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Previous research demonstrates that children prefer to use information given by people of their own gender when learning about their environment. However, young children are also very sensitive to the specialized knowledge, or expertise, of others. The present work explored whether children are willing to learn from an expert informant who displays non – traditional gender role interests. Four- to 8-year-olds were presented with conflicting opinions about a piece of domain specific information from a counter-stereotypical expert (e.g., a boy with expertise in ballet), as well as a layperson of the opposite gender (e.g., a girl with little knowledge about ballet). Participants were asked to choose who they believed was correct, who they would prefer to learn from in the future, and how much they liked each character.

Overall, participants selected the counter-stereotypical expert as correct. However, 4- to 5-year-olds reported a preference to learn from same-gender participants in the future irrespective of their expertise, whereas 6- to 8-year-olds reported wanting to learn from the counter-stereotypical expert in the future. Gender differences also emerged, with boys of all ages showing greater acceptance of the opinion of a male counter-stereotypical expert as compared to a female counter-stereotypical expert. These results demonstrate that while expertise is a powerful learning cue, there are circumstances in which expert testimony may be disregarded in favor of potent social categorical biases.

EXPERTISE IN UNEXPECTED PLACES: SELECTIVE SOCIAL LEARNING FROM COUNTER-NORMATIVE EXPERTS

by

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CHAPTER I

INTRODUCTION

Young children have significantly less experience with the world than do adults. To some extent, they must rely on those around them – parents, teachers, peers – to learn about their environment. Children are aware that some individuals may have a greater probability of providing them with accurate information due to personal characteristics or specialized knowledge that they possess (Koenig & Harris, 2005; Pasquini, Corriveau, Koenig, & Harris, 2007). Research indicates that children are discriminating when choosing between conflicting sources of information, paying close attention to the reliability and previous accuracy of individuals who provide them with information (i.e., informants). Children also attend to cues such as informant expertise (Lutz & Keil, 2002) and social category (Shutts, Banaji, & Spelke, 2010).

The social category of gender is a particularly salient cue to young children, as they display an in-group bias and prefer information given to them by an informant of the same gender (Ma & Woolley, 2013; Shutts et al., 2010). However, children are also sensitive to gender norms and notice when those around them violate these norms by displaying non-traditional characteristics or interests (Blakemore, 2003; Martin, 1989). The main question of interest in the current study was whether children are willing to learn information from an expert who displays counter-normative gender role interests.

The study also explored how certain cognitive abilities, as well as attitudes about traditional gender stereotypes, affect children's willingness to learn from such an expert.

I will review key factors that impact children's acceptance of informant testimony, such as previous accuracy (Koenig & Harris, 2005), expertise (Lutz & Keil, 2002), the social category of informants (Shutts et al., 2010; VanderBorght & Jaswal, 2009), and the valence of testimony (i.e., whether it is positive or negative; Boseovski & Hughes Maicus, 2014; Boseovski & Thurman, 2013). Also relevant to the current study is work demonstrating that young children expect others to abide by gender norms and recognize when these norms are transgressed (Blakemore, 2003; Conry-Murray & Turiel, 2012). Finally, I describe the results of a study that investigated children's use of expertise cues when presented with a character whose area of expertise conflicts with traditional gender stereotypes (e.g., a girl with expertise in football).

CHAPTER II

REVIEW OF THE LITERATURE

Previous Accuracy of Informants

When presented with two informants who offer contradictory information, children use the past history of accuracy of each to assess who is more likely to give correct information about something new (Koenig & Harris, 2005). This was demonstrated in a study in which 3- and 4-year-olds watched potential informants label familiar and unfamiliar objects. Initially, children were presented with objects they were familiar with and watched while informants labeled these common objects. One informant consistently labeled objects by their correct names (e.g., ball, cup, book), while a second informant consistently offered clearly incorrect names (e.g., saying shoe, dog, and chair to describe the items above). The same participants then witnessed both informants label one novel and unfamiliar object with different names (e.g., "That's a mido," or, "That's a loma"). When asked, "Can you tell me what this is called?", 4-year-olds were significantly more likely to endorse the testimony of the previously accurate informant, while 3-year-olds performed at chance levels (Koenig & Harris, 2005).

Children are also selective learners when there is variation in the accuracy level of potential informants. Four-year-olds trusted a previously accurate informant when they were correct 3 out of 4 times as compared with a second informant who was correct 1 out 4 times. In contrast, 3-year-olds only trusted the accurate informant when this person was

correct 100% of the time (Pasquini et al., 2007). These age-related changes are consistent with previous work (Koenig & Harris, 2005) and suggest significant differences in the way in which 3- and 4-year-olds monitor the accuracy of previous informants. The overall results of these studies indicate that children monitor previous performance of possible informants and use this information to judge who is more likely to provide them with better information. This preference for accuracy has also been demonstrated to be long lasting, with children displaying a preference for an accurate informant as long as one week after the initial exposure to the informant (Corriveau & Harris, 2009).

Informants with Expertise

In addition to informant accuracy, information about informant expertise (specialized knowledge in a domain) influences children's acceptance of information. In a study by Lutz and Keil (2002), 3-year-olds assessed appropriately the kinds of stereotypical knowledge another person might have based on their field of expertise (e.g., a car mechanic knows how to fix a flat tire), while 4- to 5-year-olds were also able to attribute underlying principles of knowledge to an expert. Children in this study recognized that a doctor would be more likely to have biological knowledge about the world while a car mechanic possesses knowledge relating to the physical characteristics of things (Lutz & Keil, 2002). Even when familiar labels such as "doctor" or "car mechanic" are not given, young children are capable of inferring expertise after witnessing an informant perform an action (Kushnir, Vrendenburgh, & Schneider, 2013). Therefore, children are able to infer expertise even when it is not explicitly stated and use that information to guide learning from these informants in relevant situations.

Young children also display an understanding that there are limitations to the knowledge of an expert. When presented with information about dog breeds, 3- and 4-year-olds chose information given by a dog expert rather than information offered by a non-expert (Koenig & Jaswal, 2011). However, when given testimony about novel objects unrelated to dogs, participants displayed no preference for either informant. These findings indicate that children not only recognize what specific kinds of information an informant may possess, but they also realize that their expertise does not generalize to unrelated domains.

Although young children consistently endorse testimony given by an expert informant, there are some limitations to this deference. Specifically, as children approach middle childhood, they develop certain biases that may outweigh expertise information. The positivity bias refers to a tendency to selectively attend to information with a positive valence, and is demonstrated in personality judgments and other social attributions made by children (Boseovski, 2010). For example, in a study by Boseovski and Thurman (2013), 3- to 7-year-olds were introduced to a novel animal and given information about this animal from a maternal figure and a zookeeper. The valence of information given by informants differed such that one informant (e.g., the zookeeper) gave positive information about the animal (i.e., "small and cuddly"), while the other informant gave negative information (i.e., "dirty and smelly"). While 3- to 5-year-olds endorsed expert testimony by choosing the zookeeper as correct, 6- and 7-year-olds consistently choose the zookeeper when the character's testimony was positive, but to a lesser extent when the zookeeper gave negatively valenced testimony. These results demonstrate that while

young children are deferent to expertise, older children begin to show biases that can affect their acceptance of expert information.

This positivity bias was also demonstrated when 4- to 8-year-olds were asked to make a judgment regarding a target character's competence. After being introduced to a target who was either playing a song on the piano or drawing a picture, participants heard conflicting opinions about the target's performance from one expert and one or three laypeople. The majority of participants at all ages selected the informant who offered positive information (e.g., "Their picture looks very good.") as correct, regardless of expertise level. However, 6- to 8-year-olds reported a preference to learn about the domain from the expert character, even when this character had given negative testimony (e.g., "Their picture looks very bad."; Boseovski & Hughes Maicus, 2014). Thus, while older children are sensitive to expertise, they are reluctant to accept a negative evaluation from an expert. This preference for positive information has been demonstrated in 4- to 8-year-olds (Boseovski & Hughes Maicus, 2014), but seems to be especially strong in middle childhood (i.e., 6- to 7.5-year-olds; Boseovski & Thurman, 2013).

Social Categories of Informants

In a real world setting, we are frequently offered information by those around us without any prior knowledge about their accuracy or expertise. When placed in this situation, young children often use an informant's social group membership to guide their assessment of who will provide them with more accurate information. Although children sometimes expect an adult to be more knowledgeable than a child (Taylor, Cartwright, & Bowden, 1991), there are occasions when a child might be expected to be a better

informant. For example, 3- to 5-year-olds expected an adult rather than a child to know more about food, but participants across these ages preferred to ask a child about novel toys or activities (VanderBorght & Jaswal, 2009). These findings indicate that in specific domains, children have expectations that individuals in a certain social group will be more knowledgeable. Also, the results of Shutts et al. (2010) suggest that 3-year-olds prefer novel activities, toys, and clothes endorsed by informants who are members of the same social groups as themselves.

This in-group bias is not unique to age and has also been found in the social category of gender. Children display a strong preference to learn new information from members of their own gender (Shutts et al., 2010) even when learning about novel, colored objects of that are typically associated with one gender (e.g., pink or blue objects; Ma & Woolley, 2013). This same-gender bias can be outweighed when in contest with an informant's previous accuracy. When presented with a male and a female informant who had both provided equally reliable or unreliable information in the past, 4- to 7-year-olds preferred information given by the informant of the same gender (Taylor, 2013). However, when the same participants were presented with a previously accurate vs. inaccurate informant, participants of all ages preferred an accurate informant of the opposite gender rather than an inaccurate informant of the same gender. These findings demonstrate that although gender is a salient social cue, there are other informant characteristics that may outweigh attention to informant gender.

Gender Norms & Transgressions. There is strong evidence that children are aware of societal norms and stereotypes regarding gender in many domains. For example, 3- to 6-year-olds display a preference for clothing consistent with gender norms, especially children that viewed their own gender as central to their identity (Halim et al., 2014). In addition to using these norms to guide their own appearance, children expect norm-consistent behavior from others in domains such as household chores (Schuette & Killen, 2010), traits (Powlishta, 1995), toys, and interests (Martin, Wood, & Little, 1990). In these salient domains, it is possible that children have a greater likelihood of relying on gender stereotypes to assess informant reliability. While a child may demonstrate a same gender bias when asked to endorse testimony regarding a pink object, they may rely on their knowledge of social norms to assess who can provide them with more accurate information when they are presented with conflicting testimonies about a commonly stereotyped interest or domain such as cosmetic use.

Children are not only cognizant of social norms associated with gender, but also notice when an individual transgresses these norms by displaying a non-traditional interest. Conry-Murray and Turiel (2012) examined knowledge of gender norms by presenting 4- to 8-year-olds with six stories about parents deciding which toy (truck or doll), costume (solider or ballerina), and class (computer or babysitting) was appropriate for their son or daughter. The majority of participants were aware of gender norms associated with each option and made consistent predictions (e.g., saying the parents should send their daughter to a babysitting class, or give a solider costume to their son). However, 6- and 8-year-olds viewed norm transgressions with greater flexibility, and

accepted that a child could display a non-normative preference (e.g., the son preferring babysitting class to computer class), as well as the possibility of norm reversals in a different country. Therefore, although children of all ages are aware of traditional gender norms, 6- and 8-year-olds are more aware than 4-year-olds that a person's interests are often different than these norms. Other research has further demonstrated this age-related increase in gender flexibility by simply asking, "Is it possible for a boy to play with Barbies?" (Blakemore, 2003) or "Can girls also play football?" (Levy, Taylor, & Gelman, 1995).

Despite the findings of Conry-Murray and Turiel (2012) indicating that children view gender norms as a matter of choice, children across age groups tend to report liking a character with counter-normative interests less than those that adhere to gender norms and these negative evaluations tend to increase with age. When 3- to 11-year-olds were asked to rate how much they would like a child who transgressed gender norms, ratings of characters who played with toys or wore clothing or hairstyles typically associated with the opposite gender became more negative with age or peaked in negativity around 1st and 3rd grade (6- to 8-year-olds; Blakemore, 2003). In this study, boys who wore girls' clothing or hairstyles, became nurses, or played with Barbie dolls were evaluated more harshly than girls who committed similar transgressions (wore masculine clothing/hairstyle, became a doctor or played with G.I. Joes). However, girls who played football or played loudly were liked less than boys who played jump rope or played quietly. The gender of the participant also had an effect on ratings, such that girls consistently rated norm transgressions more positively compared to boy participants.

Executive Functioning and Gender Stereotypes

There is some evidence that age-related changes in executive functioning skills may underlie children's adherence to gender stereotypes. Executive function refers to a number of cognitive processes that assist in goal maintenance and problem solving (Garon, Bryson, & Smith, 2008); the two specific EF components of interest in the present research were cognitive flexibility and inhibition. Cognitive flexibility refers to the ability to change or restructure information based on the situation or goals at hand (Davidson, Amso, Anderson, & Diamond, 2006). Tasks measuring this ability require the participant to see that an object may be categorized in more than one way; for example, in the Dimensional Change Card Sort (DCCS) participants must recognize that a single picture can be organized both by color and shape. Results from the DCCS indicate significant age-related changes in cognitive flexibility between the ages of 3 and 5 years (Davidson et al., 2006; Garon et al., 2008). The more advanced borders version of the DCCS (Zelazo, 2006) is a task designed to measure this ability in slightly older children, and requires that children keep both rules in mind simultaneously and switch between rules depending on the card presented.

Research by Bigler and Liben (1992) assessed directly how cognitive flexibility skills relate to children's memory for counter-stereotypical information, as well as their acceptance of those who transgress gender stereotypes. In this study, 5- to 10-year-olds were trained on a multiple classification card sorting task depicting either social stimuli (e.g., men and women performing stereotypically masculine or feminine occupations) or non-social stimuli (e.g., shoes and hats in different colors). After this training,

participants in both conditions showed significantly less stereotyped attitudes toward traditionally masculine and feminine occupations, as well as better memory for stories depicting counter-stereotypical characters as compared to a control group. Therefore, young children with greater cognitive flexibility also show greater flexibility in their view of gender norms as well as attitudes towards typically stereotyped occupations or interests. This consistency in ages across studies suggests that a general cognitive flexibility skill underlies children's view of the social world and how they categorize others.

Another important component of executive functioning is inhibition, or the ability to suppress a predominant response or behavior (Garon et al., 2008). Tasks requiring inhibitory skills, such as Stroop-like tasks, require children to suppress a learned response. In these tasks, participants are shown a picture and asked to play an opposite game, such as saying "night" when shown a picture of a sun (Carlson, 2005), or "happy" when shown a picture of a sad face (Lagattuta, Sayfan, & Monsour, 2011). The increased semantic conflict in this task makes it very difficult for preschool children, and it is not until the age of 5 years that the majority of children pass this task (Carlson, 2005). The demand of Stroop-like tasks is similar to the challenge of inhibiting highly salient gender norms. While there is no current research linking the inhibitory control of children to social stereotyping, there is strong evidence that such a connection exists in adults (Gonsalkorale, Sherman, & Klauer, 2009; Payne, 2005). Elderly adults with poor inhibitory control are significantly more likely to engage in social stereotyping compared to group of younger adults (von Hippel, Silver, & Lynch, 2000). Thus, it appears that

regardless of age, inhibitory control plays a large role in susceptibility to stereotyped attitudes.

Children become familiar with gender norms at a very young age, and expect others to act and have preferences consistent with these norms. Children endorse traditional stereotypes and expect others to display interests consistent with such norms, often even in the face of conflicting information (Martin, Wood, & Little, 1990). To accept information from a counter-normative expert, children must first inhibit this tendency to expect others to adhere to traditional interests and hobbies.

Summary

Young children are critical consumers of information, and defer to the opinion given by an informant with expertise in the domain of interest (Kushnir et al., 2013; Lutz & Keil, 2002). However, there are limitations in children's acceptance of expert testimony, as they often display a preference for information with a positive valence, even when such information is in conflict with expert opinion (Boseovski & Hughes Maicus, 2014; Boseovski & Thurman, 2013). This preference is referred to as the positivity bias (Boseovski, 2010) and is evidence that certain biases may outweigh children's deference to expert testimony. In the absence of other cues, children also attend to the social category of informants, and use this information to guide decisions about who is better able to provide accurate information (Shutts et al., 2010; Taylor, 2013, VanderBorght & Jaswal, 2009).

One such social category is informant gender. Children prefer to learn new information from informants of the same gender as themselves (Shutts et al., 2010;

Taylor, 2013). Gender is a salient social category for children that affects not only learning preferences, but also expectations for an individual's traits, toys, and interests (Martin et al., 1990; Powlishta, 1995). Children use social norms and stereotypes to guide these expectations and notice when individuals transgress these norms by displaying a non-traditional interest (Conry-Murray & Turiel, 2012). Six- to 8-year-olds evaluated such individuals harshly and were less likely to report a desire for friendship with a character who transgresses gender norms, compared to a character who does not (Blakemore, 2003). However, it is unclear whether these negative evaluations would extend to a character with expertise in a non-traditional domain (e.g., a boy with expertise in a typically feminine domain, such as ballet). Specifically, are children willing to learn from a non-traditional expert, or would they prefer to learn from a layperson with less knowledge, but whose gender is stereotypically associated with the domain in question (e.g., a girl with no expertise in ballet)? No study has systematically examined children's learning preferences when these two salient cues (i.e., expertise and gender stereotypes) are in conflict with one another.

CHAPTER III

THE CURRENT STUDY

The goal of the current study was to investigate the effects of gender and expertise on children's willingness to endorse informant claims in gender counter-stereotypical domains. Would a child endorse testimony from an expert when this expert displayed counter-normative knowledge in a domain (e.g., a girl who has expertise in football)? As described above, previous research has found an increase with age in the flexibility with which children view gender norms, as well as a decrease in their evaluations of transgressors, (Blakemore, 2003; Conry-Murray & Turiel, 2012; Levy et al., 1995) and that children as young as 4 years of age are able to recognize expertise within a domain (Kushnir et al., 2013; Lutz & Keil, 2002). The goal of the current study was to address children's learning preferences when expertise and gender norms were in conflict with one another by investigating how children would learn when presented with an expert who transgressed against gender norms. Although children are sensitive to informant expertise, previous research indicates that children expect others to adhere to social norms regarding certain activities (Schuette & Killen, 2010). Therefore, it was expected that participants' expectations would change when children are asked to endorse testimony regarding domains that are typically male or female.

The Main Task

In the main task of this study, participants were told two separate stories about two characters in a class together. Each participant heard a story about a male expert in a feminine domain (e.g., a boy with expertise in sewing or ballet) and a female layperson. A second story described a female expert in a masculine domain (e.g., a girl with expertise in construction or football) and a male layperson. Participants heard conflicting testimonies from each character about a critical element relating to the domain in question (e.g., for the construction story, the informants offered different opinions regarding which of two types of screwdrivers should be used to make a chair). Participants were then asked two questions that assessed learning preferences regarding correctness (i.e., "Who do you think is right?") and learning endorsement (i.e., "Who would you rather learn from in the future?"), as well as evaluations of the two informants (i.e., "How much do you like this character?").

At the end of the procedure, a third story was presented to participants. This story was of the same format of the previous two; however, participants instead heard about a character with expertise in a domain that was consistent with gender stereotypes and a layperson character of the opposite gender. This stereotype consistent story was similar to the counter-stereotypical stories described above, as participants heard conflicting testimonies from the two characters and were asked the same correctness, endorsement, and evaluation questions. The purpose of this story was to ensure that in the absence of conflicting cues (i.e., expertise and gender stereotypes), participants would choose the

expert character as correct and report a preference to learn from this character in the future.

Secondary Tasks

A secondary goal of this study was to explore how certain components of executive function (EF) as well as stereotyped attitudes, may predict children's willingness to accept the testimony of a counter-stereotypical character and their evaluation of such a character.

As discussed above, previous work has indicated that children with more advanced cognitive flexibility are more likely to believe that gender norm violations are possible (Bigler & Liben, 1992). To assess this ability, participants were administered the borders version of the Dimensional Change Card Sort (DCCS; Zelazo, 2006). Participants were also administered the happy/sad Stroop task (Lagattuta et al., 2011) as a measure of inhibition. It was expected that children who demonstrated greater multiple classification and inhibitory skills, as measured by these tasks, would have a greater probability of accepting information from a counter-stereotypical character.

It is possible that children who have more stereotyped attitudes towards certain occupations and activities will expect others to adhere to these expectations more rigidly and therefore be less likely to want to learn from an expert who transgresses gender norms. The Gender Attitude Scale for Children (GASC; Signorella & Liben, 1985) was used to assess participants' attitudes. The GASC is a 35-item questionnaire consisting of 14 activities that are considered typically masculine (e.g., mow the lawn, go fishing), 14 typically feminine activities (e.g., clean the house, bake cupcakes), and seven neutral

activities (e.g., ride a bicycle, go to the movies). Children were asked who they think can do each activity: men, women, or both men and women.

To further explore individual differences related to participant's willingness to accept information from a counter-stereotypical expert, parents were asked to report on their child's preferred activities, personal traits, as well as their own attitudes towards certain toys. The first part of the questionnaire consisted of 12 activity items (from the Pre-School Activities Inventory, Golombok & Rust, 1993) where parents reported how often their child engaged in each activity during the past month. The second part of the questionnaire listed 38 traits (19 feminine, 19 masculine) from Bem's (1974) sex role inventory and parents were asked to rate how often their child displayed each trait. The third part of the questionnaire listed toys typically used by mostly girls, mostly boys, and both genders (selected from Blakemore & Centers, 2005) and asked parents to rate if each toy was appropriate for only boys, mostly for boys, both boys and girls, mostly girls, or only girls.

Hypotheses

A main effect of participant age was expected for the correctness question, qualified by a participant age by expert gender interaction. It was hypothesized that younger children (4- to 5-year-olds) would be more likely to accept information from a counter-normative expert than older children (6- to 8-year-olds). While young children are very sensitive to expertise (Koenig & Jaswal, 2011; Lutz & Keil, 2002), with age, children develop biases that may lead them to disregard expert testimony at noted above (Boseovski & Hughes Maicus, 2013). It was expected that older children's dislike of

counter-normative characters would lead to a bias possibly making them unlikely choose such an expert as correct, and instead choose the information offered by the stereotype-consistent layperson character. Due to the significantly harsher evaluations of males who transgress gender norms (Blakemore, 2003; Levy et al., 1995), it was expected that this reluctance would be especially strong when the counter-normative expert was a male in a typically feminine domain.

A significant age by expert gender interaction was expected for the endorsement question. Even when biases cause reluctance to accept information from an expert, older children still report a preference to learn from the expert about their domain of expertise (Boseovski & Hughes Maicus, 2013; Boseovski & Thurman, 2013). Older children were expected to report a preference to learn from the counter-normative expert as opposed to the layperson about the domain in question, irrespective of the gender of the expert. In contrast, it was expected that younger children would prefer to learn from the informant of the same gender as themselves. Young children have previously demonstrated difficulty connecting the idea of expertise to future learning from an individual (Boseovski & Hughes Maicus, 2013) and they were expected to instead resort to the in-group bias displayed in previous work when asked to associate with one informant (Ma & Woolley, 2013; Shutts et al., 2010).

On the evaluation question, a significant interaction between participant age and expert gender was expected. With age, participants were expected to report liking the counter-normative character significantly less than the layperson. This change was expected to be especially strong when the counter-normative expert is male, consistent

with the findings of previous research (Blakemore, 2003; Levy et al., 1995; Martin, 1989). Therefore, the harshest evaluations were expected to be given of male expert characters by 6- to 8-year-olds.

It was hypothesized that individual differences in EF abilities, as well as differences in participants' attitudes towards traditionally stereotyped activities, would be related to choice of informant on the correctness and endorsement questions. Participants who demonstrated more advanced cognitive flexibility and greater inhibitory control, as demonstrated by performance on the DCCS (Zelazo, 2006) and the happy/sad Stroop task (Lagattuta et al., 2011), were expected to have a greater probability of accepting information and reporting a preference to learn from the counter-stereotypical character. Participants with lower scores on the GASC (Signorella & Liben, 1985) were expected to also have a greater probability of accepting information and reporting a preference to learn from the counter-stereotypical character. The parental questionnaire was expected to provide information about how individual differences in participants' preferred activities and traits relates to their willingness to learn from a counter-stereotypical expert character, as well as if there is any relationship between this willingness and parents' own attitudes towards typically gendered toys.

CHAPTER IV

METHODS

Participants

The final sample consisted of 96 participants: 48 4- to 5-year-olds (24 boys and 24 girls; *M* age = 60.16 months, *SD* = 7.12 months) and 48 6- to 8-year-olds (24 boys and 24 girls; *M* age = 90.81 months, *SD* = 9.99 months). Participants were primarily from upper-middle class families (63.5% of families reported an annual income of $60,000 or greater) and were ethnically diverse: 77.1% Caucasian, 12.5% African American, 4.2% Asian/Pacific Islander, 1.0% Hispanic and 5.2% who chose not to disclose this information. Participants were recruited from schools and day cares in Guilford County in North Carolina and were tested in the Development and Understanding of Children's Knowledge (DUCK) laboratory.

An additional 26 participants were tested but excluded from the final analyses for the following reasons: attention difficulties (i.e., unable to complete task or incorrect answers to manipulation check questions; four 4-year-olds, one 5-year-old, three 6-year-olds, three 8-year-olds), unable to answer stereotype-consistent task correctly (seven 4-year-olds, two 5-year-olds, four 6-year-olds), experimenter error (one 4-year-old, one 5-year-old). Two useable participants (one 4-year-old and one 8-year-old) were tested before the stereotype-consistent control task was included in the protocol. These

participants were retained in the final sample as results did not change based on retention or exclusion of these data.

Materials

The materials for the main task consisted of eight separate pictures, each of which displayed one character on a neutral background. For each domain, there was one picture of a boy and one picture of a girl with a background relating to the story domain (see Appendix A). Each participant saw one girl character and one boy character for each story.

The domains of each story were selected as a result of a pilot task in which 4- to 8-year-old children were asked to report their beliefs regarding certain domains, such as football, babysitting, soccer, computers, building things, and cooking. For each domain, participants reported who they thought would know about it (1-probably a boy, 2-might be a boy, 3-can't tell, 4-might be a girl, 5-probably a girl), and how weird it would be for a member of the opposite gender to know about it (1-not weird at all, 2-a little weird, 3-very weird). The four domains used in the current study were selected because they were most highly associated with a boy (football and construction) and a girl (sewing and ballet). Participants also were more likely to report that it would be "very weird" for a member of the opposite sex to know a lot about these domains.

The materials for the DCCS consisted of two boxes, each of which had a slot in the top and a target card affixed to the box. One target card depicted a blue rabbit and one depicted a red boat, each on a white background. Fourteen cards were used for the pre-

switch and post-switch trials. Seven of these cards depicted a red rabbit and seven depicted a blue boat. An additional 14 cards were used for the borders trial. These cards consisted of four red rabbits and three blue boats, each with a black border around the edge of the card. Seven test cards without a border (four red rabbits and three blue boats) were also used as part of the borders trial.

The materials used for the happy/sad Stroop task were 26 laminated cards, half of which depicted a yellow smiling face on a white background, while half depicted a yellow frowning face.

The materials for the GASC consisted of three black and white pictures. Each picture displayed two cartoon figures- either two identical male figures, two identical female figures, or a male and a female figure.

A video camera was used to record all testing sessions.

Design

This study used a mixed design in that there were two between-subjects variables (participant age and participant gender) and one within-subjects variable (story domain – typically male or typically female). Participants each heard two counter-stereotypical stories; one story about a male character with expertise in a typically feminine domain and one story about a female character with expertise in a typically masculine domain. Participants each also heard one stereotype-consistent comparison story, which was counterbalanced such that half of participants heard about a male character with expertise in a typically masculine domain and half heard about a female character with expertise in a typically feminine domain. Participants either heard story set 1, with counter-

stereotypical stories about sewing and construction and a stereotype-consistent story about either football or ballet, or story set 2 with counter-stereotypical stories about ballet and football and a stereotype-consistent story about either sewing or construction. The stories were counterbalanced so that half of participants heard story set 1 and half heard story set 2, with the story order counterbalanced as well. The full stories can be found in Appendix B.

Procedure

All testing was conducted in the DUCK lab at the University of North Carolina at Greensboro. The participant was seated at a table with the experimenter. Experimenter gender was counterbalanced to ensure that an equal number of participants in each condition were tested by an experimenter of each gender. For the main task, each participant heard three stories, two about a counter-stereotypical expert, and one about a stereotype-consistent expert, as well as the happy/sad Stroop task, the Dimensional Change Card Sort (DCCS), and the Gender Attitudes Scale for Children (GASC). The order of these six tasks was counterbalanced, and the order was fixed such that the counter-stereotypical stories were first and third, the happy/sad Stroop and DCCS second and fourth, the GASC was fifth and the stereotype-consistent story was last.

The parent was seated in a room adjacent to the testing room, and was asked to fill out the three-page parental questionnaire while their child was engaged in tasks with the experimenter. The complete questionnaire can be found in Appendix C.

Main Task. The experimenter verbally introduced the main task to participants. For example, in the sewing story, the experimenter would say, “Today I am going to tell

you about two kids your age, a boy named Jimmy and a girl named Sally. Both Sally and Jimmy are in a home economics class together where they learn how to do lots of things. Today, they are learning how to sew." The name of each character was chosen randomly from a list of multiple names. The experimenter then went on to introduce both characters in a randomized order. To convey the expertise of the boy character, participants were told that he "has taken many classes on sewing before" and also "knows the names of many different types of needles and when to use them". The girl character, or layperson, is taking her first sewing class and she "knows the names of some needles but does not know how to use them" (see Appendix B). Participants were told that the two characters are working together on a class project and disagree about a critical aspect of the project (e.g., what type of needle should be used when making a shirt).

Following these stories, participants were given a manipulation check to ensure that they understood which character was an expert and which was a layperson in the stories, as well as the testimony given by each character. Participants who answered these questions incorrectly were reminded of the character description and/or testimony and asked the question again. The experimenter repeated the information up to three times.

After the stories, participants were asked a series of questions. For the correctness question participants were asked, "Who do you think is right? What needle should be used to make the shirt? Should they use a stretch needle like Sally said or a wedge needle like Jimmy said?", as well as to justify their answer ("Why do you think that Sally/Jimmy is right?"). For the endorsement question, participants were asked "If you wanted to learn to sew, would you rather learn from Sally or Jimmy?" The order in which these

questions were presented to participants was randomized, as well as the order in which forced choice options were presented. Evaluation of characters was measured in the question: "How much do you like Jimmy/Sally?" Responses were rated on a 5-point Likert scale (1 – I dislike him/her very much, 2 – I dislike the him/her a little, 3 – I don't like or dislike him/her, 4 – I like him/her a little, 5 – I like him/her a lot).

DCCS – Borders Version. Participants were asked to play a card game with the experimenter, starting with one sorting rule (e.g., shape) and moving to the second sorting rule later on (e.g., color; order was randomized). The experimenter introduced the rules of the pre-switch trial to the participant: "This is the color/shape game. In the color/shape game, all of the blue/rabbit cards go here, and all of the red/boat cards go here." The pre-switch trial consisted of six cards and proceeded directly after this demonstration. For each card, the experimenter repeated the rules of the game, labeled the next card by the relevant dimension (e.g., "Here is a blue card" or, "Here is a boat card") and asked the participant to put the card down. The experimenter gave no feedback. After all six cards were sorted, the post-switch trial commenced. The sorting rule of the post-switch trial was always the opposite of the pre-switch trial. After the rules of the post-switch phase were introduced, participants were asked to sort six cards. The experimenter labeled each card by the relevant dimension.

Participants who passed the post-switch trial by sorting at least five cards out of six correctly moved on to the borders version of the task. In this trial, participants were told to play the color game when the card had a black line around the edge, and the shape game when the card did not have a line. The participant was then asked to sort 12 cards.

For each card, the experimenter repeated the rules, labeled the card by the relevant dimension, and asked the participant to sort it. Participants received no feedback from the experimenter during the entire task.

Happy/sad Stroop Task. The experimenter asked participants to play the opposite game, during which they were told to say "happy" when they saw a sad face, and "sad" when they saw a happy face. Participants practiced the rules on a deck of six practice cards. Once the participant responded without correction four times in a row, they proceeded directly into the test phase. During the test phase, the experimenter presented a total of 20 randomized cards, one at a time, in front of the participant. As soon as the participant responded, the experimenter placed the next card in front of them. Consistent with the protocol used by Lagattuta et al. (2011), participants did not receive any feedback on their performance unless they responded incorrectly for four or more cards, in which case the experimenter reminded them of the rules.

GASC. The experimenter asked the participant to tell them if they think certain activities could be done by only men, by only women, or by both men and women. The experimenter told participants to point to a picture of two men when they thought the activity could be done only be men, to a picture of two women when they thought the activity could be done only by women, and to a picture of a man and a women when they thought the activity could be done by both men and women. The participant was asked three practice questions ("Can you show me who can be a Mommy? Who can be a Daddy? Who can have two legs?"). The experimenter proceeded to read a list of 35

activities, and for each activity the child pointed to the picture indicting who can do the activity.

Parental Questionnaire. The questionnaire was comprised of three parts: activities (taken from the Pre-School Activities Inventory, Golombok & Rust, 1993), traits (selected from Bem, 1974), and attitudes towards toys (taken from Blakemore & Centers, 2005). Parents were given the questionnaire on a clipboard and asked to fill it out to the best of their knowledge. In part one, parents rated the frequency with which their child engaged in a list of 12 activities (6 feminine and 6 masculine) on a 5-point Likert scale, from one ("never") to five ("very often"). Participants received two activity scores based on these ratings. The feminine activity score was the average rating given for all of the typically feminine activities and the masculine activity score was the average rating given for all of the typically masculine activities. Part two of the questionnaire was a list of 38 traits (19 feminine, 19 masculine; Bem, 1974) and parents were asked to use the same 5-point Likert scale to rate how often their child displayed each trait. Participants also received two scores for this section of the questionnaire; a feminine trait score (the average of all the responses to each feminine trait) and a masculine trait score (the average of all the responses to each masculine trait). Part three of the questionnaire was a list of toys, and parents rated if they thought each toy was appropriate for only for girls (1), mostly for girls (2), for both girls and boys (3), mostly for boys (4), or only for boys (5).

CHAPTER V

RESULTS

The main dependent variables were children's choice of informant for the correctness (i.e., "Who do you think is right?") and endorsement (i.e., "Who do you want to learn from about this domain?") questions on the main task. Participants who chose the layperson as correct received a score of 0 and those that chose the expert as correct received a score of 1. These questions were analyzed through two separate repeated measures logistic regression analyses to examine how the independent variables of participant age (in months), participant gender, and expert gender predicted the dichotomous dependent variable of participant's choice of informant (expert or layperson). *QICC* was used as a measure of goodness of fit to assess the best model predictors. There were no significant effects of experimenter gender on children's choice of informant in the correctness, $X^2(1, N = 96) = 2.53$, $p = .62$, or endorsement, $X^2(1, N = 96) = 3.71$, $p = .16$, questions. Story domain also did not have a significant effect on choice of informant in the correctness, $X^2(1, N = 96) = .253$, $p = .62$, or endorsement, $X^2(1, N = 96) = .09$, $p = .77$, questions. As a result, these variables were not further analyzed.

Only participants who answered the control task correctly were retained in the final analyses in all of the analyses described.

Correctness

Participants were asked to choose which informant they believed to be correct about a key piece of information for each story. Model 1 (*QICC* = 171.06) included the predictors of participant age in months, participant gender, and the gender of the counter-stereotypical expert. Participant age was the only significant predictor, $\beta = .05$, Wald $\chi^2(1) = 15.73$, $p = .001$. An independent samples t-test demonstrated 6- to 8-year-olds were significantly more likely to choose the counter-stereotypical expert as correct (.906) compared to 4- to 5-year-olds (.729), $t(94) = -3.35$, $p = .001$. In model 2 (*QICC* = 169.59), interactions between participant age in months and expert gender, participant gender and expert gender, and participant age and participant gender were added. Participant age was again a significant predictor, $\beta = .08$, Wald $\chi^2(1) = 9.18$, $p = .002$, in addition to a significant interaction between participant gender and the gender of the counter-stereotypical expert, $\beta = 2.12$, Wald $\chi^2(1) = 6.45$, $p = .01$. Follow up chi-square analyses revealed that female participants (.875) were more likely than male participants (.708) to choose a female expert as correct, $\chi^2(1, N = 96) = 4.04$, $p = .04$. However, there were no significant differences between female (.792) and male (.896) participants in the likelihood of choosing a male counter-stereotypical expert as correct, $\chi^2(1, N = 96) = 1.98$, $p = .16$. Additional McNemar chi-square analyses indicated that male participants choose a male expert as correct (.896) significantly more often than a female expert (.708), $\chi^2(1, N = 48) = 3.77$, $p = .05$. There was no significant difference in female participants' choice of a male (.702) or female (.875) counter-stereotypical expert as correct, $\chi^2(1, N = 48) = 0.75$, $p = .39$.

Model 3 (*QICC* = 167.54) provided the best fit to the data. Main effects of participant age, $\beta = .19$, Wald $\chi^2(1) = 8.78$, $p < .01$, and participant gender, $\beta = 7.92$, Wald $\chi^2(1) = 3.78$, $p = .05$, were qualified by a significant interaction between participant age and participant gender, $\beta = -.150$, Wald $\chi^2(1) = 5.13$, $p = .02$, as well as a significant interaction between participant age and expert gender, $\beta = -.15$, Wald $\chi^2(1) = 4.36$, $p = .04$. These effects were captured in a three-way interaction between participant age, participant gender, and expert gender, $\beta = .17$, Wald $\chi^2(1) = 4.54$, $p = .03$. All models are displayed in Table 1.

Follow-up chi square analyses were conducted to explore participant gender effects in each age group (i.e., 4- to 5-year-olds and 6- to 8-year-olds) when the counter-stereotypical expert was male or female. No gender differences were found in 4- to 5-year-olds' likelihood of choosing either a male, $\chi^2(1, N = 48) = 1.06$, $p = .30$, or female, $\chi^2(1, N = 48) = .87$, $p = .35$, counter-stereotypical expert as correct. While there were no gender differences in 6- to 8-year-olds' likelihood to choose a male counter-stereotypical expert as correct, $\chi^2(1, N = 48) = 1.09$, $p = .29$, female participants in this age group were more likely than males to choose a female counter-stereotypical expert as correct, $\chi^2(1, N = 48) = 5.58$, $p = .02$ (see Figure 1).

Follow-up McNemar chi-square analyses were conducted to examine how the frequency with which boys and girls in each age group choose an expert as correct varied by expert gender. There were no significant differences in 4- to 5-year-old girls' likelihood of choosing a female (.75) or a male (.708) counter-stereotypical expert as correct, $\chi^2(1, N = 24) = 0.00$, $p = 1.00$. Similarly, there were no significant differences in

4- to 5-year-old boys' likelihood of choosing a female (.625) or a male (.833) counter-stereotypical expert as correct, $\chi^2(1, N = 24) = 1.46$, $p = 0.23$. There were no significant difference in 6- to 8-year-old girls' choice of a male (.875) or female (1.00) expert as correct, $\chi^2(1, N = 24) = 1.33$, $p = 0.25$, or in 6- to 8-year-olds boys' choice of a male (95.8%) or female (79.2%) expert, $\chi^2(1, N = 24) = 1.5$, $p = 0.22$.

Additional follow-up analyses revealed that 4- to 5-year-old girls were significantly more likely than expected by chance to choose an expert as correct when presented with a female expert, $t(23) = 2.77$, $p = .01$, and a male expert, $t(23) = 2.19$, $p = .04$. While 4- to 5-year-old boys were also significantly more likely than chance to choose a male expert as correct, $t(23) = 4.29$, $p < .001$, their selection of a female expert as correct was not significantly different from chance, $t(23) = 1.24$, $p = .23$. All of the older girls (6- to 8-year-olds) in the sample chose the female expert as correct, and were also significantly more likely than expected by chance to choose a male expert as correct, $t(23) = 5.44$, $p < .001$. Older boys were significantly more likely than expected by chance to choose an expert as correct when presented with a female expert, $t(23) = 3.44$, $p = .002$, and a male expert, $t(23) = 11.00$, $p < .001$.

Correctness Justification. After participants were asked to choose which informant they believed to be correct, they were asked to justify their response. Upon examination of participant responses, four distinct categories emerged (shown in Table 2). Responses were coded into these categories by two separate coders. Cohen's kappa was .95 for the female expert story explanation coding and .95 for the male expert story explanation. Table 3 displays the frequency of use of each category by age group.

Endorsement

Participants were asked to choose from which informant they would prefer to learn about the relevant domain. Model 1 (*QICC* = 145.37) included the predictors of participant age in months, participant gender, and the gender of the counter-stereotypical expert. Participant age was the only significant predictor, $\beta = .05$, Wald $\chi^2(1) = 7.57$, $p < .01$, such that 6- to 8-year-olds were more likely to report a preference to learn from the counter-stereotypical expert (95.8%) compared to 4- to 5-year-olds (79.2%), $t(94) = -3.80$, $p < .001$. In model 2 (*QICC* = 141.22), interactions between participant age in months and expert gender, participant gender and expert gender, and participant age and participant gender were added. This model demonstrated a significant interaction between participant gender and the gender of the counter-stereotypical expert, $\beta = 2.96$, Wald $\chi^2(1) = 4.99$, $p = .03$. Chi-square analyses revealed that significantly more female participants (93.8%) reported a preference to learn from a counter-stereotypical female expert as compared to male participants (79.2%), $\chi^2(1, N = 96) = 4.36$, $p = .04$. Additionally, male participants were marginally significantly more likely to report a preference to learn from a counter-stereotypical male expert (.938) as compared to female participants (.813), $\chi^2(1, N = 96) = 3.43$, $p = .06$. Additional McNemar chi-square analyses indicated that female participants were marginally significantly more likely to report wanting to learn from a counter-stereotypical expert when the expert was female (.928) compared to when the expert was male (.813), $\chi^2(1, N = 48) = 2.50$, $p = .11$. Male participants were marginally significantly more likely to report wanting to learn from a

counter-stereotypical expert when the expert was male (.938) compared to a female (.792).

Model 3 (*QICC* = 137.85) provided the best fit to the data. In addition to a significant interaction between participant gender and expert gender, $\beta = 14.09$, Wald $\chi^2(1) = 4.99$, $p = .03$, there was also a marginally significant three-way interaction between participant age, participant gender, and expert gender, $\beta = -0.17$, Wald $\chi^2(1) = 3.69$, $p = .055$. All models are displayed in Table 4. Follow-up chi square analyses were conducted to explore participant gender effects in each age group (i.e., 4- to 5-year-olds and 6- to 8-year-olds) when the counter-stereotypical expert was male or female. No gender differences were found in 6- to 8-year-olds' likelihood of endorsing the counter-stereotypical expert for future learning, regardless of whether the expert was male, $\chi^2(1, N = 48) = .36$, $p = .55$, or female, $\chi^2(1, N = 48) = 0.00$, $p = 1.00$. However, 4- to 5-year-old female participants were significantly more likely to prefer learning from a female counter-stereotypical expert (.917) than male participants in the same age group (.625), $\chi^2(1, N = 48) = 5.78$, $p = .02$. Also, 4- to 5-year-old male participants were significantly more likely to prefer learning from a male counter-stereotypical expert (.958) than female participants in the same age group (.667), $\chi^2(1, N = 48) = 6.70$, $p = .01$. These results are demonstrated in Figure 2. Follow-up McNemar chi-square analyses indicated that 4- to 5-year-old girls were significantly more likely to report wanting to learn from a counter-stereotypical expert when presented with a female expert (.917) than a male expert (.667), $\chi^2 (1, N = 24) = 3.13$, $p = .07$, while 4- to 5-year-old boys were significantly more likely to choose a male counter-stereotypical expert (.958) than a female expert (.635), $\chi^2(1, N$

= 24) = 4.90, p = .02. There were no significant differences in 6- to 8-year-old girls likelihood of wanting to learn from a male or female counter-stereotypical expert (.958), $\chi^2(1, N = 24) = 0.50$, $p = 1.00$. There were also no differences in 6- to 8-year-old boys likelihood of learning from a male (.917) or female (.958) counter-stereotypical expert, $\chi^2(1, N = 24) = 0.00$, $p = 1.00$.

Additional follow-up analyses revealed that 4- to 5-year-old girls were significantly more likely than expected by chance to report a preference to learn from a female expert, $t(23) = 7.23$, $p < .001$, but responded at chance levels when presented with a male expert, $t(23) = 1.69$, $p = .103$. Boys in this age group were significantly more likely than expected by chance to report a preference to learn from a male expert, $t(23) = 11.00$, $p < .001$, but responded at chance levels when presented with a female expert, $t(23) = 1.24$, $p = .228$. However, 6- to 8-year-old girls were significantly more likely than expected by chance to report a preference to learn from a female expert, $t(23) = 11.00$, $p < .001$, and a male expert $t(23) = 11.00$, $p < .001$. Boys in this age group were also were significantly more likely than expected by chance to report a preference to learn from a female expert, $t(23) = 7.23$, $p < .001$, and a male expert $t(23) = 11.00$, $p < .001$.

Evaluation of the Counter-Normative Expert

Participants were asked to rate how much they liked each counter-stereotypical expert character on a 5-point Likert scale, from one ("I dislike him/her very much") to five ("I like him/her very much"). A mixed ANOVA was performed with participant age (4- to 5-year-olds vs. 6- to 8-year-olds) and participant gender (male or female) as between-subjects factors and expert gender (male or female) as a within-subjects factor.

Results indicated a participant gender by expert gender interaction, $F(1, 92) = 10.47$, $p = .002$. Female participants reported liking a female counter-stereotypical expert significantly more ($M = 4.44$, $SE = .161$) than a male counter-stereotypical expert ($M = 3.96$, $SE = .175$). Male participants reported liking a male counter-stereotypical expert significantly more ($M = 4.54$, $SE = .175$) than a female counter-stereotypical expert ($M = 4.06$, $SE = .161$). Figure 3 displays this interaction and Table 5 displays participant mean responses by age, gender, and expert gender. No other significant main effects or interactions were found.

Also examined was the frequency with which participants reported that they would like to be friends with the counter-stereotypical expert character. Overall, the majority of participants (86.5%) reported a desire to be friends with both a male and a female expert character. When examining the frequency of participant's responses by gender, a similar preference for the same-sex character emerged. When presented with a female expert, 95.8% of female participants reported wanting to be her friend, as compared to 77.1% of male participants. Both male (87.5%) and female (85.4%) participants were equally likely to report wanting to be friends with a male counter-stereotypical expert.

Secondary Tasks

A secondary goal of this study was to explore how cognitive flexibility and inhibition, as well as children's attitudes towards certain gendered activities relates to their acceptance of information from, willingness to learn from, and evaluation of a counter-stereotypical expert. The borders version of the Dimensional Change Card Sort

(DCCS) was used to assess cognitive flexibility, the happy/sad Stroop task assessed inhibition, and the Gender Attitude Scale for Children (GASC) assessed attitude towards certain activities. Participants' mean performance on these tasks is listed in Table 6. Parents of participants also reported on their children's typical activities, traits, and their own attitudes towards typically gendered toys.

DCCS. Participants were assigned a score from zero to three based on their performance on the DCCS, consistent with Zelazo (2006). Scores indicated the following: zero if the participant failed the pre-switch trial (i.e., sorted less than five out of six cards correctly), one if they passed the pre-switch but failed the post-switch trial (i.e., sorted less than five out of six cards correctly), two if they passed the pre- and post-switch and failed the borders trial (i.e., sorted less than nine out of 12 cards correctly), three if they passed all three sorting trials. A 2 (Age: 4- to 5-year-olds vs. 6- to 8-year-olds) X 2 (Participant gender: male or female) between-subjects ANOVA revealed only a significant main effect of participant age group, $F(1, 92) = 37.02$, $p < .001$, but no effect of participant gender, $F(1, 92) = 2.14$, $p = .147$ and no significant interaction between participant gender and age group, $F(1, 92) = 2.14$, $p = .147$. Older participants (6- to 8-year-olds) performed significantly better on the DCCS ($M = 2.79$, $SE = 0.066$) than younger participants (4- to 5-year-olds; $M = 2.07$, $SE = 0.099$). Similar results were found in a second 2 (Age: 4- to 5-year-olds vs. 6- to 8-year-olds) X 2 (Participant gender: male or female) between-subjects ANOVA that was performed with total number of cards sorted correctly (out of 24) as the dependent variable. Specifically, a significant main effect of age was again found, $F(1, 92) = 29.23$, $p < .001$, but no effect of participant

gender, $F(1, 92) = 1.79$, $p = .183$, and no interaction between participant gender and age group, $F(1, 92) = 3.34$, $p = .071$.

Happy/sad Stroop. Consistent with Lagattuta et al. (2011), both cumulative response time and total number of errors were used as each participant's score for the happy/sad Stroop task. While coding cumulative response time, a coder recorded the time elapsed between when the card was placed on the table and when the participant responded using videos taken during testing. A 2 (Age: 4- to 5-year-olds vs. 6- to 8-year-olds) X 2 (Participant gender: male or female) between-subjects ANOVA revealed a significant main effect of participant age group, $F(1, 92) = 9.17$, $p = .003$. Six- to 8-year-olds had a significantly shorter reaction time ($M = 24.49$, $SE = .816$) than 4- to 5-year-olds ($M = 29.49$, $SE = 1.43$). There was no significant main effect of participant gender, $F(1, 92) = .010$, $p = .921$, and no significant interaction between participant gender and age, $F(1, 92) = 1.24$, $p = .269$.

The total number of response errors made by participants (e.g., responding "happy" to a picture of a happy face) was also counted for a score out of 20. A 2 (Age: 4- to 5-year-olds vs. 6- to 8-year-olds) X 2 (Participant gender: male or female) between-subjects ANOVA revealed a significant main effect of participant age group, $F(1, 92) = 14.69$, $p < .001$. Six- to 8-year-olds made significantly less errors ($M = 1.94$, $SE = .414$) than 4- to 5-year-olds ($M = 4.74$, $SD = .603$). There was no significant main effect of participant gender, $F(1, 92) = .675$, $p = .413$, and no significant interaction between participant gender and age, $F(1, 92) = .138$, $p = .711$.

GASC. Participants received a score out of 35 on the GASC, indicating how many "both men and women" responses they gave throughout the entire task. This scoring was consistent with that used in the original task by Signorella and Liben (1985). A higher score indicates a more egalitarian attitude towards the activities presented. A 2 (Age: 4- to 5-year-olds vs. 6- to 8-year-olds) X 2 (Participant gender: male or female) between-subjects ANOVA revealed a significant main effect of participant age group, $F(1, 92) = 18.38$, $p < .001$. Participants in the older age group (6- to 8-year-olds; $M = 25.50$, $SE = 1.14$) gave significantly more "both men and women" responses compared to participants in the younger age group (4- to 5-year-olds; $M = 18.04$, $SE = 1.30$). There was no significant main effect of participant gender, $F(1, 92) = .785$, $p = .378$, and no significant interaction between participant gender and age, $F(1, 92) = .001$, $p = .981$.

Correlational Analyses. Correlational analyses were conducted between participants' scores on the secondary tasks and their choice of expert (score of 1) or layperson (score of 0) character on both the correctness and endorsement question. Correlational analyses were also conducted between this score and participant's evaluation of the expert character (out of five). The secondary task scores included in the correlational analyses were: DCCS score out of 3, DCCS score out of 24, happy/sad Stroop reaction time, happy/sad Stroop total errors, GASC, and the parental questionnaire. The correlations for these tasks are presented in Tables 7 and 8.

The parental questionnaire was comprised of three parts: preferred activities, traits, and attitudes towards toys. Each of these sections involved rating items on a Likert scale from one to five. Tables 9 and 10 demonstrate the correlations for the parental questionnaire.

A significant positive correlation was found between the happy/sad Stroop reaction time score of 4- to 5-year-olds and their response to the correctness question in a female expert story, $r(46) = .292$, $p < .05$, indicating that 4- to 5-year-old participants with faster reaction time on the Stroop task were more likely to choose a counter-stereotypical female expert as correct. However, it is probable that the total number of errors on the Stroop task is a more reliable score of participants' inhibitory abilities as many of the 4- to 5-year-olds in the sample rushed through the task, and received low reaction time scores but a high number of total errors.

Participants received 5 scores based on their parents' responses in to the questionnaire: a feminine activity score, a masculine activity score, a feminine trait score, a masculine trait score, and an attitude towards toys score. All of these scores were calculated by taking the average of the relevant items on the parental questionnaire. There was a significant negative correlation between the feminine activity scores of 4- to 5-year-olds and responses to the endorsement question with a male counter-stereotypical expert, $r(47) = -.301$, $p < .05$, such that young children who were reported to engage in feminine activities more often were significantly less likely to report wanting to learn from a such an expert in the future. In the 6- to 8-year-old age group, there were significantly negative correlations between feminine activity scores and evaluation of a female counter-stereotypical expert, $r(47) = -.329$, $p < .05$, and masculine activity scores and responses to the correctness question regarding a male counter-stereotypical expert, $r(47) = -.381$, $p < .01$. Six- to 8-year-olds who were reported to engage in feminine activities more often reported liking a female counter-stereotypical expert significantly

more, while those who reportedly engaged in masculine activities more often were more likely to report a male counter-stereotypical expert as correct.

CHAPTER VI

DISCUSSION

The goal of this study was to examine children's learning preferences when two salient informant cues (i.e., expertise and gender stereotypes) were in conflict. This study is unique in that it is the first to investigate systematically children's attention to such cues. The results add to the current literature on selective social learning by addressing children's trust in an expert informant with knowledge about a domain that conflicts with traditional gender stereotypes. A secondary goal of this study was to explore how cognitive flexibility and inhibition, as well as children's attitudes towards certain gendered activities, relates to their acceptance of information from, willingness to learn from, and evaluation of a counter-stereotypical expert.

Participants in this study listened to stories about two potential informants, a counter-stereotypical expert and a layperson of the opposite gender, and were asked a number of questions regarding learning preferences and evaluation of the informants. While children generally defer to expert informants (Koenig & Jaswal, 2011), in certain cases children do not report an expert as correct (Boseovski & Hughes Maicus, 2014). Due to children's early knowledge of gender norms (Martin et al., 1990; Powlishta, 1995) and attention to individuals who transgress such norms (Conry-Murray & Turiel, 2012), it was believed that children would not consistently defer to the opinion of a counter-stereotypical expert character.

Changes in Flexibility and Trust in Expert Opinion

After hearing conflicting opinions from a counter-stereotypical expert and a layperson of the opposite gender, children were asked who they thought was correct about a key piece of information. These findings must be interpreted in light of the control story about a stereotype-consistent expert, in which all participants in both age groups reported the expert as correct and reported a desire to learn from this person in the future as opposed to a layperson of the opposite gender. This control task was added to the protocol to ensure that children had no difficulty in deferring to expert opinion when the expert did not transgress gender norms, and the participants whose responses were analyzed all chose the expert in this condition. Therefore, differences in children's acceptance of information presented by a counter-stereotypical expert cannot be attributed to a comprehension issue, as children clearly understand expertise in the absence of gender norm transgressions.

Overall, responses to the correctness question confirmed findings from previous work that expertise is a powerful cue when learning new information. Participants in most conditions trusted the counter-stereotypical expert and reported their testimony as correct more often than expected by chance, rather than trusting the testimony of the layperson of the opposite gender. However, there were some differences in response patterns depending on participant age and gender. While younger children (4- to 5-year-olds) were expected to be more likely than older children (6- to 8-year-olds) to report a counter-stereotypical expert as correct, the opposite trend emerged, with 6- to 8-year-olds overall more likely than 4- to 5-year-olds to report the expert character as correct. While

4- to 5-year-old girls deferred to a counter-stereotypical expert more often than chance regardless of gender, boys in this age group only consistently chose a counter-stereotypical expert when asked to choose between a male expert and a female layperson.

The age-related change in children's trust in the opinion of a counter-stereotypical expert is surprising given the literature demonstrating that 4- to 5-year-olds understand the concept of expertise (Lutz & Keil, 2002) and consistently defer to the opinion of an expert rather than a layperson (Koenig & Jaswal, 2011). However, previous literature has also demonstrated age-related changes across 4- to 8-year-olds in the flexibility with which children view gender norms, and this change likely contributes to this finding. While no studies have presented children with an expert character who transgressed gender norms, previous research that has demonstrated that younger children are significantly less likely to report that gender norm transgressions are possible compared to older children (Blakemore, 2003; Conry-Murray & Turiel, 2012). When presented with an expert who transgresses gender norms, young children may be unable to understand that a person can have expertise in a domain typically associated with the opposite gender due to their developing flexibility towards gender norms. Compared to 4- and 5-year-olds, 6- to 8-year-olds have increased awareness that gender norms can be violated by individuals and it is likely this increased knowledge that allows 6- to 8-year-olds accept a counter-normative expert as an accurate source of information.

Contrary to the hypothesis, 6- to 8-year-olds were significantly more likely than 4- to 5-year-olds to report a counter-stereotypical expert as correct, to want to learn from this expert in the future, and also reported overall high evaluations of such experts

(especially when the expert was of the same gender). This trend in evaluation was also seen in 4- to 5-year-olds, and is consistent with work demonstrating that children across these ages hold very positive views of others (Boseovski, 2010), and are often reluctant to say anything negative about an individual (Boseovski & Hughes Maicus, 2014). Yet, older children have also reported harsher evaluations of individuals who transgress gender norms (Blakemore, 2003). There are several methodological differences in presentation of counter-stereotypical characters in the current study and previous studies that may have led to these conflicting results. None of the past research asked children to evaluate the kind of character presented in the current study – a character with a considerable level of knowledge in a particular domain. Generally, when children have been presented with norm transgressions, they are given one specific example of a norm transgression and asked to rate how much they liked the character in question. For example, Blakemore (2003) presented participants with abstract situations, asking them "How much would you like to be friends with a boy who plays with Barbies?" In the current study, participants heard a verbal description of the counter-stereotypical expert, accompanied by a picture. As shown in Appendix A, the physical appearance of characters was consistent with gender norms – girls had long hair, boys had short hair, and none of the characters wore atypical clothing. While Blakemore's (2003) procedure allowed participants to make other assumptions about the child committing norm transgressions (for example, that the boy playing with dolls displays other feminine interests), the description and picture used as stimuli in the current study did not encourage the same kind of assumptions on the part of the participant. This procedural

difference may explain why older children did not display the same harsh evaluations of norm transgressors.

While 6- to 8-year-olds reported similar preferences for an expert informant in both the correctness and endorsement questions, 4- to 5-year-olds showed distinct response patterns on these questions. This finding is consistent with the results of Boseovski and Hughes Maicus (2014), and indicates that young children view these questions (i.e., "Who is right?" vs. "Who do you want to learn from?") differently, and thus consider different informant cues when answering them. This difference has important implications for the interpretation and generalization of other research in this area, as much of the previous research has asked participants to choose which testimony was correct. Clearly, simply the way in which participants are asked to choose between informant testimonies may affect the cues participants consider when responding.

The finding that younger children consistently reported a preference to learn from the expert of the same gender as themselves is consistent with the original hypothesis and indicates a strong same-gender bias. Learning about a domain from an expert character involves associating oneself with the expert, and because children tend to have a strong in-group bias with regard to informant gender (Ma & Woolley, 2013; Shutts et al., 2010) it makes sense that young children are more comfortable associating with an expert of the same gender as themselves.

Boys' Reluctance to Trust a Female Expert

Boys in both age groups displayed a reluctance to trust information offered by a female expert; 4- to 5-year-olds were at chance in their reporting of a female counter-

stereotypical expert as correct while 6- to 8-year-old boys were above chance, but still less likely than girls of the same age to report a female counter-stereotypical expert as correct. This reluctance is surprising given that the majority of children's teachers in preschool and the elementary years are female. Not only are young boys used to learning from a female, but teacher gender does not appear to be associated with any differences in the academic motivation or achievement of young boys (Carrington et al., 2007; Spilt, Koomen, & Jak, 2012), even in topics associated with male stereotypes, such as math and science (Marsh, Martin, & Cheng, 2008). Unlike elementary school teachers, the counter-stereotypical female expert presented in these stories were described as being "a kid your age". Therefore, while boys trust adult females, they may have less experience learning from girls their own age and are reluctant to accept information from another child who transgresses gender norms.

Boys are overall less forgiving of gender norm transgression than girls (Blakemore, 2003). Blakemore's (2003) results also indicated that boys were less likely than girls to say it is possible for a girl to play football, one of the two typically masculine domains presented with a female expert in the current study. Although this question has not been directly assessed about construction, the results of the pilot task indicated that children view these two domains as typically masculine and indicated no significant differences in the chance of a girl having knowledge about either. Therefore, it is likely that boys' view on girls playing football also extends to girls who build things.

The current study has built upon previous research in the area of selective social learning by further exploring when children attend to certain cues and under what

circumstances the same cues may be disregarded. While much of the previous work in this area has focused on children's learning of words and object use, it is unclear whether children attend to the same informant cues when learning information about specialized domains of knowledge. The current study explored this question by presenting children with information about activities many children learn about in their every day life- ballet, football, building things, and sewing clothing. The results described here suggest that although expertise is a powerful cue, there are limitations to children's ability to appreciate that an expert is a better informant than a layperson, regardless of gender. Similar limitations have been demonstrated when children are asked to choose between an expert offering negatively valenced information and a layperson offering positive information- a preference for positive information outweighs attention to expertise (Boseovski & Hughes Maicus, 2014; Boseovski & Thurman, 2013). When considered together with the results of current study, these findings indicate that children have difficulty attending to expertise when presented with testimony or an informant that transgresses against social norms. Whether this transgression is saying something unexpected (i.e., "That picture looks very bad", Boseovski & Hughes Maicus, 2014) or having knowledge in a non-traditional domain, this type of social information may lead children to endorse information offered by a layperson rather than an expert.

Secondary Measures and Main Task Performance

The finding that there were no significant correlations between children's performance on the main task and their scores on the DCCS, happy/sad Stroop, and GASC was surprising given the literature describing relations between these abilities and

stereotype use. However, the literature that supported these hypotheses was not directly related to the main task in the current study. While there is evidence for a link between inhibitory control and stereotype use in adults (Payne, 2005; von Hippel, Silver, & Lynch, 2000), it is possible that young children do not consistently draw on this ability when making decisions about learning from a counter-stereotypical expert. The hypothesis that children with higher inhibition abilities would be more likely to report a counter-stereotypical expert as correct was based on the assumption that all children would have to inhibit the dominant response to choose the layperson, as the layperson's gender was consistent with stereotypes associated with the story domain. However, this assumption may have been incorrect, because although there is evidence that children have expectations for individual's hobbies based on their gender (Martin et al., 1990), research has also indicated that children have a bias for an informant of the same gender (Shutts et al., 2010) and recognize informant expertise (Koenig & Jaswal, 2011). It is impossible to know which, if any, of these potential biases may be a dominant response in participants, or if there were individual differences in the biases of participants. For example, while some children may have had to inhibit a tendency to choose an informant consistent with stereotypes about the story domain in order to choose the expert character, others may have had a tendency to choose an informant who knows more about the domain, and thus did not have to inhibit any other type of responses. Future research is necessary to determine if there is a connection between inhibition and children's use of stereotypes and, if so, with what kind of social decisions increased inhibition skills assist.

The results regarding the DCCS were not consistent with previous research demonstrating that children with higher scores on a very similar card sorting task had more egalitarian views of which gender could perform certain jobs and activities (as measured by the GASC; Bigler & Liben, 1992). In the current study, there was no significant relation between children's scores on the DCCS and either their performance on the GASC or their responses to the correctness, endorsement or evaluation question. One possible explanation for these results is that the very high overall performance of both age groups in the card sort task made it impossible to capture this relationship appropriately. This difference may also be due to procedural differences between this card sorting task and the DCCS. While children are told the sorting rules in the DCCS, Bigler and Liben (1992) asked participants to sort cards "that belonged together" into matrixes and justify their arrangements. Allowing children to sort by their own rules may have made the task easier for children.

It is also possible that flexibility is not an ability that is necessary in order to accept the opinion of a counter-stereotypical expert. Bigler and Liben (1992) demonstrated that the ability to classify items in multiple ways was associated with better memory for counter-stereotypical story information. While cognitive flexibility may be necessary to accurately recall information that conflicts with gender norms, children's knowledge that these norms are often transgressed against may be a better predictor of if children are willing to learn from a counter-stereotypical expert. Future work in this area can further explore this by simply asking participants if it is possible for a girl to know a

lot about football before presenting counter-stereotypical expert characters to explore if this belief is related to whether the expert opinion is accepted.

The finding that children's scores on the GASC were not significantly related to their performance on the main task was especially surprising, as the GASC indicates more egalitarian views and it was expected that children with such views would be more accepting of the expertise of a counter-stereotypical expert. This finding could be caused by the fact that children in the current study earned higher scores than have been demonstrated in past research using the same task (Bigler & Liben, 1992). Five- to 10-year-olds in Bigler and Liben's (1992) study had an average score of roughly 10 (before any stereotype training), while 4- to 8-year-olds in the current study had an average score of 21.77, indicating that participants in the current study reported roughly 11 more "both men and women" responses than Bigler and Liben's (1992) participants. This drastic difference in scores could be due to changing stereotypes about the activities presented in the task that was created 29 years ago (Signorella & Liben, 1985).

The ordering of individual tasks in the current study could have also inadvertently contributed to children's elevated GASC scores. Bigler and Liben (1992) demonstrated that children who were instructed that both men and women could perform typically stereotyped tasks had significantly higher scores on the GASC (i.e., more "both men and women" responses) compared to their scores before participating in the training. In the current study, participants took the GASC after hearing two stories about counter-stereotypical experts. It is possible that this exposure increased children's awareness that

both genders are able to do traditionally stereotyped activities, and this increased awareness was captured by their elevated scores on the GASC.

Additionally, as discussed previously, children's opinions regarding the flexibility of a stereotyped activity or interest varies depending on the activity in question. While the GASC asked children their opinions on who can perform typically gendered activities, it did not ask directly about the domains presented in the stories of the main task (ballet, construction, football, and sewing). A measure that captures children's opinions about the specific domains presented would likely be more informative.

Limitations, Future Directions, and Applications

It is unclear whether the results of this study would generalize to other typically stereotyped domains of knowledge. The four domains of the stories presented here were chosen because they were found to be typically associated to an equal extent with either boys (construction and football) or girls (ballet and sewing), as well as equally unexpected for a person of the opposite gender to have expertise in the domain. Therefore, it is likely that these findings can be extended to other domains that are viewed similarly to the four domains tested. However, gender norm transgressions are viewed quite differently depending on the type of transgression; for example, appearance transgressions (e.g., a boy with long hair) are evaluated more harshly than aspiring to a career path usually associated with the opposite gender (e.g., a boy becoming a nurse; Blakemore, 2003). It is possible that children would be less likely to accept the expertise of an individual who violates gender norms by having knowledge about an appearance related domain (e.g., a boy with knowledge about fashion or makeup). Furthermore,

given the importance of appearance in both determining the gender of others as well as establishing one's own gender identity in childhood (Halim et al., 2014), future work could also explore children's willingness to trust or associate with an informant who transgresses gender norms relating to appearance.

Research that has investigated how children view experts who transgress various gender norms sheds light on the learning preferences of young children. Learning to evaluate sources of information is an especially important skill in childhood, when children are learning how to navigate the world around them and must often rely on informants to provide them with accurate information. As individuals do not always conform to gender norms, and it is important to understand if and when children are able to learn from such individuals. While older children are willing to learn from a counter-stereotypical expert, younger children are less likely to do so. This information could be useful for parents who want their children to learn hobbies typically associated with one gender; while a younger child may learn more in a ballet class from a female instructor, an older child would benefit from an experienced instructor of either gender. These findings could also have important implications in childhood education, as it is possible that young children may not consistently trust information offered by their teacher, depending on their gender and the type of information presented. Future research can address this issue by exploring if 4- to 5-year-olds still do not consistently trust a counter-stereotypical expert when there is no conflicting opinion offered, as this is a scenario more similar to one that would be encountered in a classroom environment.

As the current study found no significant relationship between children's cognitive abilities and stereotype use and their willingness to learn from a counter-stereotypical expert, future work in this area should continue to investigate which, if any, abilities may be predictive of making more advanced decisions in similar situations. Theory of Mind (ToM), or the ability to understand the beliefs, desires, and emotions of others (Wellman, Fang, & Peterson, 2011), is one example of an ability that may be relevant. Young children with increased ToM may be better able to take the perspective of an expert informant to understand their increased knowledge about certain domains, even when such expertise conflicts with gender stereotypes. Research investigating which specific abilities may be related to selective social learning will lead to a greater understanding of what thought processes are necessary to attend to relevant cues in learning paradigms.

In the current study, participants heard conflicting testimony from two informants about a key decision related to the domain of the story (e.g., what type of screwdriver needed to make a chair). Typically in the social selective learning literature children are presented with testimony of nonsense labels (e.g., one informant labels an ambiguous object as "a modi", the other labels it "a toma"; Taylor, 2013), but in the current study participants heard testimony involving real labels (e.g., a hex and a torx screwdriver). While use of these real labels increases generalizability to learning scenarios children may encounter outside of a laboratory experiment, it is possible that some of the participants in this study were familiar with these labels as a small number of children justified their choice of informant for the correctness question by referencing the tool.

Although the labels were chosen because they were associated with the domain yet relatively obscure, some participants believed they had encountered these labels before and reported making their decision regarding correctness based on this familiarity. While there is no evidence that the participants actually had any knowledge about the labels, their perception that they knew may have influenced their responses. To avoid this alternative explanation of results, future work should carefully pilot the terms used before offering them as testimony to ensure that participants are unfamiliar with them. An additional direction for future work would be to ask participants about their previous experience with the story domain as a whole, as their own perceived expertise level about the domain may change their willingness to accept the opinion of an unfamiliar expert, particularly when that expert is transgressing a gender norm.

Conclusion

In summary, the current study revealed developmental differences in children's willingness to learn from an expert who transgressed gender norms. While older children acknowledged that experts, despite transgressing gender norms, are better sources of information about their domain of expertise, younger children did not defer to expert opinion consistently. This age-related change is possibly caused by an increase in the belief that individuals can violate gender norms, as older children are generally more aware than younger children that it is possible for an individual to transgress these norms by having knowledge in a field typically associated with the opposite gender. These findings have implications for how young children view informants who transgress gender norms, and how this transgression affects children's learning preferences.

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APPENDIX A

TABLES AND FIGURES

Table 1. Logistic Regression Analysis on Participant's Choice of Informant for the Correctness Question.

Predictor	Parameter estimates					Goodness-of-fit statistic
	β	$SE\ \beta$	Wald χ^2	*df*	*p*	*QICC*
Model 1						171.06
Intercept	-2.26	0.93	5.85	1	0.02	
Age	0.05	0.01	15.73	1	0.00	
Gender	-0.21	0.35	0.34	1	0.56	
Expert	0.43	0.40	1.12	1	0.29	
Model 2						169.59
Intercept	-3.50	1.85	3.57	1	0.06	
Age	0.08	0.03	9.18	1	0.00	
Gender	0.91	1.99	0.21	1	0.65	
Expert	0.24	1.96	0.02	1	0.90	
Age*Expert	-0.02	0.03	0.28	1	0.59	
Gender*Expert	2.12	0.84	6.45	1	0.01	
Age*Gender	-0.03	0.03	0.02	1	0.26	
Model 3						167.54
Intercept	-9.99	3.88	6.64	1	0.01	
Age	0.19	0.06	8.78	1	0.00	
Gender	7.92	4.07	3.78	1	0.05	
Expert	8.16	4.34	3.54	1	0.06	
Age*Expert	-0.15	0.07	4.36	1	0.04	
Gender*Expert	-8.03	4.95	2.63	1	0.11	
Age*Gender	-0.15	0.07	5.13	1	0.02	
Age*Gender*Expert	0.17	0.08	4.54	1	0.03	

Note. Dependent variable was participant's choice of informant (expert or layperson) for the correctness question.

Table 2. Correctness Justification Categories.

Category	Definition and Examples
Expertise	References to a character's increased knowledge about the domain. *Examples:* "He knows a lot about ballet." "She's been in more classes and knows all the names."
Testimony	References to the specific testimony or opinion given by a character. *Examples:* "I think a hex screwdriver will do it." "You can sneak the ball so people don't know you have it."
Other	Responses unrelated to the character's expertise or testimony. *Examples*: "She likes to be right." "He has strong muscles."
Unelaborated	No response given. *Examples*: "I don't know." No verbal response.

Table 3. Justification Category Frequency.

	4- to 5-year-olds		6- to 8-year-olds	
Justification	Female Expert	Male Expert	Female Expert	Male Expert
Expertise	41.7% (20)	45.8% (22)	72.9% (35)	66.7% (32)
Testimony	8.3% (4)	6.3% (3)	16.7% (8)	18.8% (9)
Other	27.1% (13)	33.3% (16)	4.2% (2)	6.3% (3)
Unelaborated	22.9% (11)	14.6% (7)	6.3% (3)	8.3% (4)

Table 4. Logistic Regression Analysis on Participant's Choice of Informant for the Endorsement Question.

Predictor	Parameter estimates					Goodness-of-fit statistic
	β	$SE\ \beta$	Wald χ^2	*df*	*p*	*QICC*
Model 1						145.37
Intercept	-1.34	1.19	1.28	1	0.26	
Age	0.05	0.02	7.57	1	0.01	
Gender	-0.06	0.41	0.02	1	0.89	
Expert	0.09	0.46	0.05	1	0.83	
Model 2						141.22
Intercept	-2.97	4.56	0.43	1	0.51	
Age	0.09	0.08	1.16	1	0.28	
Gender	1.42	3.83	0.14	1	0.71	
Expert	0.20	3.66	0.03	1	0.96	
Age*Expert	-0.03	0.04	0.16	1	0.69	
Gender*Expert	2.94	1.31	4.99	1	0.03	
Age*Gender	-0.04	0.07	0.44	1	0.51	
Model 3						137.85
Intercept	1.12	3.56	0.10	1	0.75	
Age	0.02	0.05	0.19	1	0.67	
Gender	-4.09	3.99	1.05	1	0.31	
Expert	-6.59	4.19	2.47	1	0.12	
Age*Expert	0.08	0.06	1.67	1	0.19	
Gender*Expert	14.09	6.30	4.99	1	0.03	
Age*Gender	0.04	0.06	0.49	1	0.48	
Age*Gender*Expert	-0.17	0.09	3.69	1	0.06	

Note. Dependent variable was participant's choice of informant (expert or layperson) for the endorsement question.

Table 5. Evaluation Question Descriptive Statistics.

	Female Participants				Male Participants			
	4-to 5-year-olds		6-to 8-year-olds		4-to 5-year-olds		6-to 8-year-olds	
Expert Gender	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Female	4.33	1.40	4.54	0.66	4.13	1.23	4.00	1.02
Male	3.96	1.63	3.96	1.16	4.42	1.25	4.67	0.56

Note. Participants were asked to rate how much they liked each counter-stereotypical expert on a scale of one (I dislike him/her very much) to five (I like him/her a lot).

Table 6. Secondary Tasks Descriptive Statistics.

Measure	Age							
	4- to 5-year-olds				6- to 8-year-olds			
	M	*SD*	Range	*n*	*M*	*SD*	Range	*n*
DCCS Borders *Out of 4*	2.07	0.69	0-3	48	2.79	0.46	1-3	48
DCCS Borders *Out of 24*	16.88	5.92	5-24	48	21.96	2.91	7-24	48
Happy/sad Stroop *Reaction time*	29.49	9.82	9.73-53.63	48	24.49	5.65	11.68-32.73	48
Happy/sad Stroop *Out of 20*	4.74	4.13	0-17	48	1.94	2.87	0-19	48
GASC *Out of 35*	18.04	9.01	0-35	48	25.50	7.88	5-35	48

Table 7. Secondary Tasks Point-Biserial Correlation Coefficients for 4- to 5-year-olds.

	Correctness		Endorsement		Evaluation	
	Female Expert	Male Expert	Female Expert	Male Expert	Female Expert	Male Expert
DCCS Borders Score *Out of 4*	0.061	0.193	0.193	0.121	0.007	0.072
DCCS Borders Score *Out of 24*	0.032	0.124	0.200	0.099	0.059	0.154
Happy/sad Stroop Score *Reaction time*	0.292*	0.001	0.199	-0.127	-0.106	-0.176
Happy/sad Stroop Score *Out of 20*	0.210	0.022	-0.172	0.136	-0.166	0.215
GASC Score *Out of 35*	0.099	0.169	0.058	0.038	0.014	-0.054

* correlation is significant at the .05 level
** correlation is significant at the .01 level

Table 8. Secondary Tasks Point-Biserial Correlation Coefficients for 6- to 8-year-olds.

	Correctness		Endorsement		Evaluation	
	Female Expert	Male Expert	Female Expert	Male Expert	Female Expert	Male Expert
DCCS Borders Score *Out of 4*	-0.006	0.028	-0.096	0.260	-0.171	0.006
DCCS Borders Score *Out of 24*	0.042	-0.031	-0.112	0.176	-0.151	0.005
Happy/sad Stroop Score *Reaction time*	-0.103	-0.150	0.047	-0.127	-0.095	0.252
Happy/sad Stroop Score *Out of 20*	0.010	0.114	-0.098	0.021	0.100	0.021
GASC Score *Out of 35*	0.083	0.261	-0.120	0.028	0.095	-0.154

* correlation is significant at the .05 level
** correlation is significant at the .01 level

Table 9. Parental Questionnaire Point-Biserial Correlation Coefficients for 4- to 5-year-olds.

	Correctness		Endorsement		Evaluation	
	Female Expert	Male Expert	Female Expert	Male Expert	Female Expert	Male Expert
Typically Feminine Activity Average	-0.063	-0.199	0.281	-0.301*	0.180	0.056
Typically Masculine Activity Average	-0.138	0.230	-0.128	0.254	-0.106	0.071
Feminine Trait Average	-0.019	0.061	0.037	-0.112	0.166	0.060
Masculine Trait Average	-0.147	0.112	0.092	0.171	0.010	0.154
Average Toy Attitude	0.222	0.007	0.223	0.012	0.011	-0.035

* correlation is significant at the .05 level
** correlation is significant at the .01 level

Table 10. Parental Questionnaire Point-Biserial Correlation Coefficients for 6- to 8-year-olds.

	Correctness		Endorsement		Evaluation	
	Female Expert	Male Expert	Female Expert	Male Expert	Female Expert	Male Expert
Typically Feminine Activity Average	0.243	0.051	0.012	0.179	0.329*	-0.233
Typically Masculine Activity Average	-0.181	0.381**	0.079	0.269	-0.103	0.145
Feminine Trait Average	-0.009	0.269	0.186	0.240	0.122	-0.073
Masculine Trait Average	0.073	0.125	-0.250	0.030	-0.030	-0.038
Average Toy Attitude	-0.079	-0.098	0.039	-0.076	0.098	0.221

* correlation is significant at the .05 level
** correlation is significant at the .01 level

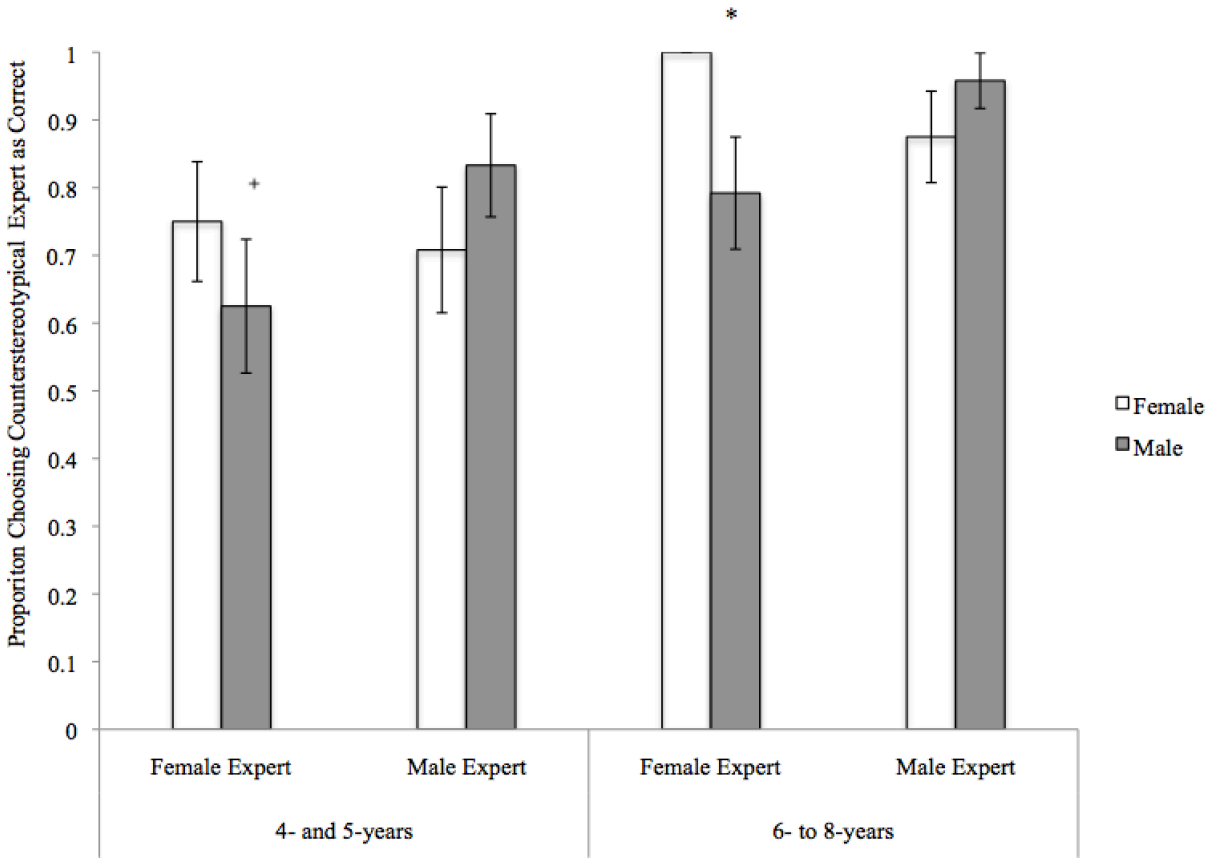


Figure 1. Proportion of Participants Who Chose the Counter-Stereotypical Expert as Correct.

* indicates bars significantly different from one another
+ indicates responses at chance level

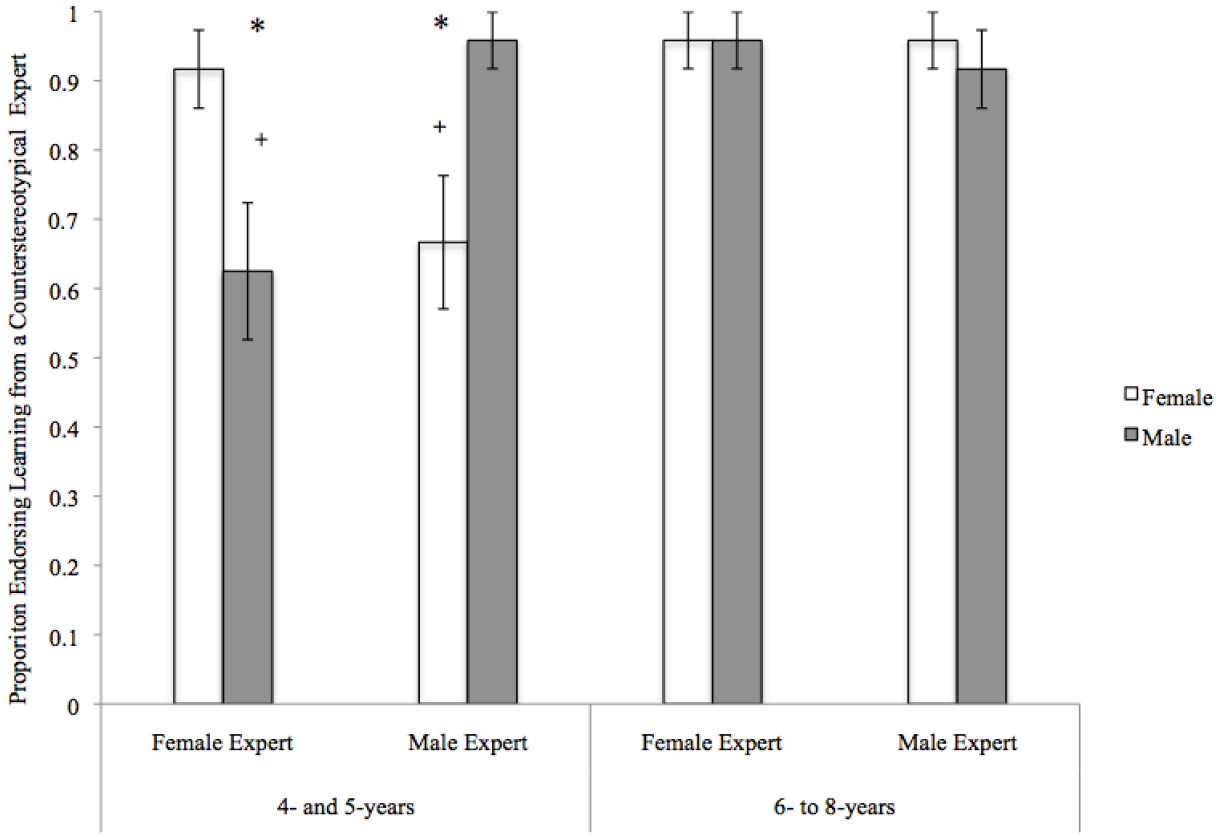


Figure 2. Proportion of Participants Who Reported a Preference to Learn From the Counter-Stereotypical Expert.

* indicates bars significantly different from one another
+ indicates responses at chance level

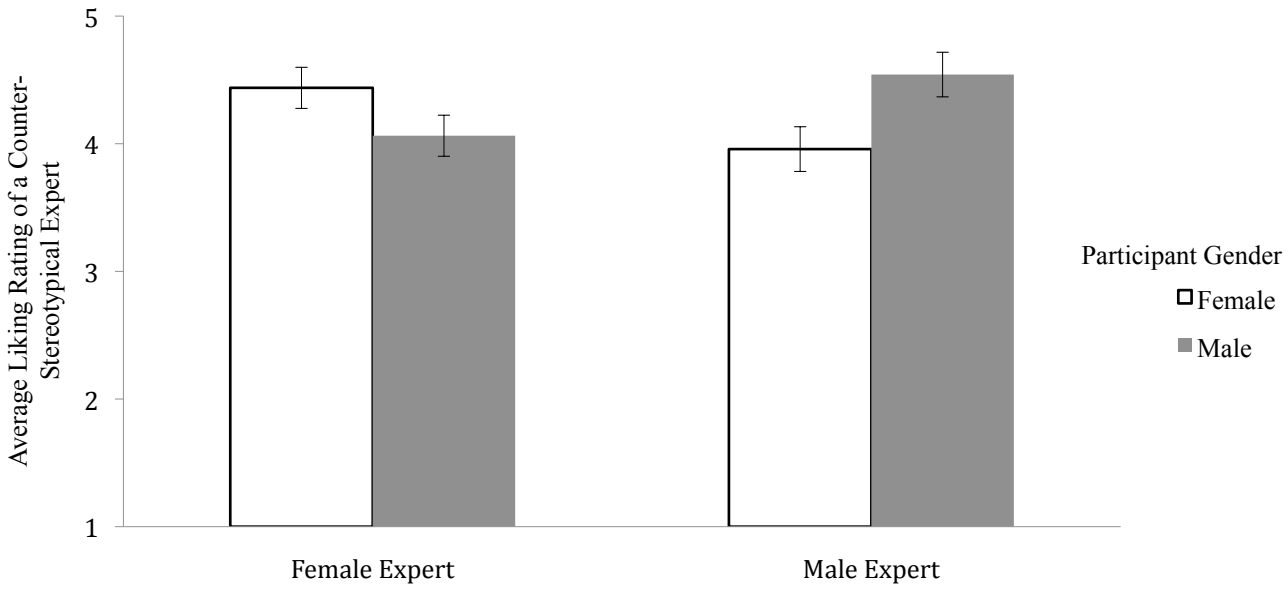
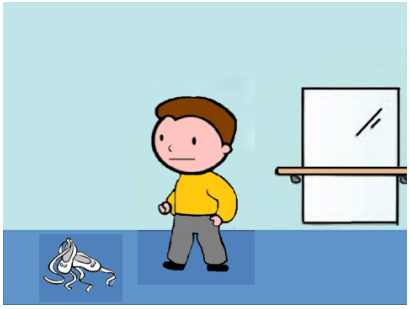


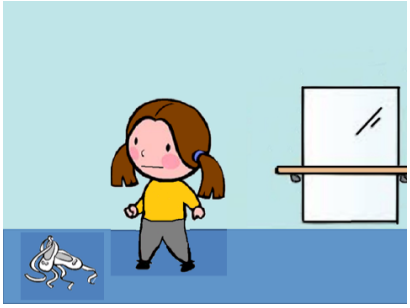
Figure 3. Average Liking Rating Out of Five Given by Participants of a Counter-Stereotypical Expert.

APPENDIX B

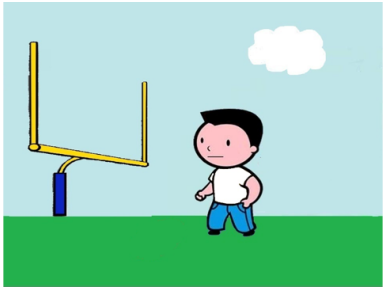
STIMULI

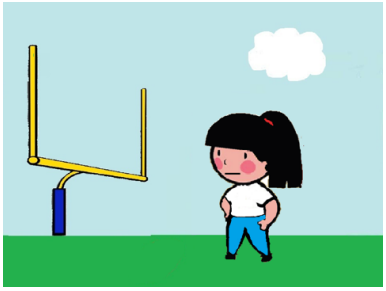
Ballet



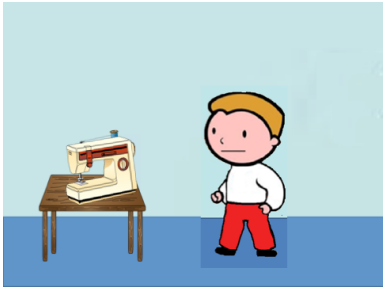


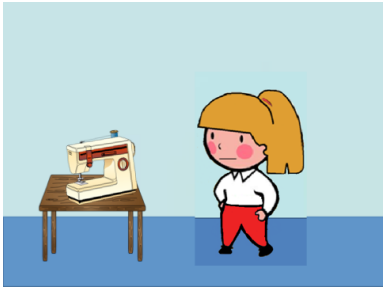
Football



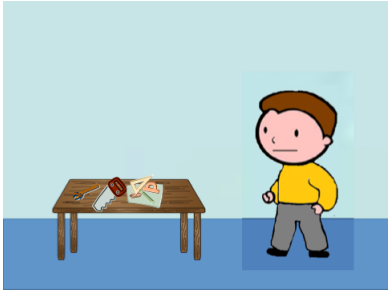


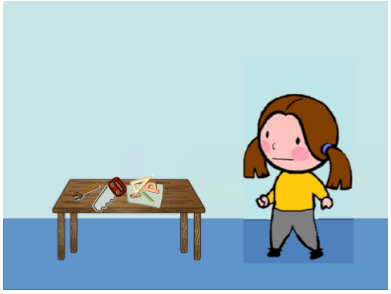
Sewing





Construction





APPENDIX C

MAIN TASK STORIES

Story Set 1

Sewing Domain

Male Expert: This is Jimmy. Jimmy has already taken many classes on sewing before. Jimmy's favorite thing to do in his free time is sew and make clothes. He sews new clothes every day after school and every weekend. Jimmy has sewed many different styles of clothing. He knows the names of many different types of needles and how to use all of them.

Female Layperson: This is Sally. This is the first time Sally has taken a class on sewing. Sally enjoys doing many different activities for fun. She sometimes practices sewing, but usually she chooses to do something else. Sally has not made any different types of clothing. She knows the names of a few different needles but does not know how to use any of them.

The Project: Jimmy and Sally are assigned to be partners for a class project. They need to make a shirt together, and they need to decide what needle to use to sew the shirt. The decision that Jimmy and Sally make is very important because whoever makes the best shirt in the class will get a special prize. It is up to Jimmy and Sally to make sure that they choose the right needle. But Jimmy and Sally cannot agree on a very important decision – what type of needle they need to use. This is very important to decide because only certain kinds of needles can be used to make shirts.

Conflicting Testimonies
Sally says to use *a stretch needle or a wedge needle* to make the shirt.
Jimmy says to use *a stretch needle or a wedge needle* to make the shirt.

Construction Domain

Female Expert: This is Karen. Karen has already taken many classes on construction before. Karen's favorite thing to do in her free time is to build things. She builds new things every day after school and every weekend. Karen has built many different types of furniture. She knows the names of many different types of tools and how to use all of them.

Male Layperson: This is Michael. This is the first time Michael taken a class on construction. Michael enjoys doing many different activities for fun. He sometimes

practices building things, but usually he chooses to do something else. Michael has not made any different types of furniture. He knows the names of a few different tools but he does not know how to use any of them.

The Project: Michael and Karen are assigned to be partners for a class project. They need to make a chair together, and they need to decide what screwdriver they will use to make the chair. The decision that Michael and Karen make is very important because whoever makes the best chair in the class will get a special prize. It is up to Michael and Karen to make sure they choose the right screwdriver. But Michael and Karen cannot agree on a very important decision – what kind of screwdriver they need to use. This is very important to decide because only certain kinds of screwdrivers can be used to make chairs.

Conflicting Testimonies
Karen says to use a *hex or torx* screwdriver to make the chair.
Michael says to use a *hex or torx* screwdriver to make the chair.

Story Set 2

Ballet Domain

Male Expert: This is Daniel. Daniel has already taken many classes on ballet before. Daniel's favorite thing to do in his free time is to practice ballet dancing. He practices ballet every day after school and every weekend. Daniel has danced ballet in many different recitals. He knows the names of many different ballet positions and what they look like.

Female Layperson: This is Mary. This is the first time Mary has taken a class on ballet. Mary enjoys doing many different activities for fun. She sometimes practices ballet, but usually she chooses to do something else. Mary has not danced in any recitals. She knows the names of a few different ballet positions but does not know what they look like.

The Project: Mary and Daniel are assigned to be partners for a class project. They have to watch their teacher show them different ballet positions and work together to name each position. The decision that Daniel and Mary make when they name each position is very important because whichever team names the most positions will get a special prize. It is up to Daniel and Mary to make sure they name each position correctly. But Daniel and Mary cannot agree on a very important decision – the name of the position they are watching right now. This is very important to decide because each position looks different and there is only one name for each.

Conflicting testimonies.
Mary says the position was *a Brisé or a Jete*.

Daniel says the position was *a Brisé or a Jete*.

Typically Masculine Domain with Female Expert: Football

Female Expert: This is Helen. Helen has already taken many classes on football before. Helen's favorite thing to do in her free time is to play football. She plays football every day after school and every weekend. Helen has played on many different football teams. She knows the names of many different kinds of football plays and what they look like.

Male Layperson: This is Thomas. This is the first time Thomas has taken a class on football. Thomas enjoys doing many different activities for fun. He sometimes plays football, but usually he chooses to do something else. Thomas has not played on any football teams. He knows the names of a few different kinds of football plays but does not know what they look like.

The Project: Helen and Thomas are assigned to be partners for a class project. They have to watch their teacher show them different football plays and work together to name each play. The decision that Helen and Thomas make when they name each play is very important because whichever team names the most plays will get a special prize. It is up to Helen and Thomas to make sure they name each play correctly. But Helen and Thomas cannot agree on a very important decision – the name of the play they are watching right now. This is very important to decide because each play looks different and there is only one name for each.

Conflicting testimonies.
Helen says the play was *a sneak or a pitch*.
Thomas says the play was *a sneak or a pitch*.

APPENDIX D

PARENTAL QUESTIONNAIRE

Parental Questionnaire : Child Activities & Traits Inventory

Part 1 – Activities

Instructions: Part 1 of this inventory asks about the everyday activities of your child. Each question asks how frequently the child engages in certain activities. There are five possible answers: 1 – Never, 2 – Hardly Ever, 3 – Sometimes, 4 – Often, or 5 – Very Often. Answer each question by circling the response which bests describes the child. If you are unsure about which responses best describes the child for any of the questions then please answer according to the response that seems the most appropriate.

Activities: Please answer these questions according to how often the child engaged in the following activities during the past month.

KEY: 1 – Never, 2 – Hardly Ever, 3 – Sometimes, 4 – Often, or 5 – Very Often

1. Playing house (e.g., cooking, cleaning) 1 2 3 4 5
2. Playing with girls 1 2 3 4 5
3. Pretending to be a female character (e.g., princess) 1 2 3 4 5
4. Pretending to be a male occupation (e.g., soldier) 1 2 3 4 5
5. Fighting 1 2 3 4 5
6. Sports and ball games 1 2 3 4 5
7. Climbing (e.g., fences, trees, gym equipment) 1 2 3 4 5
8. Playing at taking care of babies 1 2 3 4 5
9. Showing interest in real cars, trains and airplanes 1 2 3 4 5
10. Dressing up in girlish clothes 1 2 3 4 5
11. Watching television shows with mostly female characters 1 2 3 4 5
    *please list the names of specific shows*_____
    _____
    _____
12. Watching television shows with mostly male characters 1 2 3 4 5
    please list the names of specific shows _____
    _____
    _____

Part 2 – Traits

Instructions: Part 2 of this inventory asks about the traits displayed by your child. In the space next to each trait, please write the number corresponding to how often your child displays this trait. There are five possible answers: 1 – Never, 2 – Hardly Ever, 3 – Sometimes, 4 – Often, or 5 – Very Often. If you are unsure about which response best describes the child for any of the traits then please answer according to the responses that seems the most appropriate.

KEY: 1 – Never, 2 – Hardly Ever, 3 – Sometimes, 4 – Often, or 5 – Very Often

Please write your responses in the blank provided next to each trait.

1. acts as a leader _____
2. affectionate _____
3. aggressive _____
4. cheerful _____
5. ambitious _____
6. analytical _____
7. compassionate _____
8. assertive _____
9. does not use harsh language _____
10. athletic _____
11. eager to soothe hurt feelings _____
12. competitive _____
13. feminine _____
14. defends own beliefs _____
15. receptive to flattery _____
16. dominant _____
17. gentle _____
18. forceful _____
19. gullible _____
20. has leadership abilities _____
21. independent _____
22. loyal _____
23. individualistic _____
24. sensitive to the needs of others_____
25. makes decisions easily _____

26. shy _____
27. masculine _____
28. soft-spoken _____
29. self-reliant _____
30. sympathetic _____
31. self-sufficient _____
32. tender _____
33. strong personality _____
34. understanding _____
35. willing to take a stand _____
36. warm _____
37. willing to take risks _____
38. yielding _____

Part 3 – Toys

Instructions: Part 3 of this inventory asks about **your own attitudes and opinions** towards certain toys for children. In the space next to each toy, please write the number corresponding to the gender you believe each toy to be appropriate for. There are five possible answers: 1 – only for girls, 2 – mostly for girls, 3 – for both girls and boys, 4 – mostly for boys, 5 – only for boys. If you are unsure about which response best describes the toy then please answer according to the responses that seems the most appropriate.

KEY: 1 – only for girls, 2 – mostly for girls, 3 – for both girls and boys, 4 – mostly for boys, or 5 – only for boys.

Please write your responses in the blank provided next to each to each toy.

1. Baby doll stroller_____
2. Ballet costume_____
3. Beanie Baby bear_____
4. Bratz doll_____
5. Cash register_____
6. Crayons_____
7. Football_____
8. Helicopter_____
9. Jewelry_____
10. Legos_____
11. Lipstick, play makeup_____
12. Miniature guns, weapons_____
13. Mr. Potato Head_____
14. My Little Pony_____
15. Play-doh_____
16. Polly pocket figures_____
17. Sewing Machine_____
18. Slinky_____
19. Small matchbox cars_____
20. Superhero costume_____
21. Sword_____
22. Tonka truck_____
23. Tool kit_____

24. Toy kitchen_____
25. Trampoline_____
26. Transformers_____
27. Tree house_____
28. Tricycle_____
29. Wooden blocks_____
30. WWF accessories_____