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Emma Burgin April 12, 2015

The Use of Color Preference in the Development of Self-Presentation and Theory of Mind in Three-Five-and Seven-Year-Olds

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Abstract

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By Emma Burgin

As an extension of research on color perception, and discrimination, the present study tested three, five, and seven year olds on their color preferences, ascertaining if and at what age a consistent color preference emerged. More specifically, this study examined at what age children would diverge from their own strong aesthetic preferences to foster intimacy with others (i.e., social affiliation). The purpose was also to link aesthetic preferences with self-presentation and the levels of Theory of Mind. Children were tested using the Munsell Notation System color wheel. To test the extent in which children would use aesthetics to affiliate with a peer, participants were asked to choose 1) the color they would want to wear, and 2) what color of shirt they would gift to the peer of opposite taste. The results indicated that age is related to children's use of color preference for social affiliation. Furthermore, Theory of Mind was positively correlated with the extent to which children suspended their own taste to gift a t-shirt that matched a peer's taste. These results suggest that children use color and knowledge about others to better affiliate with their peers by the age of five. Overall, our study indicates that Theory of Mind, self-presentation, and aesthetic preferences develop in parallel to one another.

Keywords: Theory of Mind; self-concept; self-awareness; self-presentation; color; color perception; color preference; aesthetics; aesthetic development; color discrimination; color categorization; color naming.

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The use of Color Preference in the Development of Self-Presentation and Theory of Mind in Three-Five-and Seven-Year-Olds

Think of your favorite color. How quickly did it come to mind? As adults, we have specific opinions on our color choices, and are readily able to categorize, and name our favorites (Bornstein, Kessen, & Weiskopf, 1976; Franklin, Clifford, Williamson, & Davies, 2005). Having favorite colors helps us to decorate our lives, influencing what we wear, and even what we purchase (Kiling, 2011; Grossman, & Wisenblit, 1999). Color is just one type of aesthetic choice that can help define us with a certain "style" or "taste". We have specific color preferences, and emotional reactions to color (Zentner, 2001), but when do we start to develop these preferences? At what point do we understand that one can have a favorite color?

The present study explored the development of color preference among children, and how it drives aesthetic preferences. Research shows that from an early age infants can perceive and discriminate between colors (Zemach, Chang, & Teller, 2007). Eventually, children are able to discriminate more accurately between the different colors, and start to categorize and name them (Bornstein et al., 1976). Being able to discriminate between colors is imperative for developing a color preference. When do color preferences begin to take an affective role and help us to define and express ourselves? To explore such questions, this study considered color preferences and their affective component; looking at how color preferences (like other preferences) can help define and establish a self-concept, but also indicate how we reflect and use these preferences to communicate and present ourselves to others.

Color Discrimination

To explore aesthetic color preferences in children, one must first define the different aspects to color and summarize the development of color perception. This study used Munsell's (1905) definition of colors, which describes three physical attributes: hue, value and saturation.

According to Munsell (1905),

> Hue is the name of the color. Hue is the quality by which we distinguish one color from another, as a red from a yellow, a green, a blue, or a purple. Value is the quality by which we distinguish a light color from a dark one. Color values are loosely called tints and shades. Chroma, or saturation, is the quality by which we distinguish a strong color from a weak one. (p.19)

These three-color qualities provide a terminological foundation to understand research on color and color perception. At a basic and evolutionary level, color is meant to help us discriminate between different objects surrounding the environment (Zentner, 2001).

Previous studies show that color vision is not completely developed at birth (Bornstein, 1975); however by four to five months infants are better at processing colors. By two months, infants are able to clearly distinguish chromatic, or colored, stimuli and can discriminate between chromatic stimuli and white stimuli (Teller, Peeples, & Sekel, 1978; Zemach et al., 2007).

When and how do we master the ability to discriminate different colors? Bornstein, (1975) explained how the color spectrum is by nature continuous and categorical. When thinking of a rainbow, there is a clear distinction between the category of red and blue. According to Bornstein (1975), there are four color category centers: blue, green, yellow, and red. Bornstein refers to Heider (1971), who found evidence that three-year-olds chose these four colors more often than color category boundaries and found them more salient (Bornstein, 1975). In Bornstein's color categorization theory, the other colors are called "color category boundaries", which are less salient stimuli and more cognitively challenging for children to perceive. Overall, Bornstein, referring to Beare (1963)'s work, claims that children take longer to perceive and

name the hue transitions, or boundaries, than the color centers, or primary-like colors (Bornstein, 1975).

Like Bornstein (1975), Franklin, Clifford, Williamson, & Davies (2005) research, describes the differences between color hues and how more salient hues are easier for children to identify. There research describes how some colors are “within-category” colors, whereas others are “between-category” colors. “Within-category” colors are the colors that are similar to one another, such as red and orange-red, or blue and greenish-blue. The “ between-category” colors are colors that straddle category or color boundaries, such as red and orange, or blue and green. Children have more difficulty discriminating within-category colors, than between-category ones (Franklin et al., 2005).

Despite these theories on color categories versus boundaries, other studies indicate that children can still discriminate and categorize many different colors at a young age. Another study by Bornstein, Kessen, and Weiskopf (1976), tested four-month-olds, finding they could categorize the four basic colors, similar to Bornstein’s (1975) previous described category color centers. According to Bornstein et al. (1976), these infants’ categorization skills closely matched the categorization abilities of adults. While this study found that children could discriminate and categorize at a young age, they could not always consistently name the colors. They proposed that naming of colors develops later (Bornstein et al, 1976).

Another study on color terminology by Franklin and colleagues (2005), also supports that color naming develops later in life. Their research was based on the theory that categorical perception is likely to be an innate ability, given previous evidence that young infants and children can categorize and discriminate colors. Their study explored other cultures’ understanding and term use of colors. They found that young children in different cultures, even

though their names for colors are different, are still able to categorize colors, without a language similarity or ability at a young age. Franklin et al.'s (2005) study found evidence that suggested early categorical perception abilities decrease, unless they are reinforced or supported by language (Franklin et al., 2005).

The ability to discriminate, categorize, and name colors is a precondition to being able to make aesthetic color judgments and preferences. From the previous research and evidence stated above, humans put colors into categories, despite the fact that these color categories do not have any specific values or benefits. The presence of different perceptual color categories opens up the possibility of aesthetic judgments involving color.

Affective Response to Color

The term aesthetics was first used by a German philosopher, Alexander Baumgarten, in the mid-18th century, who defined aesthetics, as the "science of beauty". The term originated from the Greek word *Aisthetikos*, meaning sensitivity, and was meant to represent a relationship between our concepts and our senses. Today, we generally use this term "aesthetics" to refer to knowledge that we acquire through our sensory perception (Accer, & Omeroolu, 2008). We perceive aesthetic stimuli, like color, and then use perceptual knowledge, to make judgments and assessments about those stimuli.

Our society places great emphasis on the way people use this acquired perceptual knowledge to form aesthetic judgments (Accer, & Omeroolu, 2008). Another way to describe and define aesthetic judgment is creativity. From an early age, many of us are encouraged to explore our experiences with the aesthetic world and to be creative. Teachers and parents, schools and camps, all urge and implement the learning and production of "arts and crafts". They recognize that creativity and aesthetic appreciation is an important part of development that

allows a child to become aware of their own responses to certain qualities, such as color, figure, form, texture, size, balance, volume and movement, of objects they observe, (Accer, & Omeroolu, 2008).

Ideas about creativity and aesthetic sensitivity have lead many researchers to focus on when children begin to develop the ability to use their perceptual knowledge and make their own aesthetic judgments. One of the main contributors in this field was Michael Parsons whose work was influenced by Baldwin, a 19th century aesthetic philosopher. Baldwin claimed that someone's response to art is based on exploration of the self and artistic expression is a way to learn about the self (Lin and Thomas, 2002). Baldwin's philosophies about the self and art encouraged Parsons to look for detailed stages in aesthetic development, similar to the stage wise developmental paradigms of Piaget and Kohlberg. Parson's goal was to provide a cognitive and social developmental account of aesthetics.

A study by Parsons, Johnston, and Durham (1978) showed children in first through twelfth grade, three large well-known paintings[1], and asked the children questions about how they felt about a painting, what they liked about it, and why. This study found that children focus on six different topics when looking at the aesthetic of art. They focus on semblance, subject matter, emotion, color, view of the artist, and judgment. Within each category Parsons et al. (1978) established three different developmental stages. These stages were meant to establish a progressive development of aesthetics (Parsons, Johnston, & Durham, 1978).

The category most pertinent to our study that was explored in Parson et al.'s (1978) research was color. Parson and his colleagues (1978) found three developmental stages for this specific medium. At stage one of aesthetic development, children like bright and happy colors,

[1] First six grades were shown: Klee's *Head of Man* (1922), Picasso's *Weeping Woman* (1937), and Renoir's *Girl and a Dog* (1875). The last six grades were shown: Bellows's *Dempsy and Firpo* (1924), Picasso's *Guernica* (1937), and Chagall's *Circus* (1964).

and would rather have color in a painting, than no colors. This stage is ego-centered based, with children believing what they think is attractive in a picture, is what everyone should believe is appealing. At stage two, children want more realistically representative colors in paintings. Colors are only good if they match the subject matter of the painting, and are congruent with what the painting is trying to depict. During this stage, children believe that everyone else will believe the same colors should be used to represent specific objects. The last stage moves away from egocentric like thinking, and children start to reflect on the painting as a whole. They interpret the color's effectiveness, and beauty, based on the paintings mood, theme or intention (Parson et al., 1978).

While Parson et al.'s (1978) work might be methodologically oversimplified; it is one of the few studies that explored different aspects of aesthetics, and their developmental course. Parson's research provides us with the evidence that children do have aesthetic sensibility. Yet, Parson's work only related children's' aesthetic development to fine art. The definition of aesthetics used in this paper, claims that aesthetics are sensory judgments, which help us to assess and define our lives (Ezan, & Lagier, 2009). Therefore, could aesthetics relate to any object in our environment? This study aims to look at a more general aesthetic development in children, specifically color preference, and explore how this aesthetic development helps them to navigate the social world.

Individual Differences in Color Perception

Because aesthetics is our affective response to perceptual stimuli, it can also be expressed in terms of preference. Since there is evidence that children can perceive, discriminate, and name color from an early age, this study will measure aesthetics in children, by exploring color preference.

Bornstein (1975) tested four month olds and found, in addition to being able to process color, they also looked at specific spectral extremes, such as red and blue. Infants, and younger children all preferred colored stimuli more than gray (Zemach, et al., 2007). In looking at infants color preference, Zemach, et al., (2007) found that there are variations in preferences. In general, infants preferred the colors blue, purple and red, even when these three colors were matched for saturation and value consistency. Infants liked these three colors more than greens and yellows.

Preschool age children, like infants, also show consistent color preferences. Boyatzis and Varghese (1994) found that four and five year olds had distinct emotional reactions to colors. The children had more positive emotion towards bright colors, like pink, and more negative emotional reactions to dark ones, like black and brown (Read, & Upington, 2009). Zentner (2001) studied three and four year olds, placing nine colored rectangles in a half-circle away from the child. The nine different colors were red, yellow, dark blue, bright blue, dark green, bright green, pink, brown and black. The child was asked to pick the color they liked most and bring it to the experimenter. The same was done for the remaining eight colors, creating a ranking of most preferred to least preferred color. Zentner (2001) found that the children most preferred red, which, again, is relatively consistent with the findings of infant preferences. This study along with previous studies suggests that blue is thought to be the most preferred color for adults (Valdez, & Mehrabian, 1994; Zentner, 2001). Therefore, Zentner (2001) proposed there must be a developmental difference in color preference. He found that, white middle class Swiss preschool, children had a preference for red, but this preference declined once they start to reach primary school age. Other studies confirm that color preference changes with age; however they do not make the distinction that preference, specifically for the color red, decreases (Read, & Upington, 2009).

Research on color preference in both infants and children show that while, different colors (red, blue, purple) compared to others (green and yellow) can be more preferred, there is also great variability in color choice. Color preference tends to be extremely individualized, and we suggest that we add affective value to colors, which we express with our preference.

Self-Concept

We also suggest that color preference might be implicit. Similar to other preferences and judgments, it is a way to express oneself, and helps to define one's self-concept. This development of self-concept and self-awareness is present early in life. Infants around 22 months show evidence that they recognize themselves, through the mirror mark test. In this test infants are placed in front of a mirror with a mark placed on their heads. The objective is to see if and how they will react to the mark (Rochat, Broesch, & Jayne, 2012).

Around 22 months, infants begin to show a self-orientation and touching or removal of the mark. This indicates that they are able to recognize the visual representation in the mirror as themselves, and that they have something on them. The objective of this test is to represent an infant's ability to self-recognize, and how this relates to the cognitive development of self-concept (Rochat, Broesch, & Jayne, 2012).

Around the time infants can pass the mirror mark test, they have also started to develop and show acceptance and understanding of norms, rules, and social standards (Rochat, Broesch, & Jayne, 2012). Also, infants, around this time, begin to show behavior in relation to how others will notice them, often by expressing self-conscious emotions such as embarrassment, guilt, pride, and shame (Lewis & Ramsay, 2004; Rochat, Broesch, & Jayne, 2012). Based on these other conceptual emergences, Rochat et al. (2012), wanted to examine, if, when children pass the mirror mark test, they do so with or without others influencing or evaluating them. To study, Rochat et al. (2012) reproduced a classic mirror mark test condition, and compared with another

condition, called the norm condition, where infants had a mark on their head, but so did other people in the room, such as their parents or the experimenter. They predicted that those who can pass the normal mirror mark test would show differences in behaviors in the norm condition, not the classic condition. Indeed, they found that infants in the norm condition were more hesitant to remove the mark by either, leaving the mark on, having a three second delay before removing the mark, and removing the mark and putting it back onto their face. This supports the idea that self-recognition prompt the development of self-concept, and that self-awareness might have a social influence (Rochat, Broesch, & Jayne, 2012).

This research shows that the development of self-concept might be related to the development of awareness of others. The question is, are children, based on a growing self-awareness, able to understand how their behaviors, and preferences affect and communicate information to others?

Self-Presentation

Aloise-Young (1993) studied, what she called, self-presentation in children. She defined self-presentation as, when one uses certain behaviors, or selected behaviors, to help show and convey an image of the self to a specific audience. She said that many behaviors, such as representations of characteristics, preferences, and beliefs through behavior or verbal acts, are self-presentational behaviors. Therefore, self-presentation emphasizes some aspects and downplays others.

Most of self-presentational studies focus on how adults present themselves in different situations and audiences. Aloise-Young's (1993) study corroborates similar findings that explain how adults use many different strategies to present themselves positively to others. Jones, and Pittman (1982) define the strategy of promotion, where someone tries to show or convey

intelligence. Jones and Wortman (1973) defined another strategy called ingratiation. This strategy entails someone trying to present themselves as being likeable and friendly. Aloise-Young (1993), studied if children use similar self-presentational strategies.

It is not well understood about children's ability to change or control their social behavior (Banerjee, 2002). Previous literature on self-presentation in children comes from affect management studies. Around six years of age, children understand that they can change and manipulate their facial expressions and emotions to make others feel or act a certain way. These self-promotional strategies are not thought to emerge as early as affect management, but they should develop around the school years. These strategies become more apparent in the early school years, because self-presentation is a verbal way to persuade and convince others of our characteristics (Aloise-Young, 1993).

To study self-presentation, Aloise-Young (1993) used a paradigm where she asked children, six to 10 years old, to describe themselves. In the first condition, called the Baseline Condition Self-Description, the children were first asked to simply describe themselves. Then they were told that there was going to be a competition with another set of school children, and they would have a partner. After, being introduced to this interpersonal goal, they were asked to rate, on a five-point scale, how much they wanted a nice partner or a partner who was good at the game. Then, in the goal-directed condition, the children were asked to describe themselves as they would to a potential game partner. In the other condition children were asked to describe themselves, without a goal. Aloise- Young (1993) found that kindergartners did not engage in appropriate or effective self-presentation, whereas second to fourth graders were semi-selective in self-presenting, significantly using more game-related promotion strategies, not ingratiation (Aloise-Young, 1993). It is possible preschool school age children aren't able to self-present,

because they have a lack of skill in perspective taking, or Theory of Mind, and attributional processes (Banerjee (2002).

Research on self-presentation shows that adults and children are aware of how others perceive and think about them. One's self-presentation can be changed and altered to affiliate with others. Our behavior and preferences, not only helps define who we are, but also reflects who we are. Color preference can also be explicit, and help to communicate something about the self to others.

Theory of Mind

Along with learning to self-present, humans must learn and understand how to see something from another's point of view. Like the development of self-awareness, self-concept, and self-presentation, Theory of Mind is also a major cognitive development. Theory of Mind development helps children to construct ideas about others' perspectives, allowing them to begin thinking what others' desires, emotions, beliefs, and intentions are, compared to one's own (Wellman, Cross, & Watson, 2001). Theory of Mind is not a singular cognitive achievement. Instead, as postulated by Wellman and Lui (2004), Theory of Mind is a developmental process that illustrates subtle changes in the increasing sophistication of thinking about other people. The five tasks developed by Wellman and Liu (2004), tested these different levels, looking for the extent to which children could, 1) understand and acknowledge that another person's desires are different from their own, 2) also differentiate between other's beliefs from their own, 3) recognize that everyone does not share the same experiences, or knowledge 4) therefore, peoples beliefs and thoughts about experiences are going to be different from their own, and 5) identify that how others express and behave can be different from how they feel, and be related and chosen based on others.

Theory of Mind starts to develop in the early preschool years, around three or four, and improves with age. Normally, by the early school years, around 7, children have developed most levels of Theory of Mind (Wellman, Cross, & Watson, 2001. They are able to understand that someone else may have different thoughts or beliefs, and that they need to think about what and why others might be feeling, or thinking in that way.

To study Theory of Mind development in children, many different psychological tasks and studies have been created. Most tasks mainly focus on the Theory of Mind concept, false belief. This is when a child begins to understand that people can have beliefs that are different from their own, or to what is actually true in reality (Wellman, Cross, & Watson, 2001). Understanding this distinction is what Theory of Mind aims to examine—how children come to see their own thoughts, feelings and belief in reference to others (Wellman, Cross, & Watson, 2001).

Theory of Mind performance changes dramatically between the ages of three to five (Wellman, Cross, & Watson, 2001). This study wants to examine Theory of Mind, but in relation to preferences. The idea is, that if children have a more sophisticated Theory of Mind, they will be more astute and understanding of how to use their own preferences, specifically color preference, to express themselves, to please someone, to affiliate with others, or to gain intimacy and proximity with others. We want to examine how children's own self-concept, and growing knowledge of other's minds, is linked to aesthetic preferences and judgments.

The Present Study

This study has three main goals.

1. To identify if children, ages three, five and seven have a stable color preference, and at what age it might become consistent?

2. How much and at what age, will children change or diverge from their own color preference to please someone else?
3. How does aesthetic preferences and social flexibility relate to the development of Theory of Mind?

To test these concepts, we developed a series of tasks to explore color consistency in children. In general, we showed children a color wheel, and asked them their most preferred and least preferred colors. To see if these preferences translated to social stimuli we then presented the same color wheel, but the colors were in the form of t-shirts. We asked them which color t-shirt they most preferred and least preferred to wear.

Furthermore, to ascertain how much they would change these preferences in social situations, we presented vignettes about a potential friend and a birthday party. The child was meant to pick a t-shirt to wear to the party and to give as a birthday gift. We framed the choice, so that the child could either express their own color and t-shirt preferences, or diverge from their preferences in order to affiliate or appease this potential friend.

We chose to test the ages of three, five, and seven because previous research shows that this is the period for the burgeoning development of Theory of Mind (Wellman, Cross, & Watson, 2001). We assume that once children start to reach the age of five and up, they will begin to have a more developed Theory of Mind. Along with the development of Theory of Mind, children around the age of six are starting to show evidence for self-presentation (Aloise-Young, 1993). Therefore, with these two cognitive developments all roughly beginning around age five, three, five and seven year olds were great ages to study and compare. Using three year olds was important to compare against the five and seven year olds. In preschool years, children

start to show an understanding of certain Theory of Mind concepts, such as diverse desires, but their understanding can be relatively variable.

We predict:

1. Three, five and seven year olds will have specific color preferences, due to previous literature on infant and preschool children's color preferences.
2. Consistency and stability of color preference will increase with age, with seven year olds having the most consistent color preferences.
3. Five and seven year olds will be more likely to use self-presentational skills (i.e. how you present yourself), and diverge from their color preferences, when trying to please or make a friend. By contrast, three year olds will not be able to use self-presentational skills, and will be less likely to diverge from their color preferences, when trying to please of make a friend.
4. The use of self-presentation strategies is highly related to Theory of Mind. Five and seven year olds will pass the higher-level tasks of Theory of Mind, and will be more likely to change their color preferences and use self-presentational skills to please, or make a friend.

Methods

Participants

Participants in this study were a total of 44 children (19 males), living in Atlanta. The majority of the children were middle class Caucasians. The children were ages three, five and seven. There were 14 three year olds (7 male) with a mean age of 41.16 months (SD=3.48). Of the 15 five year olds, 6 were male, and had a mean age of 65.56 months (SD=5.96). The 15 participating seven year olds (6 males) had a mean age of 88. 28 months (SD=4.81). Out of the 44 children participating, one was excluded due to experimental error.

Materials

Visual Stimuli: Four 14X14” white boards were used, two of which contained a set of 20 laminated colored square magnets arranged clockwise, and two with sets of 20 laminated colored magnetic t-shirts arranged in a circle. The colors for these magnets were obtained from the Munsell Color Notation System, which is a standardized systemization of how humans perceive and cognitively process color (Indow, 1988). Refer to Appendix A for a schematic.

Along with the magnets, an adaptation of Wellman and Liu’s (2004) Theory of Mind paradigm was also used. These included a Band-Aid box, a small round box, a plastic puppy, a stuffed animal pig, two girl dolls, two male dolls, and four laminated sheets of paper with drawn picture stimuli.

Procedure

For a list of the tasks and the procedural order, please refer to Table 1.

Personal Color Preference Task 1: Participants were asked three open-ended questions in the beginning to ascertain their favorite general color preferences and to assess their knowledge about color. After the questions, participants were presented with the first whiteboard of colored square magnets. They were asked to point to the color they preferred most. The experimenter recorded the color number (refer to Appendix A, Figure 9), removed it from the board, moving the remaining magnets back into a circle shape, and turned the board. This procedure was repeated five times.

The participant was asked to point to their least preferred color of the remaining color magnets on the board. This process was repeated in the same manner as the first color preference procedure, again repeated five times.

The personal color preference task was repeated two more times to establish the participants color consistency. Once following the first theory of mind task, and again as the task proceeding task eight (refer to Table 1).

Theory of Mind—Diverse Desires: The first theory of mind task is about Mr. Jones and snack time. The experimenter shows the child two drawings: a carrot and a cookie, and asks which snack they like most. Once the participant picked, the experimenter would say that Mr. Jones likes the opposite snack. The participant was asked, "Which snack will Mr. Jones choose?" To pass this task, the participant must pick the snack Mr. Jones likes. This shows that a child is able to understand that another person might desire or like something different than what they like.

Theory of Mind Conditions: After the second repetition of color preference, the remaining Theory of Mind tasks were randomly conducted between each of the remaining color tasks, to counterbalance. Since each task was completed at a different time, and in a randomized order, in the procedure, we will separately describe each task.

Diverse Beliefs: This Theory of Mind task provides children with a toy figure named Linda. The experimenter explains to the child, "Here is Linda. Linda wants to find her cat. Her cat could be hiding in the bushes or in the garage. Where do you think Linda's cat is hiding"? Once the participant has chosen, the experimenter explains that Linda thinks her cat is hiding in the other area, and asks, "Where will Linda look for her cat?" To pass the task, the participant must answer Linda's hiding place, demonstrating the child's understanding that what he/she thinks, is not the same as what someone else thinks.

Knowledge Access: Children are shown a opaque box, which holds a toy dog inside. At first, the experimenter prompts the participant to think about what might be in the box, and then

shows them the dog inside. The dog is put back into the box, and the experimenter checks that the participant remembers what is inside. Then the experimenter pulls out a toy figure named Polly and says, “Polly’s never seen inside the box. Here comes Polly. Does Polly know what is inside the box? Has Polly seen inside the box?” If the participant answers that Polly does not know what is in the box, and that she hasn’t seen inside the box, the participant passes the task. This task is meant to test if the child understands that experiences they have had (i.e. seeing inside the box), is not what someone else has experienced, and therefore, someone else doesn’t hold the same knowledge they do.

False Belief: Another task shows the participant a clearly recognizable Band-Aid box with a toy pig inside. The experimenter asks the participant what they think is in the Band-Aid box, where the correct response is Band-Aids. The experimenter opens the box and shows the participant the pig. The participant will put the pig back in the Band-Aid box, and close it; with the experimenter checking if they remembered a pig was inside, not Band-Aids. The experimenter will introduce a toy figure of a boy named Peter, and say, “Peter has never seen inside the box. What does Peter think is in the box? Did Peter see inside the box?” If the participant answers that Peter will think Band-Aids are in the box, and that Peter did not see inside the box, they pass the task.

Real versus Apparent Emotion: In this last task participants are told they are going to hear a story about a boy. The boy might feel (experimenter points to a scale with smiley faces) happy, sad, or just okay. Their understanding of the faces and emotions is then checked. The experimenter then explains that in this story, “I will ask how the boy feels inside (patting their chest), and how the boy looks on their face (patting their face). Now, how the boy feels inside might be the same as how he looks on his face, or they may be different.” The story is about Matt

and how his aunt got back from a trip and promised to bring him a present. He wanted a toy car, but his aunt bought him a book, but Matt does not want his aunt to know how he feels, in fear she might not bring him another present. The participant is then asked to remember what Matt's aunt brought him back, and why she can't know how he feels about the book.

With the participant understanding the story, the experimenter then asks the participant to show on the scale how Matt really felt when he got the book, and then how Matt looked on his face when he opened the book. The participant must answer more negatively (pointing to the sad, or okay smiley face) for how Matt felt then for how Matt looked to pass the task.

Personal T-shirt Color Preference Task: Participants followed a similar procedure as the personal color preference task, but instead of using squares, the magnets were color t-shirts (refer to refer to Appendix A, Figure 10). Again, three open-ended questions were asked to ascertain their knowledge of t-shirts, and general t-shirt preferences. After the questions, participants were presented with the whiteboard of colored t-shirt magnets. They were asked to point to the color t-shirt they preferred to wear the most. The experimenter recorded the color number, removed it from the board, moving the remaining magnets back into a circle shape, and turned the board. This procedure was repeated five times.

From the remaining t-shirt color magnets on the board, the participant was asked to point to the t-shirt color they least preferred to wear. This process was repeated in the same manner as the first t-shirt color preference procedure, again repeated five times. This task was meant to establish if the participants color preference was translated to more social stimuli, in this instance, we used t-shirts.

Social Color Preference Task: This condition was presented as a story about a girl or boy named Goola or Goolo. The name of the friend was gender specific, to ensure that no gender biases would affect the targeted social decision.

The participant was told that Goolo/a was a nice kid of equal age, and because s/he is so nice, they wanted to be friends with him/her. Then the experimenter explained that all we know about Goolo/a was their favorite color, which was shown with the t-shirt magnets. Goolo/a's favorite color was systematically picked as the least preferred color that the participant picked. The experimenter asked for the participant to point to the favorite color to make sure they remembered. If not, they were reminded. The participant was told that they were invited to Goolo/a's birthday party and had to decide a t-shirt to wear. They were then asked which t-shirt color they would want to wear, and which one they would not want to wear to the party. Next, the experimenter explained that the participant needed to bring Goolo/a a gift, since they want to be friends with him/her. The participant was asked to point to a t-shirt they would want to bring as a gift, and one that they wouldn't want to bring. The participant was asked to verify Goolo/a's favorite color.

Color Discrimination Task: The last two tasks were simple checks on the participants color perception, discrimination and color naming abilities. We wanted to assure that the participants were able to accurately discriminate colors, and were not color blind.

The first activity required the participant to be able to understand the names of the colors, and to point to them. The experimenter showed the participant the square color magnets and asked them to point in random order to the colors red, blue, yellow, green, purple and orange. If the participant pointed at the correct color hue, the experimenter indicated that the participant knew their colors.

The next task was a control to see if the participant could discriminate between the differing hues of similar colors on the wheel. To test this, we choose four specific colors, blue (#10), red (#16), yellow (#20), and green (#4). We then paired each color on separate cards, with the two hues on either side of it, creating three color-combinations for each of the four main colors. For example, the three blue cards included 10/10, 10/9, and 10/11 (refer to Table 2 for all combinations). The participant was asked, “Are these the exact same colors?”, and gave a yes or no answer.

Dependent Measures

For analyses, we reduced the raw data, and compressed the data into four-color quadrants. Each quadrant was based on the Munsell color wheel, with five colors in each category. The four quadrants were yellow, red, green and blue. We transformed the data so that each of the exact numbers, representing the colors, became a quadrant. This helped us to look at the consistency of the exact color numbers, and the consistency of the color category a participant chose.

We then further reduced and recoded the data to obtain specific consistency indices for color preference. The consistency index compared the three-color preference tasks and then created a ratio or percentage of consistency. For the social tasks, we compared the participant’s preference with Goolo/a’s preference and gave them a rating of 1, flexible or 0, inflexible. In doing so, we also recoded the data for both the exact numbers of the colors and the recoded quadrant variable. These reductions were meant to help simplify the analyses. Below are definitions for each measure.

Personal Color Preference: To test personal color preference we assigned numbers to the colors on the color wheel. We picked number one (yellow) and went clockwise around the

wheel, ending with the number 20 (refer to Appendix A). There were three presentations of the wheel, and each time the participant named five most preferred colors, and five least preferred colors (see Procedure).

The color preference results were then recoded into the *Consistency Index of Color Preference*. This variable looked at the three colors preference tasks, specifically, the first color out of the five choices the participant picked in all three personal color preference tasks, and created a percentage of consistency. We measured the *Consistency Index of Color Preference* in two ways, by examining the exact color numbers and if the colors were in the same quadrant.

Exact Consistency: If the numbers were all three exactly the same, the participant would get a consistency rating of 100%. However, if children did not have the exact same color for each 1st ranking preference, they received a 0% consistency. If the participant had two of the same color, but one different, they received a consistency rating of 66%.

Quadrant Consistency: The same consistency percentage was given for the three quadrants chosen.

The same procedure was then followed to determine a consistency index for a least preferred color preference, both exact and quadrant.

Personal T-shirt Color Preference: To test which t-shirt color a participant wanted to wear we, again, used the same color wheel numbers, as the color preference tasks, but instead the colors were in the form of t-shirts (refer to Appendix A). The experimenter again presented a wheel, and the participants five most preferred t-shirt colors, and five least preferred t-shirt colors were recorded.

This measure was then coded into the *Consistency Index of T-shirt Preference*, which compared the participants color preference with their color preference for T-shirts. To create this

consistency index, we again compared the first most preferred colors of the three-color wheel presentations and the first most preferred color of the t-shirt color wheel presentation. Instead of a ratio, a score of 1, consistent or 0, inconsistent, was given. We measured the *Consistency Index of T-shirt Preference* in two ways, by examining the exact color numbers and if the colors were in the same quadrant.

> *Exact Consistency:* If a participant had a 100% color preference consistency, we compared the exact consistent color number with the first choice of the t-shirt color number. If they were the same color number they received a 1. However, if the participant had a 66% color preference consistency index, we then compared the most consistent color number with the first t-shirt color number.
>
> *Quadrant Consistency:* To examine the quadrant consistency, we took the most consistent quadrant of the color preference task and compared it to the first t-shirt number color quadrant. If they were in the same quadrant, they received a 1.

The same procedure was followed for the least preferred general color preference, and the least preferred t-shirt preference.

Social Color Preference: The first social color preference task was measured by reading the participant a vignette about Goolo/a and then asking them the color they would like to wear most. This color number was recorded. The same procedure was used to ask which t-shirt they least preferred to wear. To measure, we created a variable of the flexibility of Chosen T-shirt, which compared the color of the t-shirt the participant chose to wear to the party to Goolo/a's favorite color. We measured the first social color preference in two ways, by examining the exact color numbers and if the colors were in the same quadrant.

Exact Flexibility: The exact flexibility compared the specific numbers of the t-shirt colors the participant chose to wear to the number of Goolo or Goola's favorite color. If it was the exact same number as Goolo or Goola's, they were given a score of 1, indicating high flexibility, and this was an indication that the participant wanted to appease or affiliate with Goolo or Goola.

Quadrant Flexibility: This flexibility was determined by looking at the quadrants both the t-shirt color the participant chose to wear, and Goolo/a's favorite color, fell in. If the colors were in the same quadrant, they received a 1.

The same recoding procedure was done for the least preferred t-shirt color the participant chose. This was to confirm the flexibility.

The second social preference task was measured by telling the participant they had to pick a gift for Goolo/a. The participant pointed to a t-shirt color they would most want to give, and one they least wanted to give. To measure we made a variable of the flexibility of the Chosen Gift, which compared Goolo/a's favorite color to the participants chosen t-shirt color to give Goolo/a as a gift. We measured the second social color preference in two ways, by examining the exact color numbers and if the colors were in the same quadrant

Exact Flexibility: To examine the exact flexibility of this variable, we looked at the specific number chosen as Goolo/a's favorite color and the number of the t-shirt color chosen to give Goolo/a as a gift. If the number was the same, the participant received a 1.

Quadrant Flexibility: To determine this flexibility, we again looked at the number color of Goolo/a, and the color of the t-shirt given as a gift. If they were in the same quadrant, i.e. both green, they were given a 1.

The same procedure was used to look at the color t-shirt the participant chose not to give Goolo/a as a gift.

Theory of Mind: To test Theory of Mind, we used the scale developed by Wellman and Liu (2004). This scale was developed to test beyond the common and well-studied task of how children understand false belief. Wellman and Liu's scale is a multifaceted approach to target the understanding of various Theory of Mind concepts. The test includes five tasks that show the developmental trajectory of Theory of mind, including desires, beliefs and emotions. All five of these tasks use a similar structure, with picture props as well as target and control questions. The target question is about the mental state and behaviors of the tasks or the story's protagonist. The control question asks about the reality and expression of someone else. The child must answer the control question and the target question (see procedure) correctly to pass a Theory of Mind task. In order, the tasks are Diverse Desires, Diverse Beliefs, Knowledge Access, False Belief and Real-Apparent Emotion (see Procedure).

To measure Theory of Mind, we made a percentage of how many tasks (out of the five) the participant passed. We also assessed the highest task the participant was able to pass. A participant could have passed 80% of the Theory of Mind tasks, meaning they passed four out of the five tasks, but they could have only passed up to task three (Knowledge Access), and then passed task five. This gave us two measures of Theory of Mind, to account for variance.

Results

Color Preference Consistency: The first analysis we performed was a Mixed Design ANOVA. The within-subjects factors were *Exact Consistency Index of Color Preference* and *Exact Consistency Index of Least Color Preference* (1 as consistent and 0 as inconsistent). The between-subject factors were age in years (three, five, and seven) and gender (male or female).

This analysis revealed there was no significant interaction between age and preference, F(2, 43) =0.066, p>0.05, and no significant interaction of preference and gender, F(1, 43)=.616, p>.05, within-subjects (refer to Figure 1). This indicates that consistency of preference within-subjects did not change depending on the participant being three, five or seven years of age.

T-shirt Color Preference: This analysis used a chi-square test of independence to examine the *Consistency Index of T-shirt Preference* variable in relation to age. When testing for exact consistency, results were non-significant, X^2 (2, N= 42)=2.786, p>.05. However, when examining this variable based on consistency of quadrants, our results were significant, X^2 (2, N= 42)=7.112, p<.05. While children did not always have an exact consistency between their color preferences and t-shirt preferences, they often chose a t-shirt color that was in a similar color quadrant as their color preference. This could indicate that, for instance, if a child likes the color blue, they will be more likely to have a blue t-shirt preference.

Chosen T-shirt Flexibility: Another chi-square test of independence was performed to compare the flexibility of Chosen T-shirt in relation to age.

When looking for exact flexibility, we found a marginal significant difference X^2 (2, N= 43)=4.7, p=.09 (refer to Figure 2). This results showed that 92.9% of three year olds were not flexible with Goolo/a's favorite color. Three year olds were less likely to please or affiliate with Goolo/a's taste when picking a t-shirt color they want to wear to the party. This could be possible because three years olds are generally inflexible in their color preference. However, seven year olds were almost 50/50 with how often they were flexible with Goolo/a's favorite color: 51.7% of seven year olds did not choose to wear the exact same color as Goolo/a, and 42.9% did. Therefore, seven year olds were at chance for their consistency with Goola. It is possible that

seven year olds might have more conflict, when deciding what to wear—if they want to try and affiliate with Goolo/a, or to be inflexible and identify with their own color choices.

When testing the flexibility of the chosen t-shirt for color quadrants, there was a significant finding X^2 (2, N= 43)=7.549, p=.02 (Refer to Figure 3). 85.7% of the three year olds were inflexible in the quadrant from which they chose to wear their t-shirt in relation to Goolo/a. Five year olds were 60% flexible with Goolo/a's favorite color, and 40% inflexible. Seven year olds were still 50/50 in their choice of affiliating with Goolo/a, 42.9% were flexible, and 57.1% were inflexible.

Gift Preference: The last chi-square test was comparing the flexibility of the chosen gift in relation to age. The exact flexibility test resulted in significance X^2 (2, N= 43)=9.624, p<01, which shows that gift preference in relation to Goolo/a's favorite color is dependent on age (Refer to Figure 4). 85.7% of seven year olds and 80% of five year olds were flexible picking the same color t-shirt as a gift to give to Goolo/a, that was also her supposed favorite color. However, only 35.7% of the 3 year olds picked her/his favorite color, as a gift. When looking at the quadrant flexibility, the significant result is even stronger X^2 (2, N= 43)=10.995, p=.004 (Refer to Figure 5). These results showed that 100% of seven year olds gave the t-shirt gift to Goolo/a that was in the same quadrant as her favorite color. This could possibly show a relationship between the idea of gift-giving and Theory of Mind, because this variable of gift giving consistency is highly dependent on age.

Theory of Mind: First we did a chi-square test of independence to check our data for the relationships between age, highest passed Theory of Mind, and percentage of Theory of Mind passed. As expected, age and number of highest passed Theory of Mind tasks was significant X^2 (10, N= 43)=50.157, p=>.01, as was age and percentage of Theory Of Mind passed, X^2 (8, N=

43)=48.475, p=<.01. These results are consistent with previous literature on Theory of Mind (refer to Figure 8).

To then test the flexibility of the gift chosen with Theory of Mind, we performed a Spearmen correlation, comparing this variable to the highest passed Theory of Mind test, which was significant *rs* (.553)=43, p<.01, and also the percentage of passed Theory of Mind tasks, which was again, significant *rs* (.495) =43, p<.01. We found a significant positive relationship between Theory of Mind variables and both exact and quadrant flexibility of the chosen gift variables (refer to Figures 6 and 7). Therefore, we concluded that the higher a child is in Theory of Mind, the more willing they are to override their personal preferences and give the gift they know Goolo/a would want.

To understand the confound of age, with Theory of Mind and the flexibility of the gift chosen, we descriptively looked at each age, their flexibility and highest level passed for Theory of Mind. We found that out of all 14 seven year olds, 12 were flexible in giving Goolo/a the gift he/she wanted. All 12 of those children passed all five levels of Theory of Mind. Of the two who were inflexible, only one passed up to level five, whereas the other only passed up to level four. When comparing with the 15 five year olds, we found 12 were flexible with Goolo/a's gift. Within those 12 children the highest levels of Theory of Mind was varied. Four passed up to level three, four children passed up to level four, and four children passed up to level five. For the children that were inflexible with Goolo/a's gift, one only passed up to the first level of Theory of Mind, another passed to the second level, and the last one passed the fifth level. The 14 three year olds were more inflexible, than flexible, with only five being flexible. Of those that were flexible, four passed up to level two, with one not passing any Theory of Mind tasks. The nine children who were inflexible, none passed higher than level two. This descriptively

indicates support for our significant correlation between highest level of Theory of Mind and the flexibility of the gift chosen.

We also performed another Spearmen correlation to compare the exact percentage of preference, or the *Consistency Index of Color Preference*, with the highest passed Theory of Mind, with a significant positive relationship, $rs(.439)= 43$, $p<.01$, and with percentage of tasks passed in Theory of Mind, finding another significant positive relationship $rs(.408)=43$, $p<.01$. This indicates that higher levels of Theory of Mind are positively related to color preference consistency in non-social contexts.

Discussion

In the present study, we examined the use of aesthetic color preferences in relation to the development of Theory of Mind and self-presentation. This was the first study to empirically explore the relationship between these three concepts. To do so, we used the Munsell Color Notation wheel to probe children on their preferred and least preferred colors, and then created social vignettes, related to social affiliation. The child had to make color choices about what they wanted to wear, and what color gift they wanted to give to this potential friend. Our results found that children already have established color preferences beginning at age three. However, as children reach the ages of five and seven, we found that they were more likely to use these color preferences in their social environment. For example, the five and seven year olds were more willing to diverge from their own color preferences to affiliate, and they were able to understand a potential friend's color preference, and use that knowledge to then help with affiliation. In contrast, three year olds were less flexible with diverging from their color preferences, and were less able to understand how the knowledge of someone else's favorite color could influence affiliation. Our results also indicated a positive correlation between Theory of Mind and being

able to give an appropriate and likeable gift. As hypothesized, five and seven year olds, who passed the highest Theory of Mind levels, were the most flexible. Overall, our results suggest that Theory of Mind, self-presentation and aesthetic preferences are correlated, and develop parallel to one another.

These results may stem from previous research on conformity, which claims that it is not until around late in preschool, about four years of age, that children, begin to be sensitive to peer pressure and conform to peer groups (Haun & Tomasello, 2011). Likewise, we found that it is not until children reach age five that they are able to properly use self-presentation skills, and reach the higher levels of Theory of Mind. Haun and Tomasello (2011) also found that children often conform to the majority of their peers, despite previous knowledge that shows better judgment. This relates to children's growing knowledge of others, and others' thought processes and perspectives. Therefore, this shows that children start to conform purely out of social motivation around the same age as they reach higher levels of Theory of Mind, and are better to use their aesthetic color preferences to self-present and attempt to affiliate.

Color Preferences. We expected that three, five and seven year olds would have color preferences, but that consistency and stability of preference would increase with age, making the seven year olds the most consistent. Research on color perception and discrimination, shows that infants and preschoolers are able to perceive different colored stimuli and understand that these represent different colors, but it is not until later in life that they are able to more accurately name the colors and discriminate between subtle hues (Franklin et al., 2005; Bornstein et al., 1976). Therefore, since children have color preferences as young as infancy, we predicted that these preferences would become more consistent, when children were better able to discriminate and name them.

Our results confirm that children have color preferences, but we found no evidence that this preference becomes more established with age. Research by Zentner (2001), showed that by preschool, children are able to rank their favorite colors to least favorite colors. Therefore, it is possible that these color preferences by the age of three already are relatively stable, and don't dramatically change over the years. Another possible explanation is that several social factors—such as school, an increase in peer relations, and a better established self-concept ,might change how five and seven year olds view and express their aesthetic preferences, but their overall color preferences stay the same. More research on color preferences in relation to age is needed to understand, explore and confirm these findings.

Social Preferences and Self-Presentation. We predicted that five and seven year olds would be more likely, and better able to use self-presentational skills due to Aloise-Young's (1993) work on self-presentation. Her work proposed that self-presentation, or the ability to use selected behaviors to convey a specific image of oneself to an audience, does not develop until six years of age. Therefore, these older children would be more likely to diverge from their own color preferences to show themselves in a specific way. On the other hand, three year olds will not be as likely or able to do so, because, as Aloise-Young (1993) found, preschool age children did not use effective self-presentational strategies at all, when compared to the older children. She claimed that this might be due to their lack of skill in perspective taking. Our results partially confirm these predictions.

We found that when children had to decide what t-shirt color to wear to Goolo/a's party, three years olds clearly did not take Goolo/a's favorite color into account, and wore what they wanted to wear. While we predicted that seven year olds would be more likely to diverge from their color preferences and try to affiliate with Goolo/a, we unexpectedly found that they were

actually at chance with their decision. This could show, that while three year olds almost always picked their own t-shirt preference, seven year olds were more conflicted in this decision. They had to decide whether to pick their own preference, and express themselves, or to conform to what their potential new friend would like, in order to affiliate. This shows that by the age of seven, children are beginning to develop a stronger identity, and understand their identity in relation to others. As Aloise-Young (1993) discussed, children are becoming aware of their facial expressions and emotions around age six, and therefore become more conscious of self-presentation. We use self-presentation, to make ourselves seem more intelligent, adept, and likeable. These findings support our prediction of a relationship between Theory of Mind and self-presentation, because seven year olds pass all levels of Theory of Mind, suggesting that they are able to understand that someone else has different desires and beliefs than them, and also that others will react to these desires and beliefs differently. Seven year olds are able to understand this complex interaction with others, realizing how expressing and presenting themselves can affect social relationships.

As hypothesized, the results indicated that five and seven year olds were more likely to give Goolo/a his or her favorite t-shirt color as a gift, than three year olds. Therefore, we confirmed our prediction that three year olds will not be as likely or able to use self-presentational skills, and were less likely to please someone else with their gift choice. This gives evidence that five and seven year olds are better able to understand that a friend might have a different desire or belief, and can use that knowledge to try to please and affiliate with that friend. This is another way to self-present oneself. Again, this supports our prediction about the relationship between Theory of Mind and self-presentation. Three year olds are not able to pass the higher levels, indicating that they are able to understand their friends have different beliefs

and desires, but not necessarily how to use that knowledge to impress or increase the likelihood of affiliation.

Theory of Mind and Gift Giving. In accordance with Wellman et al. (2001) our results support and confirm that Theory of Mind and age are related. We confirm that as children reach seven years of age, they are able to pass the higher levels of Theory of Mind, which allows them to understand that not everyone knows what they know or have experienced, and that how we behave and appear can affect our relationships with others.

When correlating Theory of Mind with the flexibility in which children will give Goolo/a an appropriate gift, we found support for our prediction. Seven year olds, who mostly pass the highest percentage of Theory of Mind tasks, and also pass the highest levels of Theory of Mind, were more likely to give Goolo/a a gift of his/her favorite color. This helps support that Theory of Mind and self-presentation are positively correlated, because seven year olds are able to understand that Goolo/a would want his/her favorite color, not theirs. In turn, seven year olds are able to understand that giving a friend what he or she wants will help their affiliation with that friend. The friend will be more likely to associate them as someone who is nice, likeable, considerate, conscientious, etc.

Theory of Mind is an important developmental milestone for children. It allows us to understand others, and then affiliate with others. This study shows that Theory of Mind development is reflected in our ability to express ourselves, communicate with others, and form social bonds with others. Therefore, Theory of Mind is a development that encompasses and elaborates many other developments during this age range, including expanding one’s self-concept and preferences, and using them to express and relate to others.

Limitations and Future Directions

The main limitation of this study is the correlational design. Our study suggests that Theory of Mind, self-presentation, and aesthetic preference develop in parallel. It could simply be that the correlation between these three concepts is simply a function of the developmental increase in age.

But, does Theory of Mind lead to self-presentation? Or does a concept of self and others, create a self-drive to affiliate with others? We cannot claim that one predicts the other. Although our methodology created an experimental procedure to test color preference, Theory of Mind, and self-presentation, it did not combine the three, to reflect causation. Future research should consider creating a different method and procedure to connect these three concepts better. Perhaps, designing a study that creates a hybrid of Theory of Mind tests, that incorporates aesthetic concepts or preferences.

Another limitation of this study was the amount of unused data. We also collected information on children's 15 color preference rankings, and 15 their least preferred color rankings. In future studies, it would be helpful to examine the least preferred color preferences, comparing consistency. Are children more consistent with what they do not like? It would also be advantageous to explore the shifting of colors within the color wheel. The quadrants we devised were meant to help explain the data and look at more general color consistencies. However, in future research, we could assess the shifts between the quadrants and how those change.

Future studies might also consider extending or changing the specific aesthetic used. Color was chosen due to its simplicity, its everyday use and appearance, and previous research on color preferences. However, aesthetics can relate to many different types of mediums, and

senses. Perhaps, another aesthetic preference, such as music preference, could also relate to the development of the self and others, and how we express and relate ourselves to others.

Conclusion

Overall, our results suggest that a higher developed Theory of Mind, especially by the age of seven, relates to aesthetic color preferences and self-presentational skills. As children reach the age of five, they are more likely to think of their own preferences in relation to others. In turn, they start to use their aesthetic preferences as an extension of the self, deciding on their own “style”, and referencing, comparing, and changing this “style” based on their peers and societal values. Ultimately, this study suggests that starting around age five, we use our aesthetic preferences and an increasing knowledge and understanding of ourselves and others, to better affiliate with our peers.

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Table 1

Procedure Task Order and Description

Task Order	Name	Description
1	Personal Color Preference 1	Participants choose preferred and least preferred colors from the square color wheel stimuli
2	Theory of Mind-Diverse Desires	Participants had to understand what Mr. Jones wants as a snack is different from what they want.
3	Personal Color Preference 2	Participants choose preferred and least preferred colors from the square color wheel stimuli
4	Randomized Theory of Mind 1	Participants were tested on one of the remaining 5 Theory of Mind tasks
5	Personal T-Shirt Color Preference	Participants choose preferred and least preferred t-shirt colors from the t-shirt color wheel stimuli
6	Randomized Theory of Mind 2	Participants were tested on one of the remaining 5 Theory of Mind tasks
7	Social Color Preference	After being told Goolo/a's favorite color, participants choose a t-shirt to wear and give as a gift to the party
8	Randomized Theory of Mind 3	Participants were tested on one of the remaining 5 Theory of Mind tasks
9	Personal Color Preference 3	Participants choose preferred and least preferred colors from the square color wheel stimuli
10	Randomized Theory of Mind 4	Participants were tested on one of the remaining 5 Theory of Mind tasks
11	Color Discrimination	The experimenter asked participants to point to colors on the wheel and identify if two similar hues were the same

Note. Wellman's remaining Theory of Mind Tasks (2-5) were randomly interspersed.

Table 2

Percentage of Correct Color Discrimination Answers Per Age Group

	Color # Combinations	3 years	5 years	7 years
	10-11	61.5	100	100
Blue	10-10	92.9	86.7	78.6
	10-9	28.6	60	78.6
	16-17	57.1	80	100
Red	16-16	92.3	100	92.9
	16-15	42.9	80	100
	4-5	50	53.3	100
Green	4-4	100	100	85.7
	4-3	42.9	66.7	92.9
	20-1	71.4	92.9	100
Yellow	20-20	100	85.7	81.8
	20-19	85.7	100	100

Note. This is the percentage of correct answers for each color number combination, per age group.

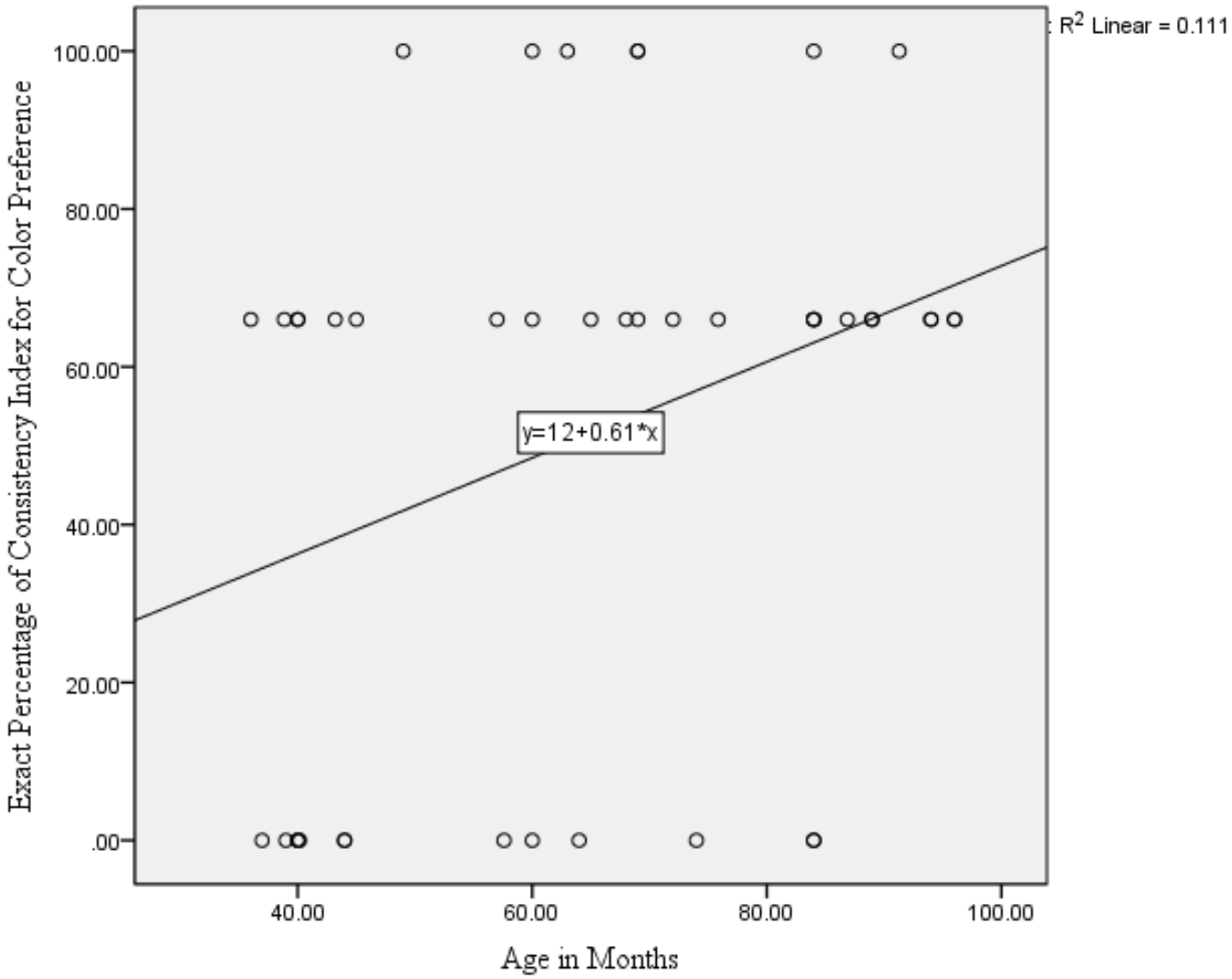

Figure 1. Color Preference Consistency by Age. This figure illustrates the exact color consistency in relation to the age in months. It shows that children are fairly stable in their preference, even around age three.

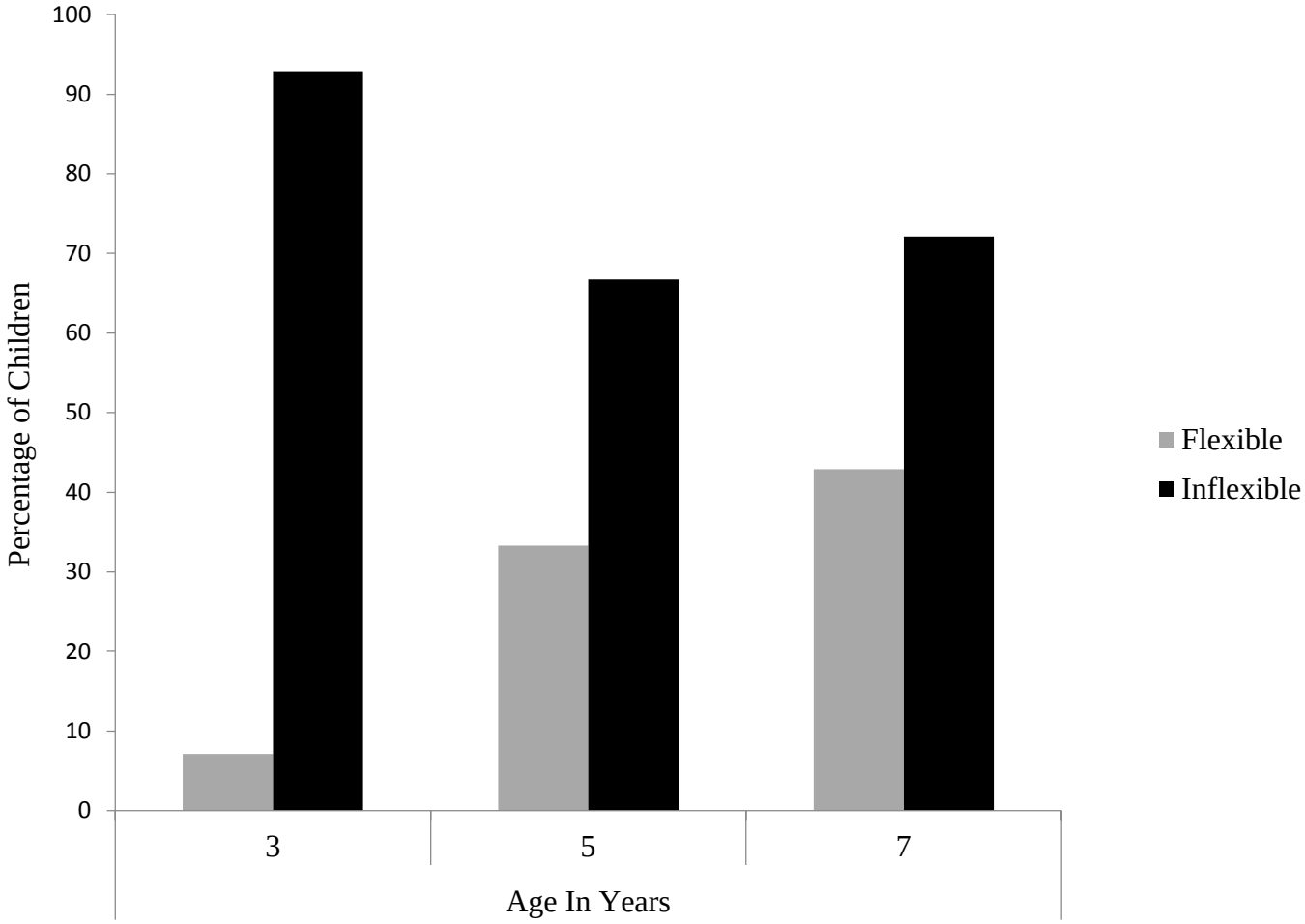

Figure 2. Average Exact Flexibility of Chosen T-shirt. This figure illustrates the percentage, as a function of age, of children who either chose the exact same t-shirt color to wear that was Goolo/a's favorite color, or did not.

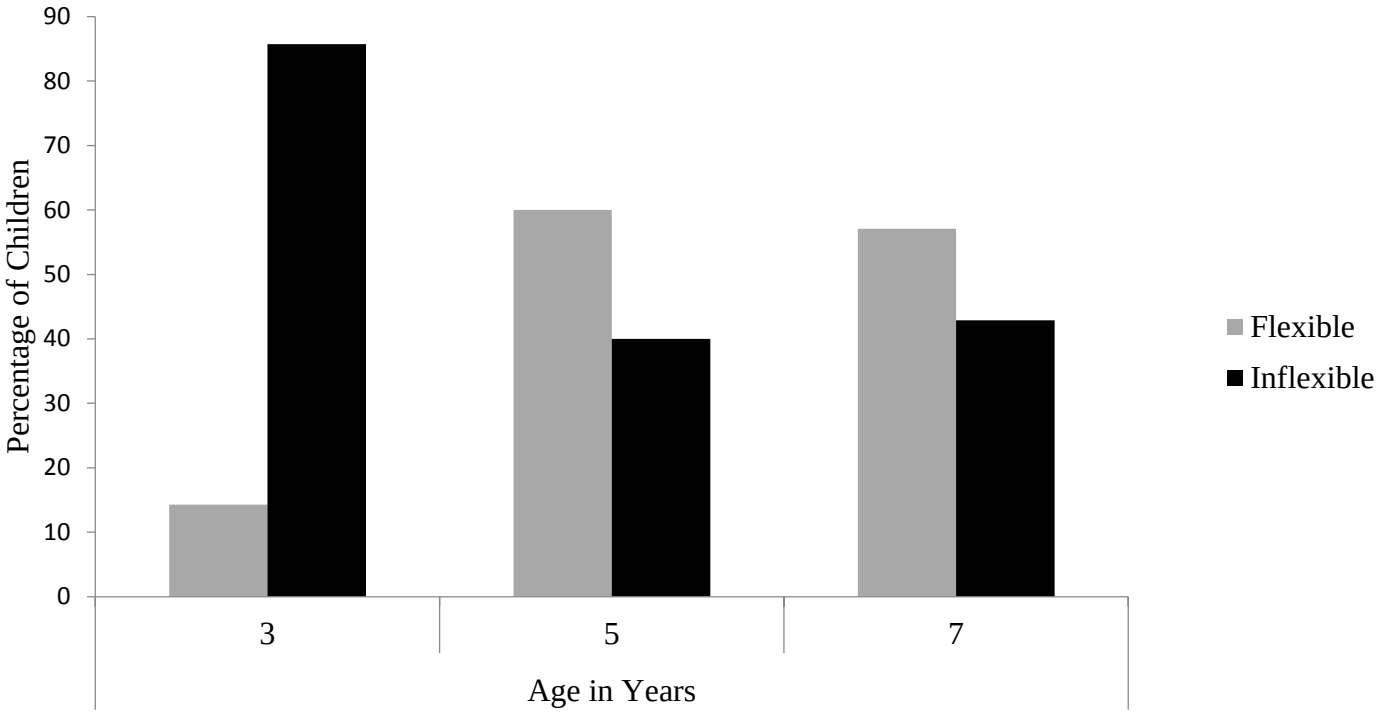

Figure 3. Average Quadrant Flexibility of Chosen T-shirt. This figure illustrates the percentage, as a function of age, of children who either chose a similar t-shirt color to wear that was in the same quadrant as Goolo/a's favorite color, or did not.

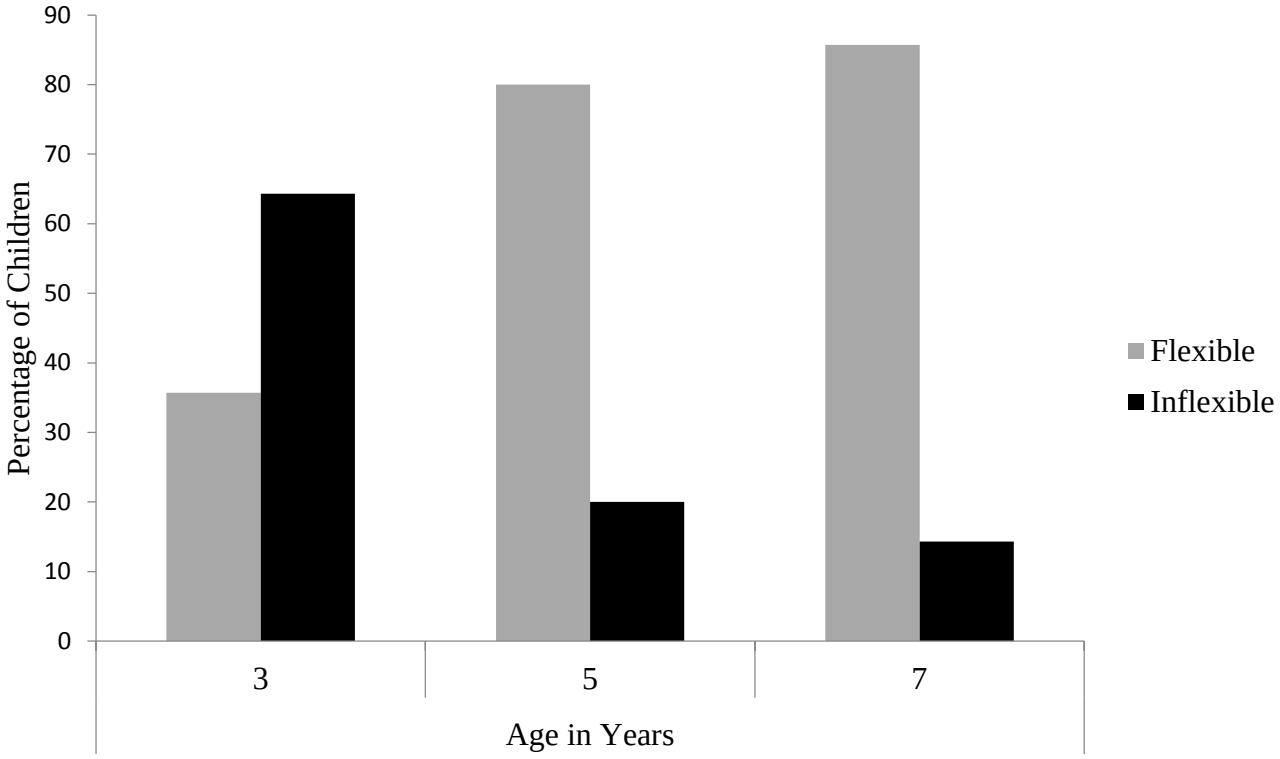

Figure 4. Average Exact Flexibility of Chosen Gift. This figure illustrates the percentage, as a function of age, of children who either chose the exact same t-shirt color, that was Goolo/a's favorite color, to give as a gift, or they did not.

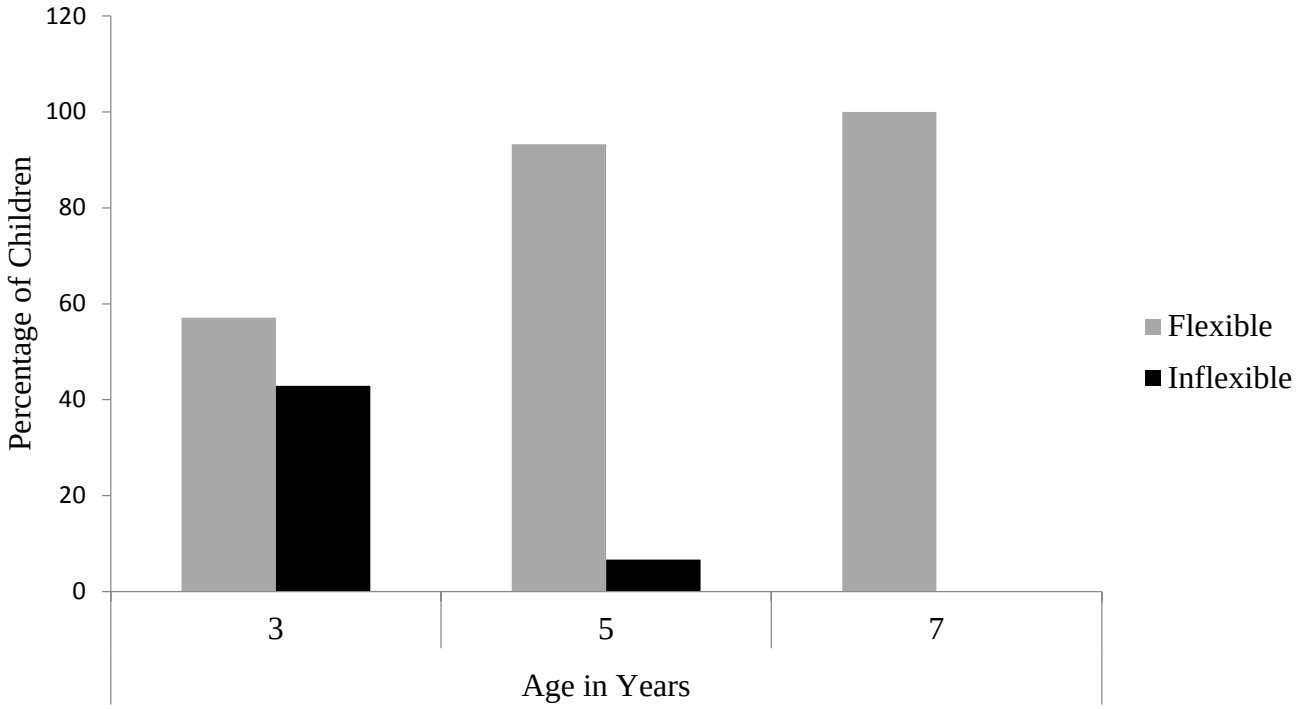

Figure 5. Average Quadrant Flexibility of Chosen Gift. This figure illustrates the percentage, as a function of age, of children who either chose a similar t-shirt color to Goolo/a's favorite color to give as a gift, or they did not.

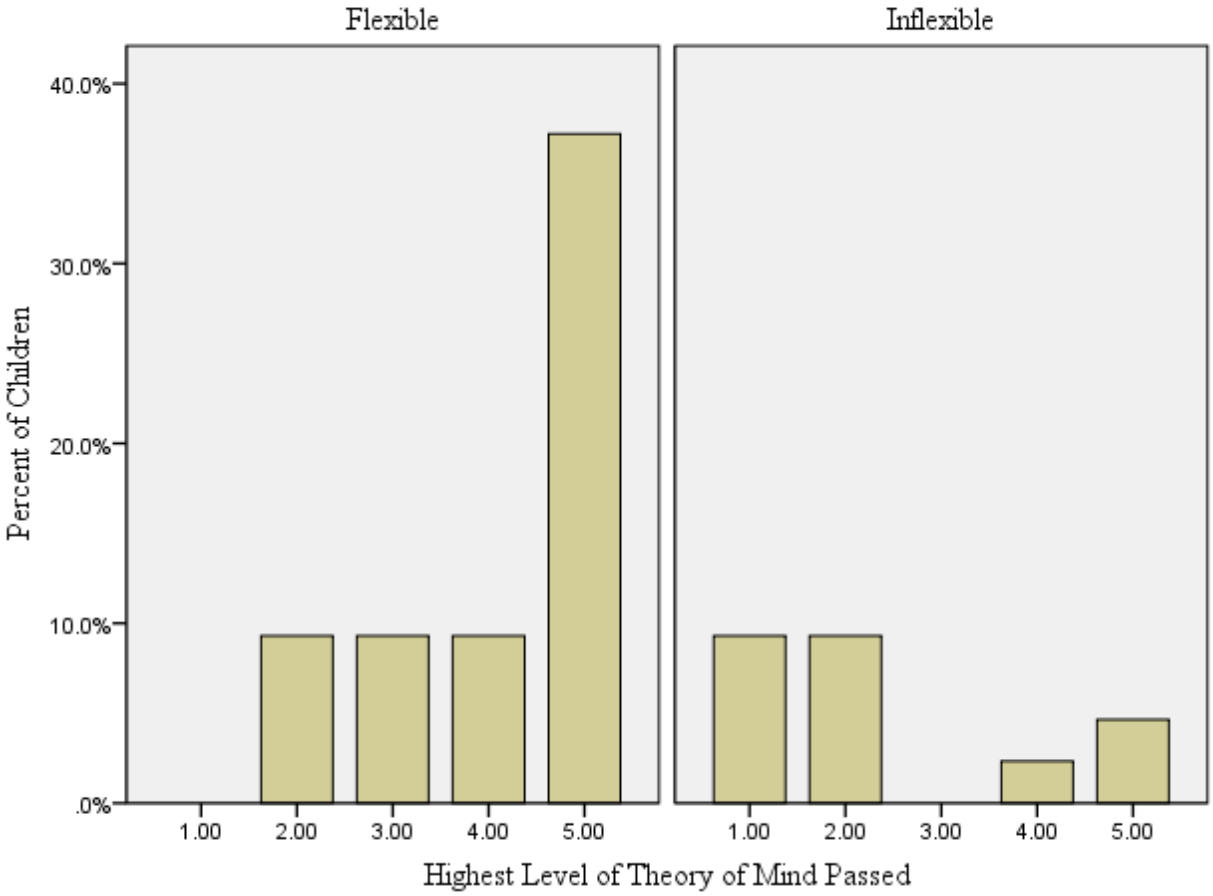

Figure 6. Percentage of Exact Flexibility and Inflexibility of the Chosen Gift and Highest Level of Theory of Mind Passed. The graph on the left illustrates the percentage of children who chose the exact same t-shirt color to give as a gift, that was Goolo/a's favorite color in comparison to the highest task completed on Theory of Mind. The graph on the right illustrates the percentage of children who did not choose the exact same t-shirt color to give as a gift, that was Goolo/a's favorite color in comparison to the highest task completed on Theory of Mind.

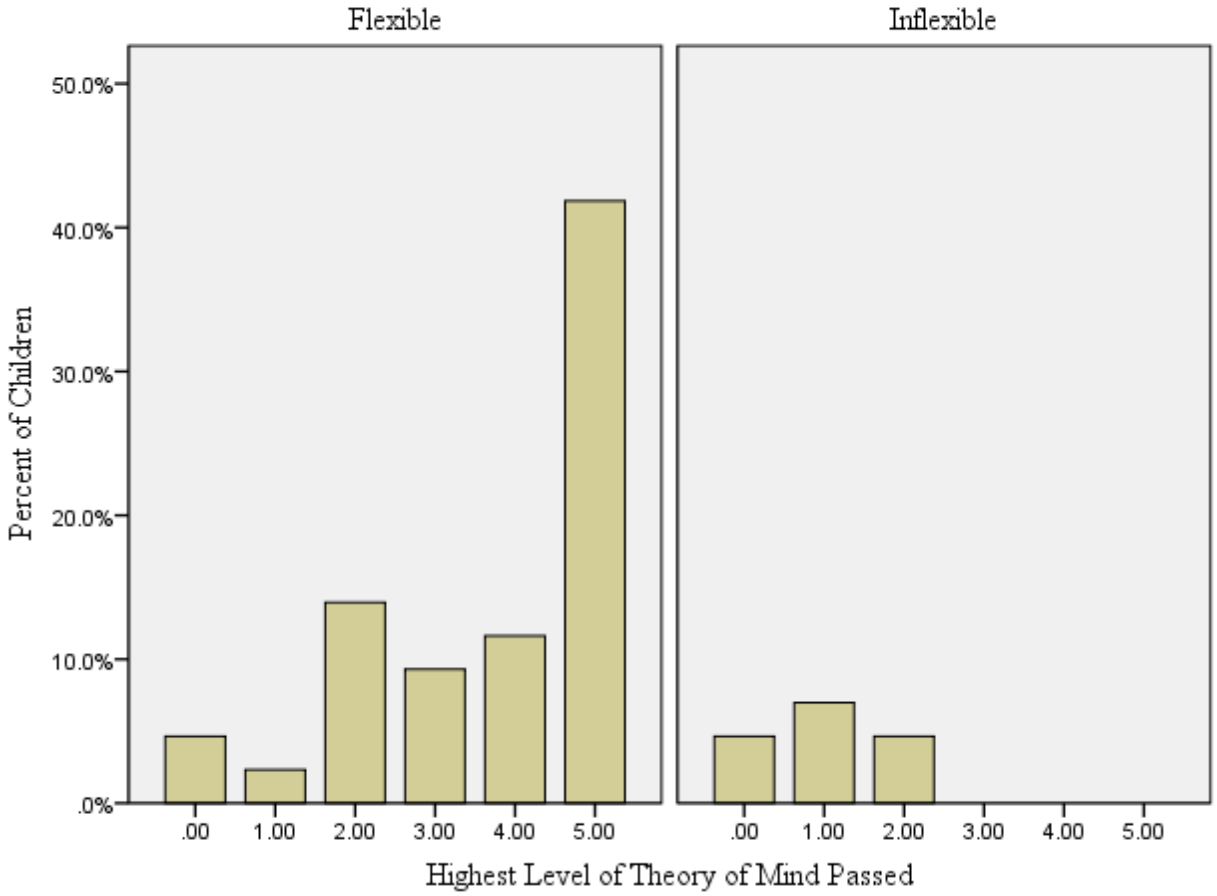

Figure 7. Percentage of Quadrant Flexibility and Inflexibility of the Chosen Gift Color and Highest Level of Theory of Mind Passed. The graph on the left illustrates the percentage of children who chose a similar t-shirt color to give as a gift, that was Goolo/a's favorite color in comparison to the highest task completed on Theory of Mind. The graph on the right illustrates the percentage of children who did not choose the a similar t-shirt color to give as a gift, that was Goolo/a's favorite color in comparison to the highest task completed on Theory of Mind.

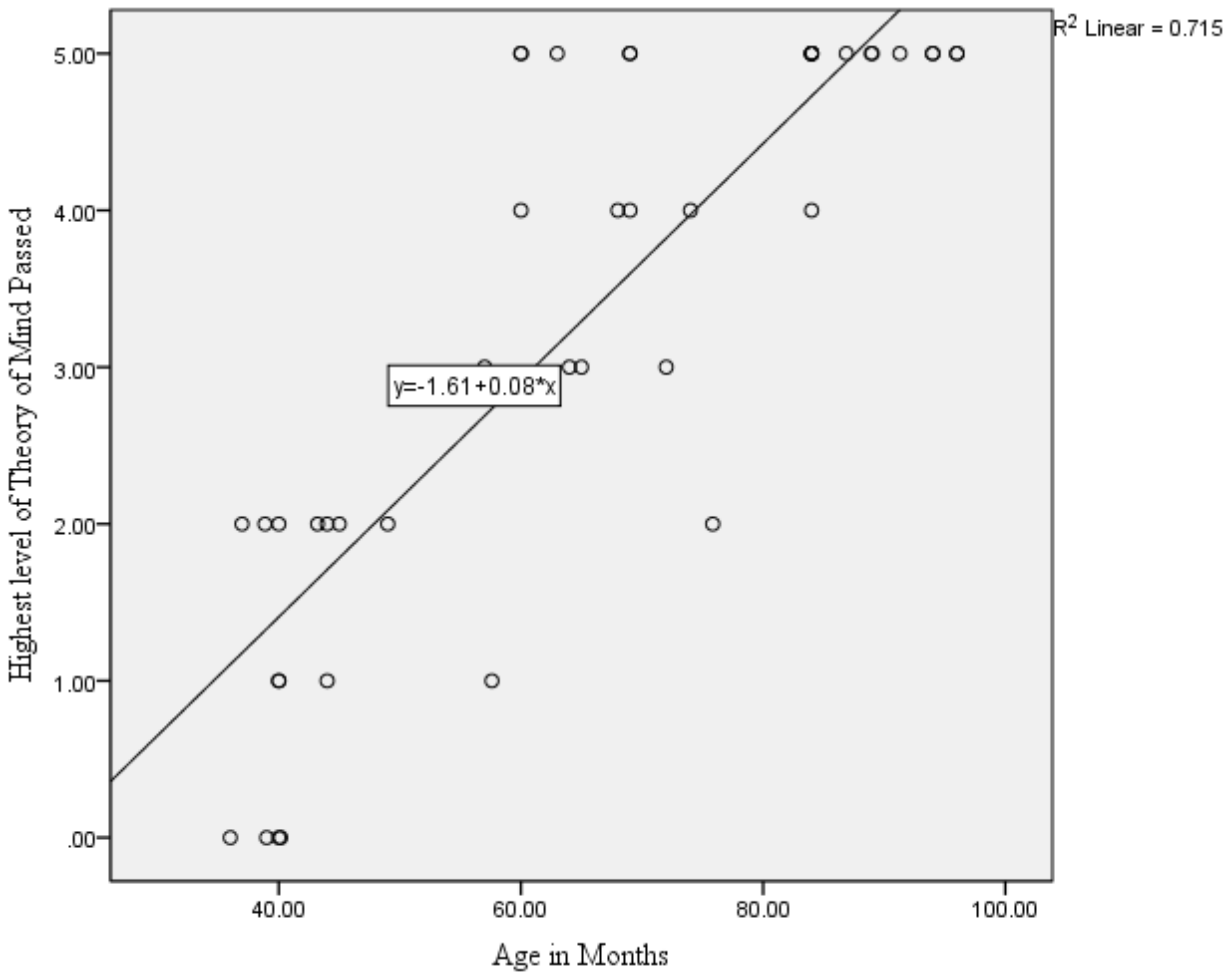

Figure 8. Highest Level of Theory of Mind Passed in Relation to Age. This figure illustrates the positive relationship between Theory of Mind levels and age in months. As children approach the age of seven, they are more likely to pass all levels of Theory of Mind.

Appendix A

Color Wheel Schematic

Figure 9. Numbered Color Wheel Square Stimuli. This figure illustrates the Color Wheel that was used with the children, for them to pick their color preferences (1-20).

Figure 10. Numbered Color Wheel T-shirt Stimuli. This figure illustrates the Color Wheel that was used with children, for them to pick their t-shirt color preferences, the t-shirt to wear, and to give as a gift.

Table 3

Numbers and their color quadrants for each Color on the Wheel

Color Wheel Number	Quadrant
1	Yellow
2	Green
3	Green
4	Green
5	Green
6	Green
7	Blue
8	Blue
9	Blue
10	Blue
11	Blue
12	Red
13	Red
14	Red
15	Red
16	Red
17	Yellow
18	Yellow
19	Yellow
20	Yellow