also reported for the neutral events (eating and drinking) combined for male and female actors.

* p<.05
Figure 3: For the female subjects, the proportion of total looking time (PTLT) in seconds (standard deviation) to the masculine and feminine activities for the male and female actors.

- For masculine activities: Male = 0.57 (SD 0.08), Female = 0.41 (SD 0.11)
- For feminine activities: Male = 0.43 (SD 0.08), Female = 0.59 (SD 0.11)

* p < .05
**Figure 4**: For the male subjects, the proportion of total looking time (PTLT) in seconds (standard deviation) to the masculine and feminine activities for the male and female actors.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Children Who Observed Activity</th>
<th>Of Children Who Observed Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>Frequency</td>
</tr>
<tr>
<td>Feminine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lipstick</td>
<td>83%</td>
<td>15</td>
</tr>
<tr>
<td>Nail polish</td>
<td>39%</td>
<td>7</td>
</tr>
<tr>
<td>Masculine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaving</td>
<td>94%</td>
<td>17</td>
</tr>
<tr>
<td>Tying a Tie</td>
<td>83%</td>
<td>15</td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating</td>
<td>100%</td>
<td>18</td>
</tr>
<tr>
<td>Drinking</td>
<td>100%</td>
<td>18</td>
</tr>
</tbody>
</table>
Appendix A: Consent form for participants

Appendix B: Questionnaires on gender-stereotyped activities within the home
Appendix A

INFORMATION AND CONSENT FORM FOR RESEARCH SUBJECTS

Infant Development Laboratory
Brigham Young University
Provo, UT 84602

Dear Parent:

You are and your son/daughter is invited to be in a research study examining infants’ perceptions. Your decision to participate is completely voluntary and you may withdraw your decision to participate at any time. Please sign this Information and Consent Form before your child enters our study. This is done to make sure that you understand (1) what the study will involve; (2) what will be done with our observations of your child; (3) what effect you should expect this experience to have on your child; and (4) what you should do if, for any reason, you do not want your child to participate in the study now, or at any time during the study. Please read this information, and if anything is unclear, do not hesitate to ask about it.

What the study involves: You have been voluntarily asked to bring your child to the Infant Development Laboratory at Brigham Young University. You will accompany your child to a research room where an assistant will explain the nature of the experiment and set up. Your child will be seated in an infant seat facing a video display. We will observe the amount of time your infant looks toward the display. The entire session will last 10-20 minutes, and throughout the procedure, an assistant will observe the direction of your child's eye movements through a peep-hole. In some studies, however, infants will be asked to return for a follow-up visit. This follow-up visit may occur within 1-day, 2-weeks or 1-month after your first visit. You will be informed of this possibility before you decide to participate today.

What will be done with the observations: All of the observations will be analyzed and reported in terms of groups (not individuals) of children experiencing similar and dissimilar conditions. There will be several groups with 12-36 in each. A report of these group results will be shared with you upon completion of the study. All individual information will be kept confidential.

The purpose and effect of the study: The purpose of this study is to gain a better understanding of how infants learn to perceive and categorize audio-visual events. For example, how do non-verbal infants learn to integrate sensory information across different sense systems? How do they learn to recognize musical passages by their tempo and rhythm? The displays your child will see and hear are designed to be pleasant for infants of this age. Because this experience is so brief relative to all other things your child experiences in his/her normal environment, it should not have any long term effect.
Therefore, you can consider the time and energy that you and your child devote to this study as a contribution toward developing a better understanding of how infants learn about the events around them.

**Risks:** There are no known risks of this study. If, however, for any reason your son/daughter becomes fussy or otherwise upset, the experiment will be terminated.

**What to do if you do not wish to participate in the study:** You should feel absolutely free to refuse to participate in this study. If you should decide not to participate now, or at any point during the study, all you have to do is say so. Your refusal would be kept completely confidential and there would be no change in your status with any program, department, or service Brigham Young University.

If you have questions about the rights of human subjects used in research, you may contact the Brigham Young University Chair of the Institutional Review Board (IRB – 120B – Stephen L. Richards Building) Dr. Shane Schulthies at 422-5490.

I have read the above description and would like my child, ______________________________, to participate in the study at this time. I understand that Dr. Ross Flom or one of his assistants will answer any questions I may have at any time concerning the procedures or investigation. I also understand that I voluntarily agree to have my child participate in this research and I may terminate my participation in the study at any time, and that the experimenter may terminate my participation at any time.

Date _________  Signature ____________________________________________

Relationship ___________________________ Date of Child’s Birth: _________

Mailing Address: ___________________________ Child’s Due Date:

_____________________

_____________________

_____________________

_____________________

Phone _______________________

Thank you for your participation.

Dr. Ross Flom
Phone: 422-1147
Department of Psychology
Brigham Young University

I, or my staff, have explained and defined in detail the research procedure and have
offered the infant's parent/guardian a copy of this informed consent form.

Date ___________ Principle Investigator's Signature
____________________
Appendix B

Questionnaire

Child’s name:  
Birth date:  
Today’s date:  
Age:  
Gender:  

<table>
<thead>
<tr>
<th>Has your child ever observed:</th>
<th>Mostly performed by mother (or another female)</th>
<th>Mostly performed by father (or another male)</th>
<th>Both parents (or males and females) performed activity equally</th>
<th>Child has never observed this activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  An adult putting on lipstick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.  An adult putting on nail polish:</td>
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<td></td>
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<tr>
<td>3.  An adult putting on a necktie:</td>
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<tr>
<td>4.  An adult shaving his/her face</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5.  An adult drinking:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.  An adult eating:</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

INSTRUCTIONS: Please mark one column to answer each question (items 1-6)