Statement on the 2020 CPSC Staff Document, "Age Determination Guidelines: Relating Consumer Product Characteristics to the Skills, Play Behaviors, and Interests of Children"1 (2020 Guidelines)

January 2020

This statement summarizes CPSC staff's approach to finalizing the *2020 Guidelines.* The *2020 Guidelines* update and revise the 2002 CPSC staff document titled, "*Age Determination Guidelines: Relating Children's Ages to Toy Characteristics and Play Behavior"* (*2002 Guidelines.*) CPSC staff, industry, and testing laboratories use the *Guidelines* to conduct age determinations of children's products, including toys.

In 2014, CPSC entered into an interagency agreement with NICHD[2] researchers to update the *2002 Guidelines*. NICHD purchased 150 toy and children's product samples and carried out their research and analyses independently of CPSC. NICHD observed 243 children (1-8 years) interacting with three products (age appropriate, one older, and one younger age group) at random. NICHD developed a unique key for each product, based on its features, to assess utilization levels (full, partial, or none) and generate an age recommendation. In December 2017, NICHD provided a *Research Report* with age recommendations for the products studied (based on summing full and partial utilization scores) and made their recommended age additions and changes to the *2002 Guidelines*.

In March 2018, CPSC staff released the draft *Guidelines* and *Research Report* on CPSC's website, and published a notice of availability in the *Federal Register*, requesting public comments on the report. CPSC staff received nine public comments from stakeholders.[3] Several commenters recommended conducting an independent validation of NICHD's age recommendation methodology. Staff from the Engineering Sciences Human Factors Division (ESHF) performed age determinations on more than 100 products by using the criteria stated in 16 CFR section 1501.2(b).[4] The major highlights of the finalized recommendations are below:

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[1] This statement was prepared by the CPSC staff, and the attached report was produced by NICHD for CPSC staff. The statement and report have not been reviewed or approved by, and do not necessarily represent the views of, the Commission.

[2] Child and Family Research (CFR) (now closed) was located within the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), at the National Institutes of Health (NIH), Department of Health and Human Services (DHHS), 9000 Rockville Pike Bethesda, MD 20854.

[3] 83 FR 13121 (March 27, 2018), accessible at https://www.regulations.gov/docket?D=CPSC-2018-0006

[4] Criteria include (1) the manufacturer's stated intent—such as on a label—if it is a reasonable one; (2) the toy's advertising, promotion, and marketing, and (3) whether the toy is commonly recognized as being

- NICHD studied 150 products and provided an age recommendation for 107 products (42 were control samples tested in only one age group). NICHD determined that 12 products were already addressed in the appropriate age groups within the *2002 Guidelines.* Overall, NICHD added or revised age recommendations for 95 products.
- ESHF staff agreed with NICHD's age recommendation for 83 toys. To generate a final age recommendation, ESHF staff considered other ESHF staff's independent age determinations (which included evaluating a manufacturer's age label if present), NICHD's age recommendations, as well as age suggestions from public commenters, and broadened the age appropriateness statements in the Guidelines to describe additional features within the same class of products.
- ESHF staff recommended an age group that was different from NICHD's for 12 products (listed below). In all cases, staff identified one or more concerns with the product utilization key (*e.g.*, some appeared too simple or too difficult for the selected age group, some central features had not been assessed, or needed testing was lacking in an older or younger age group). Other factors that influenced final age determinations included ESHF staff's independent age grading, consumer reviews, and manufacturer's age label. In addition, the public commenters provided different age recommendations for five of these toys, with which ESHF staff's final age recommendations align.

    - Wooden Train with Stackable Pieces
    - Bowling Set
    - Spiked Light Up Balls
    - Remote Controlled Monster Truck
    - Sticker Pad
    - Matching Game
    - Doll with Accessories
    - Floor Piano
    - Robotic Magnetic Building Cubes
    - Floor Launcher
    - Table Hockey
    - Karaoke Machine

intended for a specific age group. To interpret common recognition, staff consulted the (2002) CPSC *Age Determination Guidelines* to analyze how children's ages match up with different types of play behavior and specific toy features.

JANUARY 2020

PRODUCT AGE GUIDELINES: RESEARCH DOCUMENT[5]

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STAFF DOCUMENT

Interagency Agreement #CPSC-I-14-0016

[5] This document was prepared by NICHD staff for U.S. Consumer Product Safety Commission (CPSC) staff and has not been reviewed and does not necessarily reflect the views of the Commission.

ACKNOWLEDGEMENTS

A project of this scope could not have been completed without the collaboration and cooperation of many stakeholders. First, we thank all the families and children who were kind enough to take time out of their very busy schedules to come to NICHD and take part in the study. Their time and effort were priceless contributions to the completion of this project and to future toy safety for children throughout the country.

We thank all the research assistants at NICHD throughout the course of this project, particularly Laura Bradley and Shyneice Porter. They worked tirelessly with us to complete the project: from meeting with participants, to helping to set up the testing room, to coding hours of video footage. We are forever grateful for their support. In addition, we thank the NICHD Administrative Management Branch for assistance in organizing this unique interagency agreement. The staff was essential to working out the budget and purchasing materials we needed throughout this endeavor.

Furthermore, we want to thank those from outside of NICHD who collaborated to complete this project, particularly U.S. Consumer Product Safety Commission (CPSC) staff. Our CPSC project liaison, Dr. Khalisa Phillips, was instrumental in establishing the interagency agreement and securing project funds, and in helping to clarify our questions as we moved throughout the project. We also acknowledge the Human Factors age grading team for their assistance reviewing, Heath Science physiologist Dr. Stefanie Marques for removing small parts from toys used in the observational study, and the entire CPSC Age Guidelines Update project team for input and feedback. We also thank Dr. Kyle Lang (Tilburg University) and Dr. Todd Little (Texas Tech University), who were essential to helping us create a rigorous and extensive dataset for use in data analysis.

We are grateful to everyone who helped us accomplish the great task of completing this research project. Together, we were able to affect the health, safety, and well-being of children playing with toys today.

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Description of Work

This project is the outcome of an interagency agreement (IAG; #CPSC-I-14-0016) between the United States Consumer Product Safety Commission (CPSC) and Child and Family Research (CFR) within the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD). The CPSC was established in 1973 to regulate consumer products, including toys, which may pose risks to U.S. consumers. To identify a toy's safety hazards, the CPSC Division of Human Factors (ESHF) first determines the appropriate age group of potential users. ESHF staff members consult a technical manual known as the *Age Determination Guidelines* (2002), hereby referred to as the "*Guidelines."* The *Guidelines,* written over a decade ago, still contain useful information about most toys that ESHF encounters daily. However, in light of developments and new products in the children's toy industry, the existing *Guidelines* needed updates and extra information.

Child and Family Research at NICHD, hereafter referred to as NICHD, has revised the *Guidelines* on the basis of results of an empirical research project. In February 2015 work commenced at NICHD. NICHD staff members conducted a literature review and formulated a study design that could rigorously evaluate the age appropriateness of toys. Institutional Review Board approval was obtained, and recruitment began immediately. Data collection lasted December 2015-January 2017. Afterwards, researchers coded video footage for children's play behaviors and subsequently analyzed the data to produce this report.

This document details NICHD research activities in support of the *Guidelines* update. First, we include an annotated bibliography that surveys literature in the field of child development, toys, and play. Next, we present the empirical study, including a background literature review, the methods, results, and implications of the work. Afterwards, we provide the results from a survey that parents completed at NICHD about toy qualities and toy purchasing. Next, we deliver tabulated data for each toy

tested in the study. Finally, we discuss unresolved problems, and recommendations for future work.

This NICHD-CPSC collaboration will have a significant impact on toy purchasing decisions for parents of U.S. children, toy manufacturers, CPSC staff, and play scholars. This working interdisciplinary partnership between developmental science and government regulators proffers a unique opportunity to advance the health, safety, and development of children today.

Annotated Bibliography

Toys: General Research

Alexander, G. M., Wilcox, T., & Woods, R. (2009). Sex differences in infants' visual interest in toys. *Archives of Sexual Behavior, 38*, 427-433.

In this study, Alexander, Wilcox, and Woods (2009) intended to determine whether infants display a visual preference for a gender-congruent toy over a gender-incongruent toy. To this end, they showed 30 infants (17 males, *M* age = 5.5 months, 13 females, *M* age = 6.1 months) a doll and a toy truck for two 10-second intervals. Alexander et al. (2009) used eye-tracking technology, following a spontaneous visual paradigm, to track the infants' fixation on one toy over another. The toys were presented simultaneously. Each toy appeared once on the left side and once on the right (with the initial side randomized for each trial).

Results indicated that girls showed a large spontaneous visual preference for the doll rather than the truck whereas boys did not show a statistically significant visual preference for either toy. Analyses of the simple effects of toys within each sex showed that girls fixated more on the doll than the truck, while boys fixated more on the truck than the doll. While the former result was statistically significant, the latter was not. Analyses of the simple effects of sex for each toy showed that girls fixated more often on the doll than the truck, although the effect was not significant. In contrast, the number of fixations on the truck was significantly greater in boys than in girls and revealed a significant effect. These results suggest that sex differences in interest are present before 9 months of age and that these differences do not require motor abilities

to manipulate a toy or cognitive abilities to support gender identity. The authors posit that boys and girls may show different patterns of attention because they are attracted to different visual characteristics of objects. These early preferences may be part of a biological preparedness process for future gender roles.

Bonawitz, E., Shafto, P., Gweon, H., Goodman, N. D., Spelke, E., & Schulz, L. (2011). The Double-edged Sword of Pedagogy: Instruction limits spontaneous exploration and discovery. *Cognition*, *120*, 322–330.

The experimenters showed 4-year-olds a novel-looking toy with 4 functions (squeak, light up, play music, show a reflection in the mirror). Children were put in one of three conditions: (1) children received direct instructions about how ¼ of the features of the toy worked (2) the experimenter pretended to accidentally discover how ¼ of the features of the toy worked (3) children did not see the experimenter do anything with the toy. Afterwards, the children had free time to play with the toy, and were subsequently tested on whether they knew how to engage all four possible functions of the toy. Results suggested that children in the first condition who were directly instructed how ¼ functions of the toy worked explored the toy significantly less and knew less about how to utilize the other 3 functions of the toy than the no demonstration or accidental condition. Implications suggest that children explore toys if they do not receive direct instructions on how to do so, and open-ended play without direct pedagogical teaching may improve how children fully utilize all the functions of the toys they play with.

Caldera, Y. M., Huston, A. C., & O'Brien, M. (1989). Social interactions and play patterns of parents and toddlers with feminine, masculine, and neutral toys. *Child Development, 60*, 70-76.

The purpose of this study was to study the behavior of parents and toddlers when playing with sex-typed toys, independent from toy preferences. To do this, the toy selection was manipulated so that dyads were asked to play with a feminine, masculine, or neutral set of toys for a specified period of time. The researchers studied 48 parent-child dyads. Ages ranged from 18-23 months (*M* age = 20 months) for the toddlers. Each dyad played with sets of toys for four minutes each. Feminine sets consisted of dolls and a kitchen set. Masculine sets included trucks and a set of wooden blocks. Neutral sets included two puzzles and two shape sorters. The researchers found that toddlers played less with toys that are traditionally meant for the other gender. They also rejected cross-sex toys more often than same-sex or neutral toys.

Parents subtly responded more positively to same-sex toys and were also more excited about them. However, parents did not promote or discourage play with any set of toys. Rather, they stepped in whenever their toddler showed waning interest in a toy set. Interestingly, masculine toys elicited fewer questions and verbal engagement from parents as well as less proximity between the two. In contrast, feminine toys elicited more verbal interactions as well as closer proximity. These findings were true for boys and girls as well as their mothers and fathers. Of all the toys, the neutral sets elicited the most positive and informative verbal behavior. These results imply that sex-typed toys can lead to different patterns in children's behavior as well as parent-child interactions. There was weak evidence that parents respond in sex-stereotyped ways when children are engaged with toys and there were virtually no differences between the play behaviors of mothers and fathers.

Corter, C., & Jamieson, N. (1977). Infants' toy preferences and mothers' predictions. *Developmental Psychology*, *13*, 413-414.

Researchers examined infants' preferences for toys in three categories: novelty, complexity, and sex-appropriateness. 20 mother-infant pairs participated in the study with an even gender distribution among the infants. Mean age was 14 – 16 months (*M* age =15.3). Infants were given three toys in each set to determine their preference for each attribute. Mothers were asked to predict which toy the child would be the most interested in. The researchers coded the order in which the toys were touched, as well as the duration for which they played with the toy. The results revealed that infants display a preference for toys that are novel and that are more complex (i.e., greater manipulability and sound potential). There were no differences in preferences for sex-appropriate toys.

Caldera, Y., & Sciaraffa, M. (1998). Parent-toddler play with feminine toys: Are all dolls the same? *Sex Roles, 39*, 657-668.

The researchers sought to observe what parents initially say and do when playing with dolls with their toddlers. They investigated parents' and toddlers' verbal and non-verbal initiations when playing with the dolls in hopes of determining gender role socialization behaviors and the presence of gender schemata in the children. They studied 42 parent-toddler dyads. The children's ages ranged from 18 – 23 months (*M* age = 20 months). Parents and toddlers were presented with one large doll that cried, one small doll with a bottle, and a soft, stuffed clown. "Appropriate doll play" behaviors included calling attention to the toy, nurturing, and caretaking. "Object play behaviors" included

animating the toy, naming parts of the toy, demonstrating the function of the toy, and tickling the toy.

Researchers found that parents initiated more nurturing behaviors with the dolls than with the clown. Parents of girls called more attention to the dolls, while parents of boys called more attention to the clown. Mothers initiated more caretaking behaviors with the dolls than fathers, while fathers initiated more caretaking behaviors with the clown than mothers. Overall, parents initiated more caretaking behaviors with the dolls than with the clown. Fathers animated the toys and initiated tickling more than mothers. Toddlers initiated more caretaking and part-naming with the dolls than the clown. Male and female toddlers initiated more animating behaviors with fathers than with mothers. These results suggest dolls elicit different types of play behaviors for both boys and girls. Researchers conclude that giving boys soft toys in lieu of actual baby dolls is not enough to encourage the development of nurturing and caretaking behaviors.

Elder, J.L., & Pederson, D.R. (1978). Preschool children's use of objects in symbolic play. *Child Development*, *49*, 500-504.

The purpose of this study was to investigate the developmental differences in symbolic play among toddlers. The researchers studied two factors: the presence of objects and similarity vs. dissimilarity. A total of 72 children ages 2 ½, 3, and 3 ½ participated in the study. All were given a pretest to make sure they were familiar with the objects being used and/or referenced in the study. The substitution conditions consisted of similar substitution, in which children were asked to pretend to do an activity with an object that was similar to what would typically be used (e.g., comb hair with a flat piece of wood), dissimilar substitution, in which children were asked to pretend to do an activity with an object that was dissimilar to what would typically be used (e.g., comb hair with a rubber ball), and a no object present trial in which the children were not presented with any objects (e.g., pretend you have a comb and are using it). Results indicated that performance in the trials increased as a function of age. There were no significant differences across the conditions for the 3 ½-year-olds. Children in the 2 ½-year-old age group had significantly lower scores in the dissimilar condition than in the similar condition. These findings suggest that by 3 1/2, the meanings of objects are firmly established and can be inferred, even in the absence of the object. In contrast, young children have a more difficult time inhibiting established motor responses for particular objects.

Fenson, L., Kagan, J., Kearsley, R.B., & Zelazo, P.R. (1976). The developmental progression of manipulative play in the first two years. *Child Development, 47,* 232-236.

The purpose of this study was to observe children's' ability to relate objects in play, examine the beginning of symbolic play, and determine age differences in behavior sequences. The researchers recruited children in 4 age groups: 7 months, 9 months, 13 months, and 20 months. Children in the two youngest groups were observed for 10 minutes while in individual play with a metal tea set. Children in the two oldest groups were observed for 20 minutes in individual play with a tea set and several other toys. Results revealed three classes of responses: relational acts, symbolic acts, and sequential acts. Relational acts included combining or relating two objects. Symbolic acts mimicked those that occur in everyday life, such as eating, drinking, pouring, etc. Sequential responses were less commonly observed, but were defined as two or more successive responses that occurred in a clearly sequential order. Together, the results suggest a very specific developmental order for infants: banging, simple relational acts, accommodative relational acts, symbolic acts, and progressively more diverse and sequential acts. Play among the 7- and 9-month-olds was largely nonrelational and nonaccommodative, although 9-month-olds were more able to relate objects than 7-month-olds. In contrast, 13- and 20-month-olds engaged in more symbolic play, with the latter group performing the most. By 1 year, children are typically able to show appreciation of sociocultural uses of objects and attend to cause-and-effect relations.

Franklin, A., & Davies, I.R. (2004). New evidence for infant colour categories. *British Journal of Developmental Psychology, 22*, 349-377.

In this study, the researchers replicated Bornstein et al.'s (1976) work to further observe pre-linguistic infants' ability to perceive colors categorically. They performed three experiments that included primary and secondary color boundaries. Results indicated that at 4 months, infants can perceive colors categorically for the primary boundary, blue-green, as well as for two secondary boundaries: blue-purple and pink-red. Bornstein et al.'s (1976) study results were supported, as well as expanded with the addition of secondary color boundaries.

Furby, L., & Wilke, M. (1982). Some characteristics of infants' preferred toys. *The Journal of Genetic Psychology, 140*, 207-219.

The purpose of this study was to identify the characteristics of toys that infants prefer in their daily play activities. Participants included 461 mother-child dyads with the children divided into four age groups: 3-month-olds, 6-month-olds, 9-month-olds, and 12-month-olds. Mothers were asked to report whether their child has a favorite toy and if so, to describe its characteristics. The researchers then coded the items based on several characteristics. Results indicated that the likelihood of a child having a favorite toy increases with age. The first object preferences are typically for specific objects (e.g., dolls), then extend to classes of objects as children age. Also, a larger percentage of favorite objects were made of hard rather than soft material in all age categories. The preference for soft material toys was greater for 3-month-olds and declined from there. The researchers also found that interest in toys with visual movement declines between ages 3 – 6 months but increases again at 9 months. They hypothesize that it is likely because children become mobile and can manipulate toys themselves at the latter age. Finally, the number of favorite toys that produce some sort of effect also decreased with age. Researchers conclude that favorite toys are strongly influenced by cognitive and motivational characteristics typical of their developmental period as well as parental choice of objects.

Glassy, D., Romano, J., & The Committee on Early Childhood, Adoption, and Dependent Care (2003). Selecting appropriate toys for young children: The pediatrician's role. *Pediatrics, 111,* 911-913.

In this review article, the authors provide pediatricians with guidance about what recommendations they should give parents when selecting toys for their children. The authors suggest that parents select toys that will not replace parent involvement, but rather, allow parents to interact more with their child. There are also recommendations for how to sanitize toys that are in the waiting room of the pediatrician's office. Finally, they suggest that recent CPSC safety recalls should be hung up prominently in the doctor's office for ease of parent use.

Gredlein, J.M., & Bjorklund, D.F. (2005). Sex differences in young children's use of tools in a problem-solving task: The role of object-oriented play. *Human Nature, 16*, 211-232.

Humans have been using tools to attain goals for many years and the ability to do so is often seen as a sign of intellectual adaptability. In this study, the researchers sought to understand children's use of tools in a problem-solving task which involved retrieving a toy that was out of reach. They studied 38 children between the ages of 39 – 46 months (*M* age = 38.5 months). Children first participated in a free-play pretest session for 10 minutes. The following week, they participated in a tool-use session in which they were presented with six objects in front of them and an appealing toy that was out of reach. Informed that they would be able to play with the toy if they could reach it, the children were then observed to see if they would use the tools to snag the toy. If they did not retrieve the toy after five trials, the researchers gave the children a hint and encouraged them to use one of the tools. They then participated in a second toy retrieval trial and another free-play post session one week later.

Results from the pre- and post-test sessions indicated that object-oriented play occurred more frequently than all other forms of play. In addition, contact was observed more often than imaginary play. In addition, boys in the sample were more likely to spontaneously use a tool to retrieve the toy than girls. All the children could retrieve the toy after receiving a hint. The researchers suggest that object-oriented play and problem-solving abilities with tools are associated with gender.

Hasset, J.M., Siebert, E.R., & Wallen, K. (2008). Sex differences in rhesus monkey toy preferences parallel those of children. *Hormones and Behavior, 54*, 359-364.

The researchers explored whether male and female rhesus monkeys displayed similar gender-based toy preferences as boys and girls. They studied 135 monkeys by presenting them with multiple trials of simultaneous access to different two-toy combinations (which contained a stereotypically masculine and stereotypically feminine toy). Results revealed that male monkeys interacted significantly less with the plush toys than the female monkeys, which is a finding that mirrors children's toy preferences. There were no sex differences for interactions with the wheeled toys, although the male monkeys did display a significant preference for those over the plush toys. Female monkeys did not show significant preferences for one or the other. The findings suggest that there is a more rigid toy preference for males and one that is more varied and

flexible for females. The authors posit that there are hormonally organized preferences for specific activities (e.g., caretaking) that shape toy preferences which facilitate engagement in these activities.

Jadva, V., Hines, M., & Golombok, S. (2010). Infants' preferences for toys, colors, and shapes: Sex differences and similarities. *Archives of Sexual Behavior, 39,* 1261-1273.

The researchers examine toy, color, and shape preferences in infants ages 12, 18, and 24 months. They used a preferential looking task design in which each infant was presented simultaneously with two images in a darkened row. The length of time that the infant spent looking at each image was later coded and analyzed. Results revealed that girls did show more interest in dolls than boys, whereas boys showed more interest in cars than girls. These results did not have any interaction effects with age. Sex-typed toy preferences were not stronger for toys when they were sex-typed colors (i.e., blue and pink). In fact, boys and girls both preferred reddish colors over blue colors and round shapes as opposed to angular shapes. At age 12 months, boys and girls looked at the doll longer than boys and girls at 18 or 24 months.

Karpoe, K.P., & Olney, R.L. (1983). The effect of boys' or girls' toys on sex-typed play in preadolescents. *Sex Roles, 9*, 507-518.

In this study, the researchers sought to understand how preadolescent children interact with stereotypically masculine/feminine toys when provided the opportunity. They completed two studies to this end. The first study involved a free choice of toys. They recruited 30 children in the fourth, fifth, and sixth grades. They were presented with a mix of sex-stereotyped and neutral toys (e.g., dolls, blocks, animals, vehicles, etc.) and were instructed to construct an imaginary scene that they might see in a movie, and describe it. Results indicated that masculine functions and themes were more likely with vehicles, and feminine functions and themes were more likely with doll furniture.

For the second study, the researchers recruited 47 fourth, fifth, and sixth graders. The toy choices were limited to dolls and doll furniture, which represented girls' toys, vehicles, which represented boys' toys, and blocks, a sex-neutral toy. Findings revealed that when presented with sex-typed toys, children play with them in a manner that is appropriate for the gender association of the toys instead of their biological gender. Sex differences only emerged with the blocks, as girls created "feminine" constructions, while boys made "masculine" constructions. No configurations or themes were

significantly sex-typed. The authors suggest that behavioral flexibility and adaptability in play may not be apparent in situations in which children are given or choose sex-stereotyped toys.

Kimmerle, M., Mick, L.A., & Michel, G.F. (1995). Bimanual role-differentiated toy play during infancy. *Infant Behavior and Development, 18*, 299-307.

Bimanual role-differentiated manipulation involves each hand performing a different, but complementary, action. Usually, one hand is in a supporting or stabilizing role, while the other manipulates or explores the object. In this study, researchers sought to explain the pattern of expression of this role-differentiation for infants between the ages of 7 – 13 months. They studied 24 infants, split evenly by gender, and tested them at 7, 9, 11, and 13 months. In each session, the infant sat on the caregiver's lap and manipulated various toys. Some of the toys included movable parts, graspability, and finger control. Others were single, solid pieces. The toys were categorized as follows: (A) no moving parts, easy grasp, and no finger control, (B), movable parts, easy grasp, no finger control, (C) movable parts, easy grasp, finger control, (D) movable parts, difficult grasp, finger control, and (E) additional weight to make holding more difficult.

Results revealed role-differentiated bimanual manipulation in 79% of infants at 7 months and in all infants by 11 months. The number of role-differentiated actions increases with age. Frequency of expression was influenced by the type of toy used and there were no significant effects for sex. Researchers note that the size, shape, and configuration of the object, as well as the infant's cognitive understanding of the functional and effect-generating characteristics of the toy, are critical in eliciting bimanual role-differentiation. This study serves as the first empirical evidence of complex manual skills as early as 7 months.

Kulak, S. & Stein, R.E.K. (2016). Toy age-labeling: An overview for pediatricians of how toys receive their age safety and developmental designations. *Pediatrics, 138,* e20151803.

In this article, the authors clarify the process of how toys receive their age labeling. They explain that age labeling has two parts—those related to safety, and those related to developmental appropriateness. They review CPSC regulations for toy safety, as well as provide information to pediatric practitioners about the importance of communicating this toy rating process information to parents.

Lawlor, M., & Prothero, A. (2011). Pester power – A battle of wills between children and their parents. *Journal of Marketing Management, 27*, 561-581.

"Pester power" has been defined as children's influence on family consumption patterns, children asking their parents to buy products for them, or the "nag factor." The researchers' goal for this study was to explore how children interact with their parents when making purchase requests. Unlike previous literature, they sought to explore this through the perspective of the children. To this end, they recruited 52 children between the ages of 7 – 9 years. Half of the children from one school participated in single-gender focus groups, while the other half (from a different school) participated in in-depth, semi-structured interviews. Children reported that the toys that they most request typically fall into the following categories: confectionary (i.e., sweets), toys, computer games, and entertainment products. The items that they ask for are usually ones that they have seen advertised on television. Children were particularly shrewd in terms of knowing how to identify and respond to parental maneuvers in response to the request such as procrastination and delay.

The researchers discovered the parent-child interactions were typically marked by good-humored banter and negotiation. It was rare for children to become angry or frustrated in response to a parent refusal; rather, they were more likely to feel short-term disappointment and resignation. Overall, children were happy to engage in negotiation with their parents. The researchers conclude that the banter plays an important role in the consumer socialization process and allows children to learn things such as product pricing, relative product expense, suitability of certain items, parents' purchasing ability, and requirements of other family members.
**Note: This study was conducted in Dublin, Ireland.*

McCall, R.B. (1974). Exploratory manipulation and play in the human infant. *Monographs of the Society for Research in Child Development, 39*, 1-88.

This paper was a review of several studies that investigated exploratory behavior, manipulative investigation of the environment, and play during infancy. McCall noted that infants between 9 ½ - 11 ½ months of age spend more time in visually guided manipulation of objects that are high in plasticity and sound potential than those that are rigid or noiseless. These two dimensions have a consistent influence on manipulative exploration. Researchers found few sex differences in the distribution of manipulative exploration. In addition, there were no effects of long-term familiarity with the same or similar toys. That is, infants manipulated toys consistently, regardless of their familiarity

with the stimuli. Also, play was denser and richer if toys were complex rather than simple.

O'Brien, M., & Huston, A.C. (2001). Activity level and sex-stereotyped toy choice in toddler boys and girls. *The Journal of Genetic Psychology, 146*, 527-533.

The two studies presented in this article explored toddlers' level of motor activity with neutral and stereotypically masculine and feminine toys in free-play environments. In the first study, the researchers recruited 52 toddlers that were divided into three age groups: 1-year-olds, 1 ½-year-olds, and 2-year-olds. They were presented with toys that were socially stereotyped as masculine (e.g., tool set, train, truck), feminine (e.g., doll, dollhouse, tea set), and neutral (e.g., hourglass, chime toy, stacking rings). They coded for each child's activity level with the various items. Results revealed that boys and girls showed the same level of activity with the toys; however, boys played more often with the masculine-typed toys than with the other toys provided.

In the second study, the researchers recruited 27 toddlers ranging in age from 16 – 28 months to study toddlers' level of activity with toys that were identified as having low, medium, and high activity potential. These toys also fit the masculine, feminine, or neutral stereotypes. Findings indicated that the toddlers' play was sex typed and that both played with medium and high activity toys more often than low activity toys. Both genders preferred same-sex toys to cross-sex toys, but no differences were found with the neutral toys. Although girls did not play with any type of toy significantly more than the boys did, boys clearly preferred masculine toys over the neutral or feminine toys.

O'Brien, M., & Nagle, K.J. (1987). Parents' speech to toddlers: the effect of play context. *Journal of Child Language, 14*, 269-279.

The purpose of this study was to investigate mothers' and fathers' speech patterns with their sons and daughters using stereotypically masculine, feminine, and neutral toys. Their goal was to determine the style and structure of parents' speech as well as whether the play context, defined by the toy type, elicited different speech patterns from parents. The researchers recruited twenty parents, 10 mothers and 10 fathers. Half of the toddlers were boys and half were girls. Their ages ranged from 1.6 – 2 years, with a mean age of 1.9 years. Parent and toddler pairs were presented with three boxes and were asked to play with the contents of one box at a time. One box had two shape sorters (neutral toys), another had two baby dolls, a clown doll, and a baby bottle (feminine toys), and the third had two trucks and a car (masculine toys).

The study results indicated that mothers and fathers use similar speech patterns (i.e., similar structure and sentence types) when playing with their young children. Researchers also found that each toy set elicited a different speech pattern from parents. Since the shape sorters have a specific task, parents focused on the goal with their toddlers. With dolls, parents were highly verbal and encouraged verbalizations from the toddlers, whereas with the vehicles, parents made imaginative sounds (primarily motor noises), resulting in a low amount of overall language. No sex differences were present, even with the sex-stereotyped toys, and parents did not systematically encourage or discourage play with any of the sets, nor did their language change as a function of the child's gender. Researchers conclude that play with certain types of toys (i.e., traditionally feminine toys) set the stage for more language teaching, resulting in differential language-learning opportunity to sons and daughters.

Olszewski, P., & Fuson, K.C. (1982). Verbally expressed fantasy play of preschoolers as a function of toy structure. *Developmental Psychology, 18*, 57-61.

The aim for this study was to determine how children between 3 – 5 years use sustained verbal fantasy play in the presence/absence of fantasy props and how it was affected by the type of doll presented. They observed 36 toddlers who were 3, 4, or 5 years old (12 in each age group). Each child was taken to a room and left alone to play for 5 – 7 minutes, either with dolls and furniture, or just dolls alone. Some of the dolls were just cylinders of wood while others had significant feature details (e.g., eyes, nose, mouth, eyebrows, etc.). Results indicated that 3-year-olds could engage in more verbal fantasy play when they had concrete objects/props available. Toddlers in the 3- and 4-year-old groups revealed similar fantasy themes, such as household routines like eating and sleeping. However, 4-year-olds were capable of engaging with these themes even in the absence of props. It was clear that by age 5, children can include events beyond the family home into their fantasy play (e.g., sports games, vacations). There were no effects between fantasy play speech and the low/high realism of the dolls.

Prieske, B. Withagen, Rb. Smith, J. & Zaal, F.T.J.M. (2015). Affordances in a simple playscape: Are children attracted to challenging affordances? *Journal of Environmental Psychology, 41,* 101-111.

The purpose of this study was to determine whether children are attracted to challenging affordances in their environments. The researchers recruited 29 children

between 7.33 and 9.73 years of age. The children were asked to play in a contrived playscape consisting of 24 blocks with varying heights and widths that were placed at different distances from each other. They found that children tended to jump across gaps that were not challenging for them. Although children could usually cross the gaps by stepping, nearly all of them chose to jump. Jumping down was also a preferred way of descending except for at the smallest and greatest heights. They conclude that children are attracted to affordances that they can easily actualize rather than to ones that are most challenging.

Rakoczy, H., Tomasello, M., & Striano, T. (2005). On tools and toys: How children learn to act on and pretend with 'virgin objects', *Developmental Science, 8*, 57-73.

The purpose of this study was to determine the role of cultural learning in infants' acquisition of pretense with objects. The researchers completed three studies to this end. In the first, they recruited 24 2-year-olds and presented them with several novel objects. They then proceeded to demonstrate pretense or instrumental actions in front of the toddler. In the second study, they replicated the procedure from study 1 with 18-month-old children. In the third study, they sought to validate their findings on children's gazes and smiles during both types of actions in study 1. The results indicate that both pretense and instrumental actions can be culturally learned and that novel objects can be used to create pretense or instrumental meaning, based on the adults' modeling. The researchers conclude that early pretend play is a social activity that is socially constructed and heavily scaffolded by adults through verbal descriptions, action models, and special objects. As children get older, they learn pretend play through cultural learning.

Robinson, C.C., & Jackson, R. (1987). The effects of varying toy detail within a prototypical play object on the solitary pretend play of preschool children. *Journal of Applied Developmental Psychology, 8,* 209-220.

In this study, the researchers sought to explore the extent to which incremental differences in toy detail influenced children's time spent playing with the objects, time spent in distracted behavior, and time spent in non-prototypical play. Subjects included 36 children between the ages of 50-62 months. The toy prototypes used were small diecast cars, some with high detail, some with medium detail, and some with low detail. Results indicated that the level of detail matters for 4-year-olds; they remained engaged in solitary play for twice as long with the high detail cars than with the low detail cars. In

addition, flexibility of children's play and the amount of time that children spent in non-prototypical themes were not linked to the level of toy detail. Props (e.g., roads and buildings) had little effect on maintaining children's attention, regardless of the level of detail; however, props decreased versatility in play with medium and low-detailed cars and reduced distraction time with low-detailed cars. The researchers conclude that adding realistic details does make the toys more attractive to this age group and serves to enhance pretend play elaboration without negatively affecting play versatility.

Schulz, L.E., & Bonawitz, E.B. (2007). Serious fun: Preschoolers engage in more exploratory play when evidence is confounded. *Developmental Psychology, 43*, 1045-1050.

The purpose of this study was to examine children's exploratory play after they are presented with confounded and unconfounded evidence. The researchers recruited 64 preschoolers between the ages of 48-70 months. In the confounded condition, the experimenter and child depressed levers on a toy simultaneously. In the unconfounded condition, they took turns depressing the levers. Children also played with a familiar and an unfamiliar toy in both conditions. Results revealed that children were more likely to explore the familiar toy in the confounded condition than in the unconfounded condition. The researchers concluded that preschoolers' spontaneous exploratory play is affected by novelty, perceptual salience, and formal properties of evidence, like confounding. Children appear to be able to recognize confounded evidence and are then motivated to explore the stimuli.

Scott, S.M (2010). *Toys and American culture: An encyclopedia.* Santa Barbara, CA: Greenwood.

This encyclopedia lists numerous famous toys in the United States alphabetically. For each toy, the authors provide basic facts about the toy, then information about its cultural significance and history.

Shure, M.B. (1963). Psychological ecology of a nursery school. *Child Development, 34,* 979-992.

This study attempts to explore and compare patterns of preschool children's behaviors as they occur in a naturalistic physical environment. The space had five distinct areas (art, book, doll, games, blocks) in which children could play. The researcher recruited 14 children, split evenly by gender, all 4 years of age. None of the materials presented

were novel to reduce any confounding novelty factors. The children were observed in 5-minute intervals. Results revealed that the block area was the most popular, particularly for boys, and was followed by the art area, which was preferred by girls. The book area was the least populated, and sex differences were observed in all areas, except for the games section. Neutral affect was most commonly observed; positive affect was slightly higher in the doll section, while negative affect was negligible everywhere. Children engaged in the greatest proportion of complex social interactions in the doll area. Here, girls engaged in cooperative play, while boys engaged in more associative play. Children played alone most frequently in the block and game areas.

Sosa, A.V. (2016). Association of the type of toy used during play with the quantity and quality of parent-infant communication. *Journal of the American Medical Association Pediatrics, 170*, 132-137.

The purpose of this study was to determine the effects of toy type on the quality and quantity of communication between parents and infants during playtime. The researcher studied 26 parent-child dyads (aged 10-16 months) who were instructed to engage in 30 minutes of play per day over the course of 3 days. The toys used were selected based on 3 themes: animal names, colors, and shapes. The toys were either books, electronics (e.g., baby laptop, talking farm), or traditional (e.g., wooden puzzle, shape sorter). Results indicated that the type of toy is significantly associated with quantity and quality of parental language. Books elicited better communication interactions than electronic toys. In fact, it appeared that the parents let the toys talk for them when the children were interacting with electronic. No significant differences were found in play with traditional toys and book reading; however, both were superior to electronic toys. Sosa (2016) suggests that these results offer support for discouraging the purchase of electronic toys for educational purposes, and highlight the benefits of book reading to young children.

Trawick-Smith, J., Russell, H., & Swaminathan, S. (2011). Measuring the effects of toys on the problem-solving, creative and social behaviours of preschool children. *Early Child Development and Care*, *181*, 909-927.

This article reports the results of the researchers' attempt to develop and test the reliability and validity of a scientifically constructed observation system that allows investigators to examine the impact of play materials on children. The instrument development process was comprised of four steps: creating the initial rating system, checking for inter-rater reliability, identifying sub-scores through FA, and establishing

validity. Several types of toys were used in the analysis process. The researchers concluded that the instrument was reliable and valid and can include three clusters of items: thinking/learning, creativity/imagination, and social interaction. The researchers end the article with several suggestions for using the tool in professional practice.

Wolfgang, C.H., Stannard, L.L., & Jones, I. (2001). Block play performance among preschoolers as a predictor of later school achievements in mathematics. *Journal of Research in Childhood Education, 15*, 173-180.

The purpose of this study was to determine if preschool-aged children who have intensive play experiences in preschools and who can engage in block building at high performance levels later show high levels of mathematical achievement in formal school settings. To this end, the researchers recruited 37 first-graders who they followed for several years. Using correlational statistical analyses, they discovered that there is a statistical relationship between early block performance during preschool and achievement in math in the later middle and high school grades (no significant correlations were found during the elementary school years). They conclude that it is during these later years that the foundational experiences in early childhood manifest by assisting in higher-order thinking.

Toys: Media and Technology Research

American Academy of Pediatrics (AAP) (2016a). Media and young minds. *Pediatrics, 138,* e2 0162591.

This is a policy statement from the American Academy of Pediatrics about how much and what kinds of media children should be using between the ages of 0-5. They recommend that children under the age of 18 months not use media except for video chatting, and children 18-24 months should use high quality programming, but only if with a parent. Children older than age 2 should not engage in more than an hour of screen time each day.

American Academy of Pediatrics (AAP) (2016b). Media use in school-aged children and adolescents. *Pediatrics, 138,* e2 0162592.

This is a policy statement from the American Academy of Pediatrics about how much media children ages 5-18 years should consume. They review literature about how media is implicated in sleep disruptions and obesity. The risks for cyberbullying and inappropriate online content are also mentioned. They suggest that parents should ensure that their child exercises for an hour a day and sleeps 8-12 hours a night, and to make sure that media use does not cut into those two essential activities. They also suggest that children and adolescents avoid screen use before bedtime or in the bedroom, and encourage parents to be involved in their child's online habits to prevent online predators.

Bergen, D., & Davis, D. (2011). Influences of technology-related playful activity and thought on moral development. *American Journal of Play*, *4*, 80-99.

In this article, the researchers explored the role of technology, thought, and play in children's moral development. They reviewed literature from Freud, Erikson, Piaget, and Vygotsky, all of whom posited that thoughts and activities in play had a significant impact on child moral emotions, behaviors, and reasoning. Play is believed to be a medium through which children can test roles, take risks, explore boundaries and possibilities, and speculate about the impact of imagined behaviors. Technological toys allow children to engage in a wide variety of play forms since they can elicit a multitude of responses; with them, the toy becomes the "actor" while the child serves as the "reactor." Although the toys may not allow for empathic growth as much as child-directed play, they may serve to facilitate positive imaginative play and may also provide

the space for children to become more mentally engaged. Overall, there are supporters and critics to the belief that technology-related play promotes honesty, caring, empathy, and higher-order moral reasoning in children; consequently, further research and a fair and critical standard of the benefits and costs of technology in play are warranted.

Calvert, S., Richards, M., & Kent, C. (2014). Personalized interactive characters for toddlers' learning of seriation from a video presentation. *Journal of Applied Developmental Psychology, 35*, 148-155.

In this study, the researchers explored the impact of interactive characters on the development of a parasocial relationship and learning of a seriation task from a video presentation performed by the interactive character. They recruited 48 toddlers who were 18 months of age and interacted with them on three different occasions over the course of three months. Children who were unfamiliar with the interactive characters being used for the study were assigned to one of two treatment groups. In the first, the toddlers were given a plush toy dog that was programmed to say the child's name, to be the same gender as the child, and to have similar interests (e.g., favorite food, favorite song, etc.). In the second treatment condition, the toddlers were given non-personalized plush dogs that called them by a generic name, were the opposite gender, and had random favorites. The toddlers played with the toys from ages 18-21 months.

The researchers visited the toddlers' homes three times over the course of the study. First, to introduce the character and engage in an initial play session, second for another play session, and a third time (at age 21 months) to administer the seriation task. In the final visit, toddlers watched a 4-minute video in which the interactive character performed a seriation task of nesting cups by size. After allowing them to watch the demonstration twice, the experimenters gave each toddler a set of cups. They had two minutes to nest the cups as they had seen the dog do on screen. Results revealed that toddlers who had the personalized characters performed better on the seriation task than toddlers in the other groups. There were no significant improvements in seriation performance among the toddlers who had non-personalized characters. Although some learning did occur for these children, it was relatively weak in comparison to the personalized group. Toddlers in the personalized condition also increased in the development of nurturing, parasocial relationships with the character over time. These findings suggest that interactive media character-based toys can play an important role in learning and can be used to teach seriation skills to toddlers. They may also effectively be used to bridge learning from educational videos as children grow older.

Christakis, D.A. (2014). Interactive media use at younger than the age of 2 years: Time to rethink American Academy of Pediatrics guideline? *JAMA Pediatrics, 168,* 399-400.

The author discusses how modern media differs from traditional toys, and what implications this has for how much media children under the age of 2 should use. A table is presented that argues that a touch screen tablet device has most of the features of traditional toys (they can respond to something the child has done, they can promote joint attention between child and parent, and they are highly portable). They also mention that a touchscreen tablet has features that traditional toys do not usually have (they are tailorable to the child's needs and preferences, and the child can stop playing and easily arrive where he/she left off). Given the difference between a touchscreen tablet and a traditional television program, the author suggests that the use of interactive touchscreen technology could actually be beneficial for children under the age of 2.

Common Sense Media. (2013*). Zero to eight: Children's media use in America 2013.* San Francisco, CA: Author.

This report describes a nationally representative survey of the amount and types of media 0- to 8-year-olds use. Major findings revealed that between 2011 and 2013, the number of families with a tablet jumped from 8 to 40%. In 2011, 38% of 0- to 8-year-olds had ever used a smart mobile device, and in 2013, this statistic was 72%. On the contrary, the amount of time children use screen media like TV and DVDS decreased by 30 minutes a day. Nonetheless, TV was still the most common way that children consume media, but much of it (34%) was time-shifted, non-live television. Also, in 2011, only 22% of low income children had used a mobile device, and in 2013, this statistic was 65%, showing decreased demographic differences in this type of media use.

Danovitch, J.H. & Mills, C.M. (2017). The influence of familiar characters and other appealing images on young children's preference for low-quality objects. *British Journal of Developmental Psychology,* n.p. (e-publication ahead of print).

The researchers were interested in the effect of media characters on children's preferences for objects (a notebook, ball, bucket, toy car). First, the researchers demonstrated that 3- to 4-year-old children preferred objects that were not damaged.

Then, when children were shown two damaged objects, they preferred the one that had a familiar media character on it. Finally, children also preferred a damaged item with a media character on it than a plain, undamaged item. As such, the presence of media characters can be influential in what objects children prefer.

Gola, A.A.H., Richards, M.N., Lauricella, A.R., & Calvert, S.L. (2013). Building meaningful parasocial relationships between toddlers and media characters to teach early mathematical skills, *Media Psychology, 16,* 1-22.

The researchers were interested in investigating whether children learned better from a familiar than unfamiliar media character. At age 18 months, children were given a stuffed kangaroo, accessories for the kangaroo such as a backpack, and a DVD that featured the kangaroo. Children played with the toys for 3 months. At age 21 months, they watched a video of the kangaroo nesting cups. Another groups of children unfamiliar with the kangaroo watched the video as well. A third group of children were just given the nesting cups to play without a video demonstration. Results revealed that children who were familiar with the kangaroo were more likely to learn the cup nesting task than the no-exposure control group, but the group of children unfamiliar with the kangaroo did no better than the control group.

Hung, P.C.K., Fantinato, M., & Rafferty, L. (2016). A study of privacy requirements for smart toys*. Pacific Asia Conference on Information Systems Conference Proceedings 2016,* n.p.

In this review article, the authors define a smart toy as a toy that connects to online services through computing networks to give a traditional toy more functionality. This article outlines the difficulty in privacy concerns that currently exist in the smart toy domain, namely, that children will disclose information to technology blindly because they trust anthropomorphic toys and children have a poor understanding of what privacy means. The authors then highlight that there are no formal standards for setting parental controls for these toys, and there are no safety regulations to protect vulnerable children's privacy even though laws about physical safety have existed for years.

Kahn, P.H., Jr., Friedman, B., Perez-Granados, D.R., & Freier, N.G. (2006). Robotic pets in the lives of preschool children. *Interaction Studies*, *7*, 405-436.

The purpose of this study was to examine preschool children's reasoning about and behavioral interactions with an advanced robotic dog named AIBO. This "pet" was designed to be an autonomous robot dog that responds to human interaction and also initiates its own interactions with humans and objects. They recruited 80 children divided into two age groups: 34-50 months and 58-74 months. Researchers collected three forms of data: interviews to determine their reasoning and understanding of AIBO, observations of their behavioral interactions with AIBO, and card sort tasks to assess children's judgments about AIBO's relative similarity to other items. They used two dogs in the study: the robotic AIBO and a plush, stuffed dog. Children participated in an individual session (with the researcher present) for 45 minutes. Results revealed that about ¼ of children animated AIBO, ¼ attributed biological properties to AIBO, and about 2/3 attributed mental states, social report, and moral standing to AIBO. Though they engaged in imaginary play the same way with both dogs, children were noticeably more apprehensive when AIBO initiated actions. Researchers suggest that a new technological genre is beginning to emerge, in which objects are somewhere on the continuum between animate and inanimate. This presents questions about how developmental processes may change in the future.

Kara, N. Aydin, C.C., & Cagiltay, K. (2014). Design and development of a smart storytelling toy. *Interactive Learning Environments, 22,* 288-297.

The researchers are reporting on a smart toy they developed where a laptop screen could be affected by whatever physical toy the child put in front of it. The goal was to make media use less passive and allow children to become active participants in media play. Each toy went along with a story that was presented on the laptop and had an RFID tag inserted into it that would activate the images on the laptop. Qualitative analyses revealed that children age 4-6 could tell interactive stories and children were most intrigued by immediate contingency of the plush toys to something onscreen. The authors are investigating ways to make this toy more interactive, for example, making the character on the screen move when the child moves the plush toy.

Kim, Y. & Smith, D. (2017). Pedagogical and technological augmentation of mobile learning for young children interactive learning environments. *Interactive Learning Environments, 25,* 4-16.

The authors investigated how to guide children through mobile app use by supplementing the app with a humanoid robot. The researchers created a robot that could have a smart phone plugged into its head that is able to control the robot's movements. The app on the smartphone was meant to teach English as a second language (e.g., shapes, colors, and letters). Children can also "feed" a paper card into the robot's mouth and the robot responds to the codes written on the card. The book that came along with the robot would also read what was in it if the child followed the words with the robot's wand. While the book is read, the child is asked to find certain objects and colors in the book and interact with this book reading process, and is corrected (or praised) for their answers. Children ages 3-5 were observed when playing with the robot. The authors concluded that this prototypical robot was promising and should be studied further.

Korat, O. & Or, T. (2010). How new technology influences parent—child interaction: The case of e-book reading. *First Language, 30,* 2139-2154.

This article examines how reading differs between groups of 5-year-old children given electronic e-books or paper books. Children who read e-books were more likely to initiate discourse about the book with their parents; however, children who read the paper books were more likely to have parents who were responsive to their child's discourse. Although the study looks at 5-year-olds, the basic findings of how very young children react to electronic books is informative to how slightly older children that are in first or second grade may learn and benefit from electronic books.

Krcmar, M., & Cingel, D.P. (2014). Parent-child joint reading in traditional and electronic formats. *Media Psychology, 17*, 262-281.

In this study, the researchers examined parent and preschool child interactions when the parent read from traditional and electronic book formats to the child. They also tested children's comprehension of the story after each book was completed. They studied 70 parent-child dyads. The median age of the preschoolers was just under 4.5 years, and all 64 of the parents were female. Moms read two books to their child, one in the traditional paper format, and the other in the electronic book format on an iPad. The order of presentation of the book title and book order was rotated to control for order

effects. Results indicated that children scored significantly lower in comprehension with the electronic book condition than the traditional book condition. In addition, parents gave significantly more evaluative comments about the book in the traditional book condition than in the electronic condition. That is, with the paper format, parents asked their children more content-related questions than they did with the iPads. Similarly, children provided more evaluative comments, questions, and answers in the traditional book condition. Conversely, parents engaged in more distraction talk (i.e., conversation about the book format and environment) in the electronic book condition than in the traditional format condition.

Though the researchers did not find a significant relationship between parent's distraction talk and children's comprehension in the traditional book format condition, there was a significant negative relationship between distraction talk and children's comprehension in the electronic book condition. Finally, researchers found that when children had more technology experience, they scored lower on comprehension in the electronic book condition than children low in technology experience. This could be because children invest less mental effort in technological mediums. The researchers conclude that this work extends upon the work of others who found similar results in school-age children.

Kwok, K., Ghrear, S., Li, V., Haddock, T., Coleman, P. & Birch, S.A.J. (2016). Children can learn new facts equally well from interactive media versus face to face interaction. *Frontiers in Psychology, 7,* n.p.: article 1603.

Children ages 4-8 were taught facts about animals through a game that was presented either face-to-face with a researcher with pictures printed on paper or a cartoon on an interactive app with a character. Children touched either the iPad or the paper to indicate their answers. Children learned just as well from the face-to-face demonstration as the app demonstration.

Leite, I., McCoy, M., Lohani, M., Ullman, D., Salomons, N … Scassellati, B. (2014). Emotional storytelling in the classroom: Individual versus group interaction between children and robots. *International Conference on Human Robot Interaction Proceedings 2015.* n.p.

This paper researches how children play with a robot alone vs. in a small group of other children. Children were ages 6-8 and were supposed to learn social and emotional skills from the app that was connected to the robot. Afterwards, children were asked a

series of questions to assess their learning of target social and emotional skills. Children were better at recalling facts from the story if they played with the robot individually, but there were no differences in learning about emotional interpretation between the children who played alone or in groups. This suggests that children may learn facts differently from media toys depending on the subject content irrespective of whether they are playing alone.

Levine, D.E. & Rosenquest, B. (2001). The increasing role of electronic toys in the lives of infants and toddlers: Should we be concerned? *Contemporary Issues in Early Childhood, 2,* 242-247.

In this article, the authors write about their worries about electronic and media based toys. They believe that electronic toys may make play more limited and repetitive and parents will become less involved as helpers and teachers in their children's play. They create a list of suggestions for parents and teachers that encourage children to be open-ended and constructive in their play with traditional toys.

Lin, L., Cherng, R., & Chen, Y. (2017). Effect of touch screen tablet use on fine motor development of young children. *Physical and Occupational Therapy in Pediatrics.* n.p. (e-publication ahead of print).

The authors gave one group of 4- to 6-year-olds a tablet for 24 weeks with an app aimed to improve fine motor skills. The other group received items to play with at home that can help with fine motor skills such as scissors, threading, and lacing. Parents were told to work with their child on either the app or the fine motor skill tools for 20 minutes each day. Children were given a test of motor proficiency and pinch strength before and after exposure. While pinch strength did not differ between the two groups, those in the non-app group had higher fine motor skills scores.

Luckin, R., Connolly, D., Plowman, L., & Airey, S. (2003). Children's interactions with interactive toy technology. *Journal of Computer Assisted Learning, 19,* 165-176.

Researchers aimed to discover the ways that digital toys engender collaboration between peers for school-aged children. They asked children to interact with interactive Arthur and DW dolls (characters from PBS television program, *Arthur*) and observed children in three contexts: at home, in a school classroom, and in four out-of-school clubs. They also utilized interview data and diaries in their analyses. The 12 children in

the at home study were visited 3 times over a period of 2 weeks. A total of 32 children were observed in the school classroom study, and 22 children were observed in the out-of-school clubs. At the start of each session, children were given instructions on how to select a game and how to elicit help from the doll, if needed. Results revealed that children were much more likely to seek help initially from humans nearby (i.e., the parent, researcher, peer) and typically did not appear to notice or process the clues that were being given by the toy. But when the human companion suggested that they ask the toy for help, the children became competent at eliciting hints and encouragement. Children did not like the feedback given by the doll and often became irritated and/or distracted by it. The researchers conclude that the toys are not impressive collaborative learning partners as their help is often inadequate and irritating.

McReynolds, E., Hubbard, S., Lau, T., Saraf, A., Cakmak, M., & Roesner, F. (2017). Toys that listen: A study of parents, children, and internet-connected toys. ***CHI Conference on Human Factors in Computing Conference Proceedings 2017.*** **n.p.**

Researchers interviewed parents and 6- to 10-year-old children to understand how they interact with smart toys, what concerns parents about smart toys, and what children think of privacy. The researchers found that parents wish that toy manufacturers would put a notification on the toy when it is recording (which would help both parents and children know when the toy is recording). They also found that children preferred the smart toy that they could ask their own questions because children were very aware if the toy appeared to be repetitive or in a story loop. Parents also felt that the toys should have similar requirements to other non-toy internet-connected tools in the household.

Slutsky, R. & DeShetler, L.M. (2017). How technology is transforming the ways in which children play. ***Early Child Development and Care, 18,*** **1138-1146.**

The researchers surveyed parents of 3- to 5-year-olds. Parents reported demographic information, the types of media the child used, and finally, a diary to indicate when and how long the media was used on one typical weekday and weekend day. Parents also indicated in the diary how often the child was engaged in non-media activities such as playing with toys, eating, or playing outside. On an average weekday, children spend 1.15 hours watching TV, 1.04 hours using a tablet, .81 hours a day free playing outside, and 1.10 hours using traditional toys. Children spend comparable times with these activities on the weekend. The results show that preschool aged children spend more time consuming media than playing with traditional toys or playing outside.

Sridhar, P.K. & Nanayakkara, S. (2017). Towards understanding of play with augmented toys. *CHI Conference on Augmented Human Conference Proceedings 2017.* n.p.

The authors were investigating technology-mediated, interactive toy cube blocks that can transfer light from one cube to another if assembled correctly. Children were between 6-8 years old. One group played with the interactive cubes, and the other group played with the same cubes, but with the switch turned off so that there were no interactive light-producing qualities. Researchers found that children explored and interacted more in producing more complex patterns with the light producing cubes than those in the control group. Children in the control group made fewer patterns and got bored more easily.

Troseth, G.L., Russo, C.E., & Strouse, G.A. (2016). What's next for research on young children's interactive media? *Journal of Children and Media, 10,* 54-62.

This review article discusses upcoming research about how children play with media. The authors suggest that because media is no longer exclusively passive (i.e., television) more research needs to be done on what parents and caregivers can do to scaffold and foster learning from more interactive media (i.e., touchscreen tablets). The authors mention that more research needs to be done in the future on how children interact on video chatting devices that offer real-time contingent interactions, and how this may affect their relationships with whom they communicate.

Wood, E., Petkovski, M., De Pasquale, D., Gottardo, A., Evans, M.A., & Savage, R.S. (2016). Parent scaffolding of young children when engaged with mobile technology. *Frontiers in Psychology, 7,* n.p.: article 690.

This exploratory study aimed to get qualitative information about how young children and parents play with touchscreen tablets. Children ages 2-6 played for 10 minutes with a tablet that had 12 applications on it, as well as typical native applications (photo album, camera) that are already on the device. The parent and child played as they normally would and were videotaped. Most parents indicated that they think technology should be introduced to children between 1.5-2.5 years of age. Over 50% reported that they let their children use technology for fun or entertainment, to learn problem solving, math, and reading. During play with the tablet, parents were most likely to lend physical

support (e.g., adjusting screen), verbal scaffolding (e.g., providing hints and examples), and emotional/physical praise (e.g., good job! Giving child a high five).

Yilmaz, R.M. (2016). Educational magic toys developed with augmented reality technology for early childhood education. *Computers in Human Behavior, 54,* 240-248.

In this exploratory study, the researcher was interested in how 4- to 6-year-old children played with augmented reality apps and accompanying toys. In this app, a child could use the camera on a touchscreen tablet to look at a toy, and then 'play' with the toy on the touchscreen device. Children and teachers were asked about what they liked about the augmented reality toy, and the children were also tested on content comprehension after playing with the toys. Children and teachers both had high scores on liking the toy. While playing with the toys, behavioral coding revealed that children spent most of their time pointing, responding, and exploring. Children's cognitive attainment was somewhat low, however, and the authors suggest that children may need to play with augmented reality toys with an adult to act as a helper.

Zosh, J.M., Verdine, B.N., Filipowicz, A., Golinkoff, R.M., Hirsh-Pasek, K., & Newcombe, N.S. (2015). Talking shape: Parental language with electronic versus traditional shape sorters. *Mind, Brain, and Education, 9,* 136-144.

Children ages 20-27 months were observed while playing with their parent and either a traditional or electronic shape sorter for 7 minutes. The electronic shape sorter had headlights, buttons, and piano keys that would respond when the child put a shape into the bucket. Child and parent language during the session was transcribed and coded for spatial language production (e.g., locations and directions), language quality (e.g., vocabulary) and the focus of the speech (related to shape sorting, related to the toy generally, or off topic). Parents in the traditional toy condition said more unique words and more about shape sorting in the traditional toy condition. Parents in the electronic toy condition spoke less about spatial language and more about the toy features generally. The authors conclude that traditional toys allow for better parent child interaction and language exchange.

Play: General Research

Alexander, G. M., Wilcox, T., & Woods, R. (2009). Sex differences in infants' visual interest in toys. *Archives of Sexual Behavior, 38*, 427-433.

With this study, the authors sought to understand infants' free play behaviors in naturalistic settings. They hypothesized that there would be a linear sequence of development of exploration/play beginning with mouthing and ending with double substitution (pretend play in which two materials are transformed into something they are not). Forty infants between 7 ½ - 21 months were recruited and visited at their homes. Results supported previous empirical work that states the existence of a developmental sequence. The infants' knowledge of object properties appears limited in the younger children and as they age, they are better able to discriminate between objects. The authors conclude that between the last quarter of the first year and through the second year of age, play becomes increasingly sophisticated among toddlers. Their pretend play involves greater complexity as well as greater cognitive challenges.

Belsky, J., & Most, R.K. (1981). From exploration to play: A cross-sectional study of infant free play behavior. *Developmental Psychology, 17*, 630-639.

This article was a review of the literature about play. The authors explore the benefits of play in problem-solving and other cognitive strategies, perspective taking, abstract thought, social and linguistic competence, and academic skill development. They note that kindergarten environments that push for "academic readiness" and minimize time for play has a negative effect on social pretend play. They conclude by stating that if children do not have the opportunities to play, their long-term capacities for metacognition, literature, social cognition, and problem-solving may be diminished.

Bergen, D. (2002). The role of pretend play in children's cognitive development. *Early Childhood Research & Practice, 4,* 2-12.

This article provides an overview of the current state of research regarding the role of play in the development of pretense, cognitive competence, and social/academic skills in young children. Bergen discusses studies that emphasize the connection between play and the development of mental representation, self-regulation, problem-solving abilities, social and linguistic competence, and academic skill development. She asserts that the emphasis on academic readiness in preschools and elementary schools significantly detracts from the amount of time allocated to play. Without these extended

periods of uninterrupted time to explore their worlds, children are at risk of developing weak representational, problem-solving, and social-linguistic skills. Bergen encourages researchers to conduct extensive and practice-oriented studies that emphasize the importance of unstructured play time in the development of cognitive, academic, and social skills. The results from these works could be used to influence policy makers and provide empirical evidence for the impact of high-quality pretend play on long-term academic success.

Bornstein, M. H. (2007). On the significance of social relationships in the development of children's earliest symbolic play: An ecological perspective. In A. Gönçü & S. Gaskins (Eds.), *Play and development: Evolutionary, sociocultural, and functional perspectives* (pp. 101-129). Mahwah, NJ: Lawrence Erlbaum Associates.

In this chapter, Borstein (2007) explores young children's symbolic play as it relates to social relationships. He notes the multiple influences on children's symbolic play development, including genetics, the environment, experiences, and the economy. He also presents four theories (attachment, scaffolding, ethology; stimulation, modeling, and training) that support his thesis that social relationships directly influence symbolic play and details the mechanisms by which this occurs. Bornstein (2007) concludes the chapter by asserting the importance of collaborative play in the development of symbolic play since it is in this that children may observe, learn from, and be induced to use pretense.

Bornstein, M.H., DiPietro, J.A., Hahn, C., Painter, K., Haynes, O.M., & Costigan, K.A. (2002). Prenatal cardiac function and postnatal cognitive development: An exploratory study. *Infancy, 3*, 475-494.

In this study, the researchers aimed to determine if there existed a predictive association between fetal heart rate measures and age appropriate performance in symbolic function, specific language, and pretense play. To this end, they recruited 52 healthy, pregnant women, all of whom had singleton fetuses, and studied them at the 24-, 30-, and 36-week time points during their pregnancies. They conducted follow ups with the children when they were between 25 – 30 months of age. Each mother and child dyad participated in a two-hour home visit, during which the child played alone and then in elicited play with an experimenter. Mothers also completed self-report measures about their toddler's language skills prior to, during, and after the home visit.

Results revealed that prenatal fetal cardiac function did predict postnatal measures of symbolic function, language, and pretense play. More specifically, fetuses with greater heart-rate variability and accelerations at 30 and 36 weeks gestation and that had greater increases in heart-rate variability and acceleration over gestation had higher levels of language competence at 27 months postnatal age. Fetuses that had higher heart rate at 24 and 30 weeks, and increasing levels of heart-rate variability and accelerations over gestation had higher scores in symbolic play at 27 months postnatal age. The researchers also determined that variability and heart rate acceleration were more accurate in predicting developmental outcomes. These results suggest that advanced fetal performance corresponds to greater advances postnatally as well.

Burriss, K. G., & Tsao, L. L. (2002). Review of research: How much do we know about the importance of play in child development? *Childhood Education, 78*, 230-233.

This article explores the role of play in social, intellectual, and language development. The researchers provide a foundational understanding of the importance of play by calling upon the “practice” or “pre-exercise” theory, which holds that play reinforces instincts and skills that are required for successful navigation of life’s challenges. That is, through play, children learn skills important for future survival. The authors also note the contributions of psychoanalytic (Freud and Erikson), cognitive (Piaget), and socio-cultural (Vygotsky) theorists to understanding the influence of play on development. Play encourages problem-solving skills, critical thinking, creativity, language acquisition and development, interpersonal skills, and self-confidence in children. Its role in personal development among children cannot be understated; consequently, caregivers for young children should provide plenty of space for a variety of rich play experiences.

Cherney, I. D., & London, K. (2006). Gender-linked differences in the toys, television shows, computer games, and outdoor activities of 5- to 13-year-old children. *Sex Roles*, *54*, 717-726.

Leisure activities serve a crucial function in the development of social, cognitive, and motor skills. To explore the ways that boys and girls between the ages of five and 13 spend their leisure time, the researchers for this study gave a survey to 120 children (evenly divided by gender) and asked them to list their favorite toys, television shows, computer/video games, and physical activities. They were also asked to indicate the daily average number of hours that they spent watching TV, playing computer games, or participating in sports. After they completed the surveys, the participants also met

with an experimenter individually to talk about and elaborate upon their answers. The results corroborated other studies that implicated boys' and girls' preference for own-gender toys. Boys also preferred manipulative toys, action figures, and vehicles whereas girls preferred dolls, stuffed animals, and educational toys. As a result, boys could lack the opportunity to foster verbal skills, while girls may not engage in play that requires manipulation, construction, and active exploration. As they aged, boys' preferences for own-gender toys remained stable; in contrast, girls became increasingly interested in cross-gender toys as they grew older. Overall, children spent more time watching TV and playing sports than they spent on the computer. Although other studies should address, in further detail, the depth and quality of play in which these children engage during their leisure time, this study provides a foundation for understanding the play preferences for children in the 5 – 13 age range.

Eckler, J. A., & Weininger, O. (1989). Structural parallels between pretend play and narratives. *Developmental Psychology*, *25*, 736-743.

The purpose of this study was to determine if children's pretend play unfolded in a natural temporal sequence and, if so, if increases in structural complexity could be measured using story grammar. The researchers defined story grammar as an analytic tool that prescribes how stories can be broken into units and examined for their relatedness to one another. The experimenters recruited 50 children between 4 – 8 years of age (five groups of 10 children) and asked them to engage in pretend play with toys that reflected a space theme or castle theme while narrating their actions. Results revealed that the children's play did have a precise structural correspondence that was measurable in terms of story grammar. The researchers conclude that story grammar could likely be a valid tool in studying the structure of play in terms of roles, objects, and action sequences.

Fantuzzo, J., Mendez, J., & Tighe, E. (1998). Parental assessment of peer play: Development and validation of the parent version of the Penn Interactive Peer Play Scale. *Early Childhood Research Quarterly*, *13*, 659-676.

The Penn Interactive Peer Play Scale (PIPPS) is a rating system used to assess social competence in urban children who are at risk of experiencing disruptive inconsistencies between home and school. The teacher version was first created to report play activities at school and in the classroom for children in Head Start. This study aimed to validate a parent version of the measure that reports play activity at home and in the neighborhood. To this end, the researchers collected parent and teacher versions of the

PIPPS with observations based on a sample of 297 Head Start preschool children between the ages of 37 – 64 months. Parents and teachers completed the forms separately based on observed behaviors at home and at school, respectively. Results revealed a reliable three-factor solution for both measures that indicate three primary constructs of peer play: play interaction, play disruption, and play disconnection. The researchers validated the parent version by the teacher version and found matching factor congruence between the constructs on both measures.

Fantz, R. L., & Nevis, S. (1967). Pattern preferences and perceptual-cognitive development in early infancy. *Merrill-Palmer Quarterly of Behavior and Development*, *13*, 77-108.

This article is a review of the literature on infant's visual perceptual preferences. They detail infant's preferences for patterns and complexity and expound upon the various methods and schools of thought pertaining to perceptual-cognitive development. The researchers posit that infant's visual development occurs through cumulative, non-specific events as they explore and examine their surroundings.

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

This article is a review of the literature as it pertains to pretend play. Fein (1981) structures the article by first providing an overview, in which definitions of pretense are provided as well as a brief history of the study of pretend play, the development of play, individual differences in play, the influence of personal and environmental factors, the function of pretense, and a summary of theoretical orientations relevant to play. She notes that though much is known about pretend play, there is still much to be learned. For instance, although theoretical orientations have guided research in this area, they tend to be specific to particular aspects of pretend play rather than general enough to apply it as one large phenomenon.

Ginsburg, K. R. (2007). The importance of play in promoting healthy child development and maintaining strong parent-child bonds. *Pediatrics*, *119*, 182-191.

This special report details the importance and benefits of play for young children. The author explains that even children who are fortunate to have abundant resources and live in relative peace play less due to hurried and pressured lifestyles that constrain time

for free play. Research has shown that play is critical to cognitive, physical, social, and emotional development and well-being. It also enhances creativity, competence, language skills, and healthy brain development. The researcher notes that since there might be several reasons for limited opportunities for play, one solution cannot serve as a catch-all. However, he does propose several suggestions that pediatricians can provide to parents regarding play. A few examples include: promote unscheduled, screen-free, undirected play; use active play instead of passive entertainment; engage in active, child-centered and child-directed play; utilize non-technological toys that require imagination. Ginsburg (2007) concludes the article by emphasizing the critical role of play in children's development as well as parent's responsibility to provide environments that allow for academic, social-enrichment, and imaginative play opportunities.

Grindheim, L. T., & Ødegaard, E. E. (2013). What is the state of play? *International Journal of Play*, *2*, 4-6.

This article is a brief report on the state of play in Scandinavia, where play has typically been incorporated into school curriculums. Scandinavians have long viewed play as a medium for social engagement, learning, bodily health and well-being, and full realization of human potential. But in recent years, play has become increasingly characterized by adult intrusions and insistence on quiet and orderliness which the authors argue is antithetical to a holistic learning environment. They call for a more nuanced understanding of the importance of play so that it may be protected from overly regimented standards.

Gustafson, G. E. (1984). Effects of the ability to locomote on infants' social and exploratory behaviors: An experimental study. *Developmental Psychology*, *20*, 397-405.

The purpose of this study was to explore the impact of locomotion on infants' interactions with, and behaviors toward, the people and objects in their environments. To this end, Gustafson developed two studies. The first was a within-subjects design in which infants (n = 20, *M* = 8.1 months) who were still unable to locomote independently were given a walker with which they could move about the room. The infants were observed for 10 minutes while in the walker and 10 minutes without the walker. Results revealed that when using the walker, the infants approached and spent more time near other people in the room and looked, vocalized, and smiled at adults more often. The second experiment was a between-subjects design in which the researcher compared

the behaviors of infants (n = 16, *M* = 8.2 months) who could locomote independently to the infants from the first experiment who were only able to locomote with the walker. She found that the behaviors of the two groups were similar; that is, when infants could either locomote independently or were provided assistance by means of a walker, they were equally as likely to approach and look, vocalize, and smile at adults. This study sheds light on the impact of locomotion on children's social interactions.

Howes, C., & Stewart, P. (1987). Child's play with adults, toys, and peers: An examination of family and child-care influences. *Developmental Psychology*, *23*, 423-430.

This study aimed to determine the impact of family characteristics and child care settings on child play and development. The researchers recruited 55 children between 11 to 30 months of age, their mothers, and their family daycare providers. They collected information on child's play (by assessing play with peers, adult play with child, and play with objects), family characteristics (by assessing perceived maternal stress, social support, role satisfaction, and child-rearing attitudes), and quality ratings (using the Family Day Care Rating Scale and observing aspects of the daycare environment). They found that when controlling for either family characteristics or child-care quality, the remaining factor was significantly correlated with children's play in child care. Mothers who were stressed and restrictive in their child-rearing attitudes selected the lowest quality childcare settings and were most likely to switch child care settings. This research underscores the important influence of family characteristics and quality of child care on children's play and development. Further research is needed to parse out the specific impact of both factors on the construct.

Jarvis, P., Newman, S., & Swiniarski, L. (2014). On 'becoming social': The importance of collaborative free play in childhood. *International Journal of Play*, *3*, 53-68.

This article explores the state of free play in two nations: The United States and the United Kingdom. The researchers note that play has been increasingly limited for children due to a number of socio-cultural factors, including more rigid school structures and overly scheduled extracurriculars. As a result, children are left with little to no time to play in school or at home. They emphasize the importance of environments that provide rich opportunities for social connectedness and propose policy solutions that account for children's developmental needs for free play.

Jeffree, D. M., & McConkey, R. (1976). An observation scheme for recording children's imaginative doll play. *Journal of Child Psychology and Psychiatry*, *17*, 189-197.

As previous studies on imaginative play are open to criticism and difficulty of replication, the authors of this study sought to create a replicable method of recording imaginative play and evaluate its reliability and validity. The hypothesis is similar to other studies that have found imaginative play to increase with age (or developmental age in the case of mentally handicapped children). Two groups of children were included; the first being 5 boys and 5 girls of normative development between 18 and 41 months, and the second being 6 boys 3 girls with majority Down's Syndrome between 57 and 103 months. They were observed playing with a realistic rag doll and dramatic play accessories during three separate sessions with at least 24 hours between each session. The scheme for observation included a 5-item statement analogous to a sentence used in recording: actor, action, instrument, context, duration (Example: Child, feeds, spoon, doll, 5 seconds). The study conclusion aligned with previous studies, as the measures of imaginative play did generally increase with Developmental Age.

Lillard, A. S. (2015). The development of play. *Handbook of Child Psychology and Developmental Science, Vol. 3: Cognitive Development*. L. Liben and U. Mueller (Eds.), Lerner, R., Editor-in-Chief, p. 425-468. New York: Wiley-Blackwell.

This book chapter provides a detailed exploration of the development of pretend play. The piece is divided into several sections which are as follows: definition of play, major theories of children's play, play in the developmental life course, contemporary research issues regarding play, and differences in play according to culture, gender, and atypical development. Lillard (2014) concludes with future directions and a broad overview of the importance of play. She also notes the need to determine the influence of technology and limited protected time for play on child development.

Lillard, A. S., Lerner, M. D., Hopkins, E. J., Dore, R. A., Smith, E. D., & Palmquist, C. M. (2013). The impact of pretend play on children's development: A review of the evidence. *Psychological Bulletin*, *139*, 1-34.

This study is a review of the literature that seeks to determine the influence that pretend play has on child development. The researchers explored several development domains, including language, narrative, emotion regulation, executive function, social

skills, etc. The primary purpose was to determine if the most popular notion of pretend play, that it is crucial to healthy development, bears true in the literature compared to two alternatives: that pretend play is one of several routes that lead to healthy development or that it is one of several phenomena that drive development. For each domain, the researchers review the studies pertaining to that particular area and determine which notion was best supported. Overall, most studies regarding pretend play have weak methods and/or lax statistical approaches so it is difficult to conclude which theory is best supported. However, time and again they found that the causal approach did not hold up. It was impossible to make definitive conclusions regarding the remaining two. The authors call for more play-positive educational settings and significantly more methodologically rigorous research studies.

McCune-Nicolich, L. (1981). Toward symbolic functioning: Structure of early pretend games and potential parallels with language. *Child Development*, *52*, 785-797.

This article proposes a developmental sequence for symbolic play in young children. McCune-Nicolich (1981) suggests that the sequence parallels language development such that advancements in one results in advancements in the other. Theoretical evidence supports this assertion. The researcher notes that because the two phenomena are parallel, symbolic play might offer important information about key developmental points in organized language. She concludes the article by pointing to potential future research studies that further explore the link between symbolic play and language development.

Nichols, S., & Stich, S. (2000). A cognitive theory of pretense. *Cognition*, *74*, 115-147.

The goal of this paper was to introduce, and provide the rationale for, a new theory of pretense. To this end, the researchers define and describe pretense, introduce and explain the proposed theory, and compare it to other theories to underscore the ways in which it surpasses those that currently exist in the literature. Nichols and Stich's (2000) theory suggests that pretense is derived from a part of the human brain meant to foster hypothetical reasoning. The information in this space, referred to as the Possible World Box, is frequently updated and mutually informed by other brain boxes that represent desires and beliefs. The researchers argue that the motivation to engage in pretend play derives from an attempt to actualize the image formed in the Possible World Box.

They note that the theory uses concepts from several others, as well as original ones, and note that its eclectic nature is one of its greatest strengths.

O'Reilly, A. W., Painter, K. M., & Bornstein, M. H. (1997). Relations between language and symbolic gesture development in early childhood. *Cognitive Development, 12,* 185-197.

The paper presents two studies: Study 1 used a longitudinal design addressing stability of language, stability of symbolic gesture, and the relations between them. Study 2, designed as a partial replication of 1, tested for associations between language and gesture and nonverbal measure of general intellectual ability, and whether any specific aspects of language were more related to symbolic gesture than others using the same longitudinal design. Thirty-four Caucasian, middle class children were recruited from the Washington, D.C. suburban area and were tested within 2 weeks of their second birthday, within one month of their third birthday, and within one month of their fourth birthday. Language and symbolic gesture assessments were given at 24, 36, and 48 months. The pattern of the results for Study 1 suggests specific concurrent and longitudinal links between symbolic gesture and language comprehension. The results for Study 2 provide strong support for theoretical conceptualization of pretense play with objects as based in the capacity for symbolic thought, specifically the capacity for understanding symbol-referent relations.

Piaget, J. (1952). *The origins of intelligence in children.* New York: International Universities Press.

This book is one of Piaget's most defining works and offers extensive insight into the development of intelligence from infancy to childhood. He provides case examples and a strong theoretical underpinning to communicate his findings in a clear, simple, and precise way. Piaget divides development into six stages: use of reflexes, primary circular reactions, secondary circular reactions, application of prior knowledge to new information and situations, tertiary circular reactions, and mental combinations. He concludes by describing other types of intelligence as well as the primary theories of intelligence that prevailed when he wrote the book.

Piaget, J. (1962). *Play, dreams and imitation.* New York: W.W. Norton & Company.

This is another of Piaget's classic works that explores the mutually reinforcing relationship between play, dreams, and imitation for children. He explores and explains the transitions from sensorimotor to conceptual schemas, the influence of dreams in everyday play, and the central role of games. He also discusses pretense and the role that it has in play. Piaget remains one of the most influential figures in the quest to understand child development and play.

Rubin, K. H., Maioni, T. L., & Hornung, M. (1976). Free play behaviors in middle- and lower-class preschoolers: Parten and Piaget revisited. *Child Development, 47,* 414-419.

Parten's 1932 observational investigations of children's free play discovered that social participating among preschoolers increased with the child's age. The present study was designed to investigate the relationship between social play and cognitive play hierarchies. In addition, the authors explored the differences in free play behaviors in preschoolers from varying socioeconomic status backgrounds. The subjects were 23 boys and 17 girls from white, middle and lower-class families, with a mean age of 3.87 years. Each child was observed during free play time for 1 minute on 30 consecutive school days in a room with one-way mirrors. Their behavior was classified on a checklist with definitions from social play categories taken directly from Parten 1932. The results indicated strong social class difference in play behaviors and provided evidence that incident of parallel play being greater in lower class children, while associative and cooperative play appearing less often among the lower-class children than the middle-class group.

Suess, P. E., & Bornstein, M. H. (2000). Task-to-Task Vagal Regulation: Relations with Language and Play in 20-Month-Old Children. *Infancy, 1*, 303-322.

The measurement of cardiac vagal tone is commonly used as a psychophysiological measure of physiological self-regulation. This article looks at pattern changes of task-to-task vagal tone across multiple languages and play tasks and associations between the patterns in play performance in 20-month-old girls and boys. Children participated in four challenging language and play tasks that varied by social context (solitary play, collaborative play with mother, elicited play with experimenter, and language assessment by experimenter). ECG was recorded by electrodes on the child's chest

and was continuous across all tasks. Both theoretical and empirical findings of the study suggest that vagal withdrawal and vagal engagement play a functional role in children's capacity to engage and disengage environmental stimuli during a challenge to effectively self-regulate their physiological, behavioral, and social responsiveness. Girls' vagal regulation appeared to play functional roles in the development of play more than language, and boys' language more than play was predicted by vagal regulation.

Tamis-LeMonda, C. S., & Bornstein, M. H. (1990). Language, play, and attention at one year. *Infant Behavior and Development, 13,* 85-98.

This study aims to address whether language production and comprehension, play, and attention are systematically related in toddlers at the start of their second year of life, and if so, are those relations supported by external influences like maternal stimulation. Home visits of 43 toddlers (24 boys, 19 girls) were conducted and videotaped, which included a toddler and mother free play along with a detailed maternal interview regarding the child's productive and receptive vocabularies using the Bates et al. (1988) language interview. The general findings indicate that associations among toddler competencies at age two tend to be highly specific, and individual differences reflect independent underlying processes. This leads to a conceptualization of children's abilities in terms of "profiles" and a differentiated perspective on the ways particular experiences might mediate patterns of ability. It also was found that relations in specific toddler competencies reflect more on the underlying ability of the toddler and aren't solely mediated by contemporaneous maternal stimulation.

Tamis-Lemonda, C. S., & Bornstein, M. H. (1993). Antecedents of exploratory competence at one year. *Infant Behavior and Development, 16,* 423-439.

Many studies tend to assess relations between infant development and childhood outcomes, typically focusing on predictive validity of single measures. This study attempted to investigate multiple antecedents of toddler's exploratory competence, a latent construct made up of the variance shared by play and attention, in this case infant visual fixation and home activity. 39 mothers and infants were seen for observational sessions twice at 5 months of age, half seen in the laboratory and half visited at home, then all were visited again at 13 months. Mothers were given a survey at the 5-month observation that collected information on child's demographic data, health status from birth, maternal IQ, etc. All sessions consisted of the infant being shown an affectively neutral female face, followed by four 10 second trials of the familiar stimulus and a novel stimulus (red and black square-wave grating) being presented each twice and

sequentially. The results found that infant attention, activity, and maternal IQ differentially predicted unique variance in toddler's play, attention, and exploratory competencies. An infant's ability to coordinate and focus attention is thought to be a central process that may explain individual variation in visual attention.

Trawick-Smith, J. (1998). A qualitative analysis of metaplay in the preschool years. *Early Childhood Research Quarterly, 13*, 433-452.

The current study sought to examine *metaplay,* defined as the process of suspending actual role playing to think or communicate about pretend themes from outside of the play frame during imaginative play. 12 preschool age children were video recorded 8 times during separate 30-minute sessions of free play amongst peers. The observed play behaviors were put into three categories: initiations, responses, and constructions, along with 38 subcategories. Older children were found to perform more metaplay behaviors than younger children with the possible explanation being that metaplay requires greater social and cognitive competence.

Veitch, J., Bagley, S., Ball, K., & Salmon, J. (2006). Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health & Place, 12,* 383-393.

Face to face interviews of 78 parents, ranging from low to high SES backgrounds, were done in this study to identify where children typically play and gain understanding on parents' beliefs and attitudes towards outside play spaces and opportunities for their child's out of school hours' active free-play. The main themes that emerged from parent responses were safety, level of independence, social aspects, and facilities at parks/playgrounds. Findings suggest that opportunities for outdoor play and independent mobility may be very limited for many children, specifically amongst lower SES families. Children's opportunities for active free-play was generally impeded by parental safety concerns, mostly regarding fear of strangers and presence of teenagers in park spaces.

Wing, L. A. (1995). Play is not the work of the child: Young children's perceptions of work and play. *Early Childhood Research Quarterly, 10,* 223-247.

The present study sought to explore kindergartener and first and second graders' perceptions on classroom activities. Data collection methods included participant observation of classrooms and in-depth interviews of 14 children from each classroom,

both open-ended and semi-structured. Teachers were also interviewed twice and described their daily schedule, types of activities provided, and the role of play in their classrooms. While many theorists and researchers refer to play as being "the work of the child," most of the children referred to work as something they "have to do," such as writing and reading, and play as being able to "do whatever they wanted to do." Though the messages were subtle, children noticed and articulated their reasons that led to their characterizations between what they deemed as work and play.

Zosuls, K. M., Ruble, D. N., Tamis-LeMonda, C. S., Shrout, P. E., Bornstein, M. H., & Greulich, F. K. (2009). The acquisition of gender labels in infancy: implications for gender-typed play. *Developmental Psychology, 45,* 688-701.

The goals of this study were to investigate when in development children use gender labels methodically, and whether the timing of the appearance of gender labels is related to different labeling milestones. A longitudinal study of 82 children used biweekly diaries of children's language development, starting at infancy until approximately 21 weeks. It was hypothesized the emergence of gender labeling and sex-typed play would develop between these ages. Along with diaries the children's play behaviors were observed at 17 and 21 months. It was found that infants used gender labels by 18-21 months, by 21 months using multiple labels. Analyses revealed that girls produced labels consistently earlier than boys.

Play: Child-Peer Interaction Research

Connolly, J. A., & Doyle, A. B. (1984). Relation of social fantasy play to social competence in preschoolers. *Developmental Psychology, 20,* 797-806.

Previous studies support that children's social fantasy play is related to the development of cognitive and social skills and may correlate with peer group popularity in preschool children. The present study looked at the relationship between social play and social competencies of preschool age children while considering two issues: the complexity of social competence and using adequate assessments with multiple measurements, and the importance of the spontaneous fantasy play. A sample of 91 children aged 35 to 69 months were observed in naturalistic settings for frequency and complexity of social fantasy play during free play periods. Measures included teacher ratings of social competence, social role-taking skills, and observations of social behavior. Multiple regression analyses accounting for age, sex, IQ, and frequency of the social activity showed that children who engaged in social fantasy play more often were more socially competent and their teachers rated them as more socially skilled in their peer and classroom activities.

Goldstein, S., Field, T., & Healy, B. (1989). Concordance of play behavior and physiology in preschool friends. *Journal of Applied Developmental Psychology, 10,* 337-351.

Behaviors and physiological responses of children's play with friends and acquaintances were examined. Toddlers 21 months to 30 months and preschoolers 31 to 64 months were measured for heart rate during play sessions and cortisol levels were analyzed from saliva samples afterwards. Greater agreement was found between friends versus acquaintance pairs on some play behaviors, baseline heart rate, and cortisol levels. This suggests that as early as toddler and preschool age friends are more in-tune with one another's behaviors and physiological reactions and that friendships early on in life play an important part in development.

Howes, C. (1985). Sharing fantasy: Social pretend play in toddlers. *Child Development, 56,* 1253-1258.

This study investigated the emergence and integration of pretense into toddler's social play. Children between 16 and 33 months from community-based day-care centers were observed during free play periods over a 4-month period. Solitary pretend play,

simple social pretend play, and cooperative social pretend play were defined and coded. The results showed that social play emerged earlier than social pretend play and with a similar structure. Unlike previous studies that suggest social pretend play does not emerge until the 3rd year, all the children in this study over 30 months and half of children who were under 2 years old engaged in cooperative social pretend play.

Howes, C. (1987). Social competence with peers in young children: Developmental sequences. *Developmental Review*, *7*, 252-272.

This article integrates the current literature on social competence in young children through a proposed developmental model which the researcher hopes will be used for further understanding the phenomenon. Howes (1987) primarily focuses on two aspects of social competence: social interaction skills and friendship formation. She suggests that there are four stages through which young children sequentially progress and grow in their social competence: infancy, early toddlerhood, late toddlerhood, and preschool. During each stage, researchers and educators should be aware of the behavioral markers that reflect developmental appropriateness with peers. She also notes that individual differences with each stage vary dependent upon the child's experience with attachment figures in his/her life. Howes (1987) details the model in depth and concludes the article with a call for research that utilizes it in the study design.

Howes, C., & Phillipsen, L. (1998). Continuity in children's relations with peers. *Social Development, 7*, 340-349.

Children's social development and relationships to peers grows over the early years of their lives, and this study examined how children's social competence at younger ages predicted their relationships and competency later in childhood. Children (*n*=55; 27 girls) were observed and rated by independent blind observers and teachers during school/child care free play sessions as toddlers then again as preschoolers for prosocial, shy, and aggressive behaviors. The results found that children who engaged in more complex play with peers as toddlers showed more prosocial and complex play behaviors in preschool, then went on to be less aggressive and withdrawn as 9-year-olds. Those who were more aggressive and withdrawn in preschool were more aggressive at 9 years old.

Howes, C., Unger, O., & Seidner, L. B. (1989). Social pretend play in toddlers: Parallels with social play and with solitary pretend. *Child Development, 60,* 77-84.

Social pretend play and its relationship to social play and solitary play were examined in this study. Children ages 16- to 33-months were observed during free play periods four times over a four-month period in community based child care centers for three types of social pretend play: solitary pretend play, simple social pretend play, and cooperative social pretend play. The results of this study were consistent with the previous knowledge that social pretend play may exceed the cognitive capacities of younger children. Social play began earlier than social pretend play with a similar structure, and social pretend play increased with age.

Parten, M. B. (1933). Social play among preschool children. *The Journal of Abnormal and Social Psychology, 28*, 136-147.

This article took its data from a larger observational study of social behavior of 34 children 2 to 4.5 years of age during their morning free play hour. The study was interested in the size of preschool groups, influential factors of playmate choice, and the social value of various games, toys, and activities. Results found that while most children play in groups of two, the size of the play groups increased with age. Two-thirds of pair playmates were of the same sex with most of the children's favorite playmates being of the same sex. Aside from sex, age and home environment influenced friendships while I.Q. showed little influence. Playing "house" was the most social type of play, while sensory and art play, such as sand, clay, and painting, were more characteristically parallel play activities.

Pellegrini, A. D. (1988). Elementary-school children's rough-and-tumble play and social competence. *Developmental Psychology, 24,* 802-806.

This study examined how rough-and-tumble play in elementary aged children develops and is a reflection of their social competency. Grades K, 2, and 4 were observed during their recess periods on the school playground for about 8 months. Play was put into categories of rough-and-tumble play, aggressive behavior, and games-with-rules. Children's social competence was measured through sociometry, social problem solving, and an antisocial behavior questionnaire. Results indicated that while rough-and-tumble play did not move into aggressive play significantly for popular children it did

for the rejected children. Rejected children's rough-and-tumble play did not evolve into games-with-rules play, whereas popular children's play did. Data also showed that popular children's rough-and-tumble play was positively correlated with social problem solving.

Rubin, K. H., Watson, K. S., & Jambor, T. W. (1978). Free-play behaviors in preschool and kindergarten children. *Child Development, 49,* 534-536.

This study focused on the age difference in social and cognitive free-play behaviors in young children. Preschoolers and kindergarteners from two different half-day school programs were observed for 30 consecutive days during free play periods. Children were individually observed at random and were recorded for solitary, parallel, group, and onlooker play behaviors, including subcategories of each. The results revealed that preschoolers showed more instances of unoccupied, onlooker, solitary, and functional activities and fewer instances of group and dramatic play than kindergartners. It was also shown that preschoolers engaged in significantly more solitary-functional and parallel-functional play and less in parallel-constructive, parallel-dramatic, and group dramatic play than the kindergartners.

Play: Child-Parent Interaction Research

Bornstein, M.H., Haynes, O.M., Legler, J.M., O'Reilly, A.W., & Painter, K.M. (1997). Symbolic play in childhood: Interpersonal and environmental context and stability. *Infant Behavior and Development, 20*, 197-207.

The primary aim of this study was to determine the effect of environmental context and play partner (or lack thereof) on toddlers' symbolic play. To this end, the researchers recruited 37 mothers and their 2-year-olds and video-recorded them for two play sessions spaced one week apart. For each mother-child dyad, one session took place in the home and the other took place in the laboratory. Each session was structured so that the toddler first engaged in solitary play, then collaborative play with the mother, and finally collaborative play with an experimenter. As this was a naturalistic study, the researchers did not manipulate any variables, but rather watched the child play and noted symbolic and nonsymbolic demonstrations. Results indicated that child symbolic play was largely equivalent across environmental and play partner contexts. Toddlers engaged in more symbolic play when they played collaboratively with a partner; this held true when the mother and the experimenter was the play partner. These findings suggest that partner play in general can be very beneficial in the development of play in children.

Bornstein, M.H., Haynes, O.M., O'Reilly, A.W., & Painter, K.M. (1996). Solitary and collaborative pretense play in early childhood: Sources of individual variation in the development of representational competence. *Child Development, 67,* 2910-2929.

In this study, the authors aimed to disentangle the various factors associated with individual variation in children's pretend play. To this end, they assessed children's gender, language competence, play, as well as family sociodemographic characteristics, maternal affective and cognitive play behaviors, and maternal intelligence, personality, attitude toward and accountability in parenting, and knowledge of child development. Child language was used as a proxy for representational ability and was expected to predict child symbolic play (as mediated by mother's play). Mothers with advanced language competencies were expected to engage in more symbolic play and gender was expected to affect child's play, as mediated by mother's language competence with symbolic play. More specifically, girls were expected to display greater levels of language competence than boys.

The researchers conducted a naturalistic study in which they observed 141 White mothers and firstborn children (80 boys, 61 girls). All families were comprised of two parents and at least one child and were in the mid- to upper-middle SES range. Toddlers and their mothers were observed for 2 hours in which toddlers engaged in solitary play (during which researchers attained measure of symbolic play, maternal physical affection, and social play) as well as play with their mothers. The results indicate that child symbolic play is directly related to collaborative play; that is, children engaged in more symbolic play when they played collaboratively with their mothers. Mother-initiated play was also positively correlated to symbolic play, underscoring the importance of interpersonal interactions. In addition, girls were more likely to engage in solitary and symbolic play and children with higher language levels were more engaged in mother-initiated symbolic play. The researchers conclude that collaborative play provides a critical foundation for development of higher and more integrative levels of internal representation in children.

Bornstein, M.H., Haynes, O.M., Pascual, L., Painter, K.M., & Galperin, C. (1999). Play in two societies: Pervasiveness of process, specificity of structure. *Child Development, 70*, 317-331.

The primary goal of this study was to compare mother-child dyadic play in Buenos Aires, Argentina, and in Washington, D.C. in the U.S. The researchers were specifically interested in differences in exploratory, representation, social play, and interaction styles between the two groups of mothers and children. They recruited 39 Argentine and 43 U.S. mothers and their firstborn 20-month-old toddlers (47 boys, 35 girls). The experimenters recorded one two-hour home visit session during which mothers and children were provided masculine, feminine, and gender-neutral toys and instructed to play as they normally would. It is important to note that the sample was mostly demographically homogenous.

Results indicated that, compared to U.S. mothers and children, Argentine mothers and their toddlers engaged in more symbolic and social play, expressed more verbal praise toward their children, and encouraged interactive, other-directed pretense. In contrast, U.S. mothers engaged in more exploratory play and encouraged functional and combinatorial play with their toddlers. Findings also revealed that toddlers and mothers tended to be in tune with their forms of play (i.e., mothers who engaged in more exploratory play had children who also engaged in more exploratory play, etc.). There were also gender differences among the children. Whereas girls more frequently engaged in symbolic play, boys typically engaged in exploratory play. These results also

reflect the types of play that mothers initiated with their girls and boys, respectively. The differences are also consistent across the two cultures. These results are in line with other studies that have explored cultural differences in play between individualistic and collectivistic countries.

Bornstein, M. H., Selmi, A. M., Haynes, O. M., Painter, K. M., & Marx, E. S. (1999). Representational abilities and the hearing status of child/mother dyads. *Child Development, 70,* 833-852.

Expressive and receptive language and symbolic play capabilities were studied in parent/child dyads of hearing and deaf children and hearing and deaf mothers. Sessions were video recorded of children playing alone and with their parent, along with a language assessment with one of the researchers. Mothers also completed the Early Language Inventory prior to the sessions. It was found that deaf children, regardless of the hearing status of their mother, lagged in comprehension and expression, but they scored similarly to hearing children in their symbolic play. This suggests that the basic forms of language and play near the end of the second year of life are independent from one another.

Bornstein, M. H., & Tamis-LeMonda, C. S. (1990). Activities and interactions of mothers and their firstborn infants in the first six months of life: Covariation, stability, continuity, correspondence, and prediction. *Child Development, 61,* 1206-1217.

The study was designed to assess covariation, stability and continuity, and concurrent and predictive correspondences in social and didactic domains of activity and in different modes of vocalization in mothers and infants. Mothers and infants were observed at 2 and 5 months during naturalistic interactions at home. Two codes recorded the mother's engagement of her infant and organization of infant attention to the mother herself and to some property, object, or event in the environment. Few behaviors of mothers or of infants related positively, suggesting that mothers and infants both tend to specialize in specific kinds of activities. Social and didactic interactions in mothers were unrelated at 2 and 5 months, meaning mothers who are social are not necessarily didactic and vice versa.

Bornstein, M. H., & Tamis-LeMonda, C. S. (1995). Parent-child symbolic play: Three theories in search of an effect. *Developmental Review*, *15*, 382-400.

Using three theories of child play, this paper explored the role of parental interactions on children's growth and development with symbolic thought. The literature suggests that parents and/or other adults are important influences in children's symbolic play; in fact, children play for longer periods of time and engage in more symbolic play when playing collaboratively. Research has also indicated that the benefits of collaborative play do not transfer over to children's solitary play. The theories that the authors review include the following: attachment theory (which posits that maternal sensitivity, affection, and responsiveness foster more child play exploration and sophistication), scaffolding (which suggests that children benefit most when parents physically and psychologically scaffold play), and ethology (which views the functionality of parent-child play through an evolutionary lens). The authors note that collaborative play comprises a very small portion of collaborative play, despite the fact that parent-child play has tremendous benefits. They call for more research to understand parent's ability to and success with fostering their children's cognitive development.

Clearfield, M.W. & Nelson, N.M. (2006). Sex differences in mothers' speech and play behavior with 6-, 9-, and 14-month-old infants. *Sex Roles, 54,* 127-137.

Children ages 6-, 9-, and 14-months played with gender neutral toys with their mothers for 10 minutes. The authors coded for the behaviors of mothers and their children during the play session—of particular interest here were the mother's verbal behaviors. The researchers found that mothers of boys engaged in more commentary (e.g., statements to describe what the child is doing— "that is a square") but parents of girls engaged in more interpretations of feelings or needs (e.g., "you look tired"). Furthermore, mothers were less engaged with their sons than daughters, and focused more time observing their sons during the play session than actively engaged with the child in the same activity. The article highlights that mothers may play in a fundamentally different way with their sons versus their daughters.

Cote, L., & Bornstein, M. (2005). Child and mother play in cultures of origin, acculturating cultures, and cultures of destination. *International Journal of Behavioral Development, 29*, 479-488.

Play by immigrant families from Japan and Argentina was compared to families from the respective countries of origin, along with European Americans in the United States. Child and mother dyads were visited and observed playing with a standard set of toys (doll, blanket, tea set, telephone, train, two picture books, foam rubber ball, and nesting barrels) in their homes when the child was 20 months old. Their play was coded for exploratory play, symbolic play, modeling done by mothers, and solicitations given by mothers, and child/mother initiation in play. Generally, the play of the children more closely resembled the play of children in the country they reside in (United States) than that of children that live in their country of origin. They engaged in more exploratory play and less symbolic play than children in their country of origin, but their play was similar or sometimes exceeded that of European American children. Overall, it was found that the children's play generally mirrored how the mother played.

Cote, L. R., & Bornstein, M. H. (2009). Child and mother play in three US cultural groups: Comparisons and associations. *Journal of Family Psychology, 23,* 355-363.

Mothers and 20-month-old children of Latino immigrants from South America, Japanese immigrants, and European Americans were observed in their homes playing with a standard set of toys (doll, blanket, tea set, telephone, train, two picture books, foam rubber ball, and nesting barrels), both alone and with their parent. Their play was coded for exploratory play, symbolic play, modeling done by mothers, solicitations given by mothers, and child/mother initiation in play. As with the previous 2005 paper above, immigrant children's play was more similar to that of European American children than children in their country of origin. Regardless of the culture, boys participated in significantly more exploratory play and less symbolic play than did girls when they played alone. The gender differences were found only in solitary play and not in play with mothers.

Crawley, S. B., & Sherrod, K. B. (1984). Parent-infant play during the first year of life. *Infant Behavior and Development, 7,* 65-75.

In-home play of 7-, 10-, and 13-month-olds was observed and developmental changes in content of mother-infant and father-infant play interactions were compared. Two

general play types (1) stimulation games (when parents only performed the action), and (2) play affording infant contribution were coded. Stimulation games were broken down into rough play, gentle play, and stimulating object. Play types affording infant contribution were broken down into independent object manipulation, coordinated manipulation, reading, role games, and pretend. While the study's results replicated findings similar to earlier studies that fathers used rougher physical play than mothers, it also demonstrated that fathers exhibited similar developmental changes in play that was found in mothers. Both mothers and fathers used stimulation games less and behaviors affording infant contribution more as the child got older.

Damast, A.M., Tamis-LeMonda, C.S., & Bornstein, M.H. (1996). Mother-child play: Sequential interactions and the relation between maternal beliefs and behaviors. *Child Development, 67,* 1752-1766.

In this study, mothers and their 21-month-old children played together with a set of standard toys (nesting cups, tea set, blocks, etc.) for 10 minutes. Experimenters coded the videos for the child's play complexity. Mothers' behaviors were also coded using an analogous coding system noting what level of play complexity the mother *suggested* to her child during play. Mothers were also surveyed on their knowledge of play. The data were analyzed using sequential analysis so that researchers could ascertain the order of parent and child behaviors. Results revealed that mothers were sensitive to the needs of their children, suggesting play at the same or slightly higher level of complexity as their children were playing. Finally, mothers who knew more about play were also more likely to suggest more complex play behaviors.

De Falco, S., Esposito, G., Venuti, P., & Bornstein, M. H. (2008). Fathers' play with their Down syndrome children. *Journal of Intellectual Disability Research, 52,* 490-502.

Children with Down Syndrome (DS) with a mean age of 35 months were observed playing in a lab setting with a set of standard toys first alone then with their father. Play was coded for level of play based on the eight levels of play scale (see Bornstein & O'Reilly 1993; Bornstein *et al*. 1996; Tamis-Lemonda & Bornstein 1996). The quality of emotional exchanges between father and child (emotional availability) was also evaluated. When playing alone, older children showed a higher summary of index of symbolic play than younger children, and children with a higher mental age engaged in more symbolic play than children with a lower mental age. During father/child play, the

DS children showed more exploratory and symbolic play compared to solitary play, demonstrating that fathers succeeded in scaffolding their DS children.

De Falco, S., Esposito, G., Venuti, P., & Bornstein, M. H. (2010). Mothers and fathers at play with their children with Down syndrome: Influence on child exploratory and symbolic activity. *Journal of Applied Research in Intellectual Disabilities, 23,* 597-605.

Play of children with Down Syndrome alone, with mother, and with father was compared separately. Children had a mean age of 36 months. Play was coded for level of play based on the eight levels of play scale (see Bornstein & O'Reilly 1993; Bornstein *et al*. 1996; Tamis-Lemonda & Bornstein 1996). Results showed that DS children engaged in less exploratory play when playing alone than during collaborative play with mother and father, which did not differ from one another. DS children also played more symbolically with their father than when they played alone or with their mother.

Fiese, B. (1990). Playful relationships: A contextual analysis of mother-toddler interaction and symbolic play. *Child Development, 61,* 1648-1656.

Children ages 15-24 months were given the opportunity to first play alone and then play with their mothers. The child's play in all settings was coded for complexity. The authors found that children played in a more complex way when they were playing with their mothers than when they were playing alone. Less intrusive mothers (e.g., those that did not direct or instruct the child's play), had children with more complex play.

Freund, L. S. (1990). Maternal regulation of children's problem-solving behavior and its impact on children's performance. *Child Development, 61,* 113-126.

Problem solving tasks of 3- and 5-year-old children were observed to investigate the effects of maternal interaction on completing tasks. The tasks were developed with easy and difficult levels in which children were asked to sort items (pieces of miniature furniture, appliances, and same scale distractor items such as lamppost, deer, etc.) into a 2 - 6 room doll house. The children were either in the Mother Interaction (playing with mother) or the Corrective Feedback (working alone and receiving positive feedback from experimenter) condition in a three-phase procedure. In phase 1 all children were presented with a difficult level to complete alone. In phase 2 the Interaction groups were presented with easy and difficult levels to complete with their mothers, while Feedback groups completed the same two tasks independently. In phase 3 all children

received a difficult level to complete alone again. As hypothesized, children who interacted with their mothers created more correct adult-like groupings independently than children who received corrective feedback. Mothers were also found to regulate and take responsibility of the activity more with younger children and when the difficulty of the task increased.

Gmitrová, V., & Gmitrov, J. (2003). The impact of teacher-directed and child-directed pretend play on cognitive competence in kindergarten children. *Early Childhood Education Journal, 30,* 241-246.

This study investigated different forms of organized pretend play on 3- to 6-year-old children's cognitive performance. The two forms of pretend play were teacher-directed with simultaneous involvement of all children and child-directed in various small groups. Data collected looked at the children's affective (such as manipulating toys, laughing, watching) and cognitive manifestations (answer questions, find a solution, suggest a solution). The study found an increase in cognitive manifestations when the play was child-directed in small groups than teacher-directed play. Child-directed play also showed a balanced relationship between cognitive and affective spheres, shifting the children's behavior toward the cognitive domain.

Gweon, H., Pelton, H., Konopka, J.A., Schulz, L.E. (2014). Sins of omission: Children selectively explore when teachers are under-informative. *Cognition, 132,* 335-341.

This study consisted of two experiments with 6- to 7-year-old children. In the first experiment, children played with either (1) a toy with one function (children could twist a knob) or (2) a toy identical to the first, but with three other functions (i.e., button operated lights, a spinning globe, music). In both conditions, children were given a chance to play with and explore the toy until they discovered all the functions afforded by the toy. Afterwards, they had a toy puppet "teach" another puppet about "how the toy works". Regardless of the toy that the child had played with (the more simple or complex toy), the teacher puppet showed the other puppet how to utilize only one of the toy's functions (twisting the knob). Results revealed that children given the toy with four functions rated the teacher as less accurate than children given the toy with only one.

In the second experiment, 6-year-olds went through the same experiment above (except another condition was added where the teacher demonstrated 4/4 functions of the toy), and afterwards children viewed a demonstration by a teacher puppet where

only one function of the novel toy was demonstrated. Then, children were given a chance to play with the novel toy. When given this new toy, children in the condition where the teacher previously did not omit information about the toy (whether showing only 1/1 functions or 4/4 functions) trusted the puppet and spent more time doing the action that the puppet demonstrated with the novel toy than did children who had previously seen the puppet omit information about the toy (these children spent more time exploring other functions of the toy). This suggests that children keep track of informant credibility about how to use toys, and modeling from others can significantly affect the way that children play with toys.

Haight, W. L., Parke, R. D., & Black, J. E. (1997). Mothers' and fathers' beliefs about and spontaneous participation in their toddlers' pretend play. *Merrill-Palmer Quarterly, 43,* 271-290.

This article studied parents' perceptions of pretend play in European-American, middle class homes. Mothers and fathers were observed playing with their children at 24, 30, and 36 months separately, and then interviewed separately. Parents were asked their preference of three play types (pretend, rough-and-tumble, book reading), to rate the developmental significance of the play types, and to elaborate on their answers for each. In general, parents enjoyed participating in pretend play and most were observed participating in pretend play. Most parents elaborated that pretend play facilitated creativity, while book reading more often was related to their child's future success. Parents' individual beliefs and behaviors in participation were related, but these relations differed by parent gender.

Keumjoo, K. W. A. K., Putnick, D. L., & Bornstein, M. H. (2008). Child and mother play in South Korea: a longitudinal study across the second year of life. *Psychologia, 51,* 14-27.

Mother-child play was examined as an early expression of cultural parenting conventions in South Korea. Individual differences and developmental changes were observed in children and mothers' exploratory and symbolic play at 13 and 20 months of age. At each age, the children were observed playing in the home during 2 hour free play sessions in which they first played solitary then played collaboratively with the mother. Play was coded continuously by noting the play level and duration of play. It was found that mothers demonstrated more symbolic play at 13 months than 20 months, and children engaged in less exploratory play and more symbolic play when

playing with their mother than when playing alone. Thirteen-month maternal play also predicted 20-month collaborative play.

Lindsey, E. W., & Mize, J. (2001). Contextual differences in parent–child play: Implications for children's gender role development. *Sex Roles, 44,* 155-176.

This study focused on associations between parent-child and child-peer play. 33 preschool children were videotaped playing in pretend and physical play sessions with a parent, as well as playing with a same-sex peer. During the pretense play sessions, more parent-daughter pairs, particularly mother-daughter dyads, engaged in more pretense play than did parent-son dyads, while physical play sessions showed more father-son physical play than father-daughter dyads. The peer play sessions showed evidence common with previous studies: that girls were more likely to engage in pretend play while boys were more likely to engage in physical play. When children's parents engaged in more pretend play those children were found to engage more in pretend play with peers. Likewise, when children's parents engaged in more physical play those children engaged in more physical play with children. This connection suggests that parent's model of play may contribute to the gender stereotyped play behaviors with their peers.

MacDonald, K., & Parke, R. D. (1986). Parent-child physical play: The effects of sex and age of children and parents. *Sex Roles, 15,* 367-378.

The present study was interested in the developmental changes of physical play between parent and child from birth to year 10 as a function of the sex of parent and child. Three-hundred-ninety families with a total of 746 children were interviewed over the phone and asked about the frequency of physical play interactions with their children. The strongest variable that affected the frequency of physical play was the age of the child, with low levels before age 1, a peak in early childhood years, then declining after that. As previous studies have found, fathers tended to engage in more physical play than mothers, and while effects of child sex were less pronounced. Parents of girls tended to participate in more low impact physical games, such as patty cake, and parent of boys engaged in more strenuous physical activities, such as wrestling.

Mize, J., Pettit, G. S., & Brown, E. G. (1995). Mothers' supervision of their children's peer play: Relations with beliefs, perceptions, and knowledge. *Developmental Psychology, 31,* 311-321.

Parent beliefs in the importance of children's peer relationship skills and perceptions of their children's social competence with peers were obtained by using questionnaires sent to mothers of 3- to 5-year-olds. Questions included rating importance of social/non-social skills and their own children's social skills in relation to other children. Strategies for responding to children's peer interaction problems were studied by observing a subsample of mothers supervise their child playing with a peer. The mothers in the study believed that experiences were more powerful factors in shaping their children's social behavior styles than innate disposition or direct teaching. Mothers who thought of their children as more socially competent more often explained their perception by indicating that social skills are important and can be molded through parent action. Maternal knowledge was not associated with beliefs or perceptions of children's competence. The supervision observation found that mothers of more socially competent children were less involved in supervising their play.

Power, T. G. (1985). Mother-and father-infant play: A developmental analysis. *Child Development, 56,* 1514-1524.

In this study, Power (1985) aimed to determine the developmental changes in parent-infant play at ages 7, 10, and 13 months. A total of 24 infants (4 boys and 4 girls for each age category) and their mothers and fathers participated in the study. Through 15-minute videotaped play sessions (5 minutes each of mother-infant, father-infant, and solitary infant play) he investigated four aspects of parent behavior: play mode, play technique, interference, and effectiveness. The toys presented during the play sessions allowed for 6 modes of play: visual exploration, individual object manual inspection, pretend play, relational play, turn-taking play, and play involving elicitation of visual and auditory effects. Results indicated that mothers and fathers are similar in the predominant kinds of play in which they engage with their infants (i.e., play mode). In fact, the only mode with a statistically significant difference is pretend play, with mothers spending a greater deal of their time encouraging it than fathers. However, there were significant differences in play style, such that fathers were directive and interfering in their play with infants whereas mothers encouraged their infant's natural curiosity. Parents of the oldest infants were least likely to direct their play and were more likely to use verbal techniques rather than physically performing behaviors. Power (1985) also

noted gender differences; that is, as infants aged, mothers were more directive for girls and less directive for boys.

Power, T. G., & Parke, R. D. (1983). Patterns of mother and father play with their 8-month-old infant: A multiple analyses approach. *Infant Behavior and Development, 6*, 453-459.

First born children aged 8 months were observed engaging in parent-infant toy play, first with father, then mother, then simultaneously with both. The sessions were coded for predominant forms of play, sequencing, and duration of the play behaviors. Additional characteristics that were coded included parent solicitation of play, reason for failure if unsuccessful, and frequency of parent response to infant cues of interest/disinterest in play. Results support the hypothesis that mothers are more responsive to their infant's cues of interest than fathers, specifically when referring to the infant's focus/gaze. Results only partially supported the common hypothesis that father's play is more physical, as fathers responded to infant signs of disinterest by engaging in physical play, while mothers responded more with showing or giving a new toy. Overall, very few mother-father differences were significant during the individual father-infant and mother-infant play sessions.

Suizzo, M. A., & Bornstein, M. H. (2006). French and European American child–mother play: Culture and gender considerations. *International Journal of Behavioral Development, 30,* 498-508.

This study aimed to explore French and European American cultural differences in child-mother play. The authors recruited a sample of 33 French and 39 European American mothers and their 20-month-old children. The two samples were homogenous in terms of demographic characteristics (e.g., SES, age, residential areas, etc.). During a 2-hour home visit, researchers observed mother-child exploratory and symbolic play, mother's solicitations to the different forms of play, and mother social play, physical affection, and verbal praise. Results indicated that across both cultures, mothers tended to play synchronously with their infants. In both groups, mothers' behaviors toward the infant changed dependent upon the child's sex, which suggests gender differences that may be common across cultures. Although there were no significant differences in the amounts of mother play (exploratory and symbolic), American mothers did tend to solicit their children to engage in symbolic play and utilized verbal praise more frequently than French mothers. However, no differences existed in social play or displays of physical affection domains. These results support previous studies' findings that French mothers

prefer to observe their children “awakening” to the environments around them rather than directing them to particular activities or forms of play. The study takes an important first step in examining differences in mother-child play across cultures.

Sulkin, I., & Brodsky, W. (2015). Parental preferences to music stimuli of devices and playthings for babies, infants, and toddlers. *Psychology of Music, 43,* 307-320.

In this study, the researchers explore parental preferences for musical stimuli for their babies, infants, and toddlers. One of the authors created a new genre of music (referred to as Paralanguage Songs) that was based on pre-language sounds. The overarching study is comprised of three separate experiments. In the first, parents and their babies listened to three musical genres (classical, folk tunes, and paralanguage) in the waiting room before parents completed a survey indicating their music preference. The parents rated the paralanguage songs as their first choice. In study two, the experiment was replicated in the participants’ home environments. Here, parents preferred the paralanguage and classical songs equally; they were both rated higher than the folk tunes. In the third study, the participants engaged in a music movement sequence. There were no significant differences between the genres in this group, suggesting that mothers are indifferent to the music when they are cuddling with their child.
Each of the studies reflected different sample sizes. However, a total of 159 parents participated (91% of whom were mothers) and each of which had a baby between 1 – 18 months of age. All the participants were in the middle class SES bracket. Based on the results, the researchers suggest that parents are open to alternative music choices and are willing to invite new genres and music items into their babies’ lives.

Tamis-LeMonda, C. S., Baumwell, L., & Cristofaro, T. (2012). Parent–child conversations during play*. First Language, 32*, 413-438.

This study aimed to determine the ways in which mothers and fathers differentially communicate with, and subsequently impact language development for, their 2-year-old children. Using a sample of low-income mothers (*M* age=21) and fathers (*M* age=24), all of whom were taken from the Early Head Start study, the researchers explored how mothers and fathers differed on measures of communicative diversity, word types, and grammatical complexity, whether similar language environments across parents resulted in a language advantage for toddlers, and whether one parent compensated for the low language levels of the other or whether there was an additive effect. Results indicated that there were no significant differences between mothers and fathers in total

utterances, mean length of utterances, communicative diversity, and word types. However, fathers did use more action directions and were slightly more likely to ask their children to repeat words than mothers. Fathers were also more likely to use affirmations with their children (e.g., “Yes,” or “Good,”); in contrast, mothers were more likely to repeat back what their children said (likely to convey understanding). Finally, they also found that mothers’ mean length of utterances and fathers’ communicative diversity each predicted overall language for their toddlers. The researchers conclude that parents’ language to their children is cumulative rather than compensatory; that is, children who heard more language from both parents accrued more benefits.

Tamis-LeMonda, C. S., & Bornstein, M. H. (1989). Habituation and maternal encouragement of attention in infancy as predictors of toddler language, play, and representational competence. *Child Development, 60,* 738-751.

The purpose of this longitudinal study was to determine how infant habituation and maternal encouragement of attention at 5 months was associated with toddler’s language and play development at 13 months. The researchers also explored whether habituation could stand alone as an independent predictor of the dependent variables. Using a sample of 37 mothers and infants from middle- to upper-middle SES households, they observed behaviors at the 5 and 13-month time points. Results indicated that infants with greater levels of habituation tended to have more flexible language comprehension and exhibited more pretense play and advanced representational ability as toddlers. In addition, habituation was predictive of comprehension and play even after maternal encouragement was controlled. This study is unique for several reasons as it extends previous research on habituation and later language development and identifies associations between habituation and play development.

Tamis-LeMonda, C. S., & Bornstein, M. H. (1991). Individual variation, correspondence, stability, and change in mother and toddler play. *Infant Behavior and Development, 14,* 143-162.

The purpose of this study was to determine how mother and toddler play is impacted by individual and partner play factors. They followed toddlers and their mothers over a 7-month period, observing them engaged in play when the toddlers were 13 and 20 months old. They used a sample of 45 toddlers and all observations were videotaped home visits. Mothers and infants played together throughout the session, but were coded individually and as a dyad. Each session lasted 15 minutes. Results revealed

that toddlers displayed higher levels of play at 20 months than at 13 months; moreover, symbolic play increased significantly. For mothers, play stability was maintained by toddler activity levels as well as maternal affect and activity levels. The researchers also note moderate to strong concurrent associations in play sophistication between mothers and toddlers at the two time points. Changes in play were closely matched for both partners over time. In addition, findings suggest that developments in play for both partners were at least somewhat independent of partner activities. Researchers also found a moderately strong association between early play and later play activities for mothers; in other words, mothers appeared to maintain their play sophistication levels even if overall levels of play changed over time. In contrast, play at 13 months was not predictive of play at 20 months for toddlers.

Tamis-LeMonda, C. S., & Bornstein, M. H. (1994). Specificity in mother-toddler language-play relations across the second year. *Developmental Psychology, 30,* 283-292.

In this longitudinal study, the researchers aimed to determine the relationship between language and play for children at 13 and 20 months of age. They also examined the influence of maternal stimulation on toddler performance. To this end, they recruited 41 toddlers and their mothers in New York City. They conducted two home observations 7 months apart (one when the toddlers were 13 months and the other when the toddlers were 20 months old). At both visits, mother and toddler played together for 15 minutes. Information about toddlers' language was based on interviews with mothers and spontaneous toddler speech during play. Results indicated that toddler language does not predict play; however, certain aspects of it are associated with play. For example, language comprehension (but not production) was related to symbolic play for 13-month-olds. In contrast, semantic diversity in language was related to symbolic play for 20-month-olds. There also appeared to be specific association between mother and toddler language and play such that maternal language and play related to toddler language and play.

Tamis-LeMonda, C. S., Bornstein, M. H., Baumwell, L., & Melstein Damast, A. (1996). Responsive parenting in the second year: Specific influences on children's language and play. *Infant and Child Development, 5,* 173-183.

This study aimed to examine the impact of maternal responsiveness (defined as "the extent to which mothers attune to changes in children's interests and activities" p. 173) on child language and play at 13 and 20 months of age. The researchers followed two

longitudinal cohorts (mothers and infants) for 7 months. The first cohort consisted of 50 mothers and their children. The dyads were visited in their homes and observed in free play together for 15 minutes. Afterwards, mothers were interviewed about their toddlers' language development. The second cohort consisted of 40 mothers and their children, all of whom were also visited in their homes. In this study, children played alone for 10 minutes, during which time mothers could respond to their child's bid but did not actively engage with the child. After the 10 minutes had expired, mothers joined their children for 10 minutes of dyadic play using a new toy set. Results from both studies reveal that maternal responsiveness does predict language outcomes. Similarly, responsiveness to play predicted play outcomes. The authors note that maternal responsiveness can be categorized in terms of the target, content, and specific outcomes of the response. In addition, responsiveness with language was not related to responsiveness in play.

Tamis-LeMonda, C. S., Chen, L. A., & Bornstein, M. H. (1998). Mothers' knowledge about children's play and language development: Short-term stability and interrelations. *Developmental Psychology, 34,* 115-124.

The goals of this study were four-fold: 1) determine mother's knowledge about children's play and language development, 2) assess the 2-week stability of maternal knowledge in both areas, 3) examine if maternal knowledge about play is associated with knowledge about language, and 4) evaluate how maternal knowledge is influenced by their child's developmental stage. To explore these areas, the researchers recruited 64 mothers and their children, with ages ranging from 6 – 58 months. They visited the participants in their homes twice in two weeks. During both visits, mothers were asked to complete an 11-item play scale followed by an 11-item language scale. Results indicated that mothers are, in fact, knowledgeable about play and language development in children. In addition, this knowledge was maintained across the two testing periods. Mothers displayed more knowledge about language development than play development, although knowledge in one area was unrelated to the other. The researchers also note that mothers' developmental knowledge tended to depend on their children's current developmental stage; in other words, they were less likely to correctly indicate milestones that their child had reached several months earlier.

Tamis-LeMonda, C. S., Damast, A. M., & Bornstein, M. H. (1994). What do mothers know about the developmental nature of play*? Infant Behavior and Development, 17,* 341-345.

For this study, the authors created a measure that consisted of 24 play actions that ranged from concrete exploration to sophisticated symbolic play. They recruited 57 mothers and their 21-month-old toddlers in New York City. Mothers were presented with the scale and asked to rank the (randomized) items in order of least to most difficult for a child to perform. The researchers compared mothers' rankings to the order based on empirical research. Mothers' responses matched the empirical ordering for most of the items. The only exception was animate- vs. inanimate-directed pretense; that is, mothers considered play toward an inanimate object more difficult than play toward an animate object.

Tamis-LeMonda, C. S., Shannon, J. D., Cabrera, N. J., & Lamb, M. E. (2004). Fathers and mothers at play with their 2-and 3-year-olds: contributions to language and cognitive development. *Child Development, 75,* 1806-1820.

The goals of this longitudinal study were to determine how low-income resident fathers engaged with their children as compared to mothers and whether these differences remained after accounting for maternal engagement and demographic characteristics. The sample was drawn from 9 research sites for the National Early Head Start study. Although 290 fathers and their families met the criteria, only 111 had complete data. The researchers conducted separate home visits with mother-child and father-child dyads when the children were 24 and 36 months of age. Testers administered the Mental scale of the Bayley Scales of Infant Development (2nd edition) during the mother visits at both time points and the Peabody Picture Vocabulary Test (3rd edition) at the 36-month time point. Dyadic play was recorded for 10 minutes.

Descriptive statistics revealed that resident fathers in the study were more likely to be educated, employed, and married than nonresident fathers in the entire sample. Results also indicated that children experience similarly high or low levels of parenting from both mothers and fathers. Similarly, levels of sensitivity, positive regard, and cognitive stimulation from both parents predicted children's scores on both measures within and across time. The researchers also found that fathers affected their children's language and cognitive development through their play engagements, mothers' play engagements, and their education and income levels.

Teti, D.M., Bond, L.A., & Gibbs, E.D. (1988). Mothers, fathers, and siblings: A comparison of play styles and their influence upon infant cognitive level. *International Journal of Behavioral Development, 11,* 415-432.

This study compared how children visited at 12 and 18 months of age played differently with their parents vs. their older siblings (who ranged in age from 2-7 years). Children were filmed playing with their toys at home alone with their parents, and then subsequently alone with their sibling. Play sessions were scored for the types of experiences the parent or the sibling created for the infant—ranging from providing opportunities to learn about new features of toys and objects in the room to introducing new vocabulary words. Results revealed that regardless of the age at which children were visited (12 vs. 18 mos) parents generally engaged in more of these encouraging behaviors than older siblings did. Thus, during early childhood, parents provide the richest play environment compared to other children, specifically siblings.

Trawick-Smith, J. (1998). Why play training works: An integrated model for play intervention. *Journal of Research in Childhood Education, 12,* 117-129.

In this article, the author synthesizes play training models and creates a theory based on previous studies. He notes that the term “play training” is used to describe several play enrichment strategies used with preschool-age children. Although the methods vary, there are four common elements to them all: 1) adults engage with the children in make-believe activities for at least a portion of the play session, 2) adults serve as either make-believe characters or outside facilitators (do not serve an instructional role), 3) adults ask questions, make suggestions, or model behaviors to enrich play, and 4) adults gradually withdraw from play and encourage the children to continue without adult facilitation.

Trawick-Smith describes three theories of play training: 1) direct effects (which posits that children benefit simply from engaging with adults in some way), 2) play effects (suggests that symbolic play is most important in development), and 3) metaplay effects (which states that stepping out of the pretend role to talk about what is happening is just developmentally critical as the actual role playing). He then proposes an integrated model in which adult interactions influence children’s play, metaplay, and non-play and in which children’s resultant behavior subsequently influences adult interactions. The cycle then continues. In this theory, complex child and adult interactions are possible. The overarching goal would be to monitor and interpret the children’s behaviors so that all forms of play are ultimately enhanced.

Trawick-Smith, J. & Dziurgot, T. (2011). 'Good-fit' teacher-child play interactions and the subsequent autonomous play of preschool children. *Early Childhood Research Quarterly, 26,* 110-123.

In this study, preschool teachers and 3- to 4-year-old children were observed over the course of a week for 30 minutes. Children were coded for the amount of support they appeared to need in their play. Teachers were coded for demonstrating direct guidance (showing child exactly what to do), indirect guidance (demonstrating an action for the child to copy themselves), observation (watching the child play without saying anything), and not interacting at all (continuing to talk to another student or teacher in the room, not directing attention to child). Sequential analyses revealed that the closer the preschool teacher fit the child's needs (ranging from giving the child a lot of direction if they seemed confused; to just observing their play if the child appeared to be enjoying their play), the more children engaged in independent play directly after the teacher-child interaction occurred.

Venuti, P., De Falco, S., Esposito, G., & Bornstein, M. H. (2009). Mother–child play: children with Down syndrome and typical development. *American Journal on Intellectual and Developmental Disabilities, 114,* 274-288.

The purpose of this article was to assess how children with Down syndrome (DS) engage in solitary and collaborative play with their mothers compared to chronological-age-matched, typically developing (TD) children. To do so, the authors recruited 54 children and their mothers; 21 children had DS, while the remaining 33 were mental-age matched. All children engaged in 10 minutes of solitary play immediately followed by 10 minutes of collaborative play with their mothers. In both sessions, children were presented with a set of standard, age-appropriate toys that facilitated play that ranged from exploratory to symbolic. Results indicated the following: 1) TD children were more likely to engage in exploratory play than symbolic play; 2) DS and TD children showed the same amount of symbolic play; 3) when they played with their mothers, children with DS reached similar levels of exploratory play as TD children; 4) play stability across the solitary and collaborative conditions only held for symbolic play; 5) mothers of DS children elicit exploratory play less, but TD and DS mothers are the same with symbolic play; 6) mothers of both groups of children were able to attune and synchronize their play with their child. Overall, this study highlights the importance of mothers in child development, particularly for children with DS.

Venuti, P., De Falco, S., Giusti, Z., & Bornstein, M. H. (2008). Play and emotional availability in young children with Down syndrome*. Infant Mental Health Journal, 29,* 133-152.

In this study, the researchers aimed to explore the impact of the mother-child interaction and emotional availability on symbolic and exploratory play with children with Down syndrome (DS). They hypothesized that the mother's presence in an interactional context would enhance the quantity and quality of their child's play. They recruited a sample of 28 children with DS and their mothers and recorded two 10-minute play sessions during which participants were presented with standard, age-appropriate toys. The children played alone during the first session and with their mothers during the second. Play was scored using an 8-level coding scheme while emotional availability was measured using a scale that assessed sensitivity, structuring, non-intrusiveness, non-hostility, responsiveness, and involvement of mother. Results revealed that the mothers' presence greatly enhanced the children's play skills; more specifically, they found increases in child exploratory play. However, they did not find significant increases for symbolic play. Their hypothesis that dyadic interaction that is influenced by emotional involvement leads to enhanced cognitive functioning was also supported. Finally, the researchers discovered that children with DS are more likely to display sophisticated skills within high emotionally involved interactions. This study underscores the importance of emotional responsiveness in developing interventions for special needs children.

Vibbert, M., & Bornstein, M. H. (1989). Specific associations between domains of mother-child interaction and toddler referential language and pretense play. *Infant Behavior and Development, 12,* 163-184.

The goal of this study was to determine how social, didactic, and control domains of mother-toddler interactions impacted referential language and pretense play in toddlers. The researchers recruited 34 mothers and their 13-month-old toddlers. They conducted two home visits: the first lasted 70 minutes and was a naturalistic observational design; in the second visit, toddlers' language and play skills were assessed. Results revealed that didactic interactions significantly influenced toddlers' verbal skills; social interactions were not significant with play or language skills except when used in conjunction with didactic interactions; and control was associated with toddler language competence, but not play.

Wilcox-Herzog, A., & Kontos, S. (1998). The nature of teacher talk in early childhood classrooms and its relationship to children's play with objects and peers. *The Journal of Genetic Psychology, 159,* 30-44.

In this study, the researchers explored the relationship between the type of teacher talk in childcare settings and children's play with objects and peers. They recruited 89 children between 31-63 months of age through a university childcare center. The researchers observed the children during free-play time and visited each participating classroom between 6 – 16 times to conduct observation "sweeps," resulting in approximately 50 short observations per child. Primary measures for the study included teacher talk and child cognitive and social competence. Results revealed significant relationships in unanticipated directions. When teachers were within 3 feet of a child, they rarely talked to the children. Moreover, the children included in the study received high-level teacher talk less than 20% of the time despite this proximity. Regarding play, children played at lower levels with objects when teachers talked at higher levels. The researchers posit that this may reflect Vygotskian theory which emphasizes the importance of teacher talk that is geared to the needs of the specific child in any given circumstance. Results also indicated that teachers talked to younger children and to children with less language proficiency at higher levels, suggesting that teachers do adjust their speech with less competent children and that they are responsive to the specific child's needs.

The Empirical Study

From building a tower of blocks, to playing "house" with a doll, to sharing a game of checkers with a friend, children's play has been described historically as a "leading source of development" (Vygotsky, 1967, p. 6) and is implicated consistently as a crucial component of children's healthy cognitive and social growth (Bergen, 2002; Bornstein, 2007; Ginsburg, 2007; Scarlett, 2005; Trawick-Smith & Dziurgot, 2011). Essential skills of abstraction and symbolization are acquired through play (Vygotsky, 1967), and play during preschool is linked to later academic achievement (Wolfgang, Stannard, & Jones, 2001). Much of the time that children devote to play uses toys and other child-directed products (Glassy & Romano, 2003). Parents and other consumers spend substantial amounts on these items each year, with sales of toys and related children's products totaling $20.36 billion in 2016 (Toy Industry Association, 2017). The importance of understanding children's play with toys is clear, but little research has systematically investigated play with a large variety of toys in infants through school-age children. The aim of the current project is to determine how child age, type of toy, and toy age-appropriateness moderate child play.

Introduction

Play Behaviors throughout Childhood

Piaget (1962) long ago proposed three broad stages in the development of play—*sensorimotor play*, *symbolic play*, and *games with rules*, which are widely accepted as the standard progression of play complexity across childhood. *Sensorimotor play* lasts throughout infancy and early toddlerhood and entails manipulating objects for the purpose of exploration (e.g., mouthing, fingering, hitting, shaking objects). During the second year, children enter into *symbolic play*, or play that is more abstract in nature. During this imaginary play, a toy can represent a real-world object, and gestures can represent real-life actions. Symbolic play peaks in prevalence around 4 years of age, starting to decline after age 7 (Lillard, 2015). Between 7 to 12 years of age, children

begin to set their own a priori rules and regulations, and engage in *games with rules,* such as board games or basketball (Scarlett, 2005).

This traditional progression of play during childhood disregards the types of toys that children may play with in different age groups, particularly given the variety of toys available today. For example, it is difficult to categorize a 7-year-old spending hours with a bracelet-making kit into one of the three broad play stages noted by Piaget (1962). This child is engaging in a relatively complex act—carefully arranging the string, tying knots, changing colors to make a pattern—yet, it is challenging to classify this child's stage of play development. Hence, it is likely that children's play complexity at different ages is moderated by the category of toy with which they play.

Toy Categories

The Toy Association (2017) categorizes toys into the following groups when tabulating yearly sales data: Building, Vehicles, Games/Puzzles, Outdoor & Sports, Arts & Crafts, Dolls, Action Figures, Plush, Infant/Toddler/Preschool, and Other. An online search of toy retailers yields an astounding variety of options available in each of these categories for children over a range of ages.

Depending on the goal of the research, prior studies of play typically provide children with either (a) toys from one chosen category or (b) a standard set of toys from a variety of categories. For example, Corter and Jamieson (1977) gave 14- to 16-month-olds bug-shaped figurines with different degrees of movable parts. Similarly, Robinson and Jackson (1987) provided 4-year-olds with small wheeled vehicles with varying degrees of detail. Both studies aimed to measure which same-category toys were more appealing to children.

Other studies provide children with a variety of toys and observe how children play with them. One play scale used in numerous studies to trace the progression of pretend play from infancy to toddlerhood simultaneously provided participants with a tea set, doll, telephone, book, ball, blocks, nesting cups, and a vehicle (Bornstein, DiPietro,

Hahn, Painter, Haynes, Costigan, 2002; Bornstein, Selmi, Haynes, Painter, & Marx, 1999; Tamis-LeMonda & Bornstein, 1991). Another coding scheme measuring affect expression during play with elementary school children provided participants with two puppets and three blocks (Russ, 2014). When adapting this coding scheme for preschool-age children, the authors used different toys determined as "age-appropriate … easy for young children to manipulate and play with" (Kaugars & Russ, 2009, p. 741). The toys included stuffed animals, plastic animals, a car, and a rubber ball. Given our interest in determining how type of toy moderates children's play, the current study included nine categories of toys, presented one category at a time.

Age-appropriateness

It is likely that child play differs by both toy category and age. One method for teasing apart relations between toy category and child age in resulting play is to observe children when playing with an age-appropriate toy as well as toys appropriate for younger and older children from a single toy category. Doing so makes it possible to identify differences in the way children play with age-appropriate versus inappropriate (younger or older) toys.

Taking this design a step further, we conceptualized a matrix where the age of the child constitutes the columns, and rows represent categories of toys (see Appendix B, Table 1). As Kaugars and Russ (2009) alluded to when adapting a play scale for a different age group, age-appropriateness of toys is also relevant to how children play. Within each cell of this matrix, there is a multitude of toys appropriate for any given age group and toy category. We observed children's play with a toy from one cell of the matrix within their age column, one from the younger age column, and one from the older age column, holding toy category (now) constant. Doing so, we aimed to map how play behaviors differ by toy category and age, noting in particular the significant differences in play complexity that emerge when children play with toys that are less mature, more mature, or age appropriate for them.

The Current Study

An experimental design that systematically compares play with different toy categories across several ages in development would be unique. The current study filled this gap in the literature. Children aged 1–8 years played with toys from nine toy categories that were (a) young for their age group, (b) age appropriate, and (c) old for their age group. We hypothesized that children would be more likely to fully utilize age appropriate toys than those geared toward older children.

Regarding the contrast between age appropriate toys and toys geared toward younger children, we did not have a directional hypothesis. Considering only the motor and cognitive demands of toys, children of any age should be able to fully utilize toys meant for younger children. However, toys suitable to younger children may be less interesting than age-appropriate toys, and children may lose interest before they fully utilize them. This line of thinking yielded a research question of whether children playing with toys meant for younger children are equally, more, or less likely to fully utilize these toys than age-appropriate toys.

Method

Participants

Participants were 243 healthy, typically developing children, aged 1-8 years, grouped into the following four age brackets: 1-1.5 years (12-18 months), *n* = 60; 1.6-2 years (19-35 months), *n* = 61; 3-5 years (36-71 months) *n* = 62; and 6-8 years (72-107 months), *n* = 60. These age groups were chosen to conform to current safety guidelines for children's play with toys (e.g., children under 18 months cannot have long strings on their toys (ASTM Standard F963, 2017); children under 36 months are at-risk of choking on small parts (The Small Parts Regulation, 1979), as well as play progression throughout childhood (e.g., exploratory play is common through age 18 months, moving into pretense play through the toddler and preschool years, and then rule-based play around age 6; Lillard, 2015; Piaget, 1962. The children in the sample

were 49% female and 58% White, Non-Hispanic, 18% Mixed race, 9% African American, 8% Asian American, and 7% White, Hispanic. About half (48%) of children were first/only children in their families at the time of the study. Up to two children per family were allowed to participate in the study. All families lived in the greater Washington, DC, metropolitan area, and children came from largely intact (89% married) families with highly educated mothers (95% earned a bachelor's degree or higher).

Toy Selection

Toys were grouped in nine categories: (1) exploratory, (2) building, (3) games and puzzles, (4) instructional, (5) sports, recreational, and outdoor, (6) imaginative, (7) small vehicles, (8) arts and crafts, and (9) musical (see Appendix B, Table 1 for examples of each category by age group). These categories were developed based on prior research on toys, as well as common toy categories used by the marketing industry. These categories are very similar to those traditionally used by the Toy Industry Association (2017), except for three other categories of toys we identified in the marketplace through extensive research online and in toy catalogs: musical, instructional, and exploratory toys. These nine groups also span the standard sets of toys used in most studies on play. For example, the tea set (imaginative), doll (imaginative), telephone (instructional), book (instructional), ball (sports, recreational, and outdoor), blocks (building), nesting cups (games and puzzles), and vehicle (small vehicles) used by Bornstein and colleagues (1999) are encompassed in these categories.

Toys were chosen to represent classic as well as contemporary options from each category (e.g., the games & puzzles category included a standard 12-piece wooden puzzle and three-dimensional plastic puzzle maze). See Appendix B, Table 1. A matrix of child age group x toy category was then formed. In one exception, the exploratory toys category for the 6- to 8-year age group was excluded because it was determined that there were no age-appropriate toys for this age group in this category. The result

was a 35-cell matrix (9 categories x 4 age groups, minus 1 cell for 6- to 8- year exploratory toys).

Within each cell of this matrix, three toys were chosen to represent the expected age for which the toy would be appropriate. Each toy was rated on two, 6-point continuous Likert-type scales for both masculinity and femininity (35% double coded for reliability; masculinity ICC=.89, femininity ICC= .95). Ninety-five percent of toys were rated as having little masculine or feminine stereotyping. Extensive discussion and research (see below) resulted in the total selection of 105 toys (35 cells X 3 toys each). When possible, children in the youngest (1-1.5 years) and oldest (6-8 years) age groups were given toys that were appropriate for younger (6-12 months) and older (9-12 years) children, respectively. If no such toys were available (e.g., there were no appropriate arts and crafts toys for 6- to 12-month-olds, or small vehicles or imaginative play toys for 9- to 12-year-olds), one additional age-appropriate toy was substituted. These additional 25 toys for 6 to 12 months and 20 toys for 9 to 12 years were selected in the same manner as those above. After these additional toys were added to the matrix, the study included 150 toys.

Four developmental scientists chose the toys for each age group in each toy category based on (1) developmental theory, (2) children's motor, cognitive, and socioemotional capabilities in each age group, and (3) the toy manufacturers' suggested age. About 19% of toys were placed outside of their manufacturer's suggested age range because they were determined to be developmentally appropriate for another age. Of these, several (7%) were labeled by toy manufacturers as appropriate for 3 years or older, possibly because of potential for choking on small parts. As the primary focus of the study was developmental age-appropriateness, we gave greater consideration to children's abilities to manipulate and engage with the toy as intended than to safety risks.

Planned Missing Data Design

Because young children have a limited attention span (even for toys), and we wanted to test a large number of diverse toys, we employed a three-form planned missing data design (Graham, Taylor, Olchowski, & Cumsille, 2006; Little & Rhemtulla, 2013) that limited the number of toy categories tested with each child. In this design, data are collected in four blocks (X, A, B, and C), and each participant is assigned one of three forms (XAB, XAC, or XBC). The X block is collected from all participants, and two of the three A, B, and C blocks are collected across a portion of participants in a counterbalanced fashion. Mothers of all participants completed demographic information and questionnaires (see below), which became the X block (see Little & Rhemtulla, 2013). In this study, the toy categories were grouped into three blocks of three (A = building, instructional, and imaginative, B = exploratory, sports, and musical, and C = games and puzzles, small vehicles, arts and crafts). Each child was randomly assigned two of the three toy blocks (AB, AC, or BC), and therefore each child was tested on six of the nine toy categories. Planned missing data were handled using multiple imputation. More details follow in the Preliminary Analyses and Analytic Plan.

Procedure

Families learned about the study through mailings, flyers posted on community boards, and snowball recruiting (i.e., participants told other members of their community about the study). Before visiting the laboratory, mothers completed a packet of questionnaires about demographic information, the child's temperament, motor skills, and language development. When families arrived, two experimenters spent time with the parent and child in a waiting area until they were comfortable. Once all parties were ready to begin, the experimenters lead the dyad into a laboratory play room outfitted with a low table and chair (with one exception: the table was removed for 1- to 1.5-year-olds). Toys were presented at this table (or on the floor for 1- to 1.5-year-olds), but children were told that they could play anywhere in the 248-square foot room. Play was audio and video recorded through one-way glass and a ceiling camera.

Children older than 1.5 years played by themselves with one category of toy at a time from each of the six toy categories (either the AB, AC, or BC toy blocks) they were assigned. During this child solitary play session, the mother sat nearby, refrained from interacting with the child, and completed questionnaires. Children aged 1 to 1.5 years old were permitted to play with their mother during the play session. This difference in methods was enacted because (a) at this age, it is difficult to have mothers stay uninvolved in play but still reassuringly close by and (b) it is rare for 1- to 1.5-year-olds to play without adult participation in naturalistic settings.

For each of the six toy categories within the two toy blocks, children were given a 5-min trial to play with three toys: one from the age group just younger than their age, one from their own age group, and one from the age group just older than their age. For example, in the building category, a 30-month-old child was given one building toy that was assigned to the 1- to 1.5-year-old age group, one that was assigned to the 1.6- to 2-year-old age group, and one that was assigned to the 3- to 5-year age group. One min before the end of the trial, the experimenter gave the child a verbal warning that this set of toys would be removed and another set presented. This procedure was repeated for six toy sets. The toys were counterbalanced within categories so that any set of three toys in a given category was presented the same number of times throughout data collection (e.g., plain wood blocks were not always presented with the plastic interlocking bricks). The order of presentation of each of the six toy categories was also randomized across participants (e.g., an equal number of children received sports toys as their first trial, an equal number received games and puzzles as their second trial).

Behavioral Coding

The aim of this research was to categorize toys by the appropriate age group for the child, based on the formal properties of the toys and the affordances that children are able to use. As such, we were particularly interested in whether children were able to use the toys *as intended* during their play at the session.

Intended use of toys. For each toy, researchers composed three statements: (1) behaviors indicating that the child "fully utilized" the toy as intended, (2) behaviors that "partially utilized" the toy, and (3) behaviors that "did not utilize" the toy. For example, when playing with a puzzle with knobs, fully utilizing would necessitate putting the piece back in the correct well; partially utilizing would involve attempting to put the piece back in the well, but failing; and not utilizing would entail picking up a piece of the puzzle and throwing it like a ball. In total, there were 450 use-of-toy statements (3 statements for 150 toys). Each toy statement was formulated to be able to be achievable in approximately 1 to 2 min.

To ensure that toy intended use statements were complete and accurate, two independent coders assessed each of the 450 statements on a scale of 1-6 (1 = *inaccurate*, 6 = *accurate*). Coders agreed that toy descriptions were accurate (a score of 5 or 6) on 431 (96%) of the statements. The remaining 19 (4%) statements received a score of 3 or 4 by one or both coders, and these toy descriptions were revisited and amended to achieve 100% agreement.

Utilization of toy. Children's play with each of the three toys was rated as either fully utilizing (2), partially utilizing (1), or not utilizing (0). Coders also noted if the child did not play with the toy for more than 5 s. Two independent coders were first trained to reliability on 8% of the sample, then double-coded an additional 14% of the sample, evenly distributed across the four age groups. Reliability cases were checked periodically throughout behavioral coding. Reliability in categorizing level of utilization was good, Cohen's κ=.81.

Because we were primarily interested in whether the child could fully utilize the toy, we recoded the utilization of toy code to either fully utilized (1) or not fully utilized (0; this category included children who were previously coded as partially utilizing and not utilizing). We also made a variable to indicate whether the child played with the toy (1) or did not play with the toy (0) so that we could limit analyses to children who played with the toys.

Covariates

To supplement behavioral coding, we collected information from parents through surveys and interviews to gather a more comprehensive picture of the child's characteristics that could affect their utilization of the toys. In addition to family demographics, parents completed the following questionnaires.

Temperament. Parents of 1- to 2-year-old children filled out the Early Childhood Behavior Questionnaire—Very Short Form (ECBQ-VSF; Putnam, Jacobs, Gartstein, & Rothbart, 2010), and parents of 3- to 8-year-old children filled out the Children's Behavior Questionnaire—Very Short Form (CBQ-VSF; Putnam & Rothbart, 2006). Both temperament questionnaires assess three elements of temperament: Surgency (activity level, shyness), Negative Affect (fear, anger), and Effortful Control (inhibitory control, attention focusing). Items are rated on a 7-point array, and each scale is computed as the average of the 12 items that make up the scale. The three factors of temperament measured by the ECBQ and CBQ have satisfactory internal consistency and criterion validity for children in the age range of our sample (Putnam et al., 2010; Putnam & Rothbart, 2006). Cronbach's alphas in our sample exceeded .70 for all scales (except negative affectivity on the ECBQ, which had an $\alpha = .55$).

Motor skills and communication level. Parents completed two portions of the Vineland Adaptive Behavior Scales—Second Edition (VABS-II) Parent/Caregiver Rating Form (Sparrow, Cicchetti, & Balla, 2005), yielding two domains—communication skills and motor skills. Each domain has high internal consistency, test-retest reliability, and convergent validity (Sparrow et al., 2005). The VABS is approved for use for ages 0 to 90 years, and as such, provides age-standardized scores. Standardized scores were calculated for each participant based on reference groups surveyed during development of the measure (Sparrow et al., 2005).

Familiarity with toy. At the end of the testing session, all the toys the child played with were presented again to parents to report on whether (1) or not (0) their child had previously played with that particular toy before their toy play session.

Preliminary Analyses and Analytic Plan

All missing data (i.e., both planned and unplanned missing data) were multiply imputed using the R (R Core Team, 2017) package PcAux (Lang, Little, & PcAux Development Team, 2017). The PcAux package implements the methods of Howard, Rhemtulla, and Little (2015) to create principled multiple imputations via sequential regression imputation that uses principal components regression (PCR) as the elementary imputation method. Because of the large proportion of missing information in our planned missing data design, 100 datasets were imputed using PCR (Graham, Olchowski, & Gilreath, 2007). Detailed discussions of the algorithms implemented by PcAux is beyond the scope of this manuscript; interested readers are referred to Enders (2010), Little, Jorgensen, Lang, and Moore (2014), and Lang and Little (2016) for reviews of multiple imputation (MI) and its relative strengths, to Van Buuren (2012) and Van Buuren, Brand, Goothuis-Oudshoorn, and Rubin (2006) for further information about the sequential regression approach for MI, and Hastie, Tibshirani, and Friedman (2009) for an introduction to PCR.

In all analyses that follow, we considered maternal education and child gender, temperament (negativity, surgency, effortful control), communication and motor skills, and familiarity with the toy as potential covariates. However, none of these variables had significant or practically important relations with fully utilizing the toys, r_{pooled} (11,827) = -.01 to .07, *p*s = .450 to .000, so we did not control these variables in the analyses below.

For the main analyses, the multiply imputed dataset was exported from R into SPSS 24 (IBM, 2016). First, we explored the proportions of children who played with toys appropriate to younger children, children their age, or older children, by age group and toy category. Then, we excluded toys that were not played with and assessed whether children were more likely to fully utilize toys that were age appropriate versus appropriate to younger and older children. We computed a Toy Category (9) x Age Group (4) x Age-appropriateness (3) generalized linear model with logit link function.

Within-subject variance was accounted for by modeling each participant's toy trials as a repeated effect. Because some sibling pairs participated in the study and they may have similar toy experiences at home, we also included a repeated effect for family to account for within-family variance. Significant interactions were exposed by exploring age-appropriateness effects within toy categories and age groups. SPSS reports statistics that pool across multiply imputed datasets for most statistical analyses, but pooled statistics are not available for Wald's tests in generalized linear models. Hence, we report the range of those statistics across imputations.

Results

Playing with the Toys

Appendix B, Table 2 shows the proportions of toys in younger, age appropriate, and older categories that were played with for 5 s or more by child age group and toy category. Overall, children played with nearly two-thirds of the toys. With a few exceptions, children played with at least half of the toys in each category.

Fully Utilizing the Toys

After excluding toys that were not manipulated for at least 5 s, the 9 Toy category X 4 Age group X 3 Age-appropriateness generalized linear model revealed a significant 3-way interaction, Wald χ^2s(42) = 303.48 – 765.72, *p*s < .001, as well as significant 2-way interactions between toy category and age-appropriateness, Wald χ^2s(16) = 96.63 – 229.88, *p*s < .001, and age group and age-appropriateness, Wald χ^2s(6) = 78.91 – 206.76, *p*s < .001, in each of the 100 imputed datasets. Hence, we computed separate generalized linear models for each toy category and age group to assess the contrasts between older vs. age appropriate toys and younger vs. age appropriate toys. Proportions of toys that were fully utilized by age group and toy category appear in Appendix B, Table 3, and pooled unstandardized regression coefficients and standard errors are presented in Appendix B, Table 4.

Utilizing age appropriate toys vs. older toys. We hypothesized that children would utilize age appropriate toys significantly more than those that are geared towards older children. Aggregating across all age groups, children were more likely to fully utilize age appropriate toys than toys appropriate for older children in every toy category except imaginative and musical toys (last column in Appendix B, Table 3). When aggregating across all toy categories, children were more likely to fully utilize age appropriate toys than toys appropriate for older children in every age group except the 1- to 1.5-year-olds (last row in Appendix B, Table 3). However, these effects were moderated by age group and toy category.

Individual cells of the matrix in Appendix B, Table 3 indicate that the pattern of relations differed by age group and toy category. Children were significantly more likely to utilize age-appropriate toys than toys meant for older children for only 8 out of 32 individual contrasts (otherwise, there were no differences in level of utilization between age-appropriate and older toys). Within age groups, there were no differences in the likelihood of fully utilizing age-appropriate and older building, imaginative, small vehicle, or musical toys. However, 1- to 1.5-year-old children were more likely to fully utilize age-appropriate exploratory toys than those appropriate to older children; 1.6- to 2-year-olds were more likely to fully utilize age-appropriate games and puzzles and instructional toys than those appropriate to older children; 3- to 5-year-old children were more likely to fully utilize instructional and arts and crafts toys than those for older children; and 6- to 8-year-old children were more likely to fully utilize age-appropriate games and puzzles, instructional, and sports, recreational, and outdoor toys than those appropriate to older children. Overall, our hypothesis was partially supported.

Utilizing age appropriate toys vs. younger toys. We inquired whether children would be more, equally, or less likely to utilize toys that are too young for them. Collapsing across both toy category (last row in Appendix B, Table 3) and age group (last column in Appendix B, Table 3), there was never a significant difference in the proportions of children who utilized an age appropriate toy than a younger toy. In other

words, collapsing across toy category and age group, children were just as likely to fully utilize toys for younger children as age-appropriate toys (See Appendix C for figures).

When disaggregating age groups and toy category and looking at the individual cells inside of the matrix of Appendix B, Table 3, the pattern of age appropriate = younger utilization held for 26 out of the 34 contrasts (76%). The pattern was particularly consistent for the imaginative, small vehicles, and musical toy categories, as it held within all of the contrasts in these categories regardless of age group.

Out of the eight contrasts that showed a difference in utilization between age appropriate and younger toys, four indicated that children were more likely to fully utilize younger toys than age-appropriate ones, and four indicated that children were less likely to fully utilize younger toys than age-appropriate ones. Specifically, 1- to 1.5-year-old children were more likely to fully utilize age-appropriate exploratory, building, and instructional toys than those appropriate to younger children, but they were more likely to fully utilize sports, recreational, and outdoor toys appropriate to younger children than their own age group; 1.6- to 2-year-old children were less likely to fully utilize age-appropriate exploratory toys than younger toys, yet they were more likely to fully utilize age-appropriate games and puzzles than those appropriate to younger children; and 6- to 8-year-old children were less likely to fully utilize age appropriate instructional and arts and craft toys than those appropriate to younger children.

Discussion

Our study systematically investigated how children play with nine types of age-appropriate and inappropriate toys from infancy into the school-age years. Previous research has never before fully investigated how children play with a standardized set of toys across so many categories and so many age groups. Contrary to universal developmental progressions previously proposed by Piaget (1962) and Vygotsky (1967), children's play appears to depend on the child's age and the category of toy the child plays with.

There was partial support for our main hypothesis that children would fully utilize age-appropriate toys more than toys appropriate for older children. When collapsing across age groups and toy categories, age-appropriate toys were more likely to be fully utilized than toys appropriate for older children. For example, 2-year-olds had difficulty completing games and puzzles appropriate for 3- to 5-year-olds. However, this effect was also moderated by age group and toy category, indicating that the developmental level of the child and the types of toys engaged influence the child's ability to fully utilize a toy. For example, in three toy categories – imaginative, small vehicles, and musical– age-appropriateness of the toy had no bearing on the likelihood of children in any age group fully utilizing the toy. As another example, for the youngest age group (1 to 1.5 years), there was no difference in the likelihood of fully utilizing toys that were age appropriate and appropriate for older children (except for exploratory toys).

The study results suggest that play is not a purely developmental phenomenon that unfolds in the child independent of the types of toys children play with as Piaget (1962) and Vygotsky (1967) proposed. Although children are more likely to fully utilize toys that are age appropriate rather than appropriate to older children, when aggregating across age groups, child play appeared to be moderated by the toys played with. Some categories of toys, like imaginative ones, are equally likely to be fully utilized, regardless of their age-appropriateness or child age. Perhaps fully utilizing imaginative toys is related more to individual differences in pretense abilities or preference for pretense play than age-appropriateness per se. Other toy categories, like instructional toys, had relatively strong age-appropriateness effects across age groups. Instructional toys likely have the highest cognitive requirements of all toy categories, which may limit abilities of children of a given age to fully utilize instructional toys that are appropriate for older children.

Regarding how children would utilize toys that were meant for younger children, aggregate data indicated no differences in the level of utilization between age-appropriate and younger toys. One difference in this general trend emerged among the 1- to 1.5-year-olds, where exploratory, building, and instructional toys appropriate for

younger (6- to 11-month-old) children were less likely to be fully utilized than age-appropriate toys. Perhaps more rudimentary younger toys are less appealing and quickly abandoned for more age-appropriate toys in this age group, particularly if the mother playing with her child in this age group steered her child away from toys she may have detected as too babyish for her child. It is also possible that children in this age group were especially good at using age-appropriate toys in the exploratory, building, and instructional categories because those toys have features that are especially attractive to this age group, such as sound potential and moving parts (Corter & Jamieson, 1977), when compared to the 6- to 11-month-old toys.

Children's play with various types of toys across development is important from scholarly and theoretical perspectives, as well as to parents, toy manufacturers, and government stakeholders, such as the U.S. Consumer Product Safety Commission (CPSC). Before testing is performed to identify potential safety hazards to children, CPSC staff first determine the appropriate ages of potential users. For example, toys intended for children younger than 3 years of age must meet the testing requirements under The Small Parts Regulation (1979), which essentially bans toys with small parts that pose a choking hazard. Playing with toys that are too young for oneself generally holds few safety consequences because toys intended for younger children are subject to strict safety regulations. The more important finding is that in most cases children are able to fully utilize toys that are aimed at the age group above them at the same rate as an age-appropriate toy, particularly within imaginative toys, small vehicles, and musical toys. Whereas the proportion of children who fully utilized older toys was never *greater than* that for age-appropriate toys, the proportions of children who fully utilized the age-appropriate and older toys were similar in 75% of the cases. Even though a doll with accessories is rated for children ages 3+, children 1.6 to 2 years of age still play with the toy and are able to use it as intended.

Limitations and Future Directions

Although this study is one of the first to comprehensively assess play across a wide age range of children with a large variety of contemporary toys, there are some limitations. Because we used three toys to represent each toy category in each age group, and children received only six of the nine toy categories, there was a high proportion of missing information. However, using a planned missing data design with principal components regression and 100 imputed datasets, the relative efficiency of the parameter estimates was always greater than 99%, suggesting that the number of imputations was sufficient. Planned missing designs are controlled to ensure that the data are missing completely at random (MCAR), and MCAR data are very well recovered with multiple imputation (Graham et al., 2006; Little & Rhemtulla, 2013). Children could not be presented with all the toys in the study, but our method allowed inclusion of 150 toys in nine categories. Another limitation of the study is the relatively high socioeconomic status (SES) of the families. Children varied in age and ethnicity, but they were recruited from the Washington, DC, metropolitan area, which has a high average level of education. Studies of children in lower-SES families may yield different results regarding the age-appropriateness of toys. In addition, children in the study did not have a lot of time to play with each toy, even though we accommodated time limitations by making sure utilization statements could be completed in less than 5 min. Finally, the 1- to 1.5-year-olds were the only age group to play with a parent. Hence, it is possible that parents moderated the toy interactions, allowing this age group to play similarly with toys that were age appropriate and geared toward older children.

Future research should continue to examine the age-appropriateness of toys given to children. We gave children toys that were meant for the age group *just* above them. Our research suggested that in many cases, children were just as capable of utilizing toys that were meant for children an age group older as they were an age-appropriate toy. It is possible that starker contrasts would appear when children play with toys that are two or more age groupings above them. Future research could investigate this

possibility within the framework of Vygotsky's zone of proximal development (1978), particularly how parents may help children fully utilize toys that are very difficult to use.

In addition, future research should operationalize the qualities of the toys themselves (e.g., sound potential, moving parts) and analyze relations between these features and children's toy utilization or the amount of time children spend with the toys. It is possible that certain age groups of children are particularly drawn to noisemaking toys, or toys that have many pieces, and as such, are more likely to utilize them. Toys have unique qualities that may lend themselves to different degrees of utilization, and their features should be studied further.

We next plan to explore pretense that emerges with each different toy category by age group. By coding levels of exploratory play and pretense in each age group for each toy category, we will be able to map peaks among age groups and which categories of toys foster pretense.

Conclusion

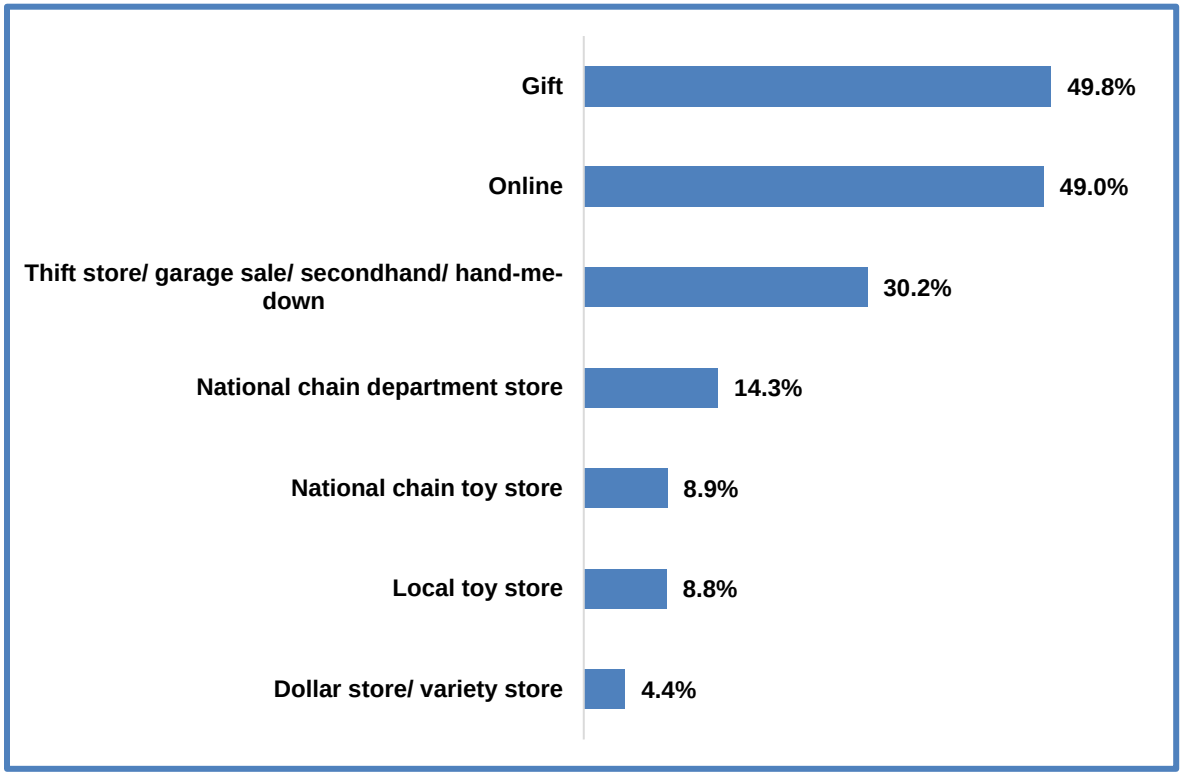
Toys are ubiquitous in the lives of children, and clear information about how child age and toy category affect children's play is sorely needed for parents, researchers, toy manufacturers, and safety regulators. This study is the first to demonstrate that children often play with and can fully use toys that are meant for both older and younger children and that child play is heavily dependent on the toy category. Our results advance scholarly knowledge and contribute to the health, safety, and development of children.

Parent Toy Questionnaire

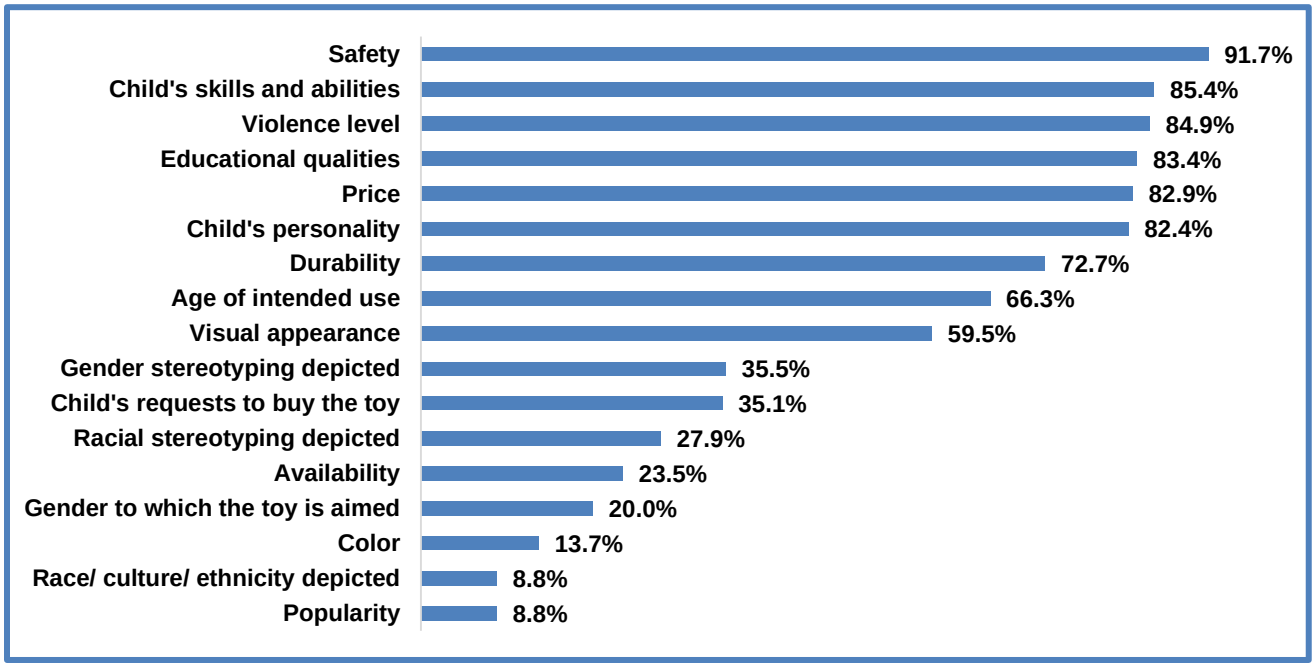
During their visit to NICHD, parents filled out a survey to indicate their thoughts about their children's toys. Their responses are below.

Parent Behaviors for Obtaining Toys and Information

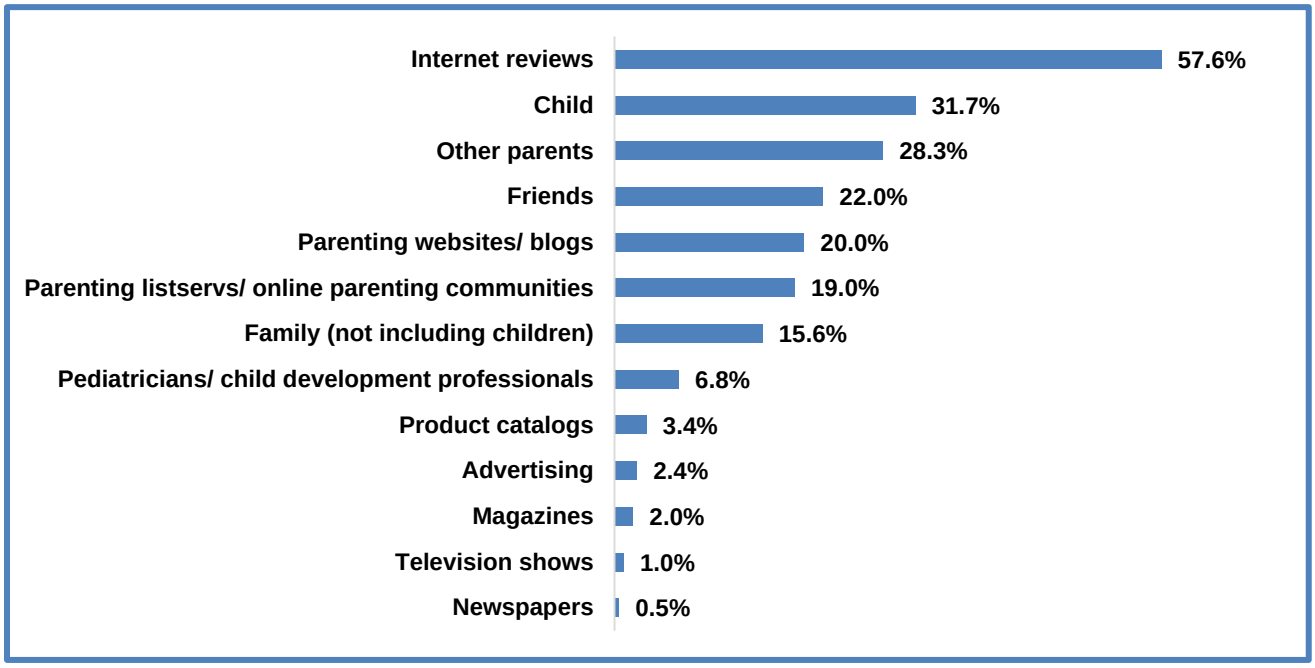
Percentages of parents who reported they obtain toys for their child from the following places "often or always"



Percentages of parents who consider the following factors "often or always" before choosing toys for their child



Percentages of parents who gather information about toys from the following sources "often or always"



Free response: What types of information do you wish you routinely had available to you when making decisions about which toys to provide to your child? Percentage of parents reporting them are below:

- ✓ What will the toy teach my child or what development goals will it help my child reach? How educational is it? (27.3%)
- ✓ Is the toy safe? Does it have small parts or is it made of toxic materials? Are there any CPSC recalls or complaints? (25.6%)
- ✓ How durable is the toy? (20.3%)
- ✓ How do other parents review the toy? (19.2%)
- ✓ Can the toy keep my child interested for more than a day? Will they get bored with it shortly? Can the toy scale up or grow with my child? (17.4%)
- ✓ What is the appropriate age for the toy and why? Is it for safety, interest, or to indicate developmental skill level? (16.9%)
- ✓ Which retailer has the lowest price for the toy? (7.6%)
- ✓ Is my child going to find the toy fun? Do other children their age like the toy? (7.6%)
- ✓ How many batteries or refills are needed, and how frequently will they have to be replaced? (5.8%)

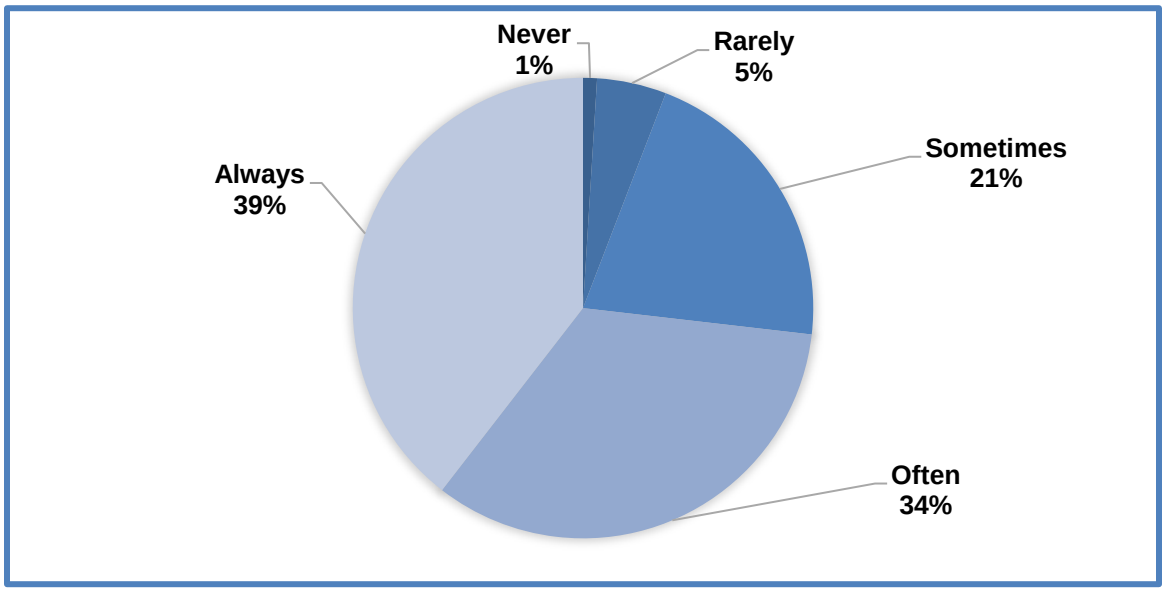
Summary

When we examine where children get their toys, gifts, online, and secondhand sources are most prevalent. Fewer parents obtain toys from traditional brick-and-mortar stores often or always. Safety, the child's skill level, violence, educational level, price, the child's personality, and durability are the most common items parents consider when purchasing toys.

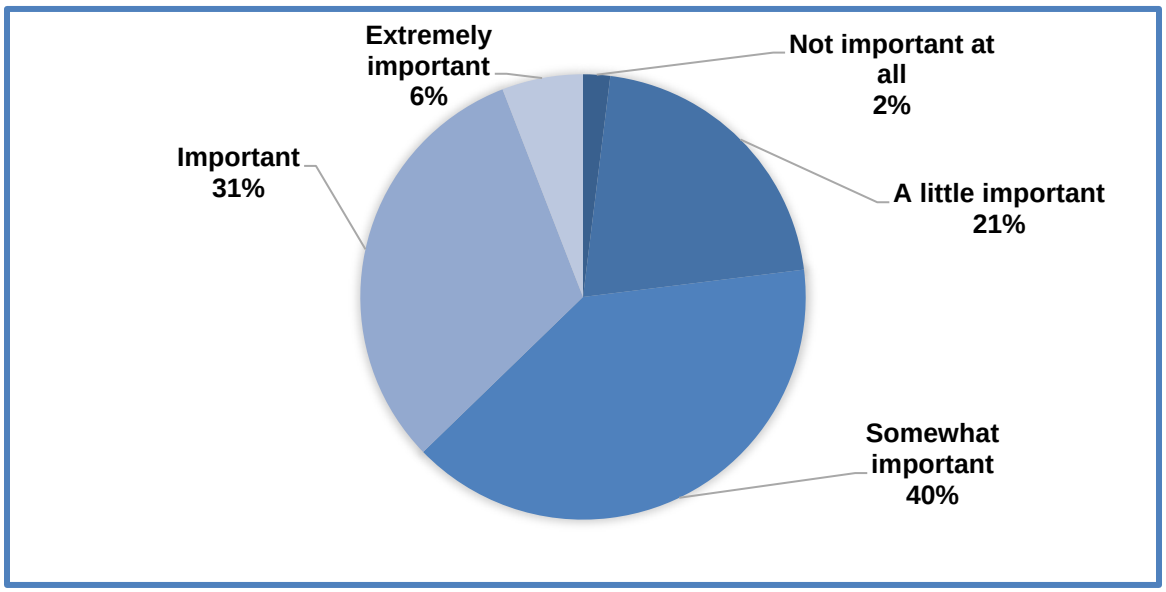
Parents often rely on internet reviews, knowledge of their child's abilities, and other parents' suggestions when gathering information about toys. Yet, they still wish that they had more information available to them when purchasing toys. Parents want to know why the age was recommended for the toy, what other parents think of the toy, and whether or not the toy will grow with their child as the child develops new skills.

Parent Opinions on Manufacturers' Suggested Age

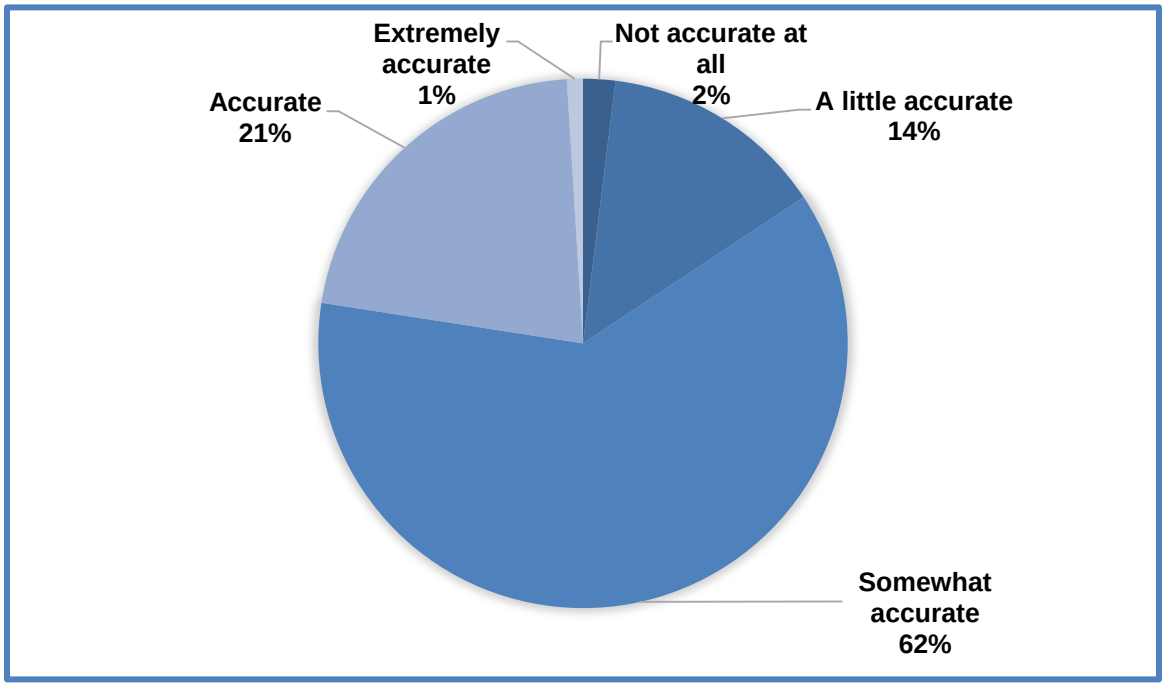
Do you read the manufacturers' suggested age printed on the labels of toys?



How important is the manufacturers' suggested age labeled on toys?



How accurate is the manufacturers' suggested age labeled on toys?



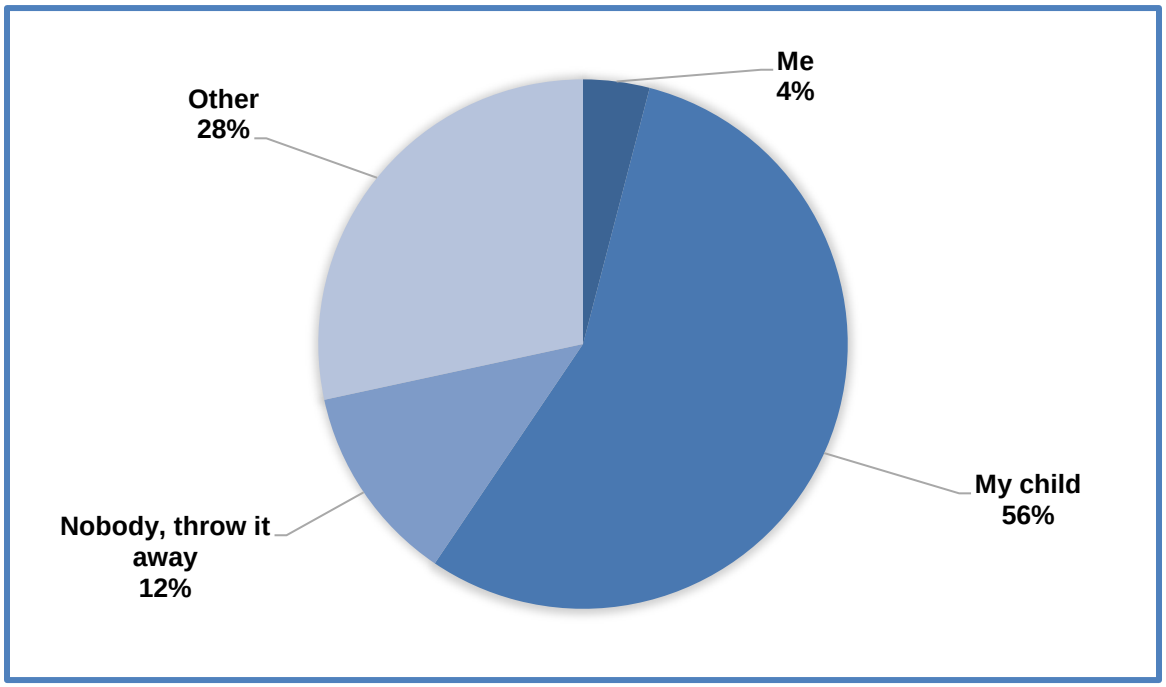
Summary

A majority of parents (73%) "always" or "often" read the manufacturers' suggested age on toys, but only some parents (37%) view the suggested age as "important" or "extremely important". Most parents (62%) consider the suggested age as only "somewhat accurate", and only 22% of parents consider the age accurate or extremely accurate.

Parent Experience with Candy Filled Toys

- **43.1%** of parents think that the presence of candy affects whether their child is attracted to the toy
- **36.1%** of parents have bought a candy filled toy
- **9.9%** of parents have bought a toy that has candy pieces inside of it without being aware of it

If you have bought a candy filled toy, who eats the candy inside the toy?



Summary

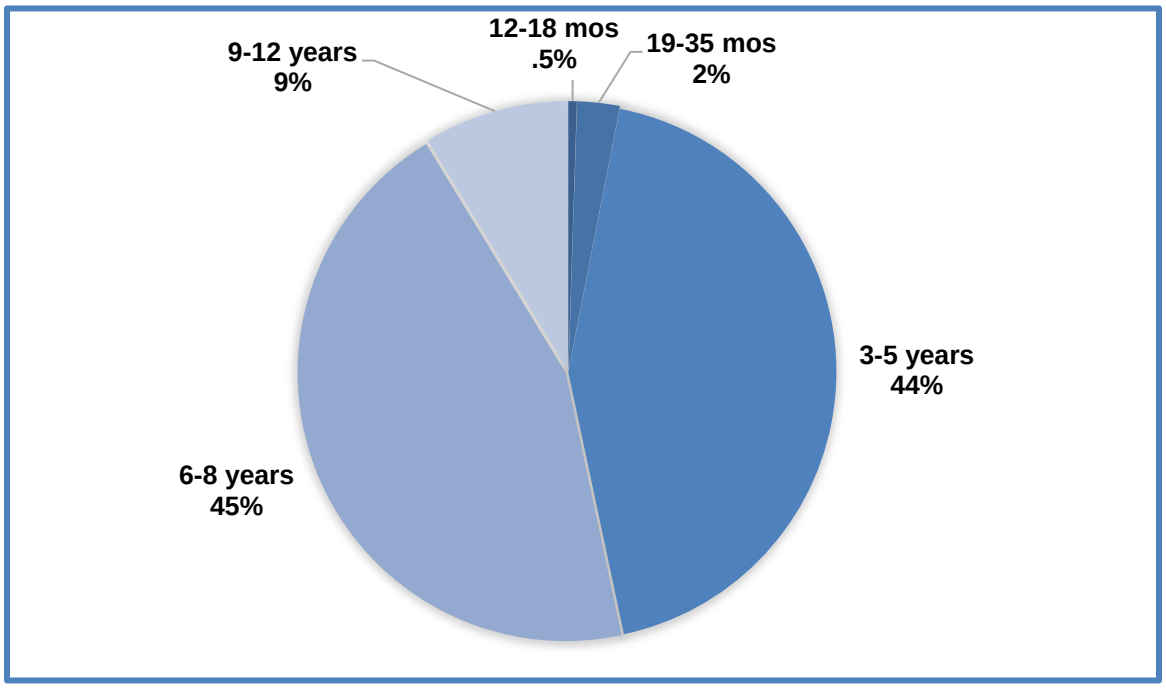
A minority of parents have bought a candy filled toy (36.1%) and even fewer (9.9%) bought the candy filled toy without knowing about the candy. In most cases, the child is the person who eats the candy (56%). Some parents (43.1%) believe the candy makes the toy more attractive to their child.

Parent Judgement of Appropriate Age of Toys

Experimenters showed parents six additional toys. Parents were asked for what age they would most likely purchase the toy. Parents could also freely respond to why they chose that age group. Their answers are summarized below.

Chocolate Egg with Plastic Figurine

A hollow chocolate egg wrapped in foil with licensed characters on it. On the inside of the thin chocolate shell is a small hard plastic toy figurine.

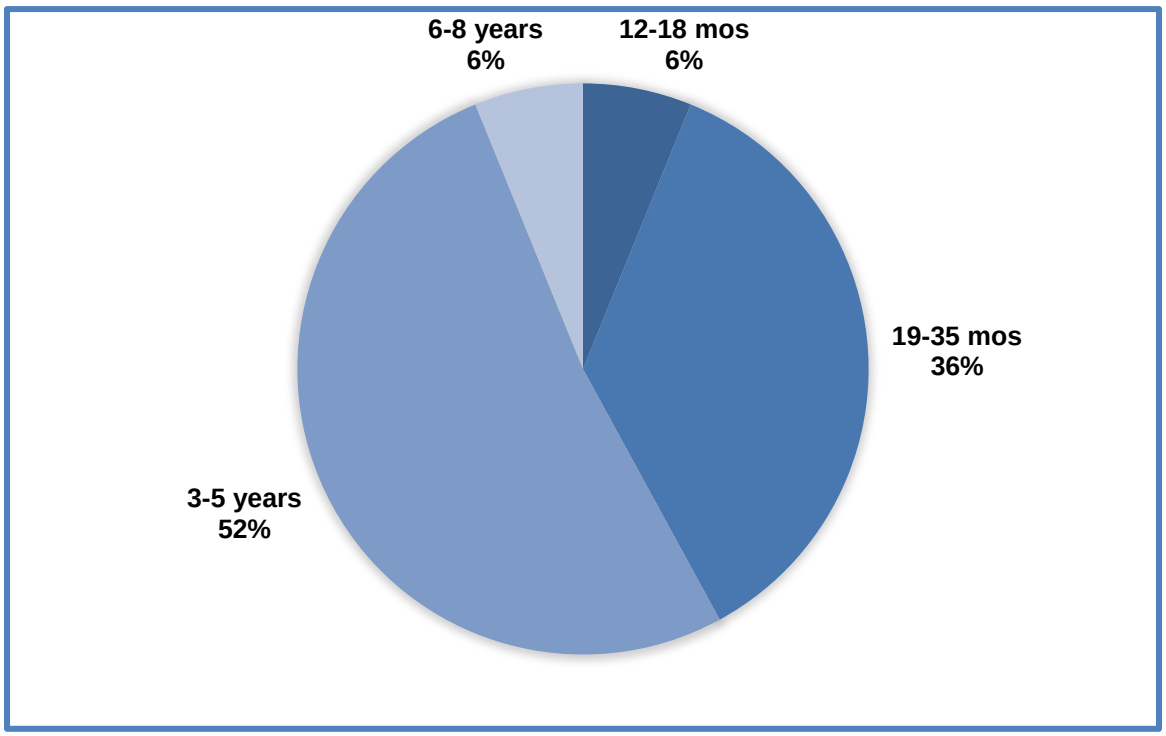


Free response: Why did you choose that age grouping?

- ✓ The toy inside the candy is a choking hazard (65.1%)
- ✓ The candy is not good for the child's nutrition (34.4%)
- ✓ Based on personal experience, children at this age would like the toy (21.0%)
- ✓ The toy would be too boring/ babyish for children at any older age (5.6%)
- ✓ The candy itself is a choking hazard (5.1%)

Motorized Ride-On Toy

An motorized ride-on toy with a button on the handlebar to activate the engine and propel the child forward.

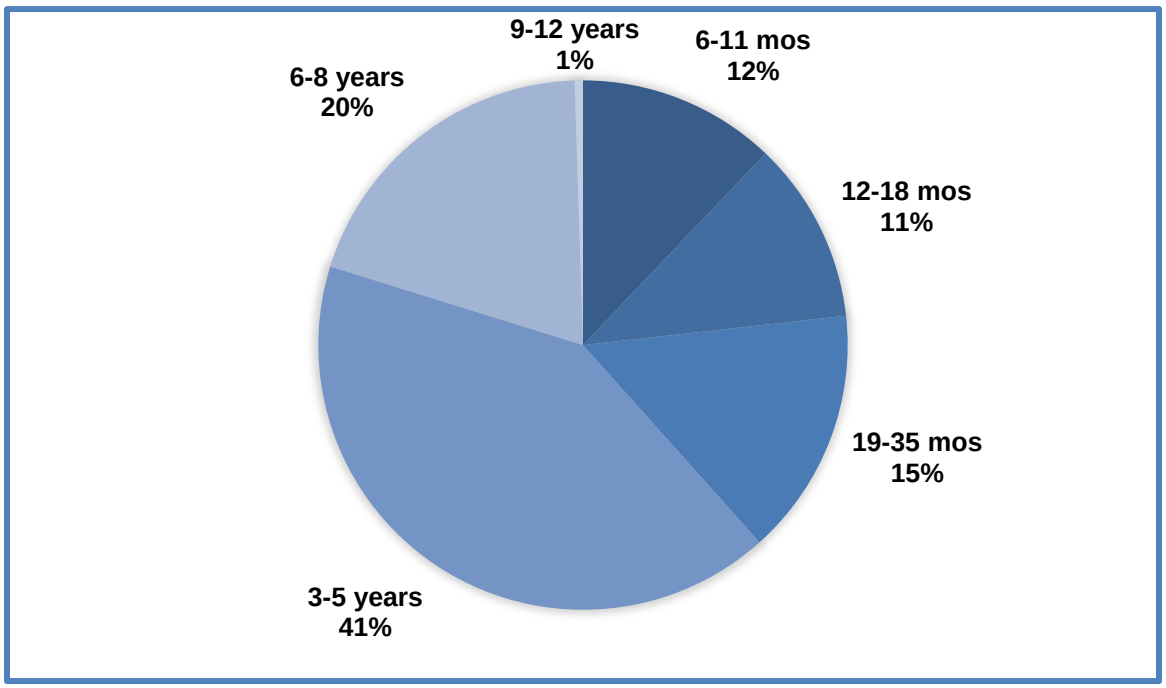


Free response: Why did you choose that age grouping?

- ✓ The toy is physically too small to hold a child of any older age (36.1%)
- ✓ At this age the child will have the gross motor skills needed to play with the toy (20.6%)
- ✓ At this age the child will have the fine motor skills needed to play with the toy (18.6%)
- ✓ The motorized component of toy is unsafe any younger (17.0%)
- ✓ Based on personal experience, children at this age would like the toy (15.5%)

Plastic Rattle

Pastel rattle made from brittle plastic with a clear chamber on top. Chamber is filled with very small multicolored pastel balls on the inside that make noise when shaken.

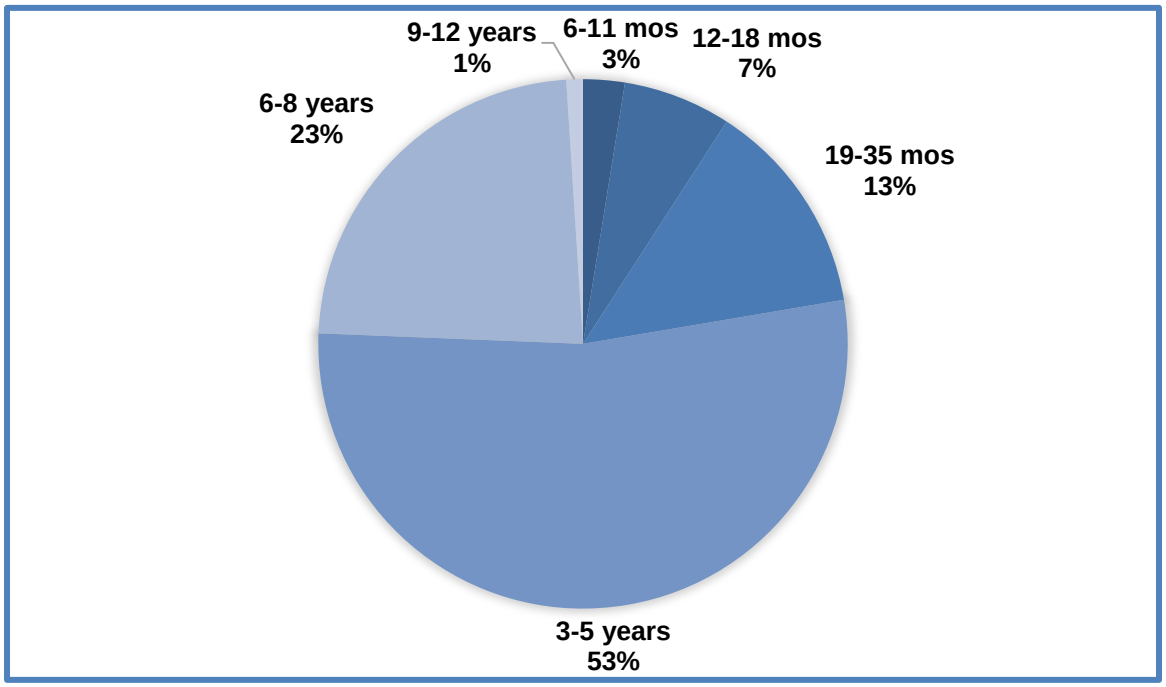


Free response: Why did you choose that age grouping?

- ✓ The toy is a choking hazard (63.8%)
- ✓ The toy could be used for pretend play, and children at this age like to pretend play (34.3%)
- ✓ The toy would be too boring/ babyish for children at any older age (15.0%)
- ✓ It looks like toy is not durable and would break (10.1%)
- ✓ At this age the child will have the fine motor skills needed to play with the toy (6.8%)

Plastic Pacifier

Clear pastel pacifier made out of hard, clear plastic.

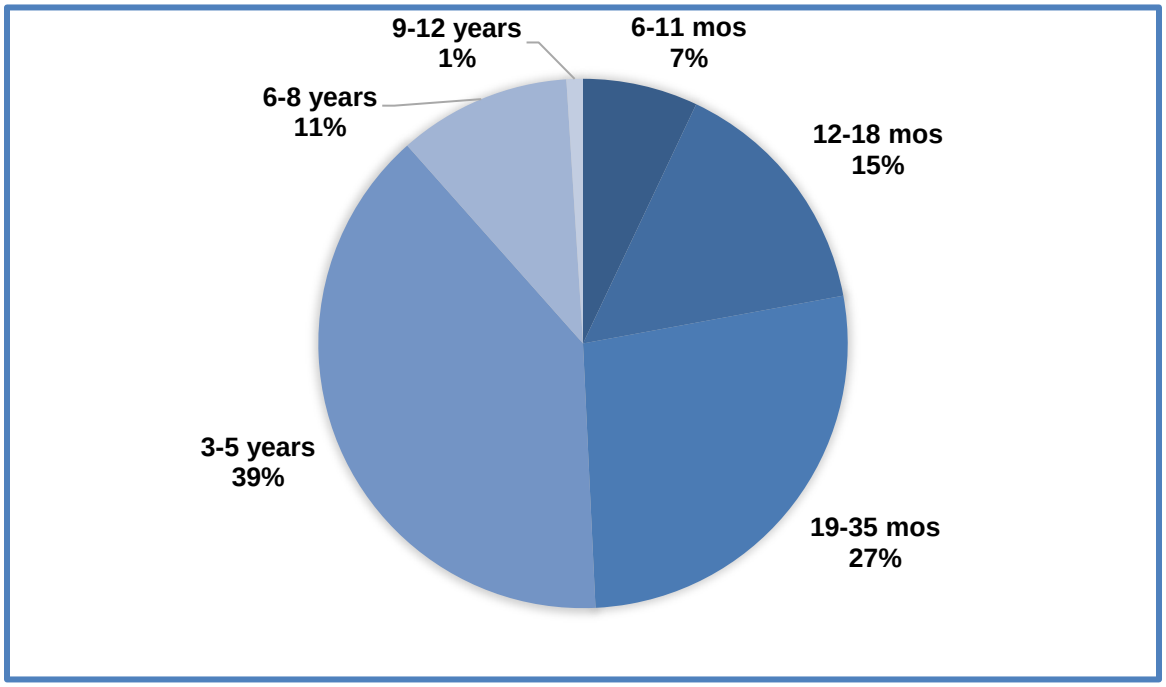


Free response: Why did you choose that age grouping?

- ✓ The toy is a choking hazard (66.3%)
- ✓ The toy could be used for pretend play, and children at this age like to pretend play (36.2%)
- ✓ The toy would be too boring/ babyish for children at any older age (14.1%)
- ✓ At this age the child will have the fine motor skills needed to play with the toy (6.0%)
- ✓ It looks like toy is not durable and would break (5.5%)

Rattle Drum

Bright blue circular drum attached to a stick. An animal is illustrated on one face of the drum. On each side of the drum, a string with a circular pink bead is attached. If the stick is twisted between the user's hands, the beads swing and hit the drum to make noise.

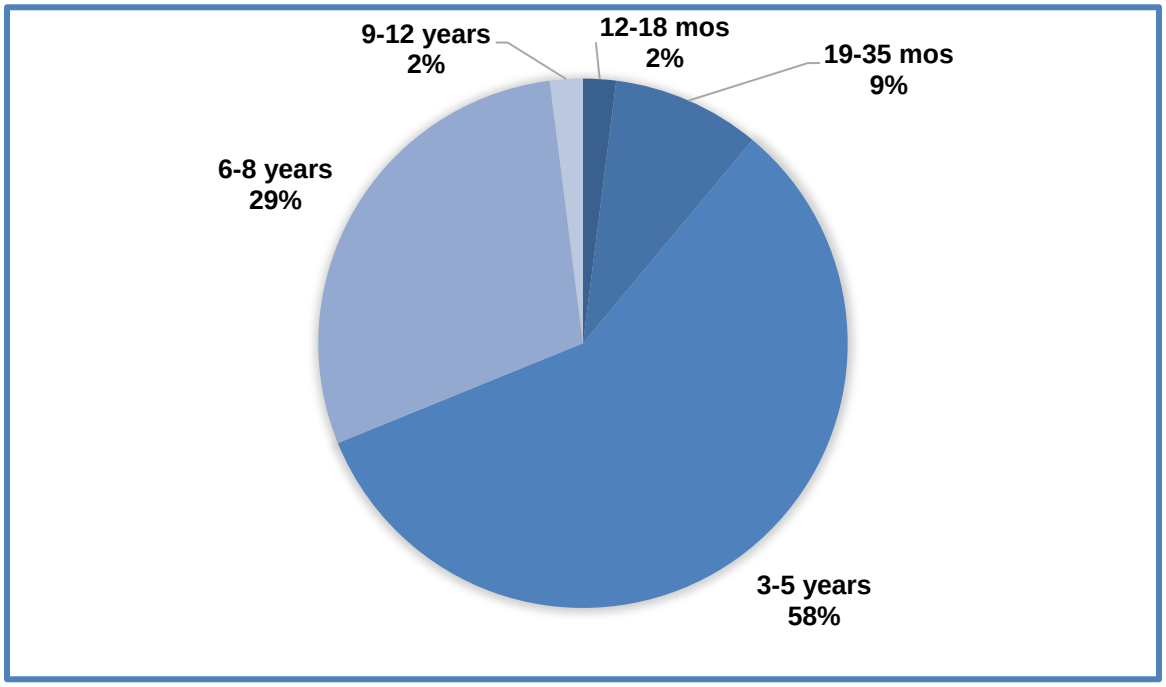


Free response: Why did you choose that age grouping?

- ✓ At this age the child will have the fine motor skills needed to play with the toy (44.2%)
- ✓ Children at this age would probably find the toy entertaining (35.2%)
- ✓ The toy is a choking hazard (29.6%)
- ✓ Based on personal experience, children at this age would like the toy (10.1%)
- ✓ At this age the child will have the cognitive skills needed to play with the toy (9.5%)
- ✓ The toy would be too boring/ babyish for children at any older age (9.0%)

Pull Back Car with Candy

Yellow car with an animal head in the front seat “driving” the car. The hood of the car is made out of clear plastic and is filled with candy beans. There is a pull string at the back of the car that will propel the car forward very quickly when it is released.



Free response: Why did you choose that age grouping?

- ✓ The candy itself is a choking hazard (50.8%)
- ✓ The candy is not good for the child's nutrition (36.7%)
- ✓ At this age the child will have the fine motor skills needed to play with the toy (26.1%)
- ✓ Children at this age would probably find the toy entertaining (12.1%)
- ✓ The toy would be too boring/ babyish for children at any older age (9.0%)
- ✓ Candy should not be mixed with toys (5.0%)
- ✓ At this age the child will have the cognitive skills needed to play with the toy (5.0%)

Tabulated Data

Introduction

The following pages present individualized descriptive information for each toy in the empirical study. Each toy has a brief description of its packaging, materials, and other unique features. Toys were also rated for various qualities using a Likert-type 6-point rating scale to provide a more in-depth portrayal of each item. Next, information about how children actually played with each toy by age grouping in the study is graphed. Finally, we suggest the appropriate age for the toy based on the data collected during the project.

Packaging, Materials, and Unique Features

Toys were categorized as having the following characteristics. For each subheading, only "YES" responses are included so that the tabulation is easier to navigate.

"Packaging" included the following possible options:

- Developmental information written on package
- Cartoon illustrations on package
- Real photos on package
- Picture of child on package that is different than suggested age
- Statement about the toy indicating it is a party favor
- Cardboard box
- Cellophane/ plastic bag
- Cardboard backing with plastic
- Cardboard tag
- Cardboard with plastic window
- Cardboard with open front where toy can be touched

"Materials" included the following possible options:

- Hard plastic
- Soft plastic/ vinyl/ rubber/ elastic/ silicone/ clay/ pliable metal or wire/ inflated plastic
- Fabric/ canvas/ nylon/ carpet/ mesh/ string/ rope (note: faux hair, plastic brushes, and feathers are included in this category)
- Wood
- Hard Styrofoam
- Hard metal (non-pliable)
- Ceramic/ glass/ mirror/ stone
- Soft foam/ sponge
- Paper/ sticker paper/ cardboard
- Wax/ graphite/ chalk
- Jelly/ paint/ glue/ ink
- Water/ liquid
- Sand/ powder (includes glitter)

"Other Features" included the following possible options:

- Is any part of the toy battery operated?
- Does the toy produce light?
- Does the object produce noise in response to manipulation? If so, is it music, animal noise, a human voice, synthesized noise, or operational noise (e.g., crinkling of infant toy, squeaker)?
- Does the toy have a mirror?
- Does the toy feature a licensed character?
- Does the toy have a face? If so, is it two- or three-dimensional?

For “Responsiveness”, toys are categorized as either “No response”, “Some response”, or “Immediate response”.

Qualities of Toys

Toys were rated on a Likert-type scale of 1-6 for qualities such as the level of fine and gross motor skills needed to work the toy, the level of realism in the toy, and the colorfulness of the toy. See Appendix D for detailed instructions with photographic reference points used by raters.

Behavioral Coding

Researchers coded video footage from the play sessions and categorized each child as either playing or not playing with a toy. For children who played with the toy, their behaviors were categorized as either “fully utilizing”, “partially utilizing” or “not utilizing” each toy. Each graph in the tabulation pages below includes a key that details utilization of each toy. For detailed information about coding, see pages 79-81 of this research report.

Interpreting Graphs and Recommended Age Grouping

Based on the study data, the NICHD staff selected one of the study age groups as the most appropriate for each toy[1]. It should be noted that there can be no single percent cutoff to render any individual toy age appropriate. Children’s ability to fully utilize a toy varies by category, unique affordances of a toy, child age and other individual differences, and so forth. Our method for choosing the age appropriate group for an individual toy is necessarily flexible, but guided by the following steps:

Step 1: Determine which age group had the highest cumulative score of fully and partially utilizing.[2]

Step 2: Compared to the age group below, determine whether the cumulative score is similar (e.g., within 5%).

a) If yes, then the younger age group is the appropriate age group.

b) If no (OR if there is no younger age group), then the group with the highest cumulative score is the recommended age.

Step 3: Any particularly difficult-to-judge cases are discussed by two researchers who jointly determine a final age.

Revision of Guidelines based on Study Data

When determining appropriate *Guidelines* revisions based on study data, NICHD staff first determined if the toy was already clearly mentioned in the existing *Guidelines*. If the toy was already listed in the *Guidelines*, staff members confirmed that it was documented in the age bracket that was supported by the study results. If the age bracket differed, the toy was moved to a more appropriate age group that was supported by the study data. Any qualitative information that staff had about that toy use during study sessions was also added to supplement the toy's existing listing in the *Guidelines*.

If a toy was not already classified in the *Guidelines*, NICHD staff incorporated it into an appropriate subcategory and placed it under the age group that the study data suggested. Qualitative information, when appropriate, was also provided as a supplement to the new *Guidelines* listing.

Footnotes

[1] Some toys were not included in the study for age determination reasons. This included toys aimed at 6-11-month-olds that were included as a comparison to see how 12-18-month-olds played with toys aimed at younger children, as well as toys aimed at 9-12-year-olds that were included as a comparison to examine how 6-8- year-olds played with toys aimed at older children. As such, we have no evidence to make an age determination or address the updated *Guidelines* on these particular toys because only one age group of children played with toy. However, qualitative information about how children in the study played with each of these toys is included in the following toy tabulation tables.

[2]We interpret "partially utilized" in our results and combine it with the percent of children who "fully utilized" a toy. From a child development perspective, Vygotsky (1967) noted that play is a crucial vehicle for learning new skills and tasks and moving from one developmental stage to

another. A vital part of development is to give children objects that may challenge them but allow an opportunity to move to a higher level of functioning during play. As such, we view children who are partially utilizing a toy as still using it in a way that is appropriate.

From a psychometric perspective, it is acceptable and standard procedure to operationalize abstract concepts by creating continua on which to rate phenomena. As DeVellis (2016, p. 130) noted in his work on scale development, theoretical variables "require a respondent to reconstruct, interpret, judge, compare, or evaluate less accessible information…. one item may not capture the complexity of the phenomenon of interest." One clear example of a 3-point scale is in use in one of the survey measures used in the study, the Vineland Adaptive Behavior Scale (Sparrow, Cicetti, & Balla, 2005), that measures children's attainment of developmental milestones. Children's scores on this survey consider behaviors the child has partially mastered.

For these conceptual, developmental, and statistical reasons, we decided that partially utilizing a toy should be considered when making determinations about age appropriateness for individual toys.

Tabulation Pages

Toy #1: Baby Keys

Brief Toy Description	Three large "keys" on black and white keychain. Connected to yellow fob with purple and green buttons.
Packaging	Cartoon illustrations on package, cardboard tag
Materials	Hard plastic
	Silicone
Other Features	Produces sound (operational noise)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

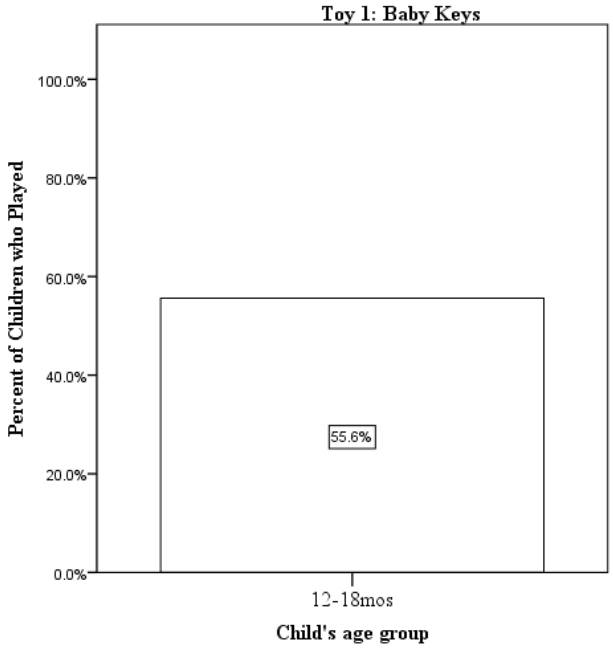
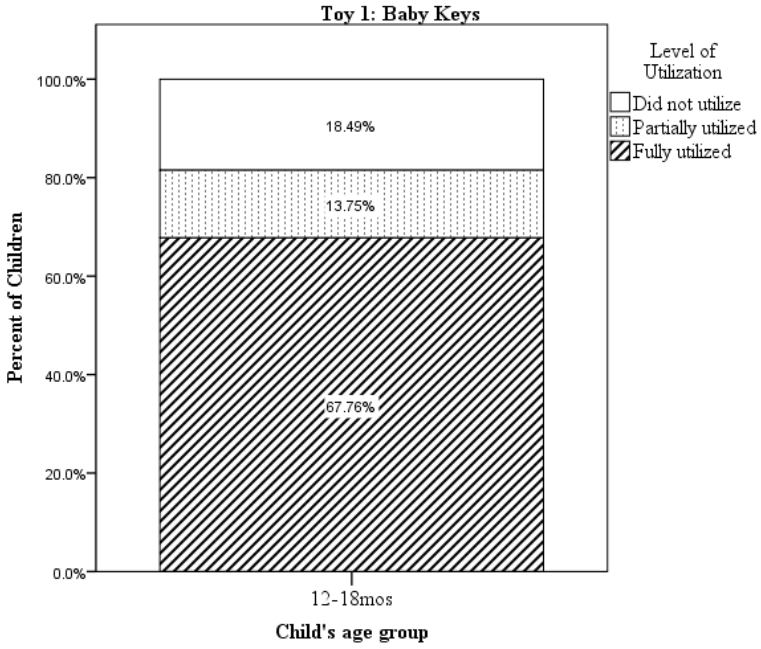


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or sits on toy
- *Partially utilizing:* Mouthing, touching, or patting keys
- *Fully utilizing:* Shakes keys or presses buttons on keys

Age Determination:

Manufacturer's suggested age	3 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Most children (67.78%) fully utilized this toy. An additional 13.75% of children partially utilized the toy. Only 18.49% of children did not utilize the toy.
Justification for recommended age group	When 12-18-month-olds play with this toy, they still seem interested enough to play with it and use it to the fullest extent possible. Even into this older age range, children still like to rattle the keys and press the buttons on the fob.

Toy #2: Rattle and Ring Manipulative

Brief Toy Description	Yellow and teal handle with clear plastic ball in the middle that contains small rattling balls inside. Blue and purple rings also on handle.
Packaging	Cartoon illustrations on package, real photos on package, cardboard tag, multilingual phrases
Materials	Hard plastic
Other Features	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

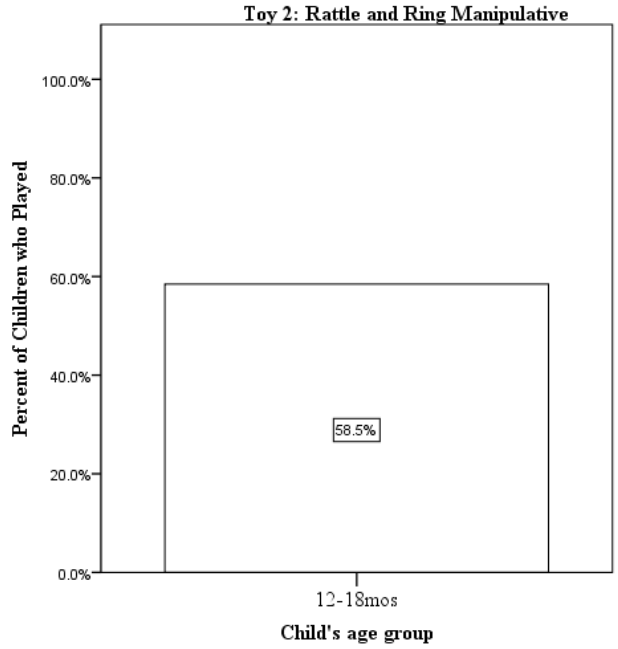
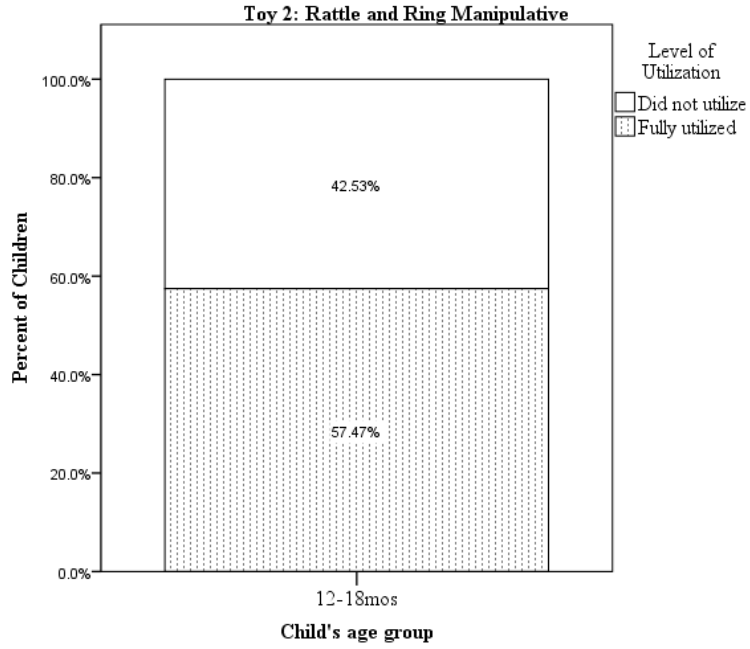


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or sits on toy
- *Partially utilizing:* Mouthing, touching, or patting rattle
- *Fully utilizing:* Uses hands to spin part(s) of toy OR shakes the toy to make noise as a rattle

Age Determination:

Manufacturer's suggested age	3 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Most children (57.47%) fully utilized this toy. An additional 42.53% of children did not utilize the toy.
Justification for recommended age group	When 12-18-month-olds play with this toy, they still seem interested enough to play with it and use it to the fullest extent possible. Even into this older age range, children still enjoy shaking it so that it makes rattling noises.

Toy #3: Soft Manipulative Cube

Brief Toy Description	Medium-sized soft cube in bright colors and black and white stripes with pictures of small, soft objects on each side.
Packaging	Developmental information written on package, real photos on package, cardboard box, multilingual phrases
Materials	Hard plastic
	Fabric
Other Features	Produces sound (operational noise)
	Includes mirror
	Includes a face (two-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

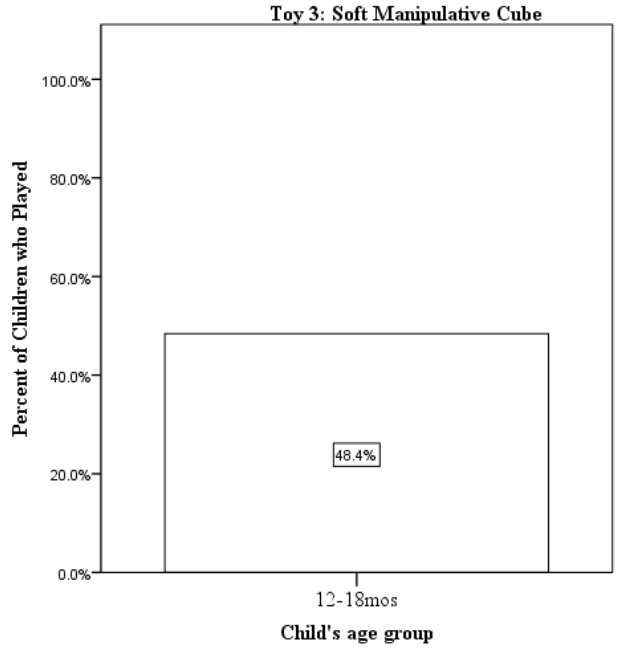
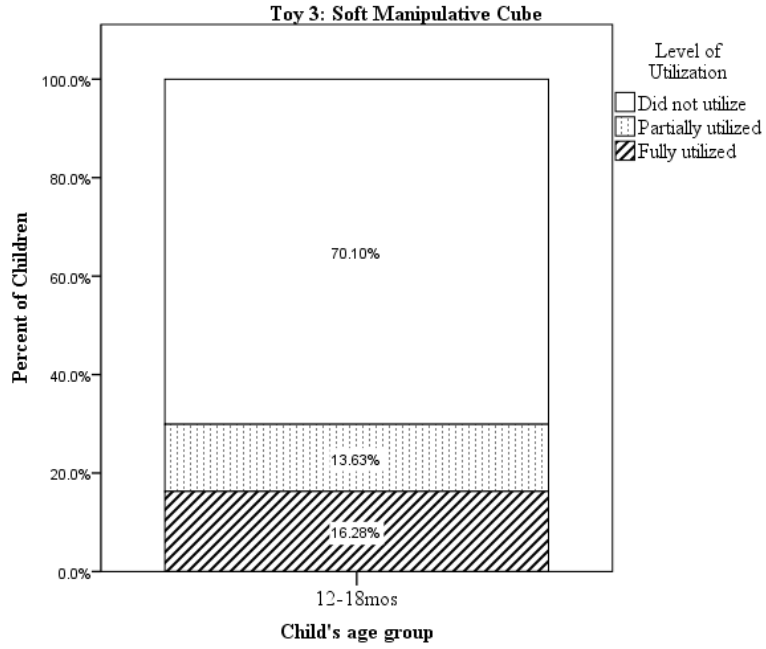


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws toy around the room
- *Partially utilizing:* Uses one side of cube
- *Fully utilizing:* Pulls or feels or opens parts of toy, must use at least 2 sides (top of cube DOES count as a side

Age Determination:

Manufacturer's suggested age	3 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (16.28%) fully utilized this toy. An additional 13.63% of children partially utilized the toy. Most children (70.10%) did not utilize the toy.
Justification for recommended age group	Given the ease of using the sides of this cube, it is unlikely that the large number of children who did not utilize the toy did so because the toy was too challenging for them. Rather, it is possible that this toy lacked the immediate cause and effect affordances that 12-18-month-olds find appealing. They may have been too bored with this toy to explore the sides in the same way that an infant would in the first year of life.

Toy #4: Soft Cube Blocks

Brief Toy Description	Six medium soft cube shaped blocks (blue, orange, purple, yellow, red, green).
Packaging	Cellophane/ plastic bag
Materials	Vinyl
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

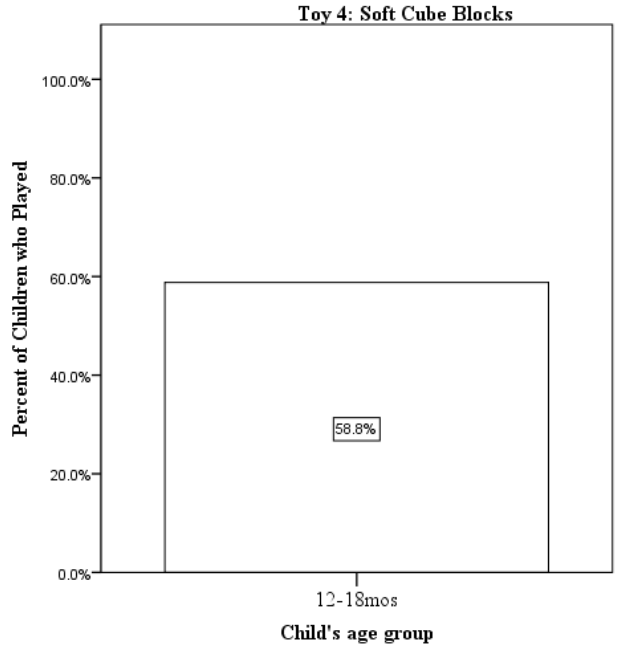
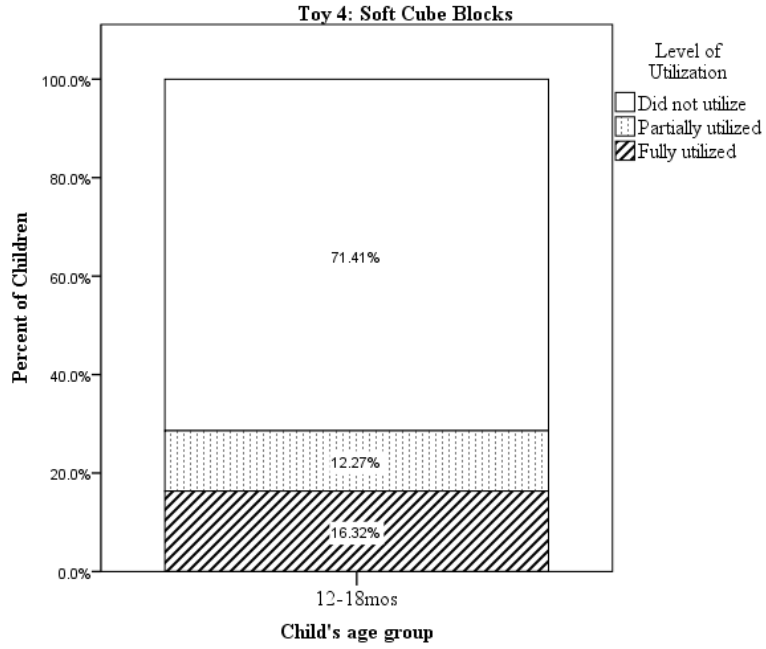


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws blocks or carry them around
- *Partially utilizing:* Attempts to stack or line up blocks but child fails
- *Fully utilizing:* Stacks blocks or lines them up

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (16.32%) fully utilized this toy. An additional 12.27% of children partially utilized the toy. Most children (71.41%) did not utilize the toy.
Justification for recommended age group	At 12-18 months, our data on other block sets (e.g., Toy #28 Large Foam Blocks) demonstrates that children at this age can stack and line up blocks at higher rates than demonstrated with this toy. The lack of children's stacking and lining up of these particular blocks is likely due to their uniform shape (other block sets have rectangles, arches, cubes, etc.) and children try to arrange these other shapes in a systematic way. In addition, these cube blocks are soft and more rounded, and it is possible that considered them as manipulative or ball toy (of sorts) that they could carry, throw, or squeeze instead.

Toy #5: Connecting Suction Cup Rattles

Brief Toy Description	Three suction cup rattling objects (pink, teal, neon green). Can be stuck together or to other objects.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package
Materials	Silicone
Other Features	Produces sound (operational noise)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

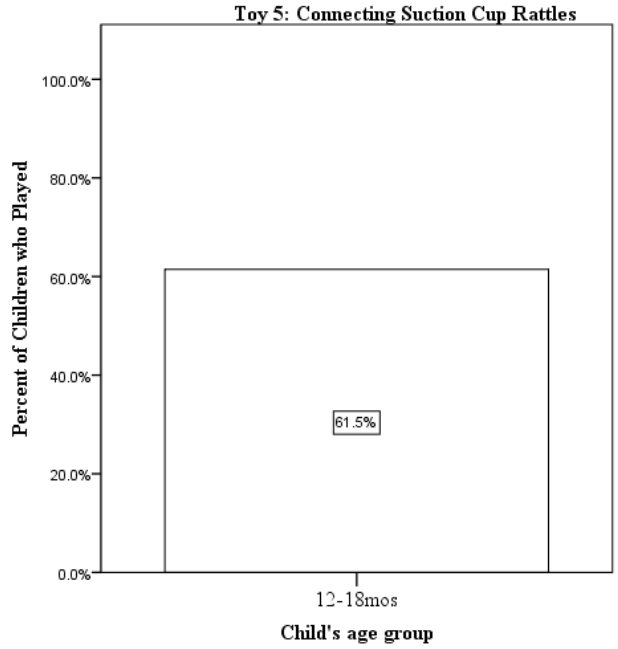
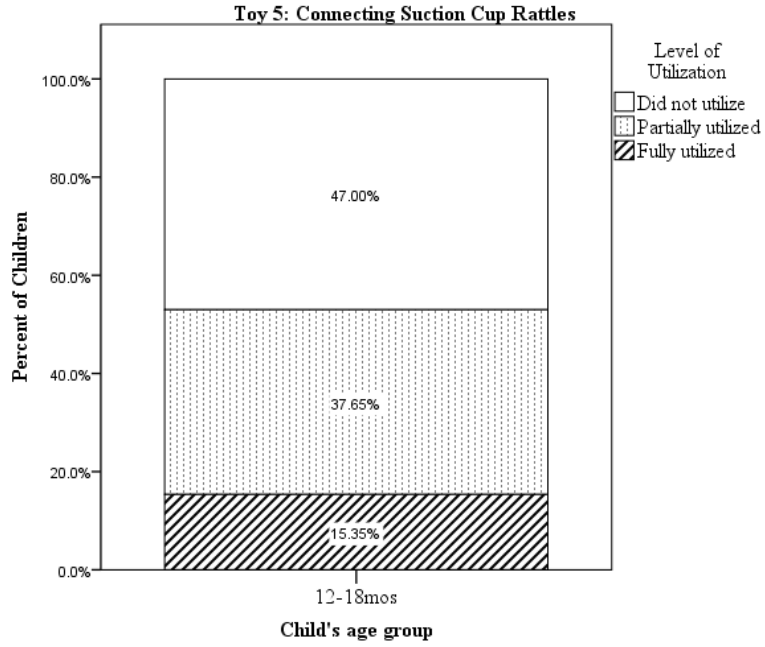


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries them around
- *Partially utilizing:* Tries to stick the suction portions together or on another surface but fails and is unable to get the suction to hold
- *Fully utilizing:* Sticks suction portions together or on end table or other surface in room

Age Determination:

Manufacturer's suggested age	6 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (15.35%) fully utilized this toy. An additional 37.65% of children partially utilized the toy. Some children (47.00%) did not utilize the toy.
Justification for recommended age group	The data indicates that almost half of children were unable to use this toy as a building tool during their play session. This is likely due to lack of the amount of gross motor skill strength needed to stick the pieces together, as well as fine motor skills needed to align the pieces together, even though they are chunky.

Toy #6: Building Half-Spheres

Brief Toy Description	Six stackable egg-like half-spheres with a zig zag cut in pink, orange, yellow, green, blue, and purple.
Packaging	Developmental information written on package, cartoon illustrations on package, in clear, hard plastic clamshell packaging
Materials	Hard plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	2
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

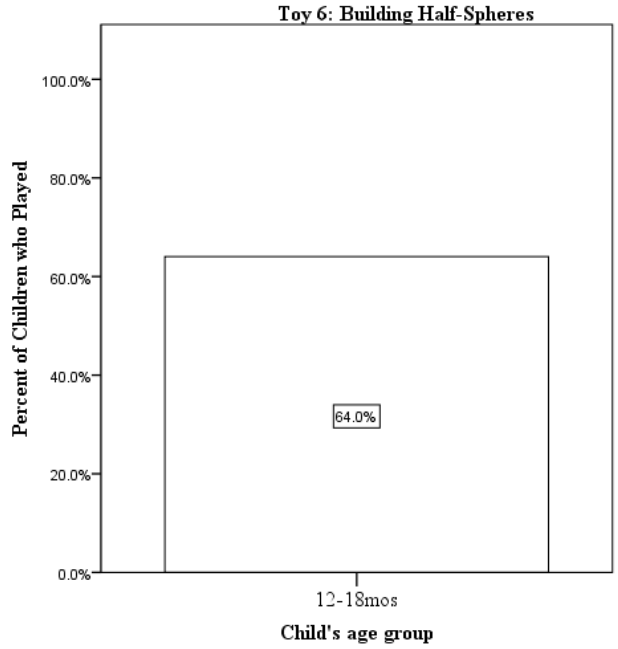
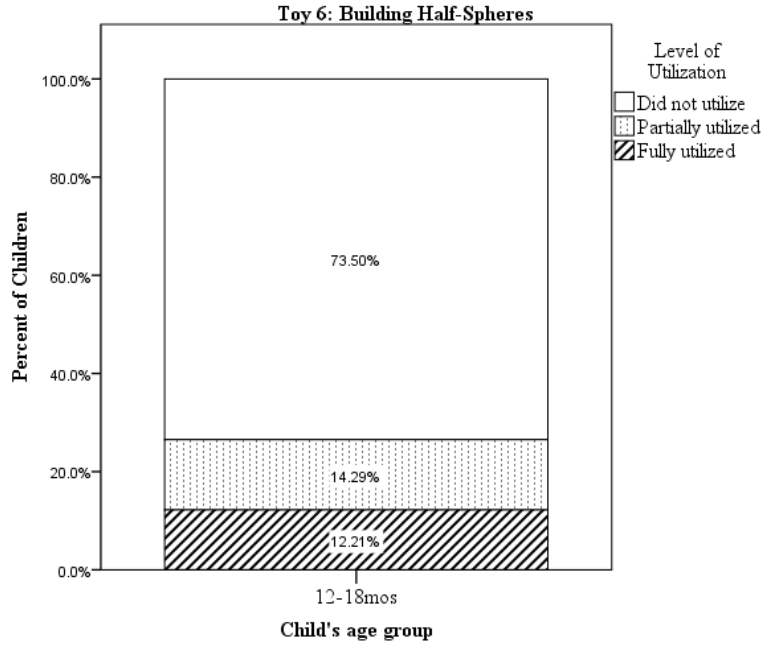


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries them around
- *Partially utilizing:* Attempts to stack or line up spheres but fails
- *Fully utilizing:* Stacks spheres or lines them up

Age Determination:

Manufacturer's suggested age	6 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (12.21%) fully utilized this toy. An additional 14.29% of children partially utilized the toy. Most children (73.50%) did not utilize the toy.
Justification for recommended age group	In order for the spheres to be built and stacked for this toy, they need to go in order from large to small. At 12-18 months, children do not have the skills needed to seriate the order of the spheres. Most children at this age wanted to explore the spheres by handling them and carrying them around instead. Part of this is because children's early math skills needed for seriation have not yet emerged at this age, and part of this is due to the fact that the spheres resemble balls, which children know can do other things.

Toy #7: Soft Shape Sorter

Brief Toy Description	Small blue bag with red handle that can zip open. Contains 9 colorful plastic shapes (triangle, square, star, circle, moon, oval, heart, octagon, diamond) on the inside that fit into holes on one side of the object. Opposite side contains 9 crinkly flaps, each of which has a drawing of an object on the front that corresponds to one of the plastic shapes (e.g., an egg corresponds to the oval plastic shape)
Packaging	Developmental information written on package, real photos on package, cardboard with plastic window
Materials	Hard plastic
	Fabric
	Hard metal (non-pliable)
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

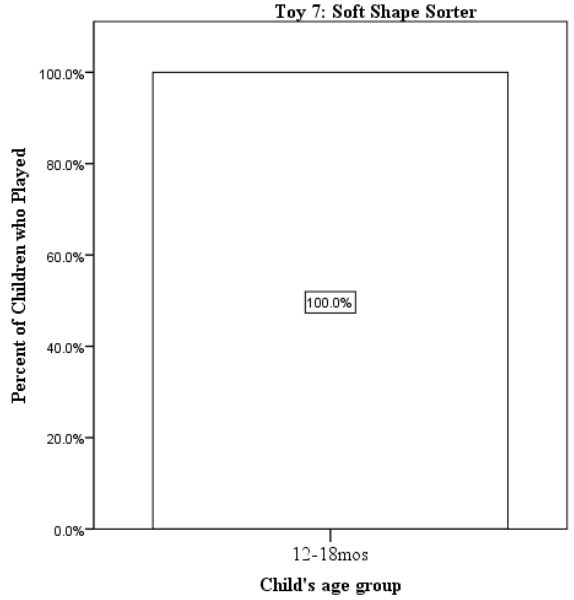
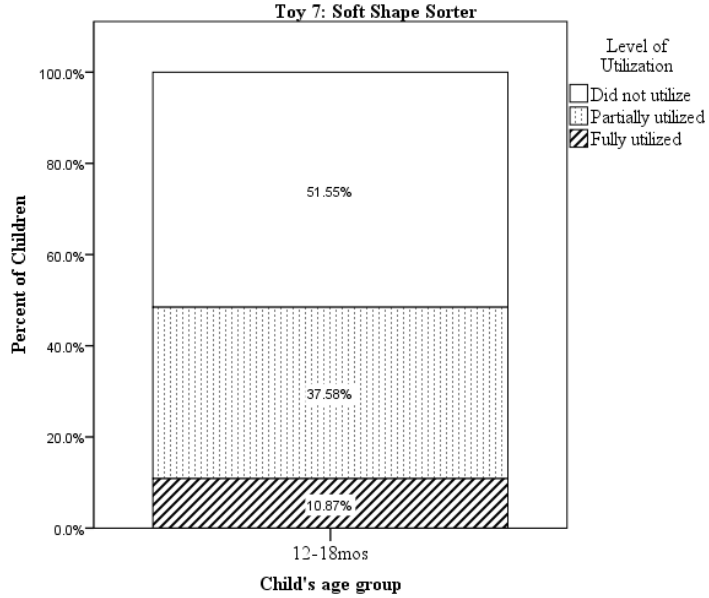


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps shapes out of bin, throws shapes
- *Partially utilizing:* Attempts to put a block through the slot but fails (child is trying to stick the circle into the square slot) OR child only opens the flaps on the back and does not try to match the plastic shapes to them
- *Fully utilizing:* Puts shapes through appropriate slots *OR* opens up flaps on opposite side and matches a plastic shape to one of the objects on the flap (e.g., child picks up the half-moon shape and mom says "Which one of the flaps has that shape on it?" and child points to watermelon slice)

Age Determination:

Manufacturer's suggested age	9 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (10.87%) fully utilized this toy. An additional 37.58% of children partially utilized the toy. Most children (51.55%) did not utilize the toy.
Justification for recommended age group	By 12-18 months, about half of children are using a shape sorter like this one correctly, or are attempting to use it correctly. Given the shape sorter component to this toy, as well as the flap side of the toy, children have more options for fully and partially utilizing the toy, which may explain why more children either fully or partially utilized the toy when compared to a traditional shape sorter (Toy #9). Shape sorting is a task that parents may start to work on between 6-9 months with their children as the manufacturer's age suggests, but children will not fully master the skill until well after their first birthday.

Toy #8: Soft Stacker with Rainbow Rings

Brief Toy Description	Six doughnut-shaped plush objects of decreasing size that are stacked on soft rod. Red, orange, yellow, green, blue, purple.
Packaging	Cardboard with plastic window
Materials	Fabric
Other Features	Produces sound (operational noise)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

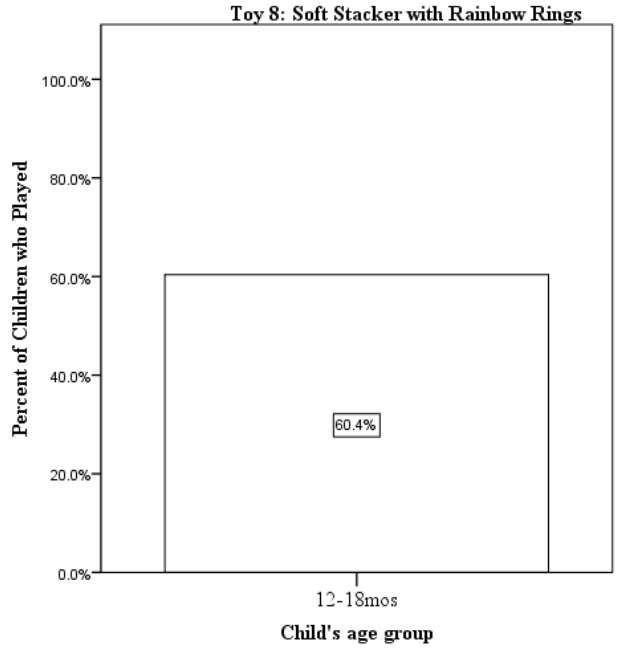
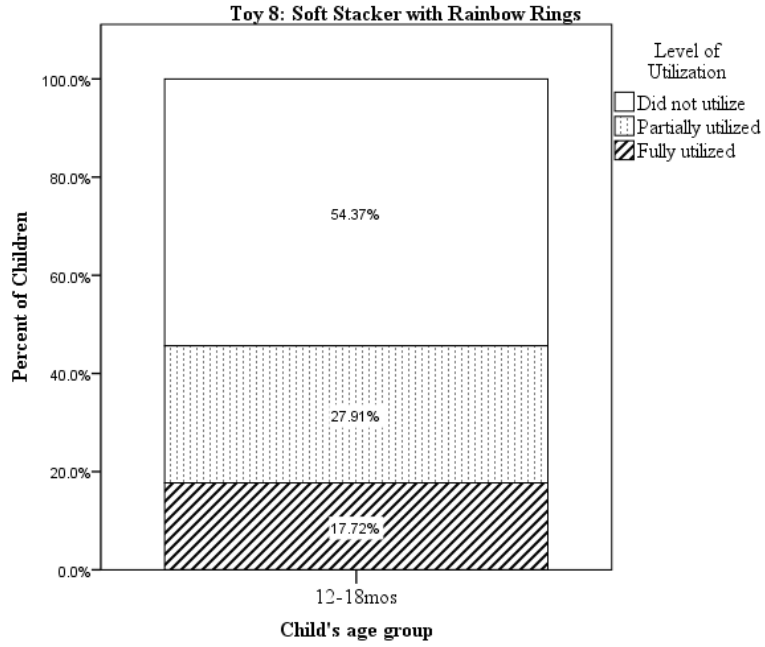


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps post over, throws rings
- *Partially utilizing:* Child attempts to stick the ring over the post but fails (child is unable to align it quite right)
- *Fully utilizing:* Stacks rings on to post

Age Determination:

Manufacturer's suggested age	9 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (17.72%) fully utilized this toy. An additional 27.91% of children partially utilized the toy. Most children (54.37%) did not utilize the toy.
Justification for recommended age group	At 12-18 months, over half of the children in the study had trouble utilizing this toy. Being able to align the plush rings takes a fair amount of dexterity and coordination that children are still working on at this age (with 27% of children trying to stack on the rod but failing).

Toy #9: Plastic Shape Sorter

Brief Toy Description	Plastic red bucket with yellow lid. Contains five brightly colored plastic shapes (circle, cross, square, star, triangle) on the inside that fit into holes on yellow lid.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

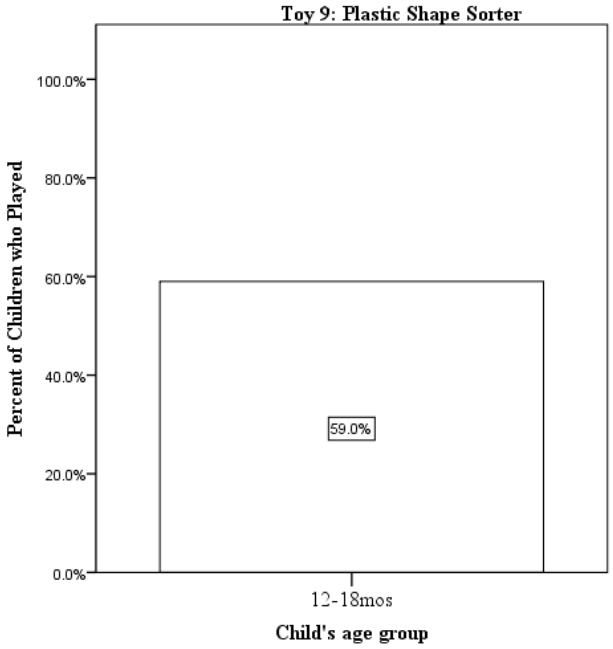
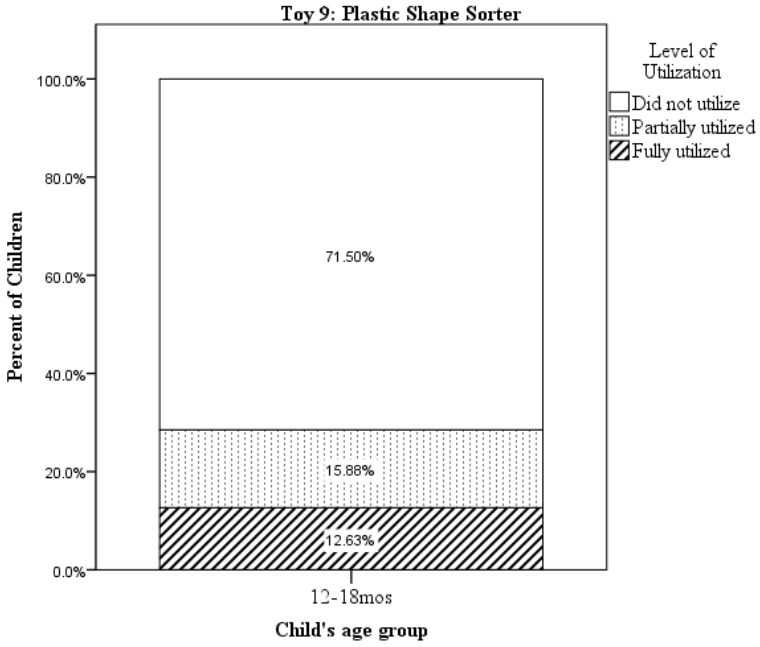


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps shapes out of bin, throws shapes
- *Partially utilizing:* Child attempts to put a block through the slot but fails (child is trying to stick the circle into the square slot)
- *Fully utilizing:* Puts shapes through appropriate slots

Age Determination:

Manufacturer's suggested age	6 mos-3 years
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (12.63%) fully utilized this toy. An additional 15.88% of children partially utilized the toy. Most children (71.50%) did not utilize the toy.
Justification for recommended age group	By 12-18 months, fewer than 30% of children are partially or fully utilizing this shape sorter correctly. Given that this toy does not have a flap side component as Toy #7, the actions needed to partially or fully utilize the toy are narrower, hence the higher non-utilization rate of the toy. Shape sorting is a task that parents may start to work on between 6-9 months with their children as the manufacturer's age suggests, but children will not fully master the skill until well after their first birthday.

Toy #10: Flip Phone with Buttons

Brief Toy Description	Small orange phone with green attachment that can be flipped open to reveal five large buttons and a mirror.
Packaging	Cartoon illustrations on package, real photos on package, cardboard with open front where toy can be touched, multilingual phrases
Materials	Hard plastic
	Soft plastic
Other Features	Battery operated
	Produces light
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

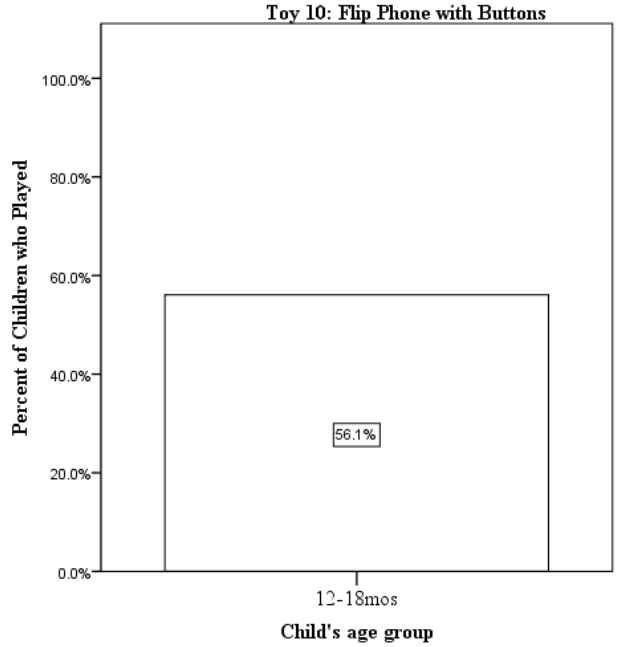
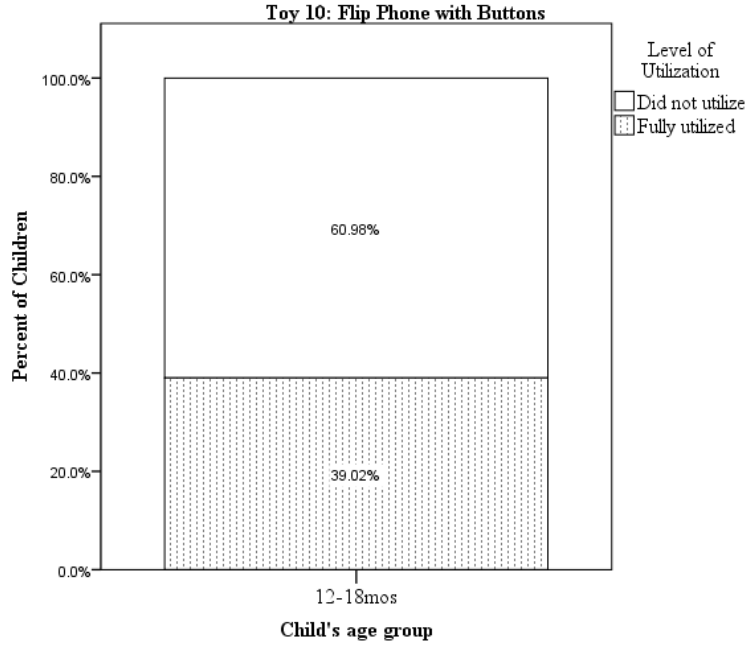


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws phone
- *Partially utilizing:* Opens phone but does not press button OR only presses buttons without opening phone
- *Fully utilizing:* Opens phone and presses button

Age Determination:

Manufacturer's suggested age	6 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (39.02%) fully utilized this toy. Most children (60.98%) did not utilize the toy.
Justification for recommended age group	Other toys in the study demonstrate that children can press buttons at 12-18 months. When children played with this phone, they either fully utilized the toy, or they did not utilize it at all. The fact that most children did not utilize the toy is likely because it was not appealing enough to this age group, and children preferred to manipulate it without its buttons.

Toy #11: Bead Triangle

Brief Toy Description	Plastic green/purple triangular prism object. Contains interactive flap objects on the interior that rattle, flip, and spin.
Packaging	Cardboard with open front where toy can be touched
Materials	Hard plastic
	Mirror
Other Features	Produces sound (operational noise)
	Includes mirror
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

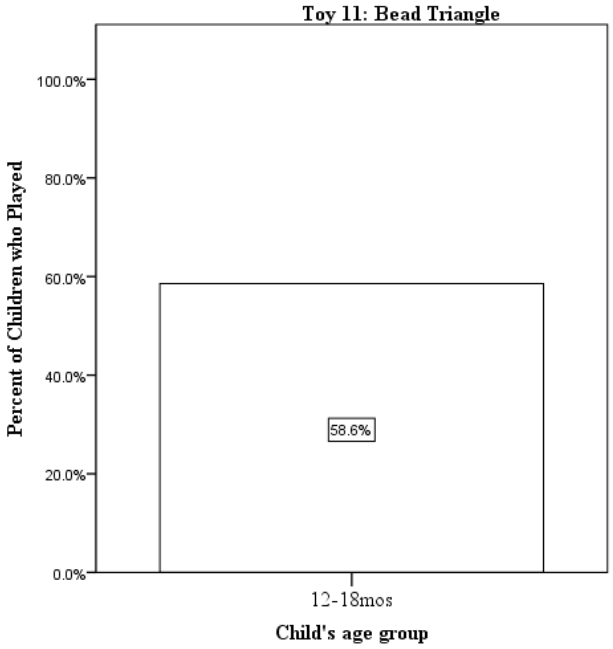
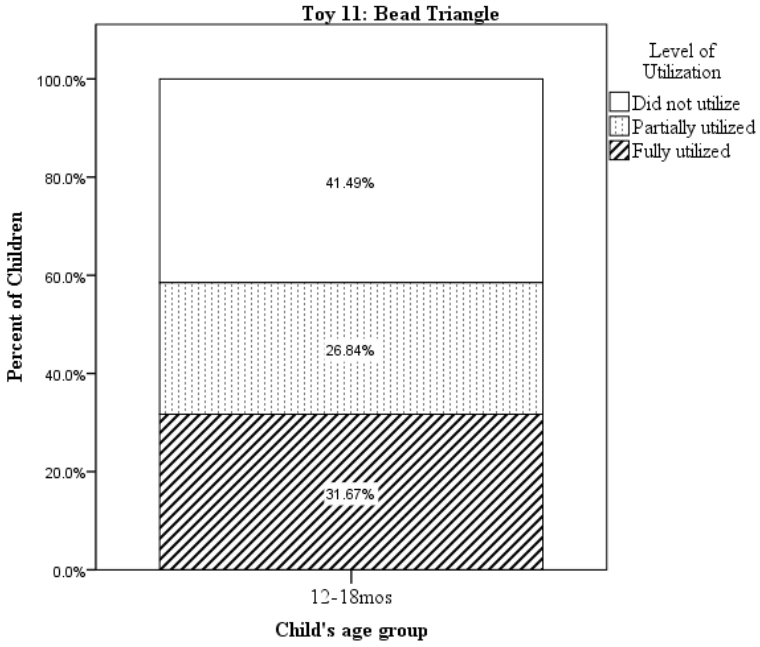


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Just carries the bead triangle around
- *Partially utilizing:* Child only uses one side of triangle
- *Fully utilizing:* Spins or turns or manipulates beads and moving parts of the triangle; must use at least 2 sides (top of triangle DOES count as a side)

Age Determination:

Manufacturer's suggested age	6 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (31.67%) fully utilized this toy. An additional 26.84% of children partially utilized the toy. Some children (41.49%) did not utilize the toy.
Justification for recommended age group	Even at 12-18 months, children still appear to be intrigued by this toy. They enjoy spinning and manipulating beads, and will use 1-2 sides frequently.

Toy #12: Soft Peek-a-Boo Book

Brief Toy Description	Cloth book with red handle and brown owl on cover.
Packaging	No packaging
Materials	Fabric
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

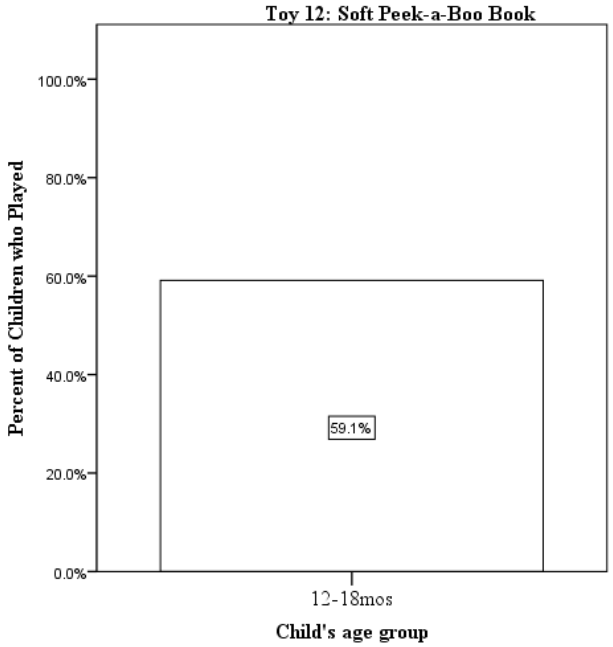
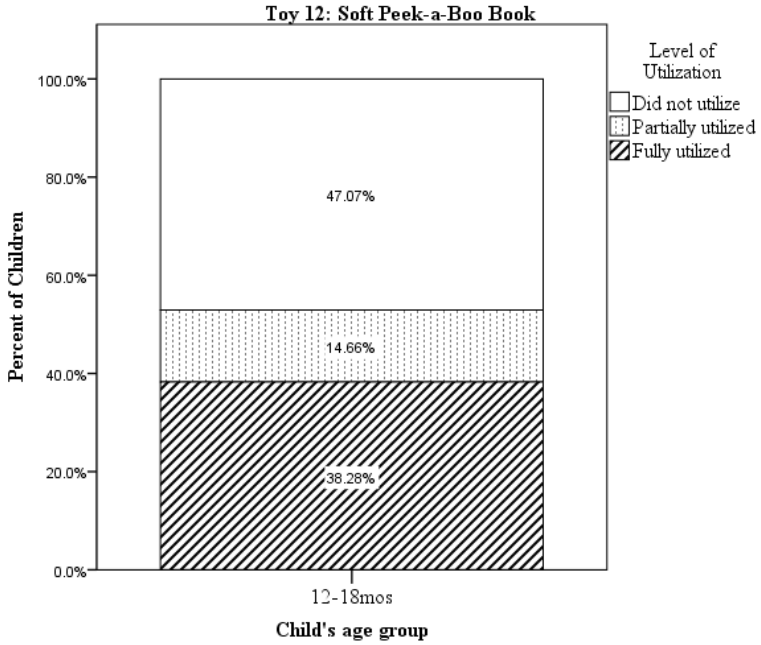


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws/carries book around
- *Partially utilizing:* Looks at interior of the book or touches the items on the page or turns the pages*, but book is not oriented the right way*
- *Fully utilizing:* Looks at interior of the book or touches the items on the page or turns the pages; book should be oriented the right way

Age Determination:

Manufacturer's suggested age	6 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (38.28%) fully utilized this toy. An additional 14.66% of children partially utilized the toy. Some children (47.07%) did not utilize the toy.
Justification for recommended age group	This toy continues to hold some interest for 12-18-month-olds, with over half of children either fully or partially utilizing the toy. Given children's abilities to work with vocabulary (Toy #35) and story (Toy #61) board books at 12-18 months, those who are not utilizing the toy at all are likely not doing so out of boredom rather than difficulty in using the book.

Toy #13: Textured Balls

Brief Toy Description	Four red and orange patterned/textured, small, squeezable balls.
Packaging	Cardboard with open front where toy can be touched
Materials	Hard plastic
	Inflated plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

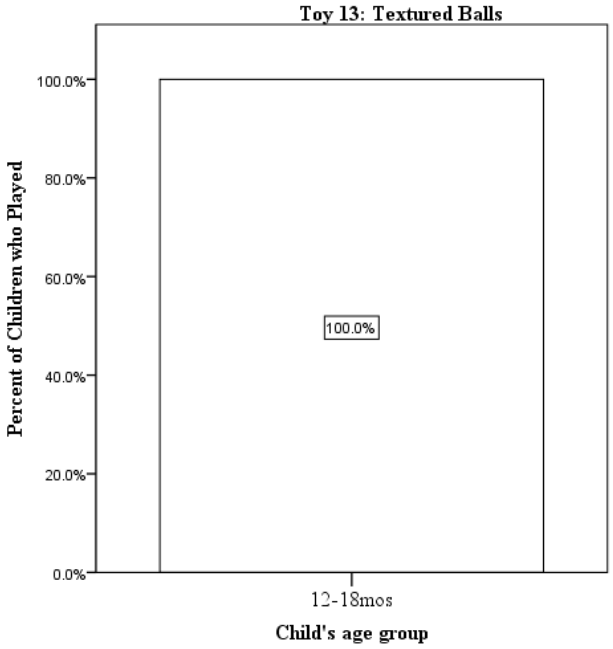
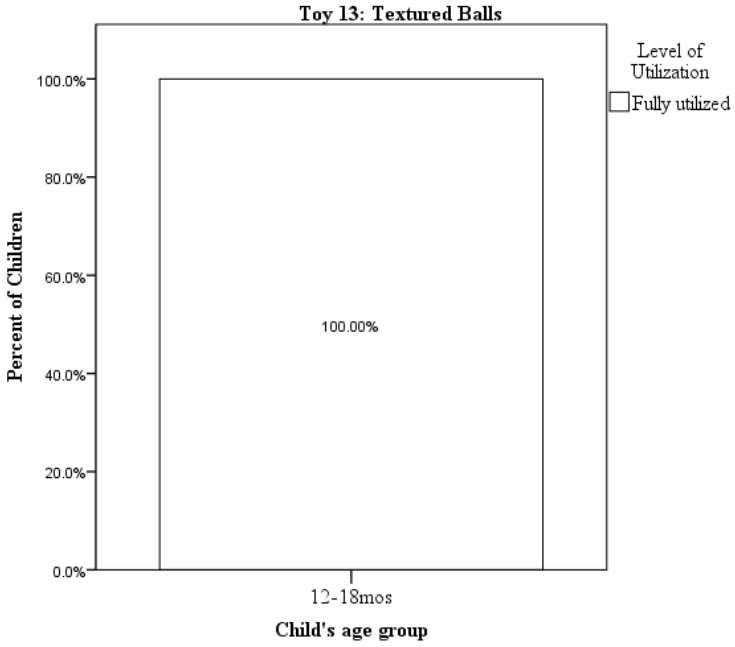


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child tries to sit on ball
- *Partially utilizing:* Mouthing, touching, or patting the balls
- *Fully utilizing*: Throws or pushes or rolls or chases or kicks balls

Age Determination:

Manufacturer's suggested age	6 mos-6 years
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	All children (100%) fully utilized this toy.
Justification for recommended age group	It is clear that children at 12-18 months have no problem using balls and find them very appealing, with 100% of the sample both electing to use the toy in the first place and fully utilizing the toy.

Toy #14: Tiny Basketball Hoop

Brief Toy Description	Orange and blue basketball hoop with smiley face and number buttons on the backboard. Comes with two small basketballs.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Inflated plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	4
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

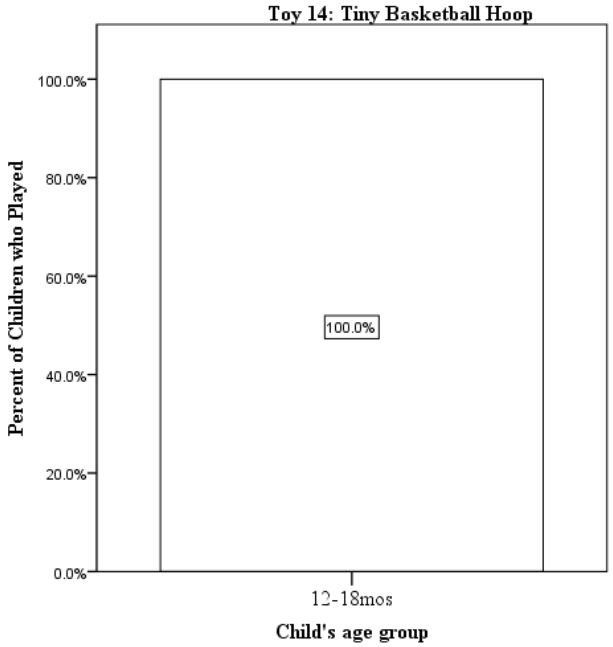
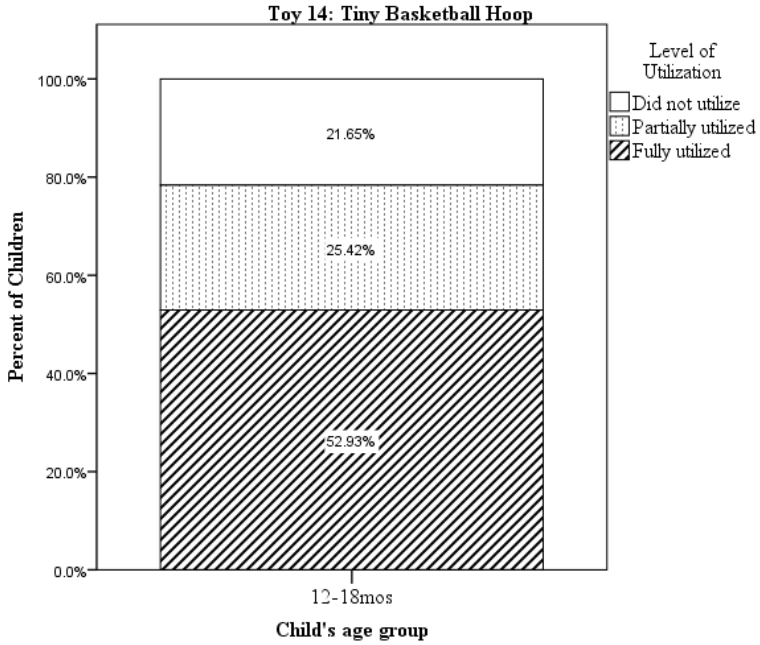


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child knocks over hoop, or child spends whole time pressing buttons on the hoop
- *Partially utilizing:* Child throws or pushes or rolls or chases or kicks ball but does not try to put the ball through the hoop, OR child tries to put the ball into the hoop but misses
- *Fully utilizing*: Puts ball through hoop (does not have to throw)

Age Determination:

Manufacturer's suggested age	6 mos-3 years
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Most children (52.93%) fully utilized this toy. An additional 25.42% of children partially utilized the toy. Only 21.65% of children did not utilize the toy.
Justification for recommended age group	At 12-18 months, children are beginning to feel comfortable with putting a ball through a hoop or attempting to, as demonstrated by this toy, as well as other basketball centered toys in the study (see Toys #38 & #65). Only 20% of 12-18-month-olds were unable to fully or partially utilize the toy.

Toy #15: Moving and Noisemaking Electronic Ball

Brief Toy Description	Plastic, round yellow/black bumblebee ball. Has three buttons (circle, star, triangle) on the front. Rolls around, flashes light and makes noise.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

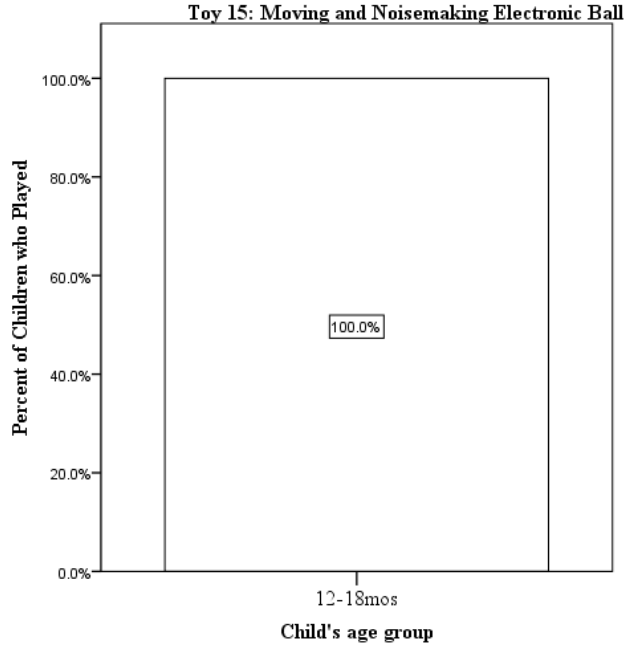
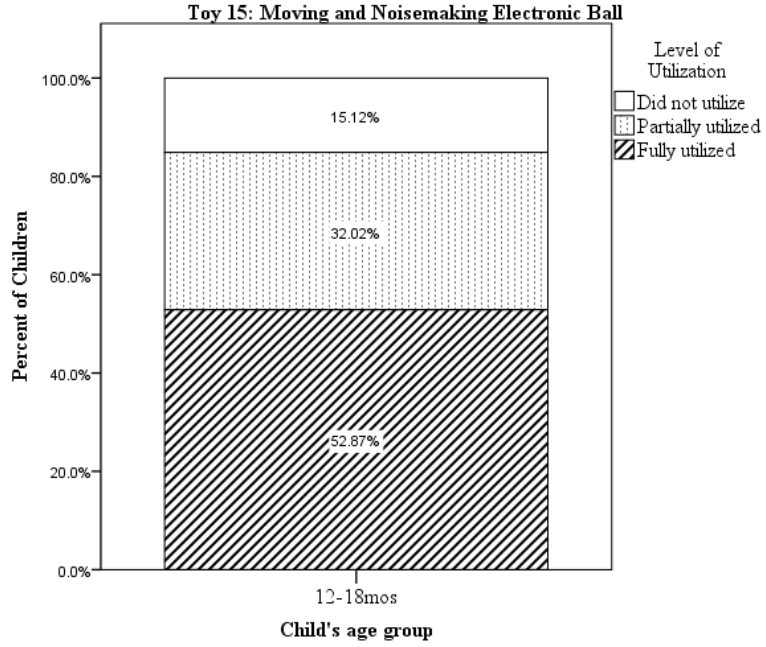


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child tries to sit on ball
- *Partially utilizing:* Child only presses buttons on toy
- *Fully utilizing:* Throws or pushes or rolls or kicks chases ball

Age Determination:

Manufacturer's suggested age	6 mos-3 years
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Most children (52.87%) fully utilized this toy. An additional 32.02% of children partially utilized the toy. Only 15.12% of children did not utilize the toy.
Justification for recommended age group	Children found this toy easy to utilize at least partially or fully at 12-18 months. They also found it appealing, given that 100% of participants used it.

Toy #16: Plush Baby Doll

Brief Toy Description	Small baby doll in pink and white onesie with plastic face and plush body.
Packaging	Cardboard with open front where toy can be touched
Materials	Hard plastic
	Fabric
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	3
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

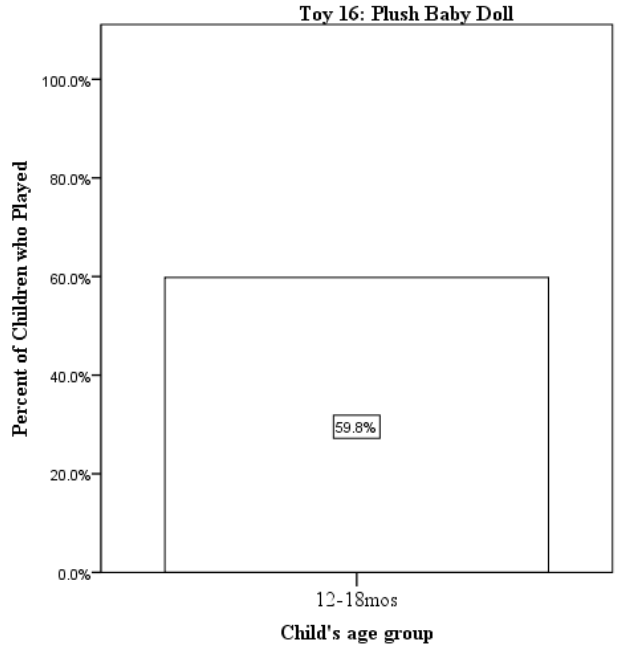
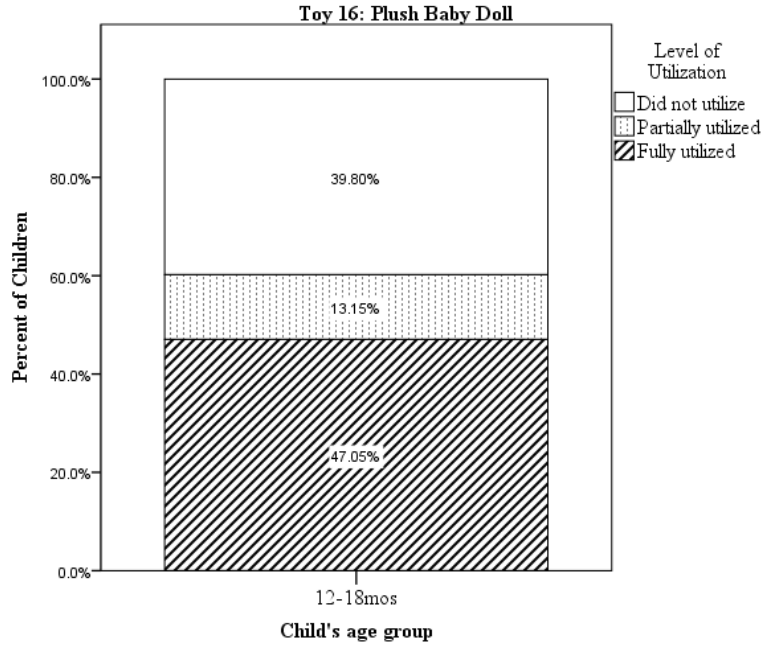


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws doll, puts in mouth
- *Partially utilizing:* Holds/carries doll
- *Fully utilizing:* Hug or rocks baby or uses it for pretend (make it eat or tuck in for nap, etc.)

Age Determination:

Manufacturer's suggested age	0 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (47.05%) fully utilized this toy. An additional 13.15% of children partially utilized the toy. Some children (39.80%) did not utilize the toy.
Justification for recommended age group	A small number of children chose to use this baby doll as a manipulative to be thrown or mouthed at 12-18 months, but at this age, imitative behaviors are emerging before pretend play fully blossoms. Children carried around the doll, held it, hugged it, or they may even have tried to feed it as they have seen adults do.

Toy #17: Cow Hand Puppet

Brief Toy Description	Black and white spotted cow hand puppet with metallic gold collar.
Packaging	Cardboard tag
Materials	Fabric
Other Features	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

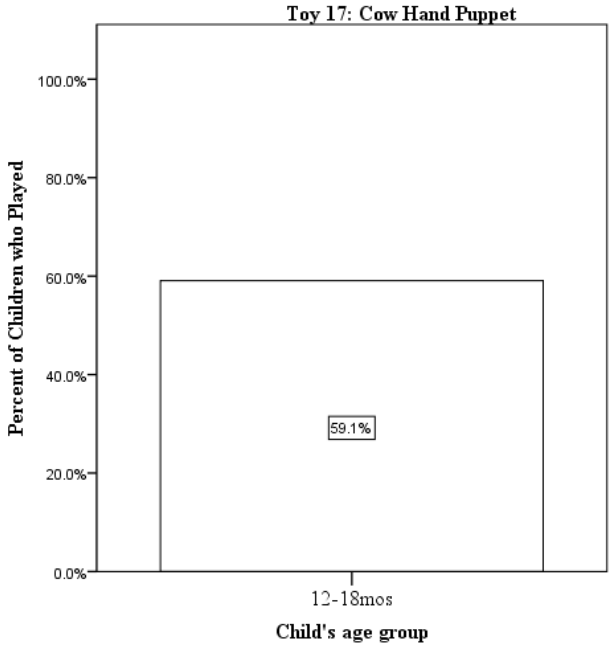
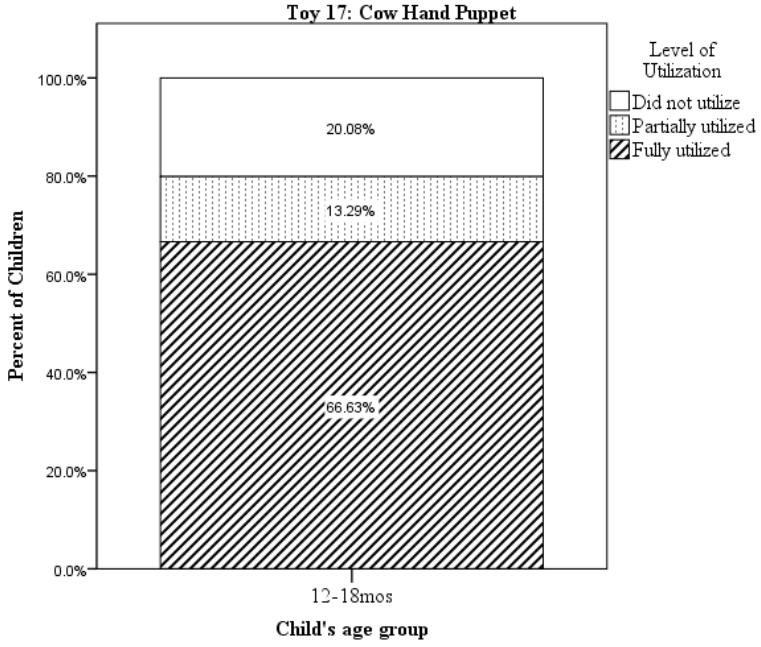


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws puppet, puts in mouth
- *Partially utilizing:* Put puppet on hand but does not move the mouth; holds/carries cow
- *Fully utilizing:* Watches/reacts/laughs at mom while mom is putting on puppet show for child, OR child puts puppet on hand and moves its mouth

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Most children (66.63%) fully utilized this toy. An additional 13.29% of children partially utilized the toy. Only 20.08% of children did not utilize the toy.
Justification for recommended age group	A small number of children chose to use this puppet as a manipulative to be thrown or mouthed at 12-18 months; at this age, most children tried to use this toy as a puppet or watched their parent use it as a puppet.

Toy #18: Beanbag Dog

Brief Toy Description	Black and white spotted Dalmatian beanbag dog.
Packaging	Cardboard tag
Materials	Hard plastic
	Fabric
Other Features	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

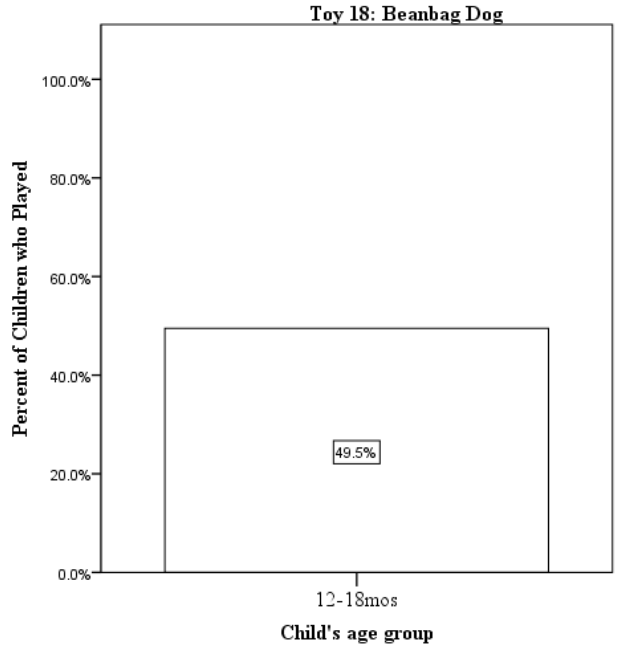
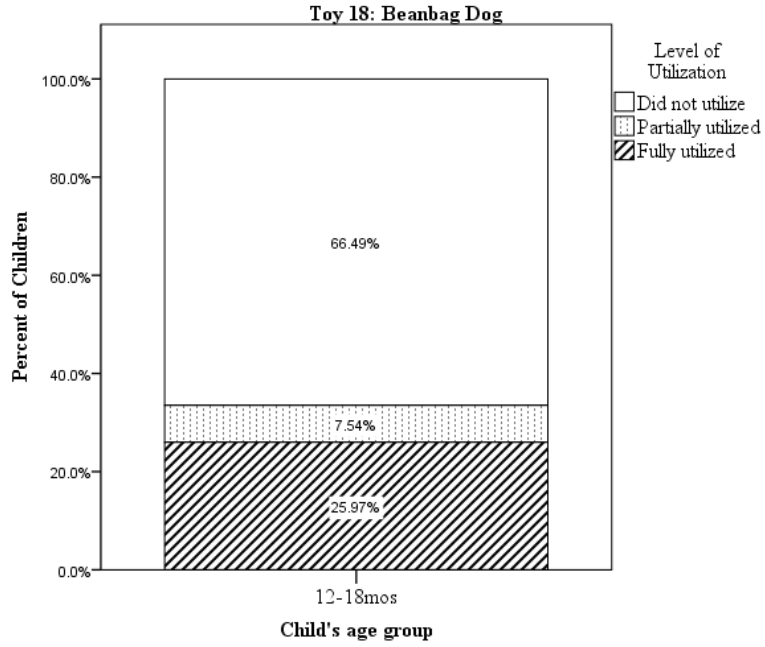


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws dog, puts in mouth
- *Partially utilizing:* Holds/carries dog
- *Fully utilizing:* Hugs dog or uses it for pretend (makes it bark or eat, etc.)

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (25.97%) fully utilized this toy. An additional 7.54% of children partially utilized the toy. Most children (66.49%) did not utilize the toy.
Justification for recommended age group	Most children who played with this toy chose to use it as a manipulative to be thrown or mouthed at 12-18 months, which stands in contrast to the baby doll also given to this age group (Toy #16). It is possible that this difference in behavior is due to the texture of this toy (filled with beans and covered in fur instead of the soft plush of the baby doll that may encourage hugging) as well as the human aspect of the baby doll when compared to the dog (children may draw more of a connection to hugging, cradling, or nurturing a humanoid object than an animal).

Toy #19: Rolling Snail

Brief Toy Description	Green object in shape of snail that can be pushed or pulled along a flat surface with hand contact (no handle). Mirror on one side of "shell."
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Includes mirror
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

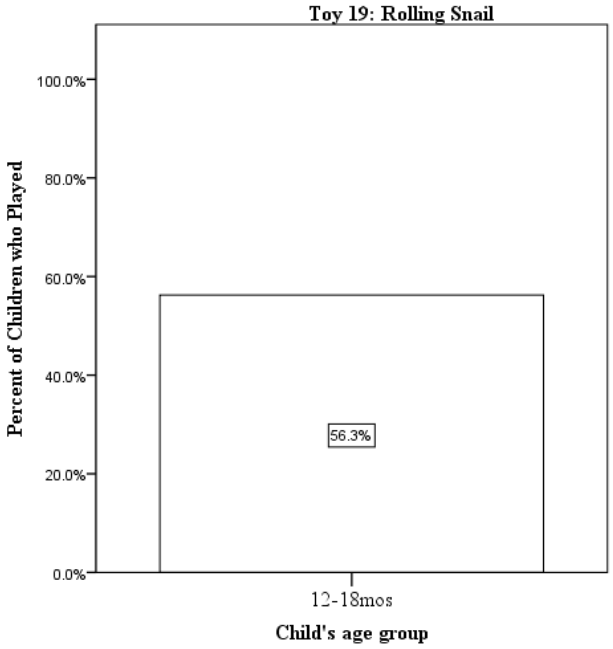
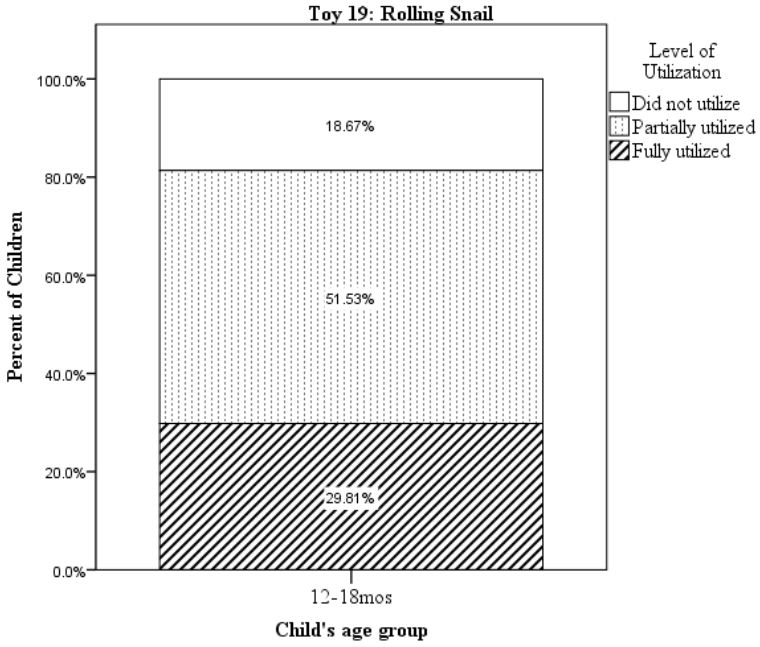


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries snail around
- *Partially utilizing:* press button/switches or looks in mirror on side of snail
- *Fully utilizing:* Pushes or pulls snail so it rolls or moves

Age Determination:

Manufacturer's suggested age	3 mos-3 years
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (29.81%) fully utilized this toy. Most (51.53%) children partially utilized the toy. Some children (18.67%) did not utilize the toy.
Justification for recommended age group	Most children at 12-18 months were still very interested in this toy and fully or partially utilized it. Numerous other small wheeled vehicles in the study demonstrate that children can wheel items around at this age, so the few children who did not utilize the toy at all may have done so out of boredom. In addition, it is possible that the partial utilization rate was so high because children were interested in the buttons and mirror noted in the partial utilization statement (not because they did not know how to wheel the snail).

Toy #20: Plastic Train with Removable Pieces

Brief Toy Description	Wheeled plastic train with four detachable square pieces on top (yellow, orange, blue, green).
Packaging	Developmental information written on package, real photos on package, cardboard with open front where toy can be touched
Materials	Hard plastic
Other Features	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

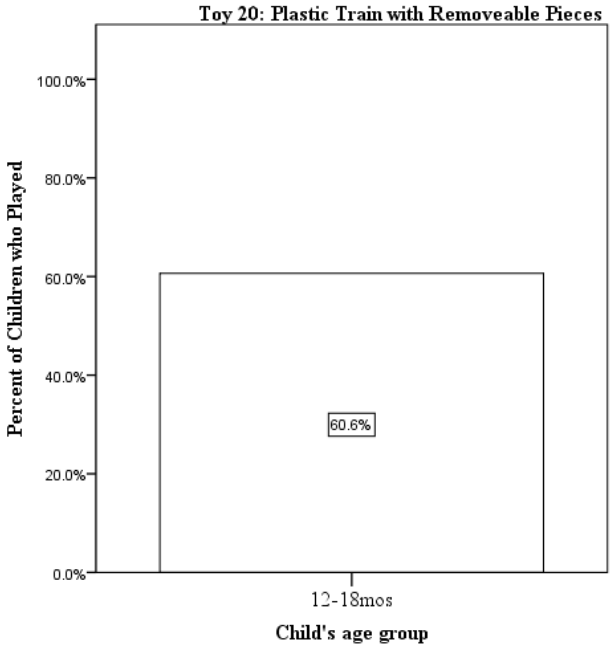
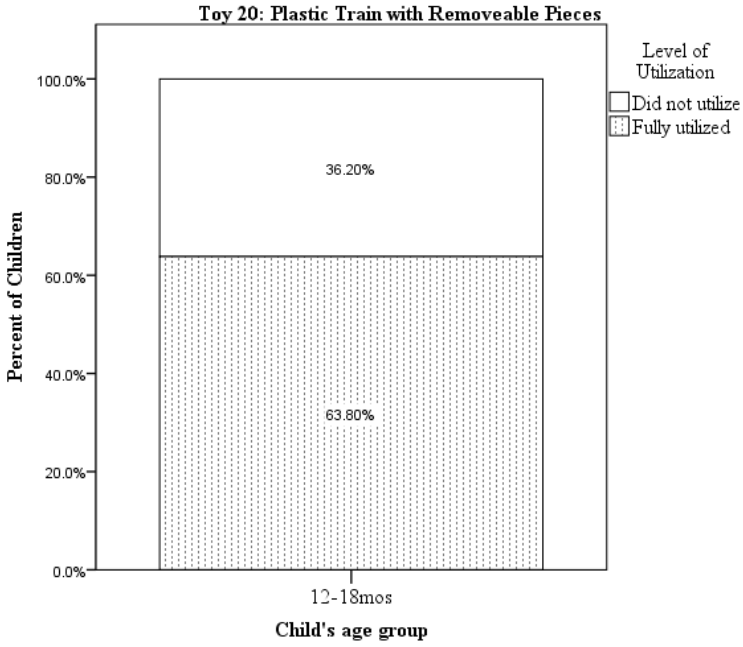


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries train around
- *Partially utilizing:* Takes pieces off train and tries to snap them back on
- *Fully utilizing:* Pushes or pulls train so it rolls or moves

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Most children (63.80%) fully utilized this toy. An additional 36.20% of children did not utilize the toy.
Justification for recommended age group	Most children at 12-18 months had no problem fully utilizing the toy, and no children in the study played with the blocks mentioned in the partial utilization statement. Numerous other small wheeled vehicles in the study demonstrate that children can wheel items around at this age, so the few children who did not utilize the toy at all may have done so out of boredom.

Toy #21: Worm with Wheels

Brief Toy Description	Small figure with soft, white smiling face and tail. Wheels filled with beads in red, yellow, blue. Rattles as rolls. Has press and go function.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Fabric
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

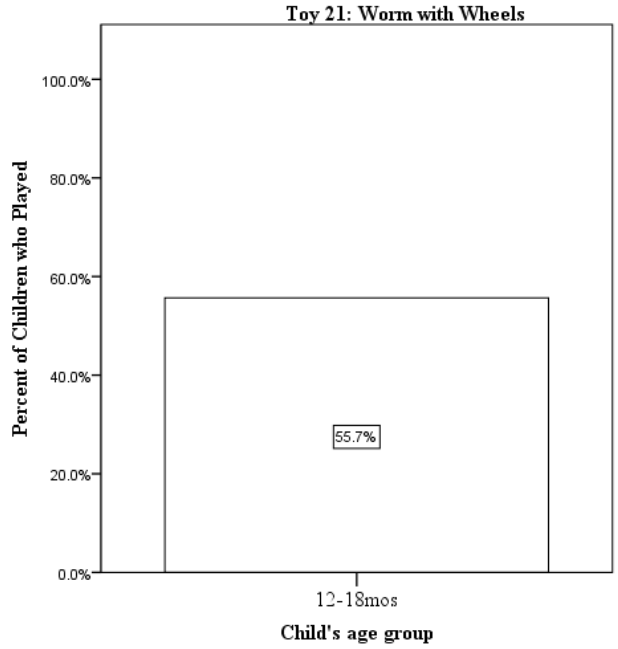
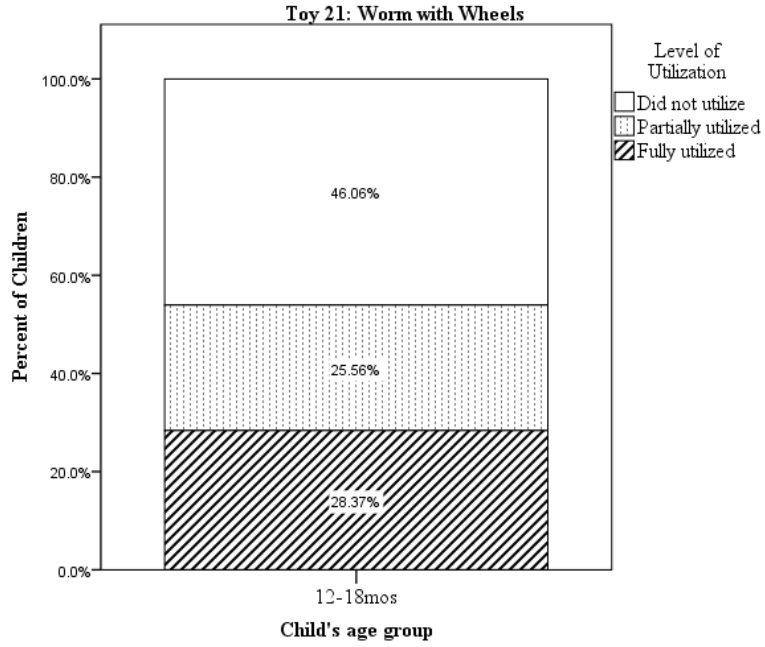


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries worm around
- *Partially utilizing:* Shakes snail to make noise in the rattle portion of snail or squeezes the small soft portions of worm
- *Fully utilizing:* Pushes or pulls worm so it rolls or moves

Age Determination:

Manufacturer's suggested age	6 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (28.37%) fully utilized this toy. An additional 25.56% of children partially utilized the toy. Some children (46.06%) did not utilize the toy.
Justification for recommended age group	Most children at 12-18 months were still very interested in this toy and fully or partially utilized it. Numerous other small wheeled vehicles in the study demonstrate that children can wheel items around at this age, so the few children who did not utilize the toy at all may have done so out of boredom. In addition, it is possible that the partial utilization rate was so high because children were interested in the rattle and plush face noted in the partial utilization statement (not because they did not know how to wheel the inchworm).

Toy #22: Plush Animal Chime Ball

Brief Toy Description	Round, plush, tan and white object with monkey face and arms. Chimes when shaken.
Packaging	No packaging
Materials	Fabric
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

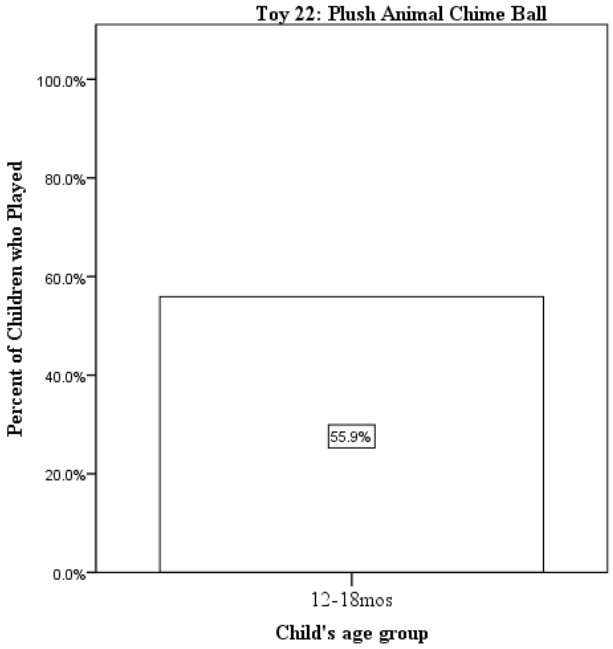
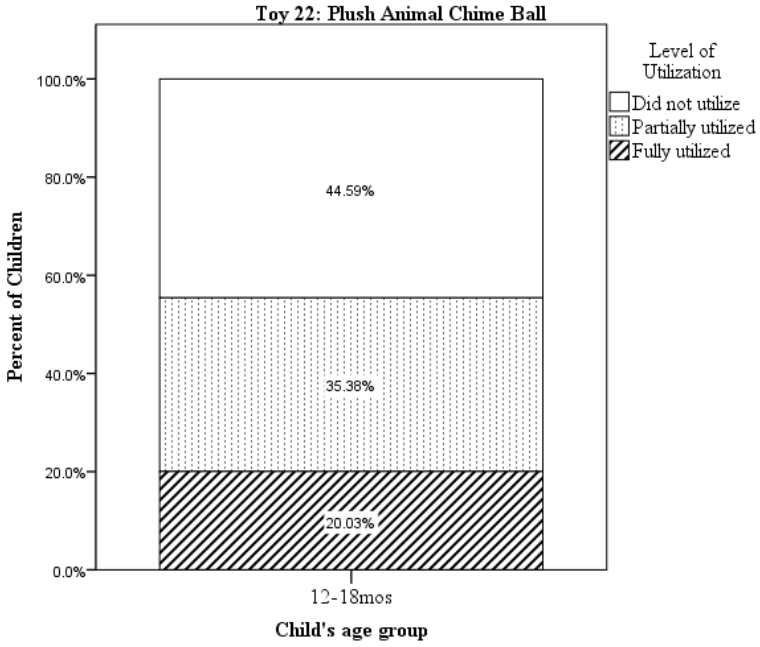


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Pets, sits on, or throws toy
- *Partially utilizing:* Hugs, pushes, moves, or carries monkey -- must make noise
- *Fully utilizing:* Shakes ball (like maraca or rattle) so it makes chime noise

Age Determination:

Manufacturer's suggested age	0 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (20.03%) fully utilized this toy. An additional 35.38% of children partially utilized the toy. Some children (44.59%) did not utilize the toy.
Justification for recommended age group	To partially or fully utilize this toy, the child had to move and/or shake the ball in order to create chiming sounds, and most children who received this toy were able to do so. Furthermore, numerous other toys in the study demonstrate that children can shake items at 12-18 months to produce sound. As such, the 44% of children who did not utilize the toy likely did not utilize the toy because they were bored with it, not because of the inability to use the toy. Given the fact that the toy did have a ball shape, it is possible that children at 12-18 months were more excited at the prospect of using they toy as a ball than a chime.

Toy #23: Circular Musical Touch Pad

Brief Toy Description	Round, flat object with five large half-circle buttons (red, yellow, green, blue, purple) on top that make music when pressed.
Packaging	Developmental information written on package, real photos on package, cardboard with open front where toy can be touched
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (music)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

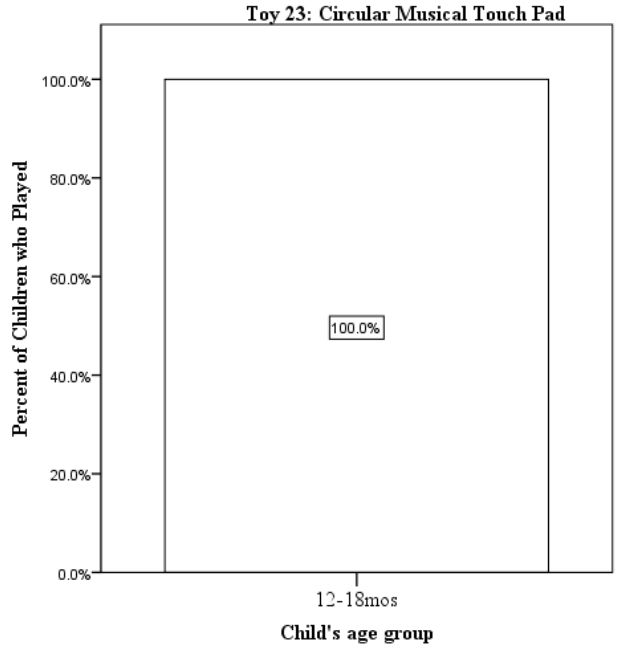
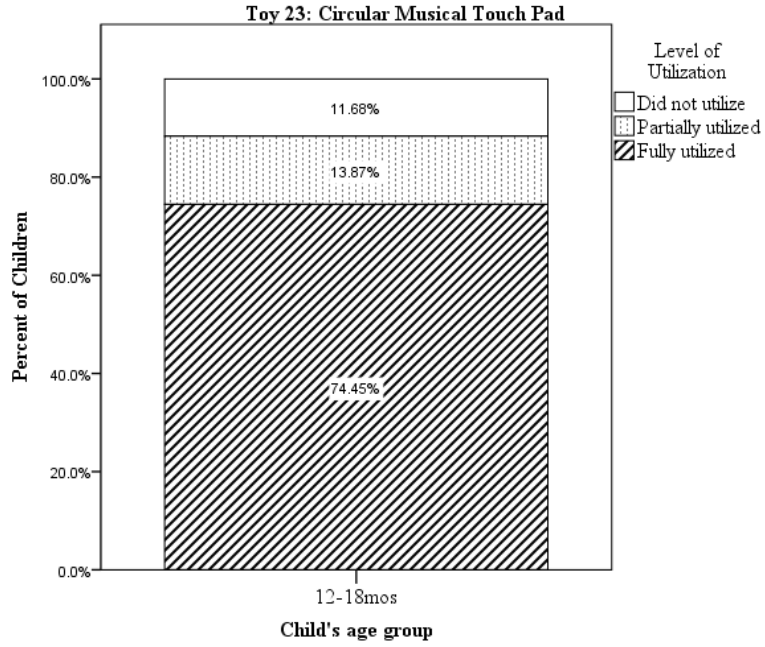


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Puts toy in mouth, throws toy
- *Partially utilizing:* Attempts to press buttons but does not push hard enough to make noise
- *Fully utilizing:* Press button(s) to make noises

Age Determination:

Manufacturer's suggested age	6 mos-3 years
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Most children (74.45%) fully utilized this toy. An additional 13.87% of children partially utilized the toy. Only 11.68% of children did not utilize the toy.
Justification for recommended age group	100% of the 12-18-month-olds in the study played with this toy, and most had no problem fully utilizing the toy. The buttons were large and easy to press, and the quick cause and effect functionality was especially appealing at this age.

Toy #24: Soothing Music Machine

Brief Toy Description	Rectangular blue and white object with animals and nature scene inside. Makes constant music when button is pressed.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard with open front where toy can be touched
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (animal noises)
	Produces sound (synthesized noise)
	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

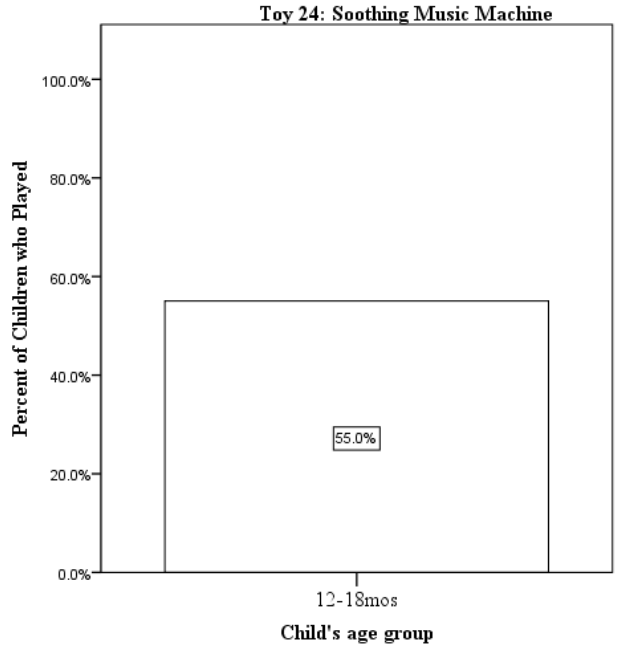
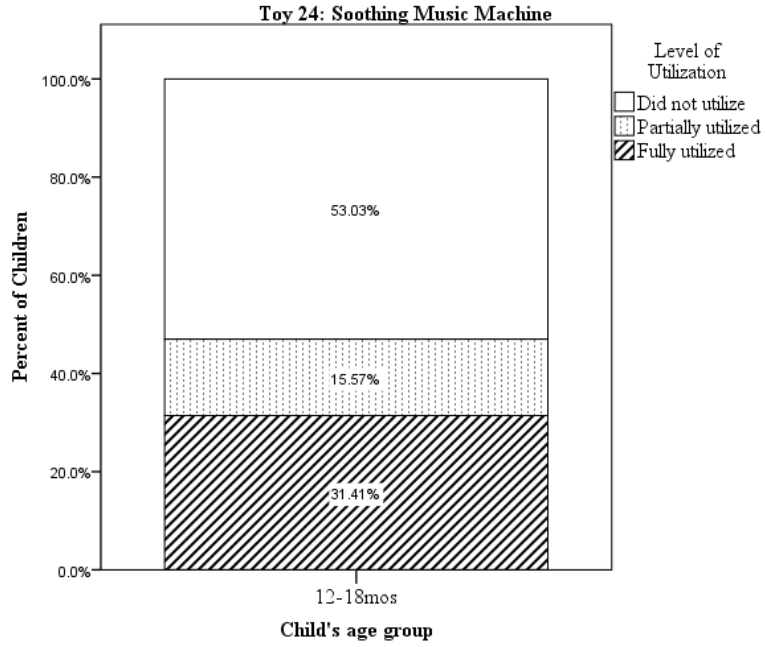


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Puts toy in mouth, throws it
- *Partially utilizing:* Attempts to press buttons but does not push hard enough to make noise
- *Fully utilizing:* Presses button(s) to make noises

Age Determination:

Manufacturer's suggested age	0 mos +
Hypothesized age group	6-11 mos
Recommended age group	Insufficient data
Utilization report	Some children (31.41%) fully utilized this toy. An additional 15.57% of children partially utilized the toy. Most children (53.03%) did not utilize the toy.
Justification for recommended age group	It is clear from Toy #23 that children can press buttons to make music at 12-18 months. This toy had a lower partial and full utilization rate by the 12-18- month-olds than Toy #23 because the toy had less buttons, made softer sounds, and was not as brightly colored, which was most likely associated with greater boredom with this toy.

Toy #25: Wooden Flower Wheel

Brief Toy Description	Small, wooden, circular object with 10 wood half circles ("petals") that turn to the left or right based on the child manually flipping the petals over. When turned to the left, all petals are yellow and white, when turned to the right, all petals are primary colors.
Packaging	Developmental information written on package, cardboard box
Materials	Wood
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

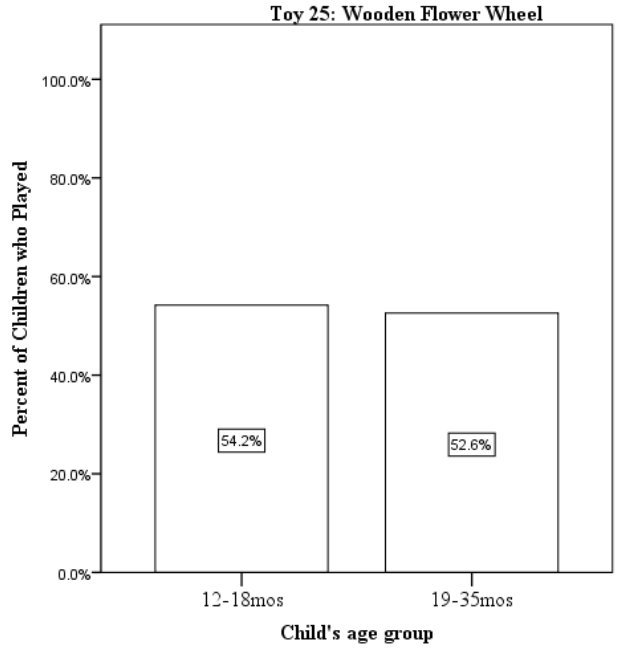
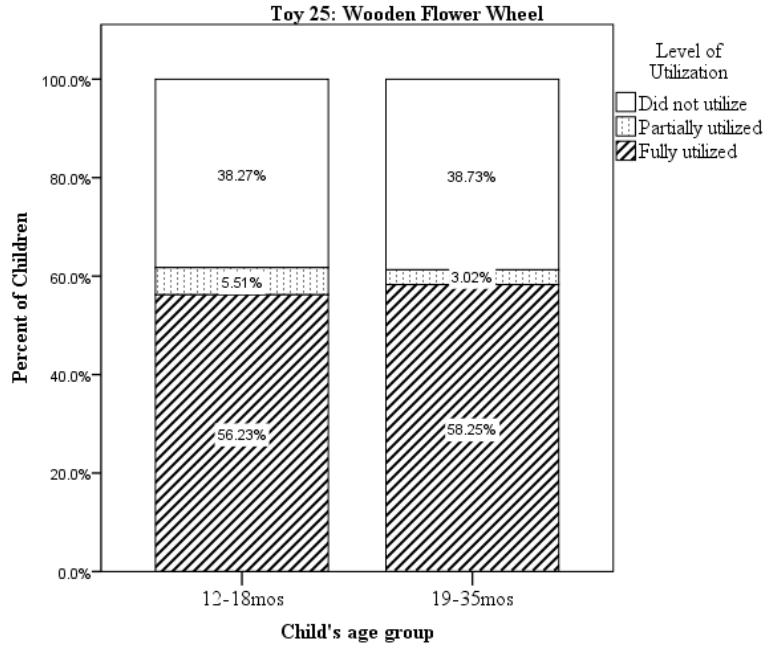


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws or mouths toy
- *Partially utilizing:* Touches or pats the toy
- *Fully utilizing:* Moves petals back and forth to reveal colors on each side

Age Determination:

Manufacturer's suggested age	9 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, children can easily use the pincher grasp motor skill and turn the petals left and right.

Toy #26: Wooden Bead Maze Cube

Brief Toy Description	Large wooden green, blue, and red cube with interactive objects on each side (e.g., a side with gears, a side with spinning cubes on dowels with animals printed on them, a side for sliding removable shapes onto pegs, and a side for moving shapes through a maze). Has blue and red wire bead maze on top and animal shaped beads.
Packaging	Developmental information written on package, cardboard box, multilingual phrases
Materials	Hard metal (non-pliable)
	Wood
Other Features	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

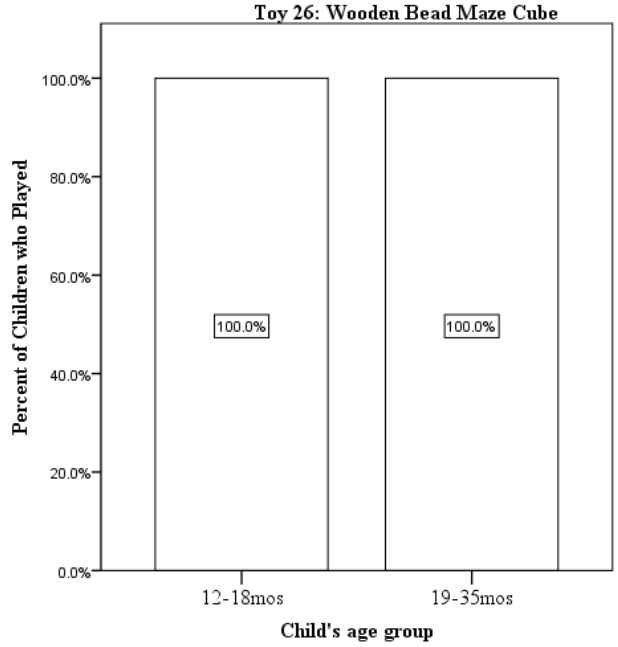
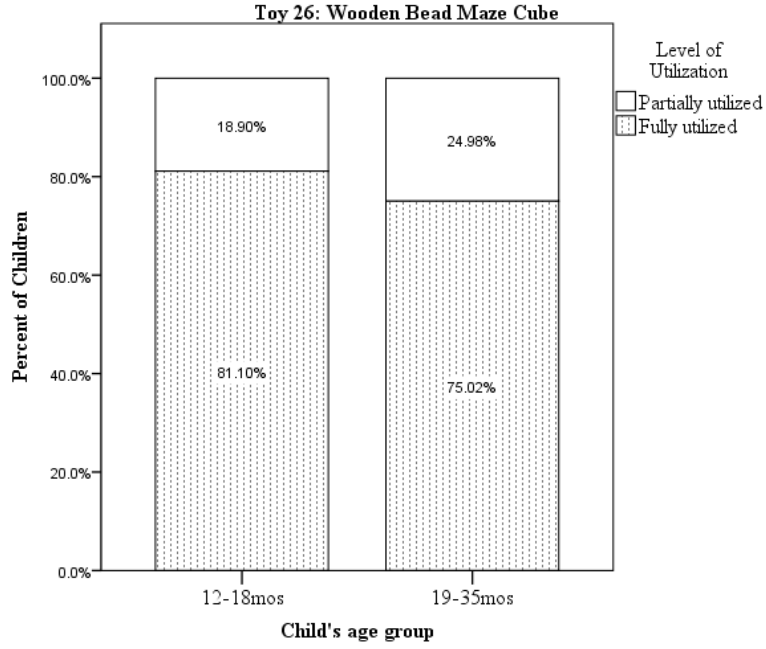


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child tries to sit on top of cube
- *Partially utilizing:* Uses one side of the cube
- *Fully utilizing:* Moves figures on top side or spins cubes or spin gears or takes apples out of center; must use at least 2 sides (top of cube does count as a side)

Age Determination:

Manufacturer's suggested age	12 mos-2 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Children have the fine motor skills needed to grab onto the beads in a bead maze and guide them through a simple path, spin gears and cubes on dowels, and attach pieces onto chunky pegs by 12-18 months. Cognitive skills in language development at this age will also permit the child to label the beads if they are in the shape of familiar objects, such as cars, dogs, and ducks.

Toy #27: Bead and Elastic Squeeze Toy

Brief Toy Description	Rods with multicolored bright balls on the ends that are connected by black elastic. Can be squeezed into different shapes.
Packaging	Cardboard box
Materials	Elastic
	Wood
Other Features	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

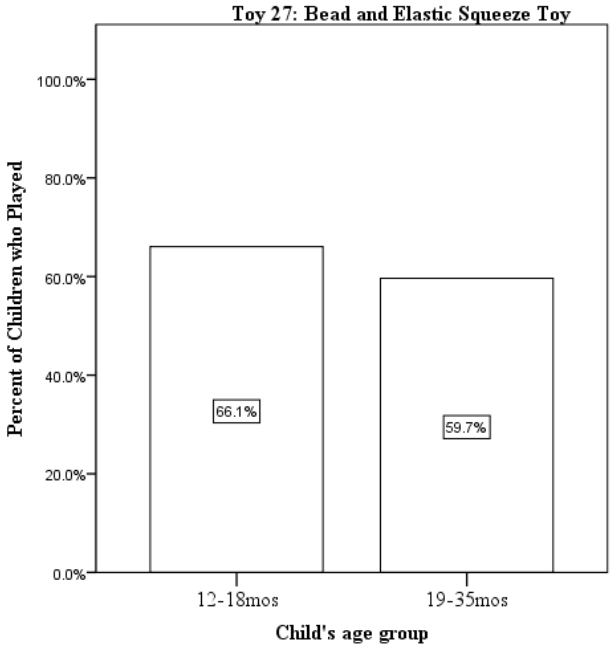
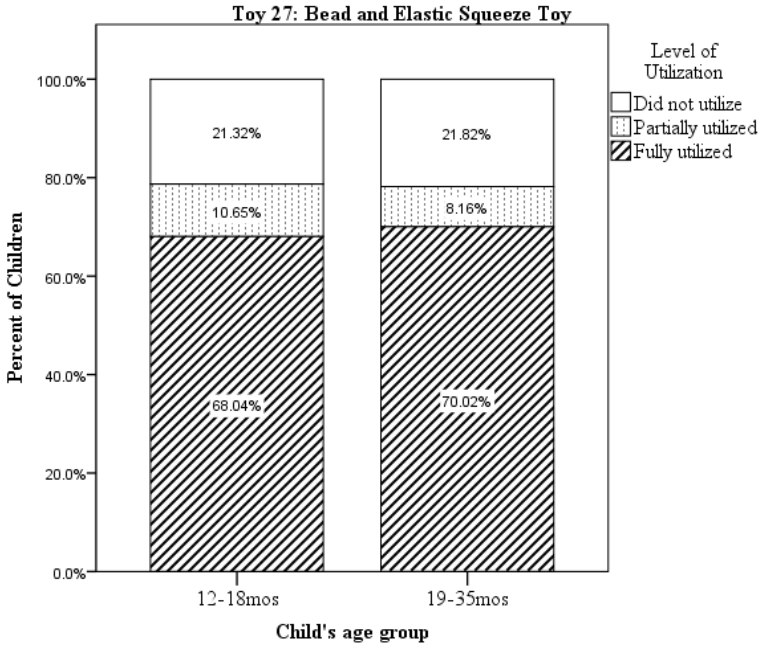


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or sits on toy
- *Partially utilizing:* Touches or pats the toy
- *Fully utilizing:* Shakes or moves beads around on bands or squeezes toy

Age Determination:

Manufacturer's suggested age	0 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 12-18 months, children are capable of controlled grasping and releasing, pushing, pulling, squeezing, patting, poking, and shaking, and can twist, turn, slide, and crank toys. Toys that combine these options are especially appealing—such as this squeezable ball with beads interlaced on elastic. A toy like this can be squeezed, shaken, or used for fine motor practice as the child slowly moves the beads across the elastic.

Toy #28: Large Foam Blocks

Brief Toy Description	Foam blocks (32) in pastel colors that come in multiple units of the following shapes: square, rectangle, triangle, large bridge, small bridge, and circle.
Packaging	Developmental information written on package, real photos on package, in clear, reusable plastic zipper bag
Materials	Hard Styrofoam
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

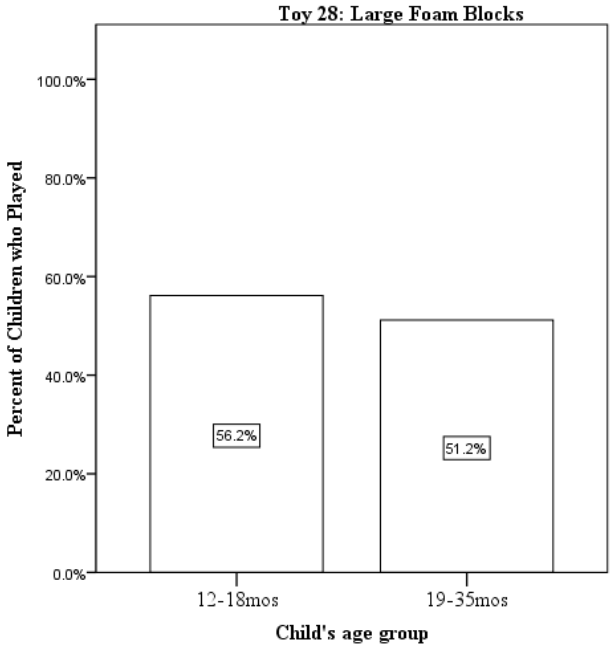
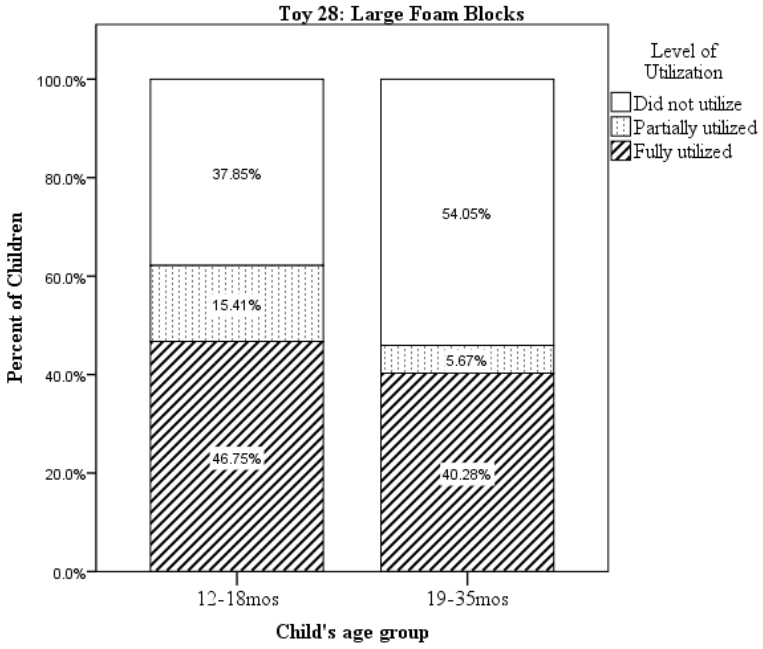


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries them around
- *Partially utilizing:* Attempts to stack or line up blocks but fails
- *Fully utilizing:* Stacks blocks or lines them up

Age Determination:

Manufacturer's suggested age	9 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Children's emerging interests in novelty and exploration characterize the 12- through 18-month period. Their curious nature is enhanced by the new ability to walk, which makes many more items available for their reach. However, walking is still unsure and wobbly, and children in this age group often fall as often as they step, particularly early on. Blocks with rounded edges make falls onto them safer. Blocks that are made from soft foam work well for meeting this need. Children are able to use their fine motor skills to stack and line up blocks at 12-18 months. If children are attempting to stack and line up blocks and are failing, the soft foam allows for mistakes without injury.

Toy #29: Chunky Interlocking Bricks

Brief Toy Description	Multicolored (green, blue, red, yellow) chunky interlocking plastic bricks (100 pieces). Shapes: four prong square, four and two prong rectangle, and single prong bricks included.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box, multilingual phrases
Materials	Hard plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

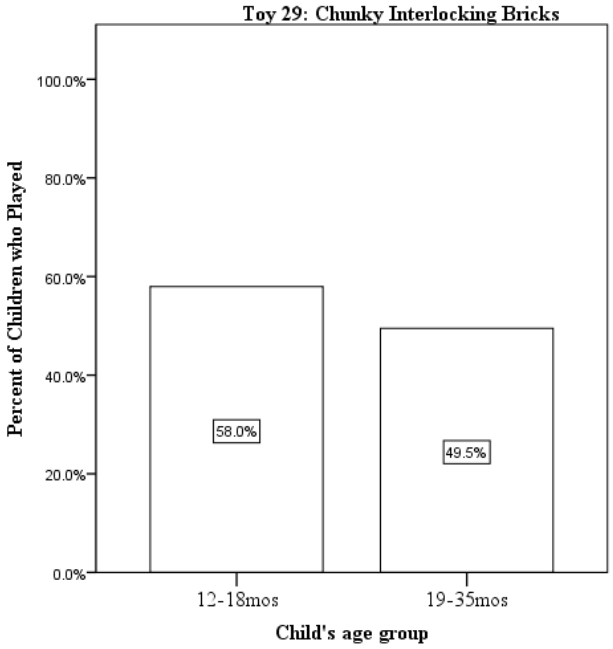
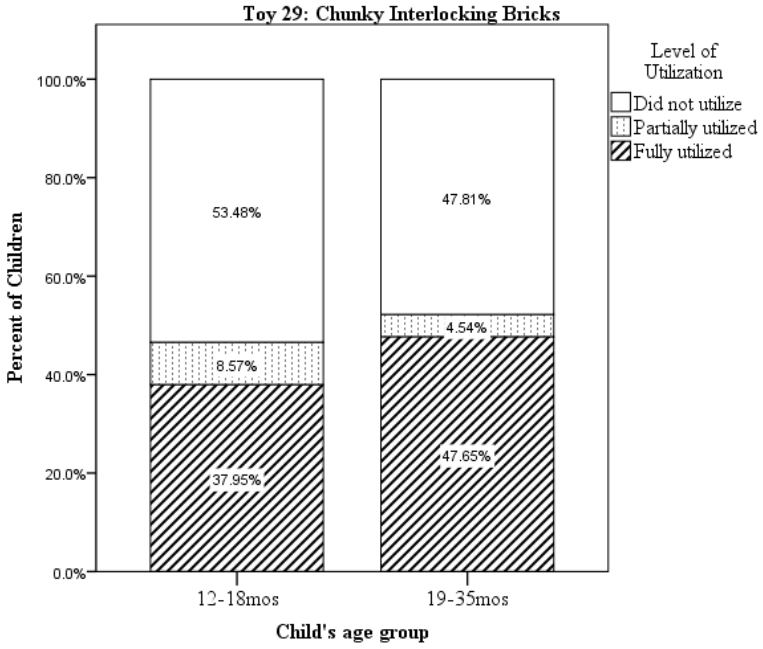


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over bin, throws bricks
- *Partially utilizing:* Attempts to interlock bricks but fails
- *Fully utilizing:* Clicks bricks together

Age Determination:

Manufacturer's suggested age	12 mos-5 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Sets of large, chunky plastic bricks that can be easily stacked or pressed together in a non-systematic way are often the earliest appropriate interlocking system for children at 19-35 months. At any earlier ages, children have trouble using fine motor and cognitive skills to align the bricks to appropriately stack them together.

Toy #30: Wooden Blocks with Internal Magnet Connectors

Brief Toy Description	Small pastel multicolored, wooden, blocks (14 pieces). Shapes: large rectangular strip, small rectangular strip, rectangle, square, triangle, diamond. Interior to the blocks are magnets so that the blocks can be stuck together.
Packaging	Real photos on package, cardboard box
Materials	Wood
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

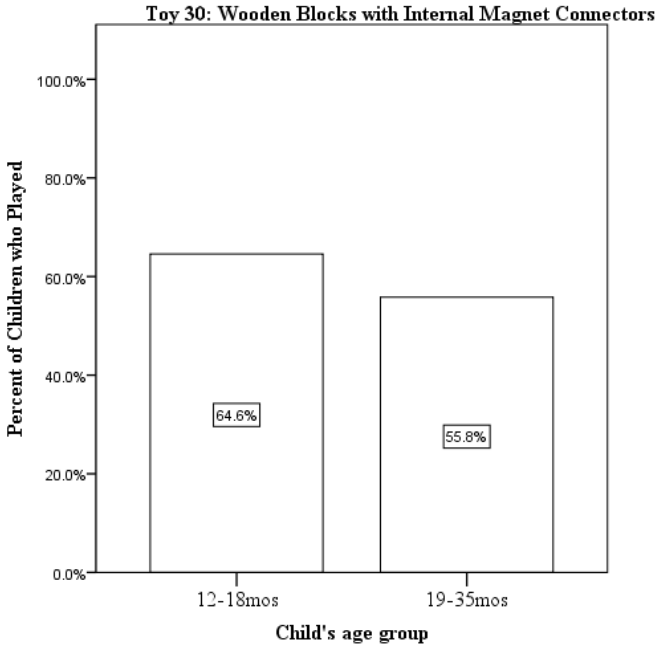
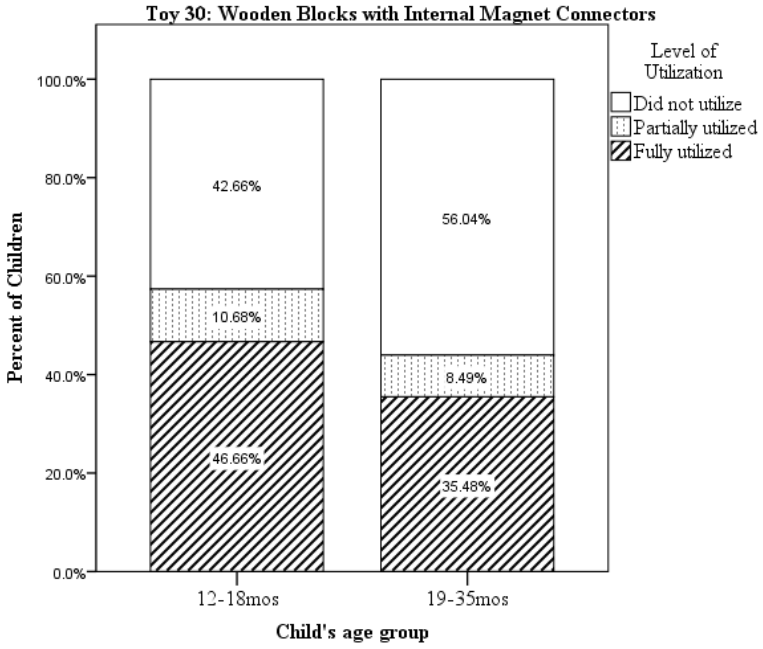


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over bin, throws blocks
- *Partially utilizing:* Attempts to put two blocks together using the magnets but fails
- *Fully utilizing:* Connects blocks on magnetic portion

Age Determination:

Manufacturer's suggested age	1+ years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By 12-18 months, children have the emerging cognitive abilities to understand that the blocks go together in a predetermined way. Although children at this age will not make predetermined structures with magnetic blocks, they find it exciting to click and unclick blocks if they have internal magnets.

Toy #31: Soft Fishing Game

Brief Toy Description	Plush "pond" with bright multicolored plush animal creatures and Velcro fishing rod that can pick up the 6 objects (star and fish shaped objects).
Packaging	Developmental information written on package, real photos on package, cardboard with plastic window
Materials	Soft plastic
	Fabric
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	2
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

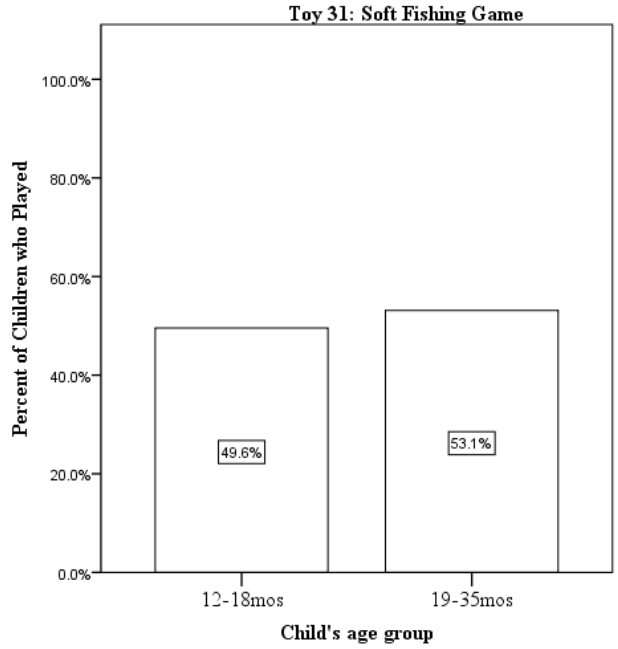
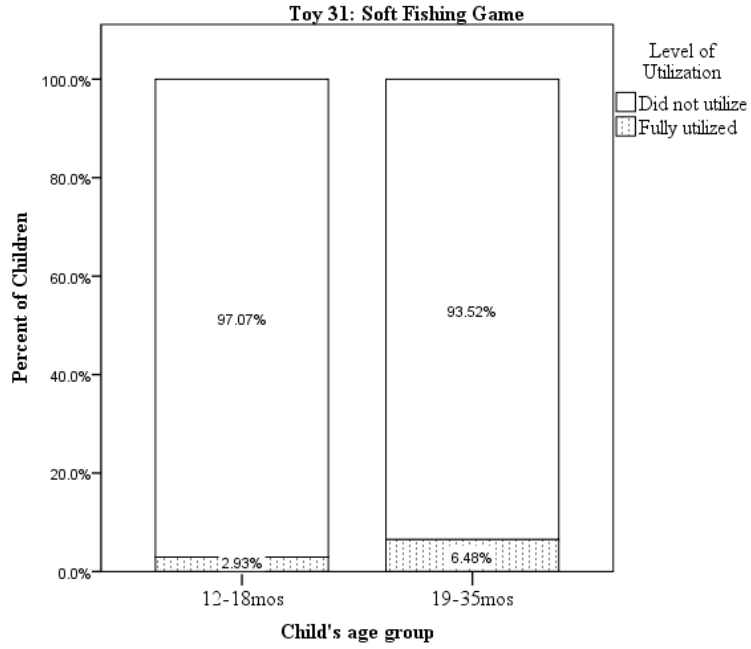


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps shapes out of pond, throws objects
- *Partially utilizing:* Child attempts to catch a fish or object out of the pond but fails (i.e., child could not align Velcro with objects just right).
- *Fully utilizing:* Uses fishing pole to "catch" fish out of little pond

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Recommended age group	Insufficient data
Utilization report	Due to low utilization rates in both age groups tested, it is not suitable to suggest an appropriate age for this toy.
Justification for recommended age group	Very few children, even in an age group higher than the manufacturer's suggested age, were able to utilize this toy. Under the age of three, the concept of using a rod to catch and pick up soft plush objects is too difficult and impractical given fine motor skills that are not fully developed. Other activities at this age are more enticing, especially when children can grab the objects and dump them out (an appealing activity at 12-18 months) and use them in the beginning of pretense play at 19-35 months. The combination of the inability to use fine motor skills before age 3 to pick up the pieces, combined with the mixed message that the plush pieces send as a manipulative or pretend play toy likely makes this toy more appropriate for older children.

Toy #32: Puzzle with Chunky Knob Handles

Brief Toy Description	Wood puzzle with a green inset frame, three large puzzle pieces in the shape of a monkey, tiger, and black toucan. Each of the pieces has a knob handle.
Packaging	Cellophane/ plastic bag
Materials	Wood
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

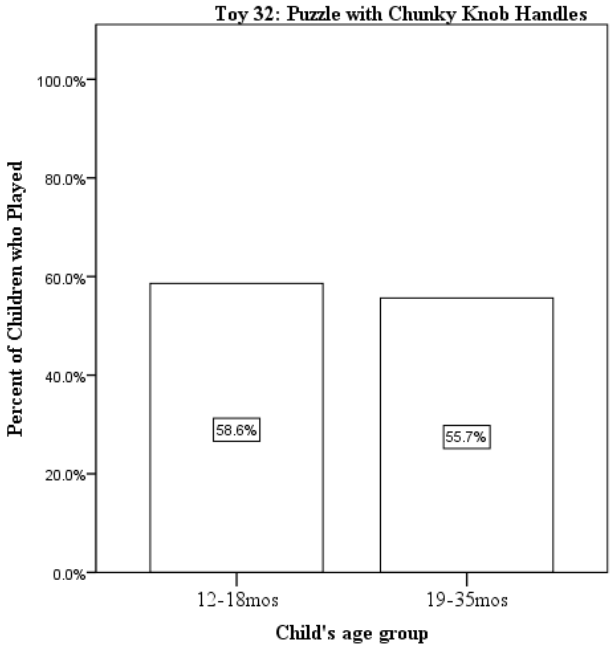
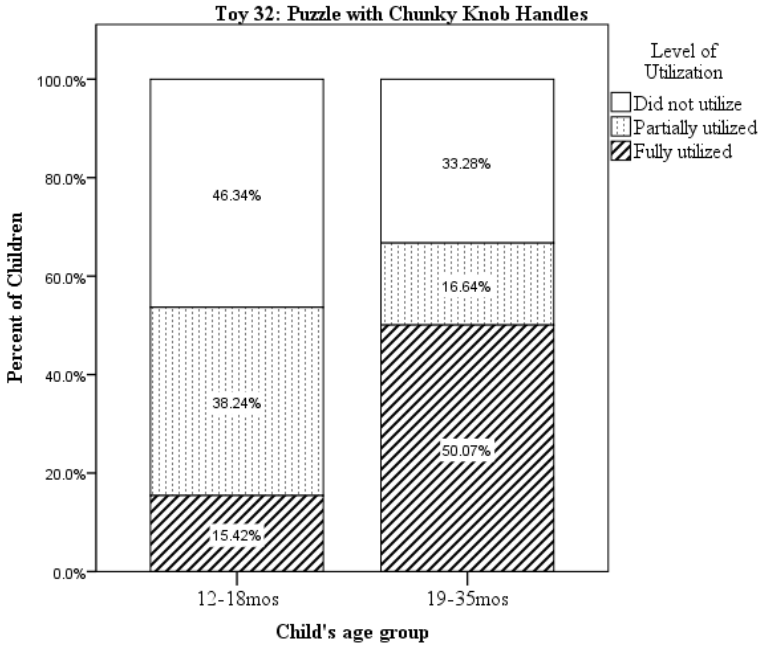


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps pieces out of puzzle, throws pieces
- *Partially utilizing:* Child takes a piece out of the puzzle and tries to stick the piece back in but fails (e.g., child tries to put the monkey piece into the lion notch in the puzzle, or tries to put the monkey piece in the monkey notch but the monkey is turned the wrong way).
- *Fully utilizing:* Removes piece(s) and puts back into appropriate places

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By 19-35 months, children can complete inset puzzles that have individual pieces with distinctive shapes to emphasize visual cues. Knobs on the puzzles allow the child to rotate the puzzle piece in place without having to move their fingers. At younger ages, children's cognitive skills lead them to struggle with aligning the puzzle pieces correctly into the wells.

Toy #33: Egg Puzzle

Brief Toy Description	Yellow carton with six plastic eggs (red, orange, yellow, green, blue, purple) inside. Eggs have removable shell lids with faces that match the faces on the eggs. Each of the eggs has a unique shape (star, cross, circle, square, triangle, heart) on the bottom that can only fit into one of the wells in the carton.
Packaging	Developmental information written on package, real photos on package, multilingual phrases
Materials	Hard plastic
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

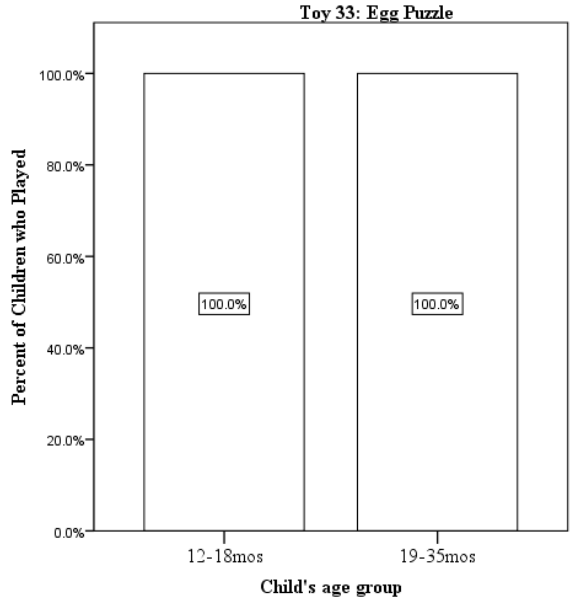
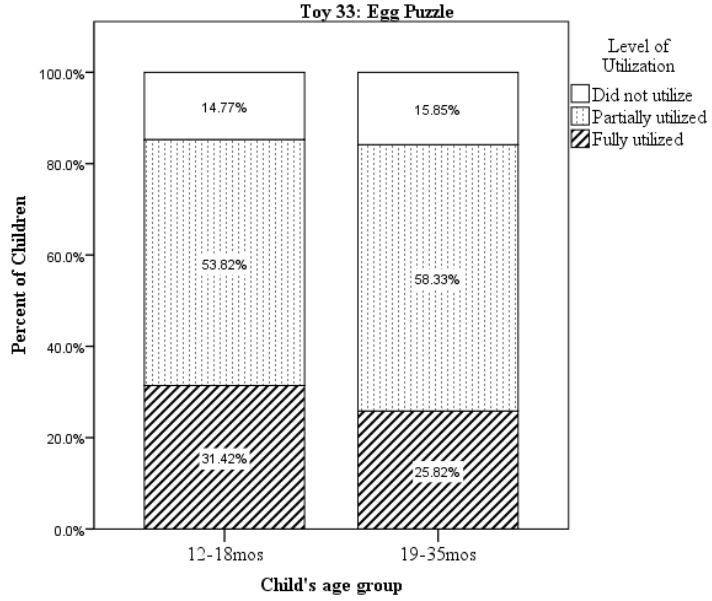


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Lifts egg out of well but does not attempt to put it back in the puzzle, OR dumps all the eggs out
- *Partially utilizing:* Lifts egg out of well and puts it back in the wrong well, OR lifts egg out and attempts to put it in a well but child is unable to make it fit in, OR takes shell off and on an egg, OR presses the inside of the egg up and down so that it squeaks.
- *Fully utilizing:* Takes one of the eggs out of its place and puts it back where it belongs (note that the bottoms of the eggs have a special shape that fit into the wells of the egg carton)

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 12-18 months, figurine puzzles are appealing and age appropriate if the figurines are chunky and easy to grip (to accommodate rudimentary fine motor skills at this age). If unable to align figurines back into wells, children will still enjoy exploring qualities of the figurines themselves (e.g., their noisemaking potential).

Toy #34: Animal and Letter Spinning Sphere

Brief Toy Description	A white sphere on a blue stand with a colorful spinning wheel in middle. Narrator recorded on toy calls out letters and animals. Animals are matched to the letter they start with. Has a slot on the wheel for each of the letters of the alphabet.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (animal noises)
	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

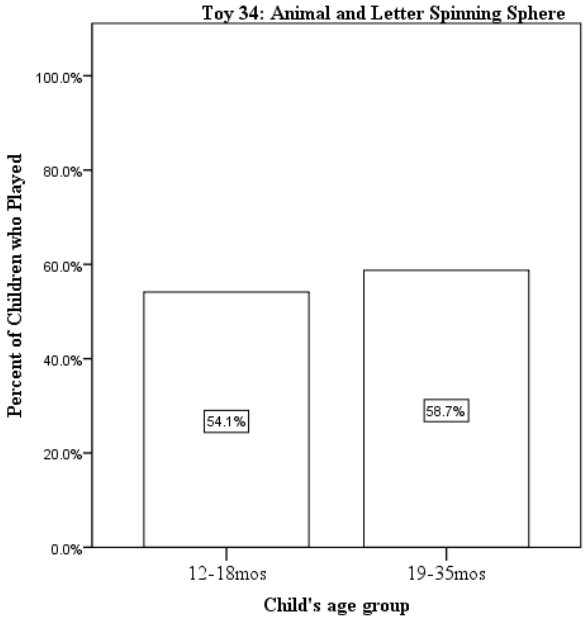
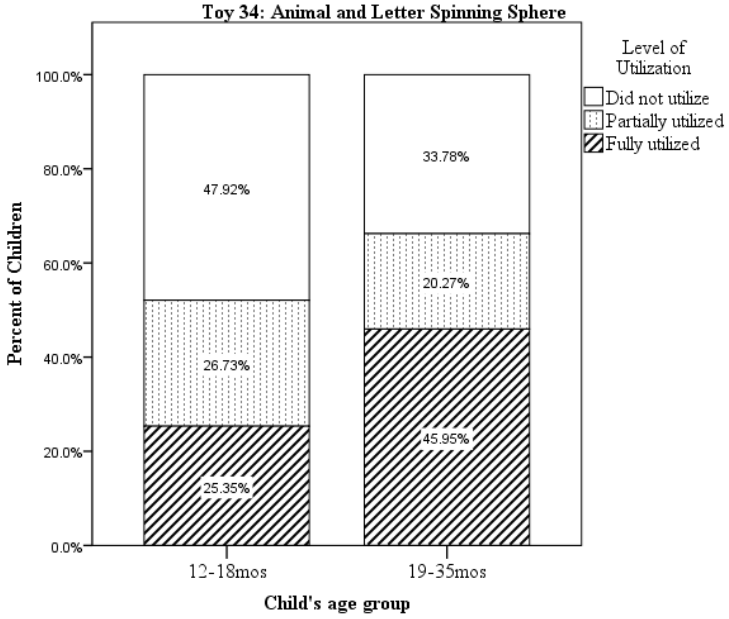


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws/carries around the sphere
- *Partially utilizing:* Looks at letters or animals on sphere, but doesn't say words and does not spin sphere OR child just spins sphere but does not pause to look/listen to letters/animals
- *Fully utilizing:* Looks at the letter or animals and spins sphere OR points to either a letter or animal and says the word for it

Age Determination:

Manufacturer's suggested age	6 mos-3 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 19-35 months, simple electronic-teacher and other learning toys that teach colors, shapes, animals, letters, and numbers are suitable, especially when activated by buttons or a child's hand movement. Children at younger ages may lack the cognitive skills to absorb the content produced through these electronic-teacher toys at younger ages, and may be too interested in the cause and effect functionality of the buttons to listen to what the machine is saying instead of pausing to absorb the content.

Toy #35: Vocabulary Board Book

Brief Toy Description	Red board book with colorful squares and objects on the front cover. Interior of book provides pictures of objects and a word label written underneath them.
Packaging	No packaging
Materials	Cardboard
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

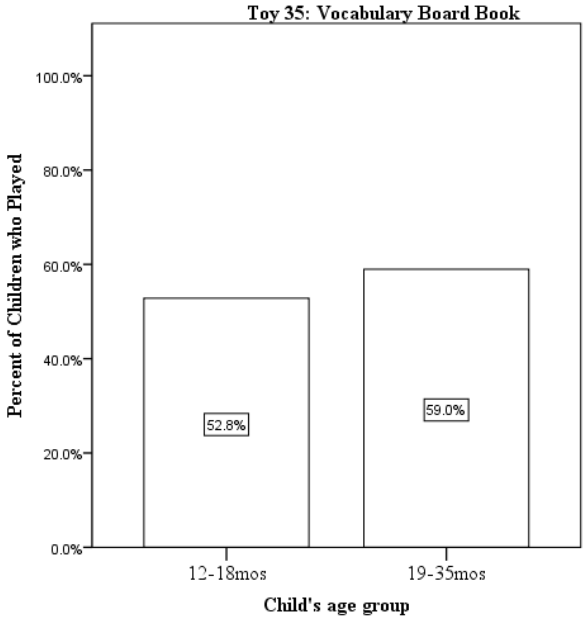
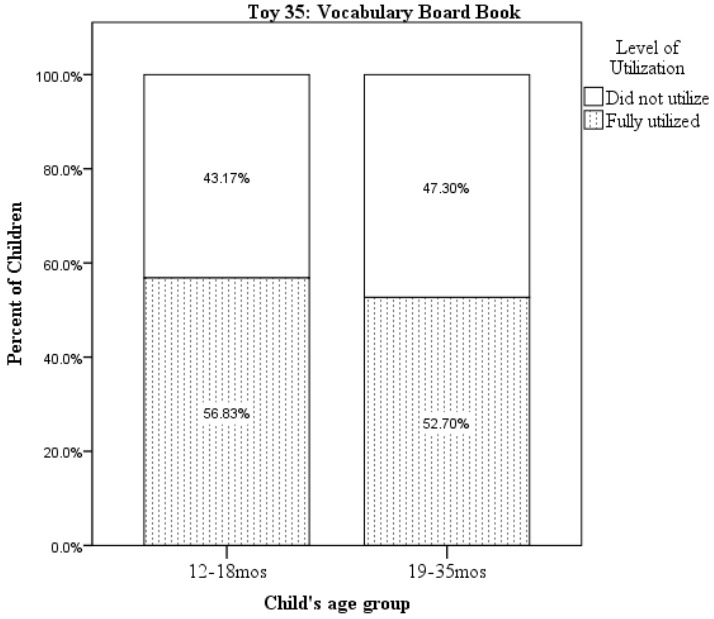


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws/carries the book around
- *Partially utilizing:* Looks at interior of the book OR touches the items on the page, OR turns the pages, *but book is not oriented the right way*
- *Fully utilizing:* Looks at the interior of the book or touches the items on the page or label an object after looking at it, OR turns pages of the book; book should be oriented the right way.

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, vocabulary books are pleasing to children. As children's cognitive skills and one-word utterances expand during this age group, they will enjoy pointing to these familiar objects in books and labeling them aloud.

Toy #36: Play Touchscreen Phone

Brief Toy Description	Blue and white plastic cell phone with a fake touchscreen on the front. The screen depicts a number of 'app' buttons and one conventional button.
Packaging	Developmental information written on package, cartoon illustrations on package, cardboard box
Materials	Hard plastic
	Soft plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Includes licensed character
	Includes a face (two-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

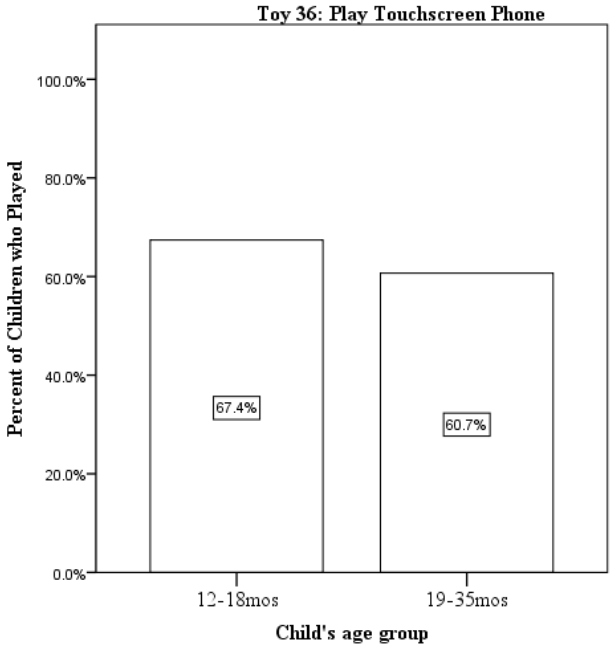
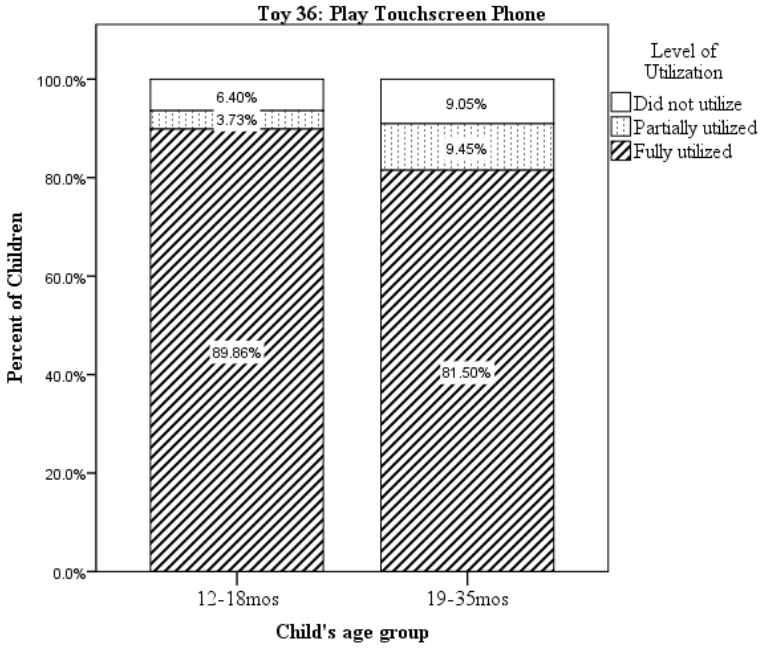


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws phone
- *Partially utilizing:* Looks at phone but does not press buttons
- *Fully utilizing:* Pushes blue button or square buttons

Age Determination:

Manufacturer's suggested age	18 mos-4 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, children have the rudimentary fine motor skills to use play cell phones with fake touchscreen square 'app' buttons and they can also press a conventional button. Children will spend a fair amount of their time pressing the buttons repeatedly to hear the electronic sounds that come from the phone.

Toy #37: Push Toy

Brief Toy Description	Blue and green push toy with wooden handle. Has three plastic cylinders that move when the toy is pushed, causing pieces inside to rattle. The pieces inside are yellow, green, orange, red, and blue triangles, squares, and balls.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
	Wood
Other Features	Produces sound (operational noise)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	5
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

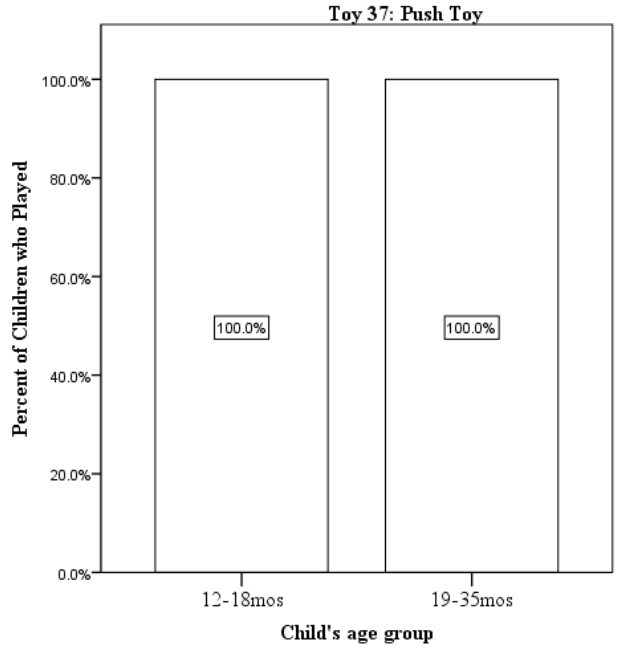
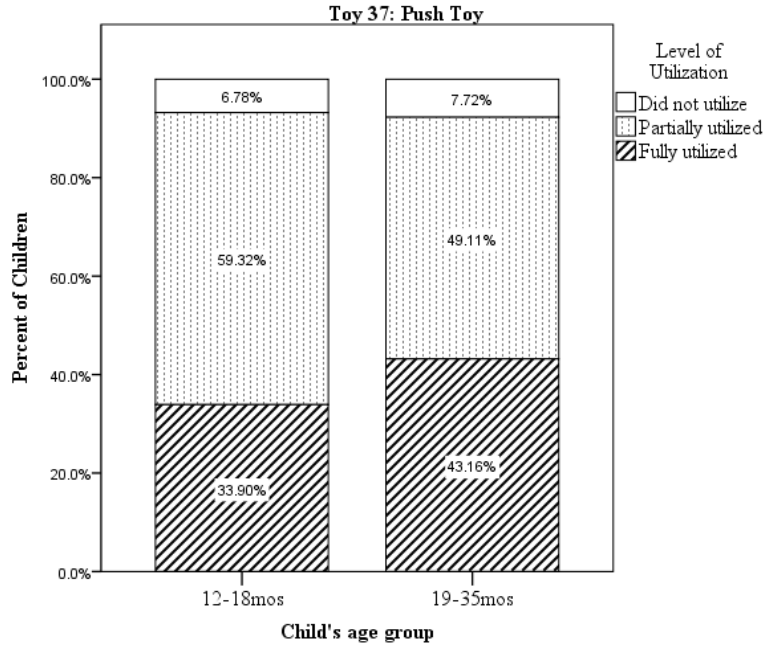


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child turns toy upside down
- *Partially utilizing:* Child uses hand to roll around cylinders and watches the balls move inside OR tries to push the toy but not with the handlebars (e.g., child pushes it from the wrong side)
- *Fully utilizing:* Holds on to the handlebar and pushes or walks with toy

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 12-18 months, emerging gross motor skills allow for the ability to walk with a push toy. Children can use push toys with high upright handles or rigid rods with large attached handles, and they can be used to help stabilize unsteady walkers. If the child is not yet walking at this age, they are able to use other features of the push toy (e.g., manipulating other objects on the side of the toy).

Toy #38: Basketball and Soccer Combination Sport Center

Brief Toy Description	Yellow, green, and blue mini plastic basketball hoop and soccer net (corresponding balls on each side). Three interactive buttons, a flap, and a gear are on front of toy. Illustrations of animals are all over toy.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Inflated plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	5
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	4
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

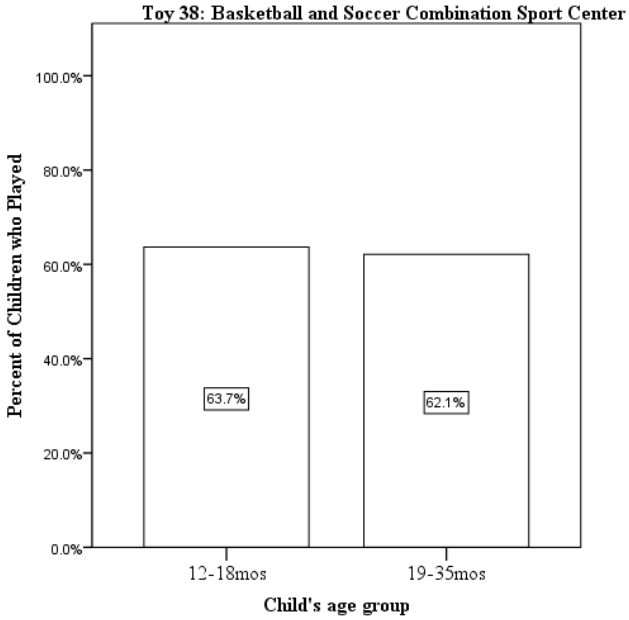
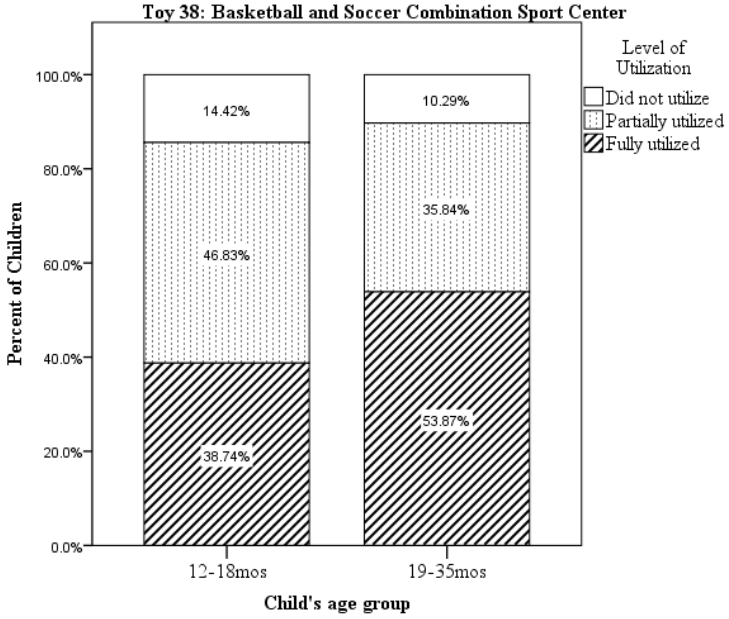


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child knocks over sport zone OR child spends whole time pressing buttons on side of sport zone
- *Partially utilizing:* Child throws, pushes, rolls, chases or kicks balls but does not try to put the ball through the hoop or kick into net, OR child tries to put the ball into the hoop or kicks into the net but misses
- *Fully utilizing:* Either kicks the ball into the goal or puts the ball through the hoop (does not matter if it is the soccer or the basketball)

Age Determination:

Manufacturer's suggested age	12 mos-3 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, children can use small combination sport centers and accompanying balls, as they are learning how to place balls through hoops at this age as their coordination and gross motor skills develop.

Toy #39: Small Indoor Slide

Brief Toy Description	Yellow and blue slide with basketball hoop on one side and hanging baseball on the other side. Comes with a basketball and a baseball bat.
Packaging	Real photos on package, cardboard box, multilingual phrases
Materials	Hard plastic
	Inflated plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	5
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

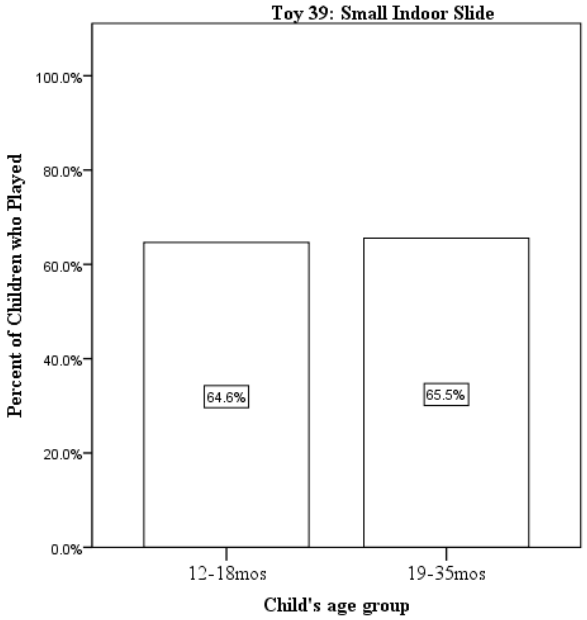
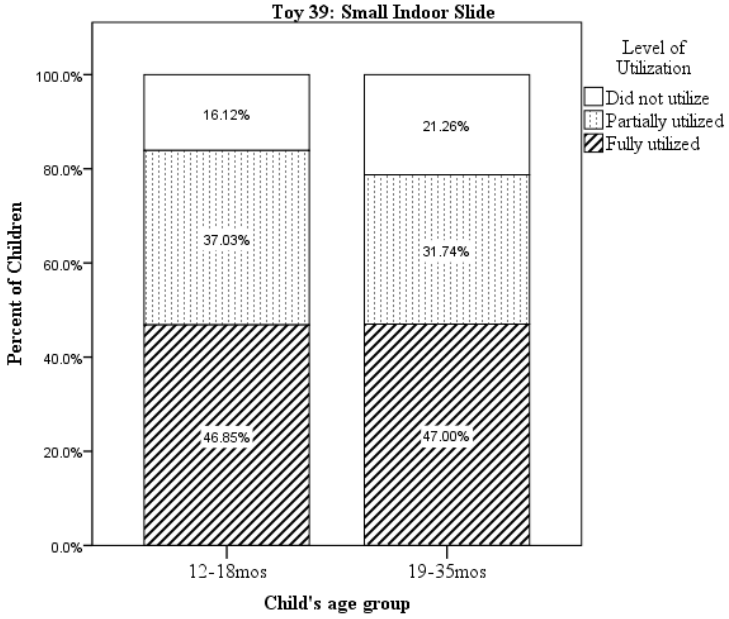


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child pushes it around the room, touches or pats it or grabs the bat and spends the whole time banging the bat against alternate surfaces in the room
- *Partially utilizing:* Child spends all of his or her time with the bat/baseball and the basketball/hoop OR child walks up the slide end of the toy and tries to get off the toy using the stair part (i.e., the child approaches it backwards)
- *Fully utilizing:* Walks up the stairs and slides down the slide

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Play equipment is very enjoyable for children starting at 12-18 months, including very short slides. Children's use of slides may need adult assistance at first, as some children may need to be taught how to enter the slide from the correct direction and slide down (children may not yet have the cognitive skills to realize that a slide is not intended for use as a ramp for crawling up).

Toy #40: Play Vacuum

Brief Toy Description	White vacuum with purple handle. Three interactive buttons (yellow, red, green) on front.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (music)
	Produces sound (human voice)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

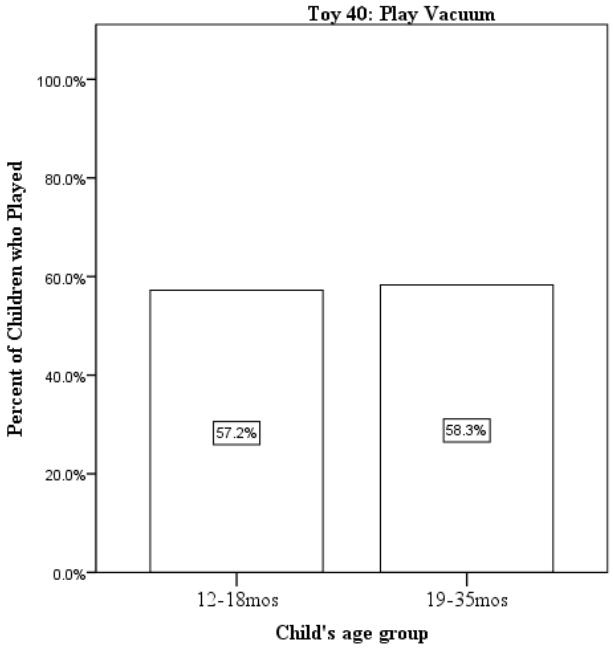
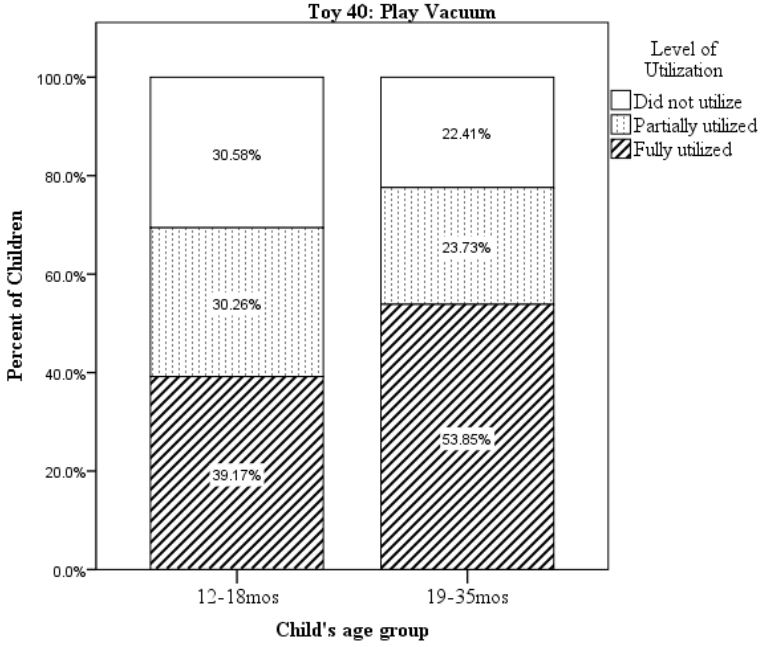


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Carries or throws vacuum around OR child presses the buttons the whole time
- *Partially utilizing:* Pushes vacuum around, but does not hold it correctly to mimic a real vacuum (e.g., child grabs it by the white part and pushes it around)
- *Fully utilizing:* Holds the top and pushes around (like a real vacuum)

Age Determination:

Manufacturer's suggested age	12 mos-3 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By the time a child reaches 19-35 months, they have developed the cognitive skills needed to step outside the bounds of reality and pretend with a prop like a vacuum. Prior to this age group, children may have some difficulty using these tools as pretend play tools and may strictly engage in exploratory play with them without any symbolism. Children at younger ages may also have difficultly balancing this vacuum while pushing and walking at the same time.

Toy #41: Tea Set

Brief Toy Description	Blue, yellow, and red plastic tea set with tea pot (1), cups (4), saucers (4), and spoons (4), sugar dish (1), cream pourer (1).
Packaging	Cardboard box
Materials	Hard plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

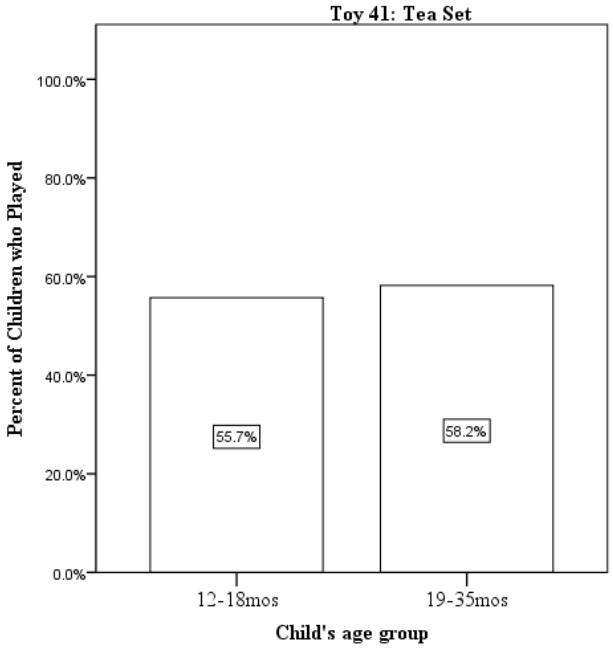
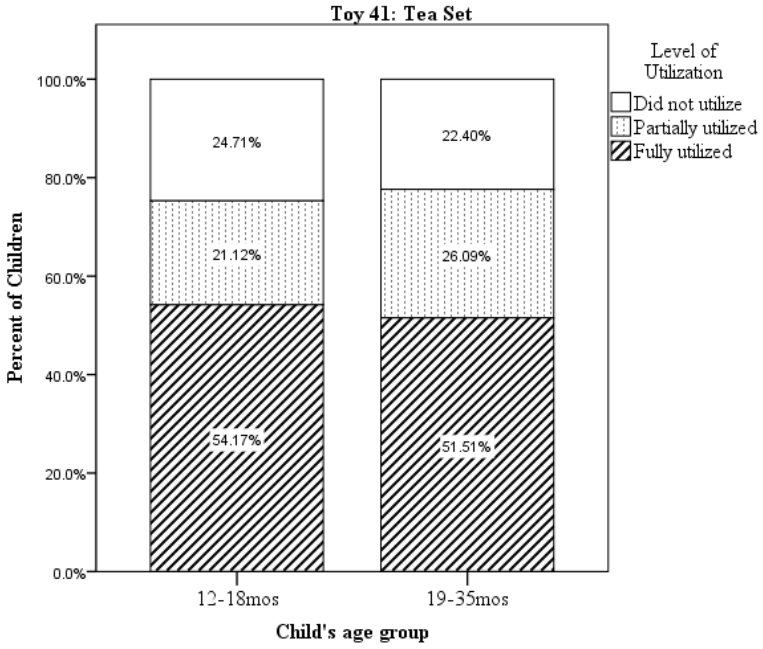


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Bangs cups against table to make noise, carries or throws pieces
- *Partially utilizing:* Puts the lid on the sugar cup, puts a cup on a saucer (i.e., child arranges the pieces meaningfully but never appears to pretend with the objects)
- *Fully utilizing:* Pretends to pour or drink or stir with spoon or feed oneself or something else with a mouth

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, children are able to readily imitate the simple actions that they have seen adults do (e.g., stir, pour, feed) with the objects available in a tea set.

Toy #42: Light Up Star Wand

Brief Toy Description	Red wand with star on top and switch on the handle. Lights up if turned on.
Packaging	No packaging
Materials	Hard plastic
Other Features	Battery operated
	Produces light
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	1
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	2
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

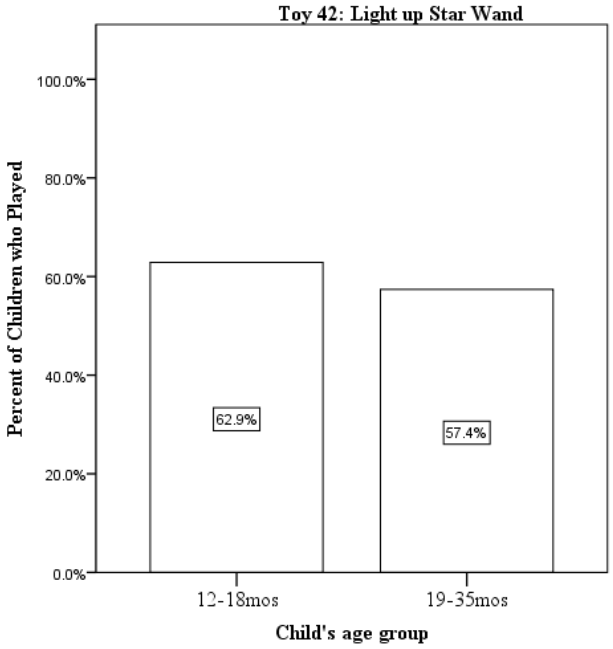
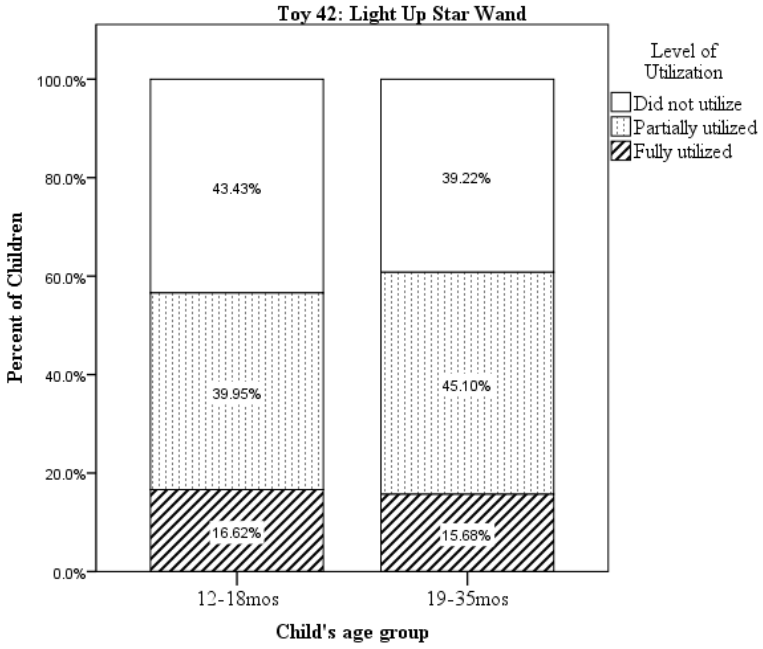


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Bangs wand against table, throws wand
- *Partially utilizing:* Holds at base and waves in air but does not turn switch to make it light up OR child spends the whole time turning the switches on but does not wave the wand
- *Fully utilizing:* Holds at base and waves in air and turns switch to make it light up

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, children can readily imitate simple actions that they have seen adults do when trying to encourage pretend play, such as waving around a magic wand. Children at this age are also capable of turning on a switch, which parents have also likely modeled for them.

Toy #43: Wooden Cars

Brief Toy Description	Three chunky green, blue, and red wooden cars with very simple illustration.
Packaging	Cardboard box
Materials	Hard plastic
	Wood
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

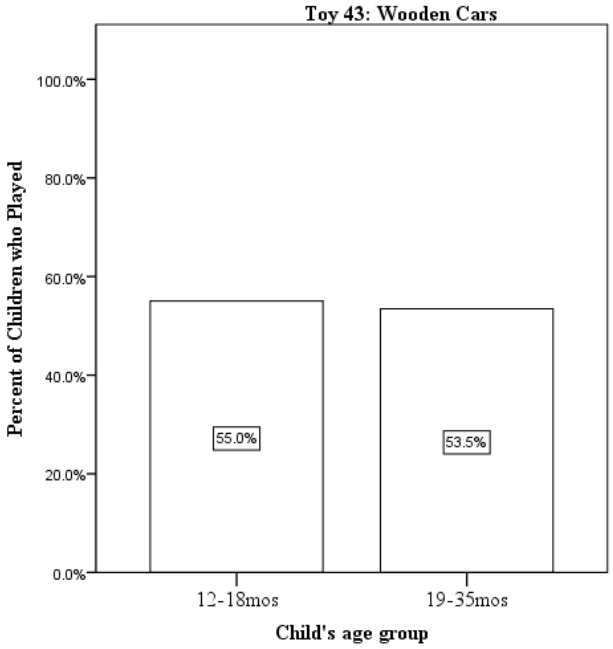
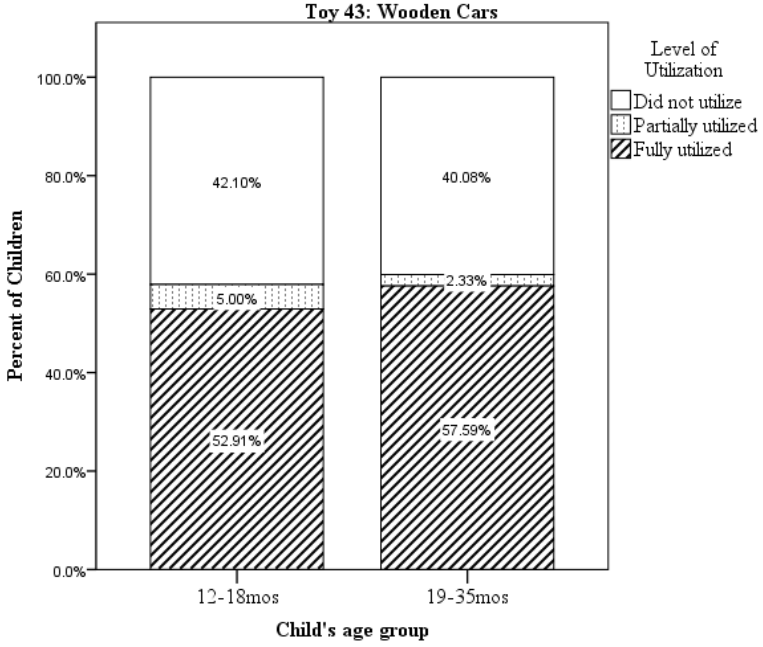


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries cars around
- *Partially utilizing:* Stacks cars on top of each other
- *Fully utilizing:* Moves car back or forth or pushes it so it rolls or moves

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, children enjoy small vehicle toys that are simple, easy to recognize, and of one-piece construction, though the wheels may spin. They are able to push these vehicles on their wheels. Because of children in this age group's tendency to mouth objects and their low degree of fine motor dexterity and control, appropriate small vehicles (such as these cars) do not have removable or loose parts.

Toy #44: Talking Monster Truck

Brief Toy Description	Chunky red monster truck with black wheels. Talks if top bottom is pressed.
Packaging	Cardboard with plastic window
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	3
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

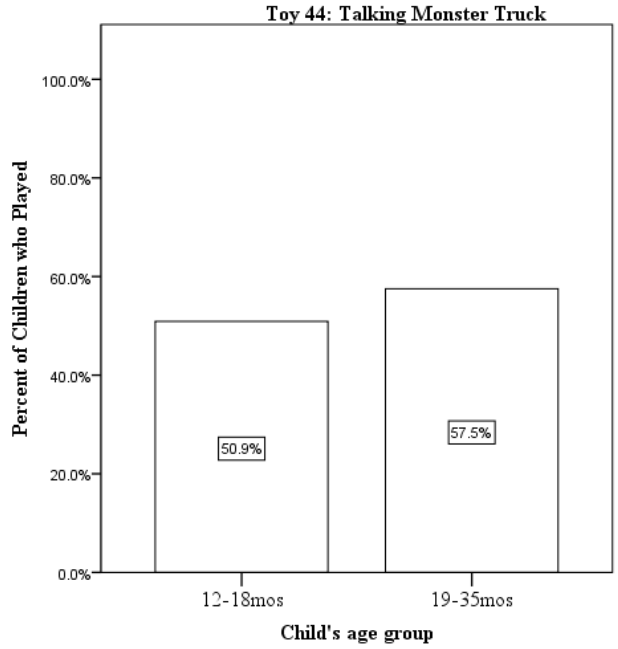
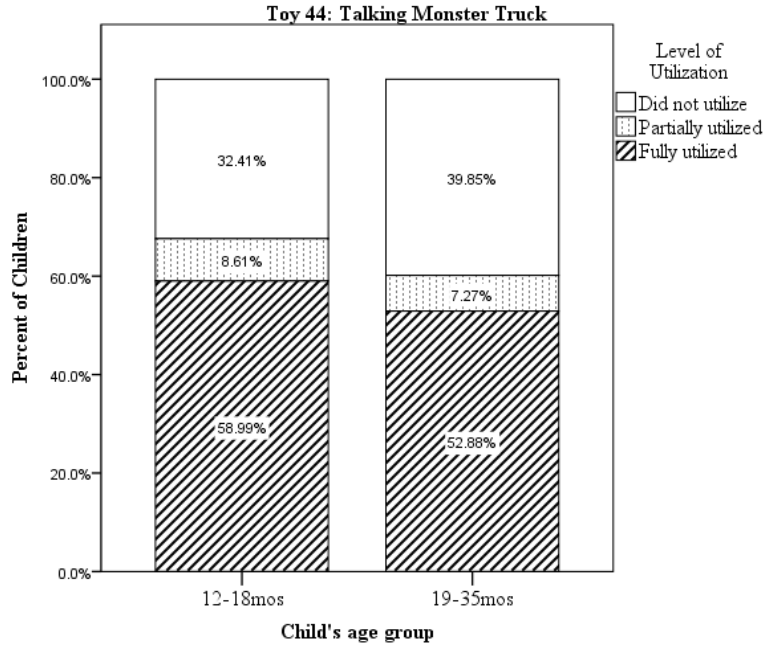


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries car around
- *Partially utilizing:* Spends whole time pressing button on the toy
- *Fully utilizing:* Moves truck back or forth or pushes it so it rolls or moves

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By 12-18 months, children are able to roll and wheel vehicles around, and they enjoy small vehicle toys with a small degree of cause and effect, such those with push buttons that produce simple sounds.

Toy #45: Car with Rattle Controller

Brief Toy Description	Red car with two interactive buttons on top. Comes with yellow rattle that can act as a remote controller if shaken.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (human voice)
	Produces sound (synthesized noise)
	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

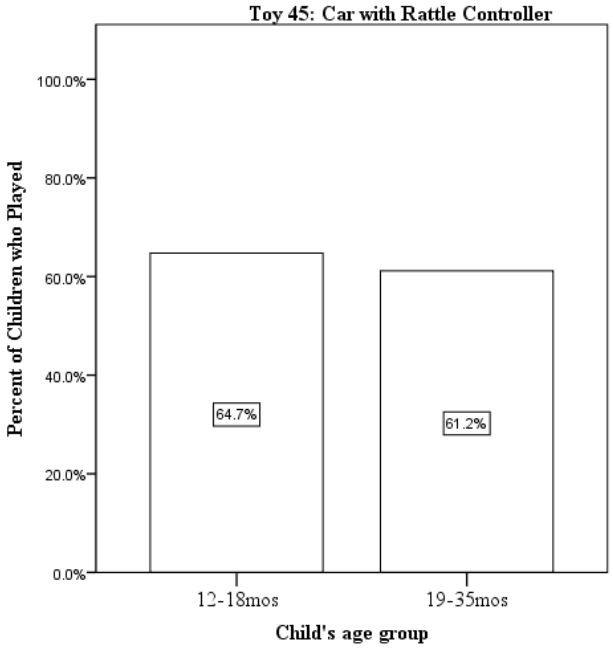
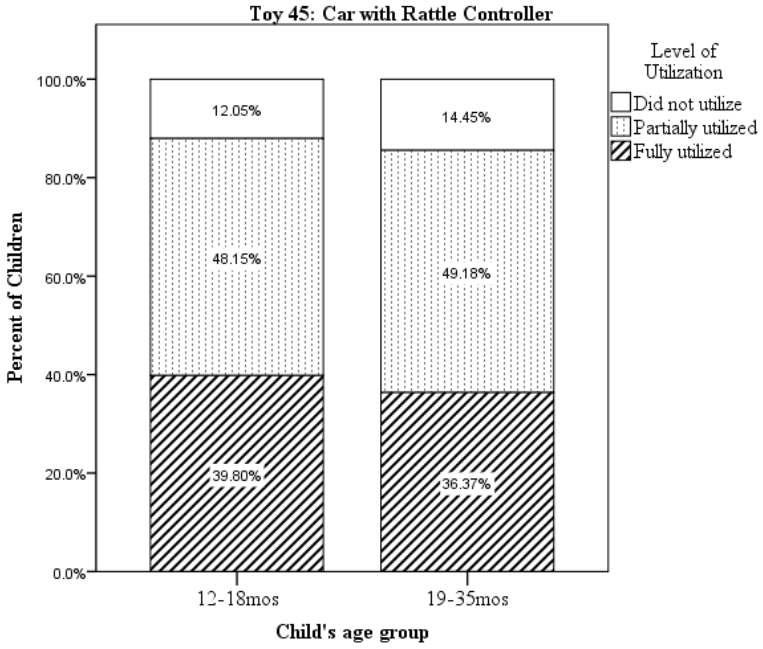


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries car around
- *Partially utilizing:* Pushes car around
- *Fully utilizing:* Presses button or shakes the rattle to make the car move (note: pushing the car around does not count as full utilization of toy)

Age Determination:

Manufacturer's suggested age	6 mos-3 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 12-18 months, cognitively, children are able to understand that the shake of a rattle or the press of a button on a remote control causes the vehicle to move.

Toy #46: Animal Marker

Brief Toy Description	Small black and white plastic cow. Top can be removed to reveal marker. Only creates color on special paper.
Packaging	Developmental information written on package, real photos on package
Materials	Hard plastic
	Sponge
	Paper
Other Features	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

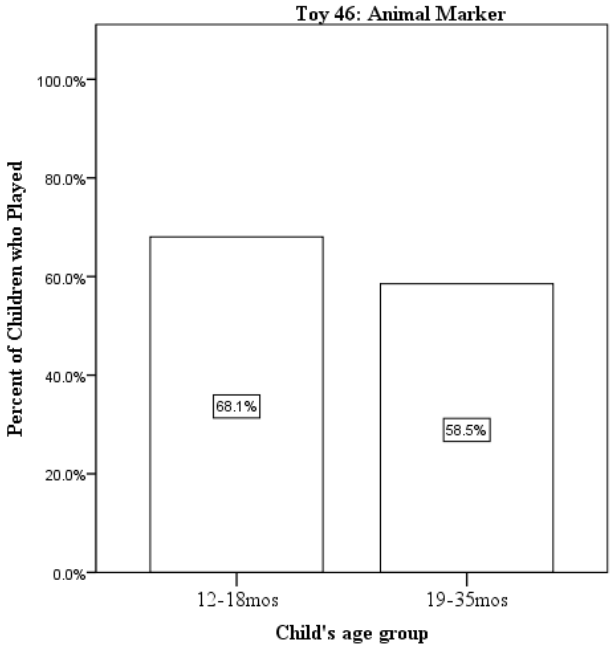
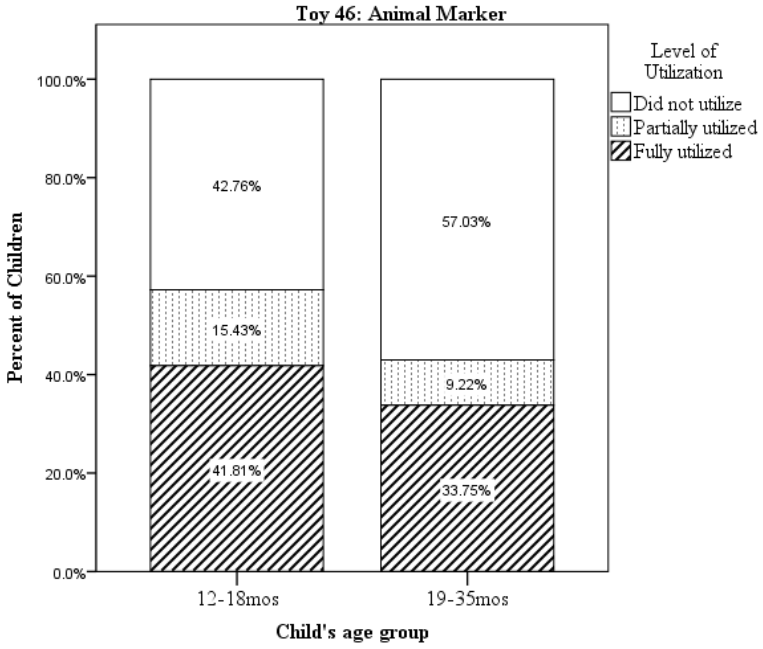


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Sticks marker in mouth or uses the animal as a figurine instead of a marker
- *Partially utilizing:* Holds with hand but does not make marks on the paper OR uses marker on another surface that is not the special paper
- *Fully utilizing:* Holds with hand and makes a mark(s) on the piece of paper

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Markers in the shape of animals are easy for children to grip at 12-18 months. At this age, children's fine motor skills are rudimentary, but they are able to scribble with these chunky writing utensils instead of playing with the markers as manipulative play objects, as they may at younger ages.

Toy #47: Gel Art Board

Brief Toy Description	Blue and orange board. Side has blue gel surface that creates patterns if pressed with finger.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Jelly
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

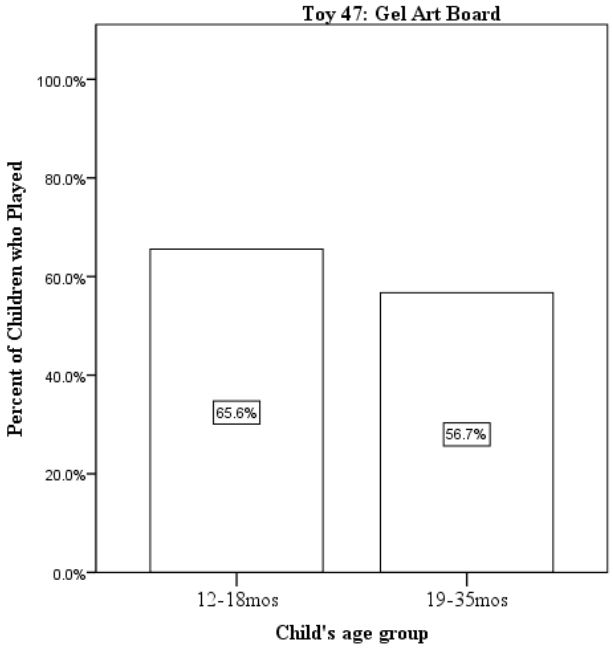
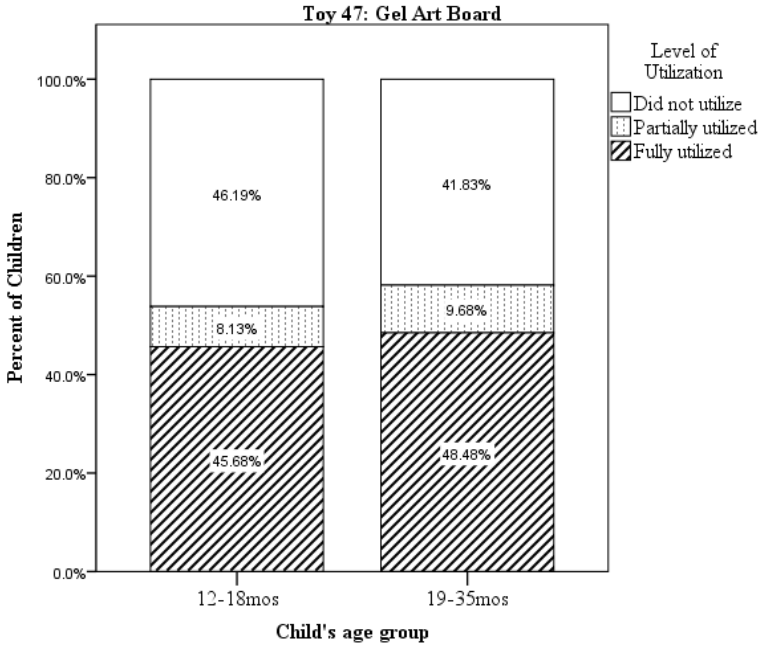


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws doodle board around the room or bangs it on the end table
- *Partially utilizing:* Child pats the blue goo without making purposeful mark or design
- *Fully utilizing:* Uses finger or whole hand to press or feel the blue goo in the board to make line, mark, or shape

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 12-18 months, children can hold tablets in their lap that have gel inside and can make designs using their finger or a stylus. Using fingers to make designs is appropriate at this age because it accommodates limited fine motor skills.

Toy #48: Spherical Crayons

Brief Toy Description	Three egg-shaped objects (blue, yellow, red) that are crayons. Presented with a lap desk and paper.
Packaging	Developmental information written on package, cartoon illustrations on package, cardboard with plastic window
Materials	Hard plastic
	Paper
	Wax
Other Features	None
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

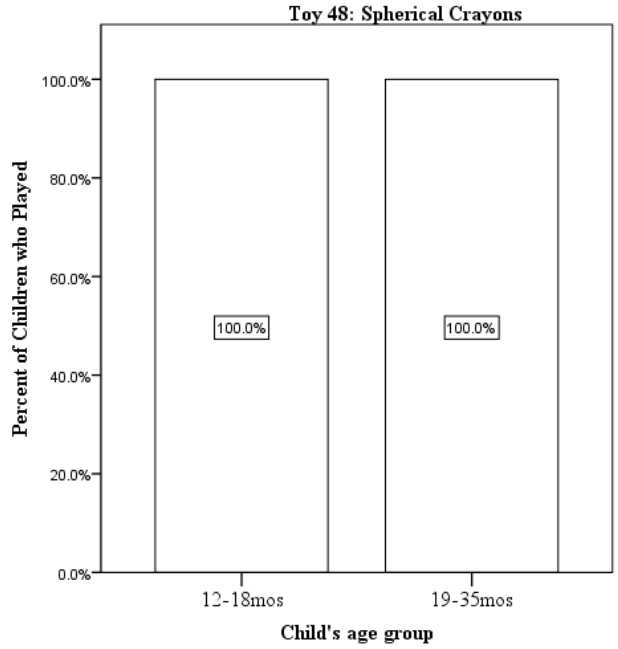
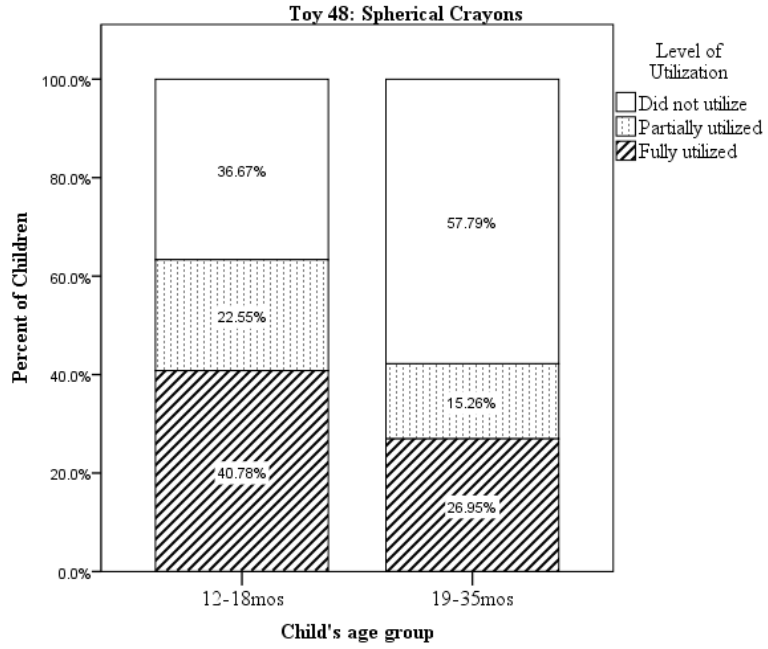


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Sticks crayon in mouth or uses the crayon as a ball instead of a crayon
- *Partially utilizing:* Holds with hand but does not make marks on the paper OR uses crayon on another surface that is not the paper
- *Fully utilizing:* Holds with hand and makes mark(s) on the paper

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Crayons in the shape of eggs are easy for children to grip at 12-18 months. At this age, children's fine motor skills are rudimentary, but they are able to scribble with these chunky writing utensils instead of playing with crayons as manipulative play objects, as they may at younger ages.

Toy #49: Xylophone

Brief Toy Description	Small wooden xylophone with 5 rectangular keys (rainbow color pattern; red, orange, yellow, green, blue) with wooden stick.
Packaging	Developmental information written on package, cartoon illustrations on package, cardboard box
Materials	Wood
Other Features	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

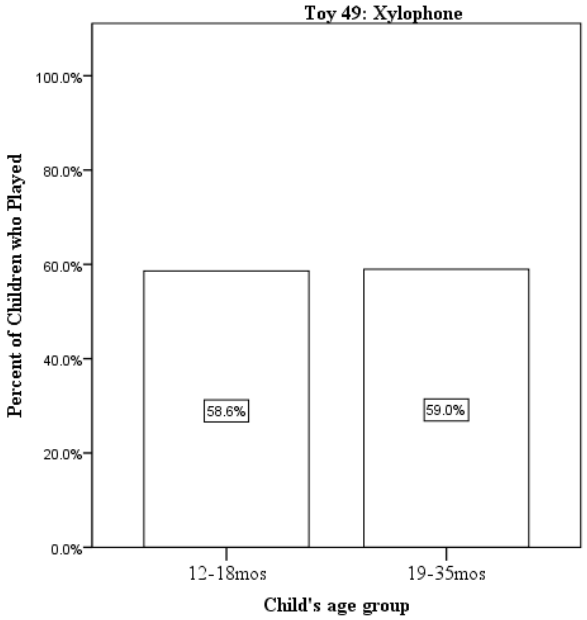
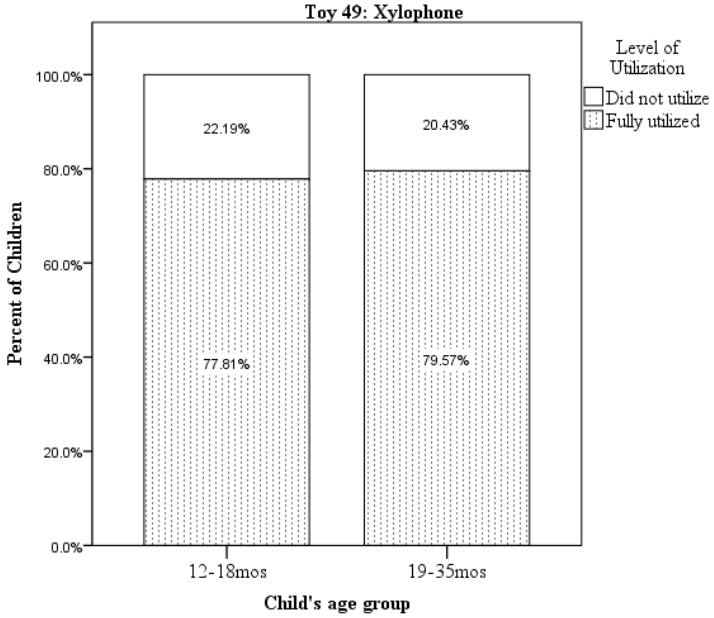


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Presses hand on tiles to feel the elastic that holds the tiles stretch, flips it upside down, or uses mallet to hit other surfaces in room like tables, couch, or other instruments
- *Partially utilizing:* Uses other objects to hit tiles OR attempt to hit the tiles with the mallet but misses
- *Fully utilizing:* Uses mallet to hit tiles to make noise

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Xylophones are most appropriate for 12-18 months because they have an exciting cause and effect functionality. They are also easy to activate with limited fine motor skills through the use of a mallet.

Toy #50: Bongos

Brief Toy Description	Two white connected barrels with red, green, blue, yellow, and orange polka dots and red accents.
Packaging	No packaging
Materials	Hard plastic
Other Features	Produces sound (synthesized noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

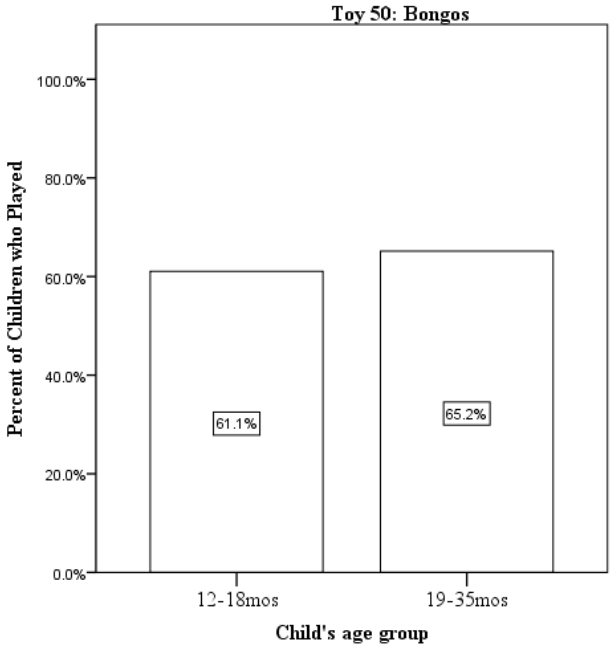
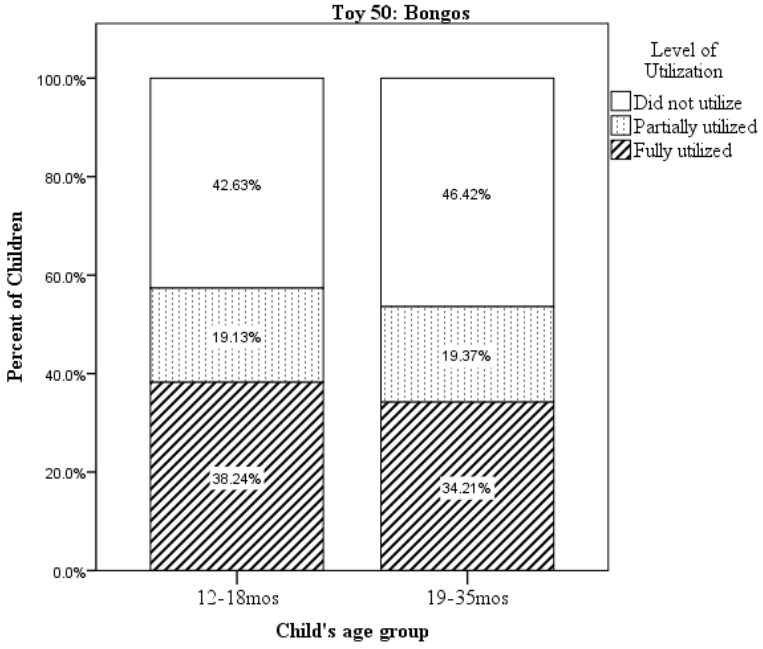


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Flips them over and starts to throw items into them like a bin
- *Partially utilizing:* Pats or rubs the drums with hands but does not make any noises OR uses another object in the room to bang on them and make noise
- *Fully utilizing:* Uses hands to hit on the tops of the drums to produce noise

Age Determination:

Manufacturer's suggested age	12 mos +
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 12-18 months, children are very interested in instruments that they can use in functional/exploratory ways such as pounding on drums or bongos. Pounding on bongos with hands is an easy activity for children's limited fine motor skills at this age.

Toy #51: Plastic Electronic Guitar

Brief Toy Description	Orange plastic guitar with yellow handle and red, green, and blue accents. Contains a spinning wheel controlled by a red button, green button, and a blue lever. Spinning wheel displays pictures of animals and a number that counts the number of animals. 3 other switches are on the front of the guitar to change the mode.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (music)
	Produces sound (animal noises)
	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

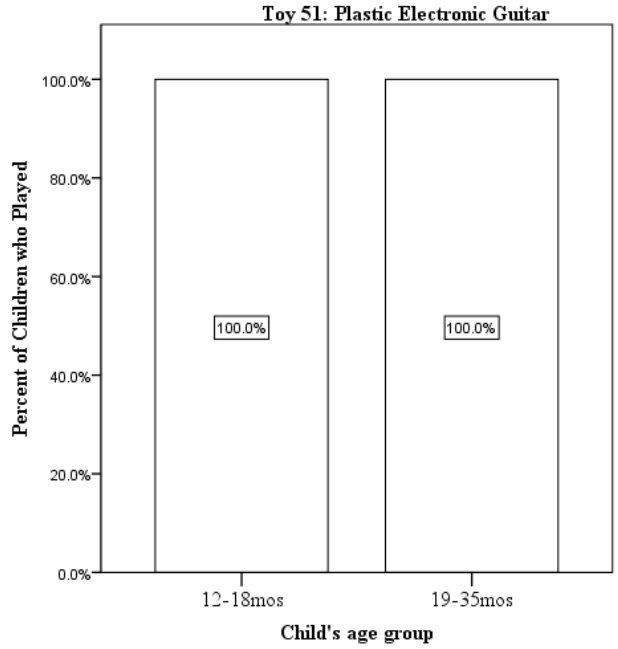
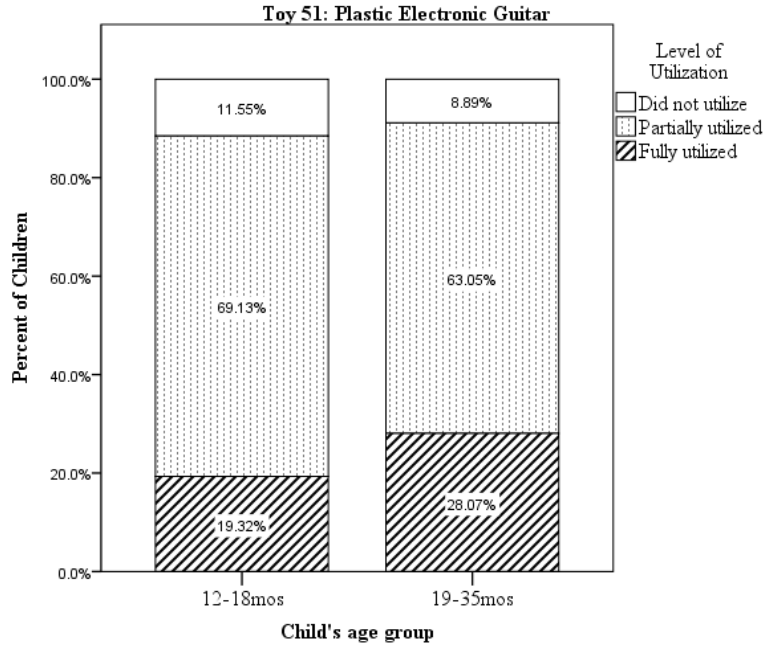


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Bangs the guitar on the end table, carries it around
- *Partially utilizing:* Only makes the spinning part go around without pressing the lever
- *Fully utilizing:* Pushes down on lever to make the spinning part spin around OR holds it like a guitar and presses one of the buttons

Age Determination:

Manufacturer's suggested age	12 mos-3 years
Hypothesized age group	12-18 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 12-18 months, children are very interested in interactive toys that have musical features like this plastic guitar activated by button pressing and lever pulling. It is easier for children with limited fine motor skills to operate at this age than a conventional guitar with strings.

Toy #52: Gear Toy

Brief Toy Description	Wood board with 7 spinning, multicolored gears (red, orange, yellow, green, blue, purple, magenta) and a black background. Gears are magnetic and can be taken off board and reattached.
Packaging	Developmental information written on package, cardboard box
Materials	Hard plastic
	Wood
	Cardboard
Other Features	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

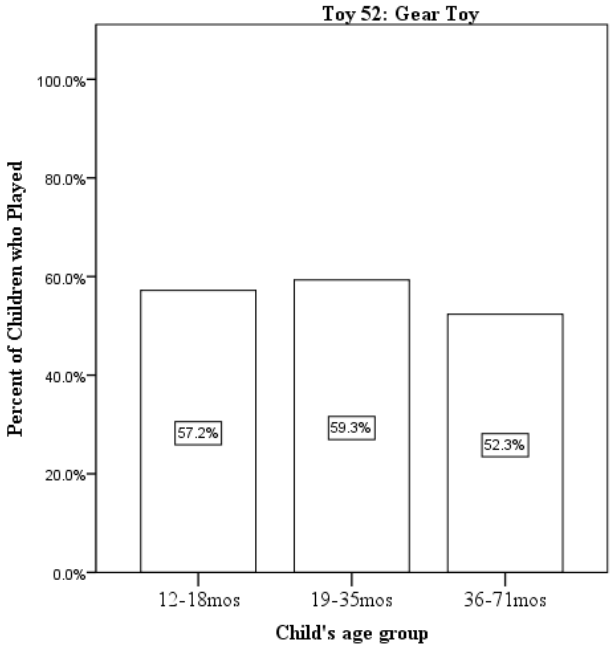
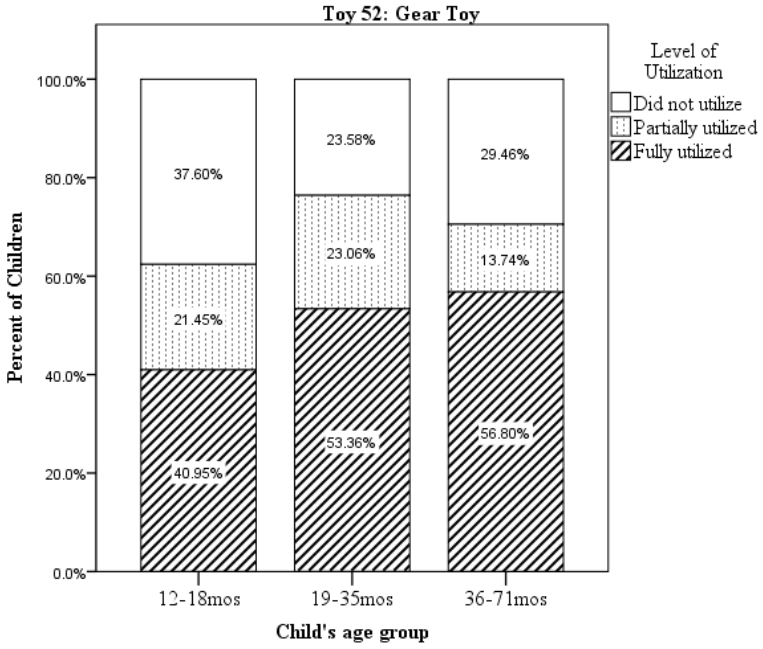


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Puts plastic pieces in mouth
- *Partially utilizing:* Grabs gears and magnets and moves them around the board
- *Fully utilizing:* Turns gear to make all gears move

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 19-35 months, children use their budding fine motor skills to spin gears and grasp them to create a design of their choosing, which they may not accomplish at any younger age. Some children may use their cognitive skills to sort the gears into different colors.

Toy #53: Bubble Wand and Receptacle

Brief Toy Description	Pink and purple cylindrical container with removable wand. If flipped over, bubble solution will not come out.
Packaging	Real photos on package, cardboard tag
Materials	Hard plastic
	Liquid
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	2
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

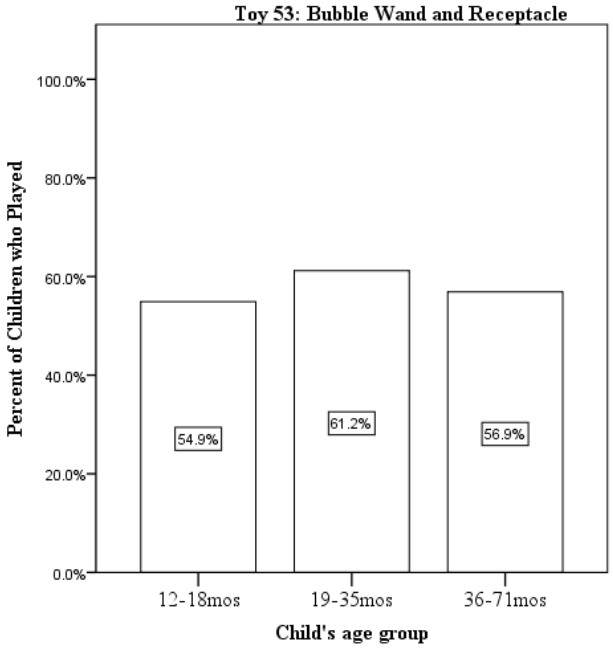
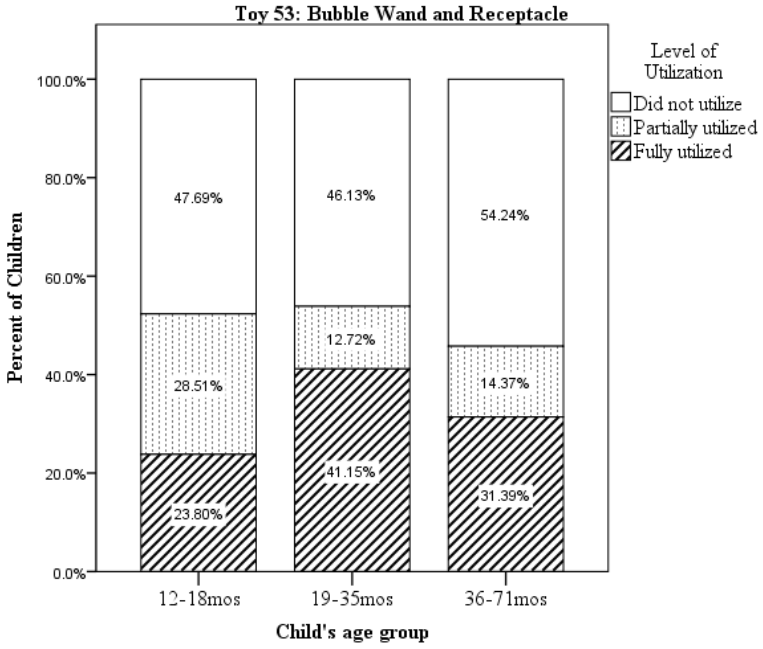


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child flips receptacle over and shakes it
- *Partially utilizing:* Child blows in the wand but is not able to make bubbles
- *Fully utilizing:* Takes wand out of receptacle and blows bubbles

Age Determination:

Manufacturer's suggested age	18 mos +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By 12-18 months, some children are able to use simple bubble wands, but may be frustrated if they cannot produce bubbles on their own. Sources of frustration can include too frequent dipping of the wand into the bubble container to make the solution too sudsy to produce bubbles, as well as the child's difficulty in blowing into the wand softly enough to produce a bubble. Still, use of this toy is appropriate at this age.

Toy #54: Chunky Animal Bubble Blaster

Brief Toy Description	Plastic bubble gun in shape of a clownfish. Plays a song and produces light when button is pressed.
Packaging	Cartoon illustrations on package, cardboard tag
Materials	Hard plastic
	Liquid
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

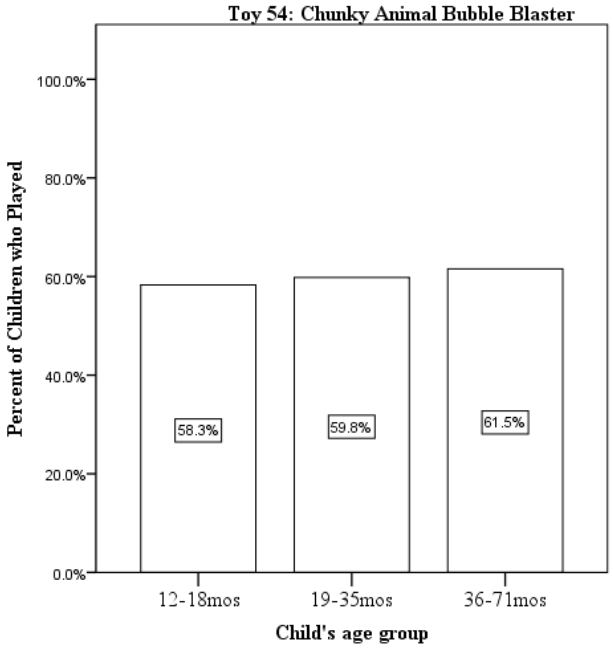
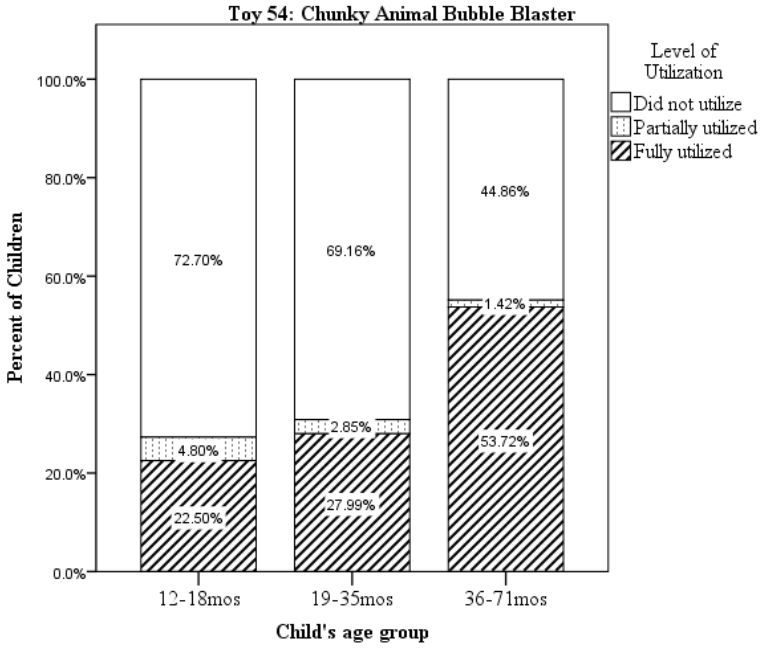


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child turns it upside down
- *Partially utilizing:* Child holds it in the correct way (upright) but is not able to press button
- *Fully utilizing:* Pulls trigger on blaster

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By age 3, children can operate bubble guns with a trigger (both conventionally shaped and those in the shape of an animal). At any younger age, children do not have the strength or gross motor skills to hold up the gun and press the trigger at the same time, or lack the strength to press the trigger altogether.

Toy #55: Suction Cup Building Pieces

Brief Toy Description	Multicolored (dark blue, light blue, yellow, red, white, purple, green) and multi-shaped (6 cupped, 4 cupped, 3 cupped, 2 cupped) silicone objects with suction cups on ends. 22 pieces. Can be stuck together or to other surfaces.
Packaging	Cartoon illustrations on package, in clear, hard plastic container
	Silicone
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

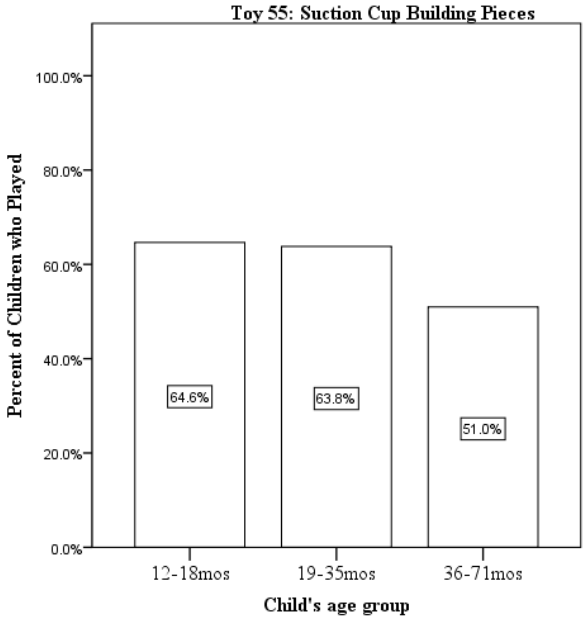
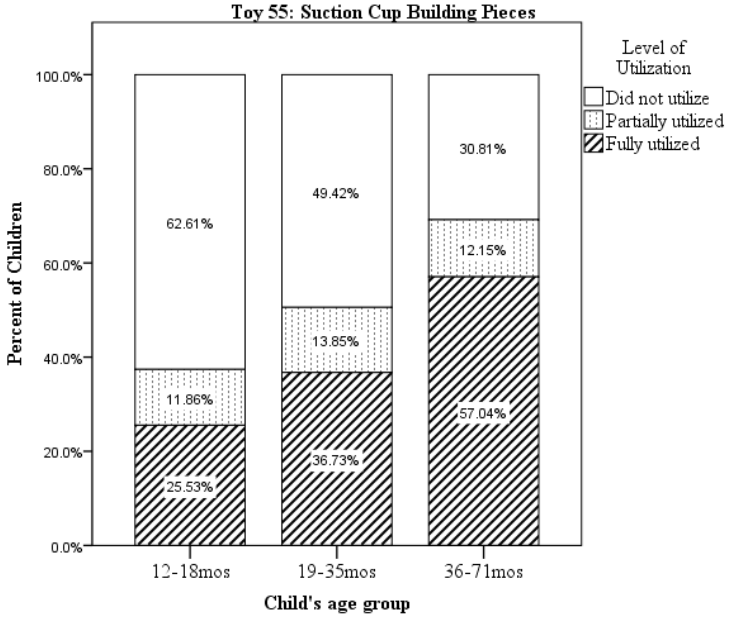


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over bin, throws pieces
- *Partially utilizing:* Child tries to stick the suction portions together or on another surface but fails and is unable to get the suction to hold OR child successfully un-pops already connected pieces by pulling them apart.
- *Fully utilizing:* Sticks suction portions together or on end table or other surface in the room

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Suction cup connecting blocks are often too difficult for children younger than 3 years to assemble, with a fair amount of gross motor skills needed to forcefully stick them together and pull them apart and fine motor skills needed to align the pieces. In addition, children at younger ages are more likely to find the suction cups as a fun item to chew or suck on instead of using as a building tool.

Toy #56: Wooden Train with Stackable Pieces

Brief Toy Description	Wooden train with red rolling wheels, three segments, and stackable blocks that connect on dowels coming out of top of train. Blocks are blue, green, yellow, and red cubes, arches, rectangles, and triangles (15 pieces).
Packaging	Developmental information written on package, cardboard with open front where toy can be touched
Materials	Wood
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

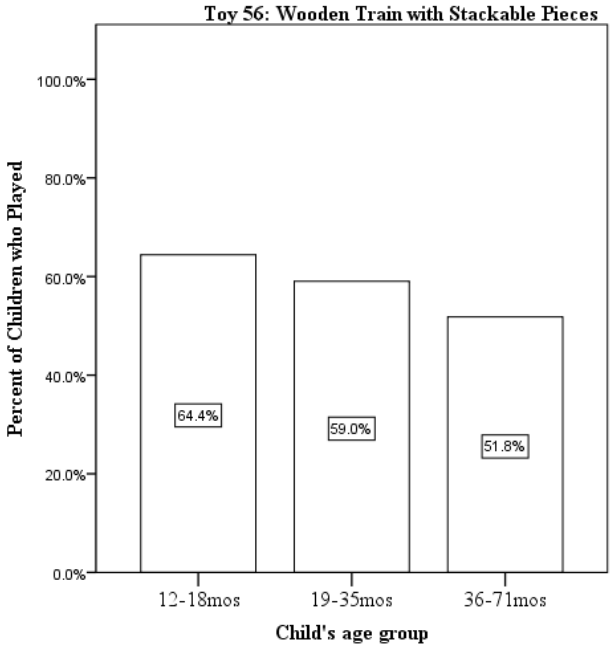
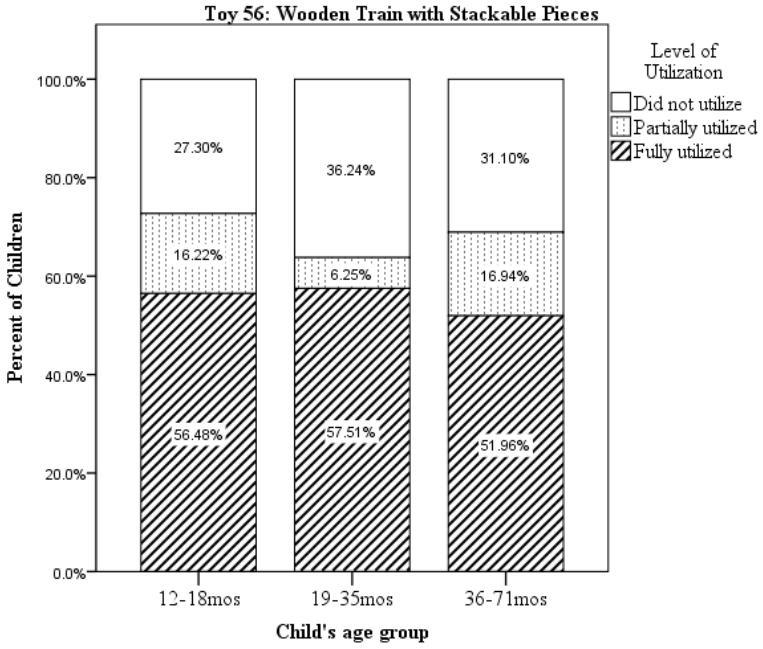


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child takes off pieces but does not put them back on, throws them, or dumps train over so all pieces fall out but does not put them back on
- *Partially utilizing:* Child spends whole time wheeling train around
- *Fully utilizing:* Interchanges some of the blocks or takes one off and puts it back on (no wheeling required)

Age Determination:

Manufacturer's suggested age	1+ years
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By 12-18 months, children are becoming capable of making combinations of two to three objects. Children have the physical motor and coordination skills necessary to understand that the blocks go together in a predetermined way. At this age, children are able to use their fine motor skills to grasp lightweight blocks and subsequently stack them onto chunky dowels.

Toy #57: Colorful Wooden Blocks

Brief Toy Description	Multicolored (green, blue, yellow, red) and multi-shaped (square, rectangle, triangle, cylinder, thin rectangle, arch, half circle) smooth wooden blocks. 100 piece set.
Packaging	Cartoon illustrations on package, cardboard box
Materials	Wood
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

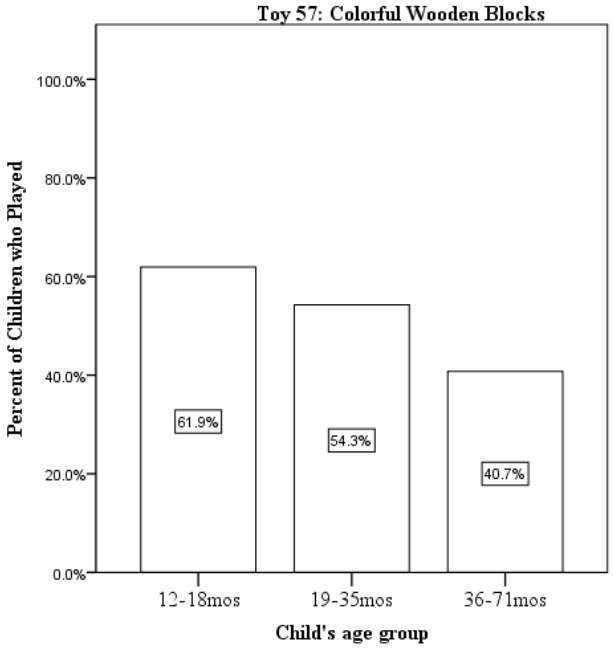
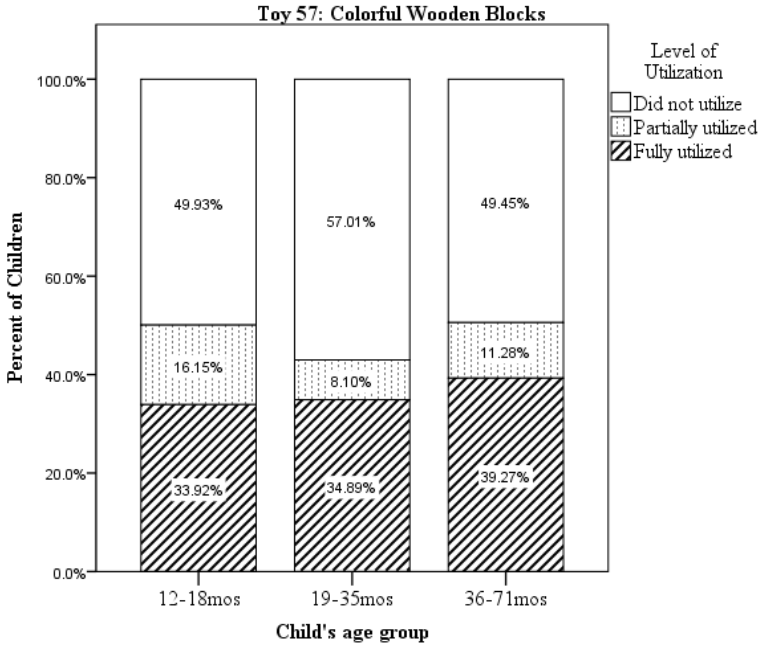


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps over bin or throws blocks
- *Partially utilizing:* Child attempts to stack or line up blocks in an orderly way but fails
- *Fully utilizing:* Stacks blocks or arranges in line

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Children in the 12- to 18-month age group can begin to line up these medium lightweight non-interlocking blocks or stack them, or they may attempt to stack or line up blocks in an orderly way. Note that success with stacking or lining up blocks is not necessary as this still shows that children in this age group are making use of the blocks in a building play setting. Based on child observations, little to no mastery of fine or gross motor skills was required for stacking or lining up blocks in the set, making it appropriate for children in this age group. Block sets with many pieces is not necessarily a deterrent to this age group as they show they are comfortable making use of a partial set.

Toy #58: Nesting Cups

Brief Toy Description	Multicolored bowls (10) with rattle smiley face ball. Red, orange, light orange, yellow, light green, green, light blue, blue, light purple, purple. Can be nested, stacked, or snapped together to make a ball.
Packaging	Developmental information written on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Includes a face (three-dimensional)
	Produces sound (operational noise)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	2
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

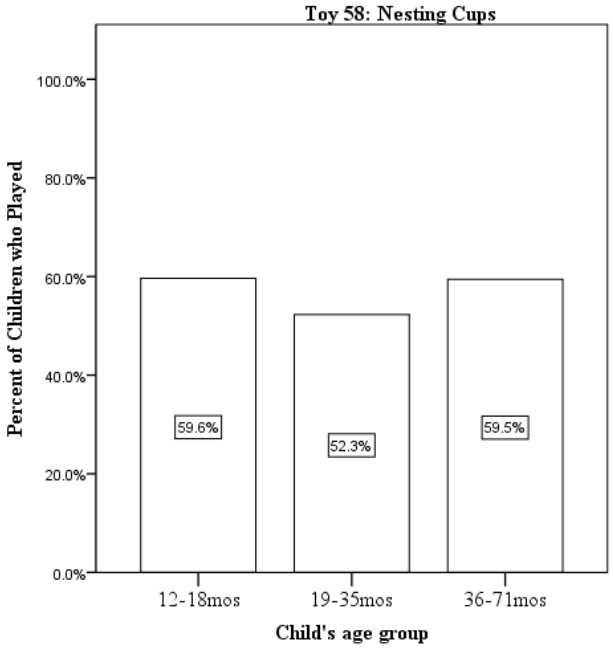
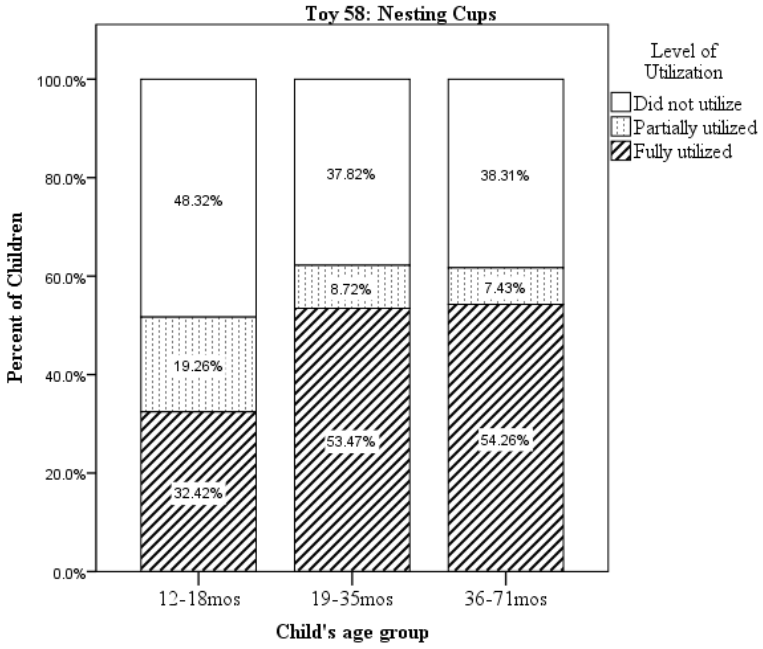


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Puts cups on head, throws cups, or shakes the rattle ball the whole time
- *Partially utilizing:* Stacks cups incorrectly ordered OR nests cups incorrectly ordered OR snaps cups together but fails
- *Fully utilizing:* Stacks cups in correct order OR nests cups in correct order OR snaps cups together to make ball

Age Determination:

Manufacturer's suggested age	6-36 mos
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Cognitively, the early math skill of seriation is developing at 19-35 months and children are able to sort and order nesting cups in a meaningful way. This is different than previous age groups, who may have used the cups out of order to build or stack or as a manipulative.

Toy #59: Peg Shape Sorter

Brief Toy Description	Long wooden rectangle with five prongs (red, blue, yellow, purple, green). Red prong can fit 5 red octagon shaped pieces, blue prong can fit 4 blue square pieces, yellow prong can fit 3 yellow triangle pieces, purple can fit 2 purple rectangle pieces, green prong can fit one green circle piece.
Packaging	Cellophane/ plastic bag
Materials	Wood
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	2
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	24

Figure 1. Percent of children who played with toy by age group

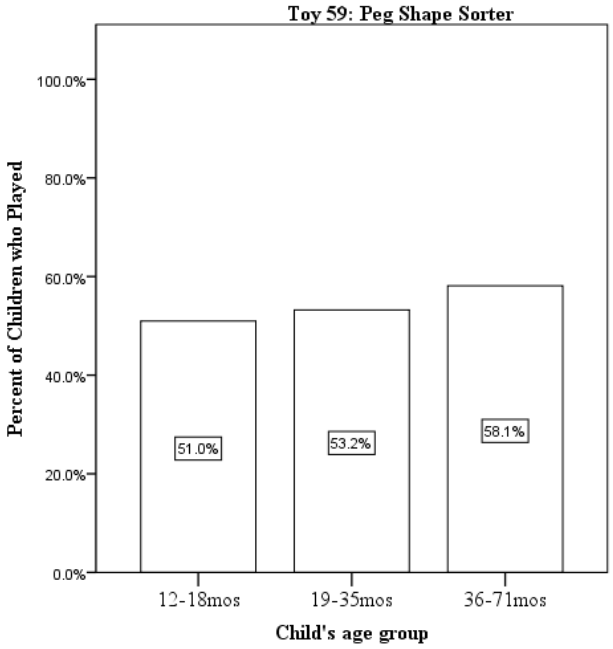
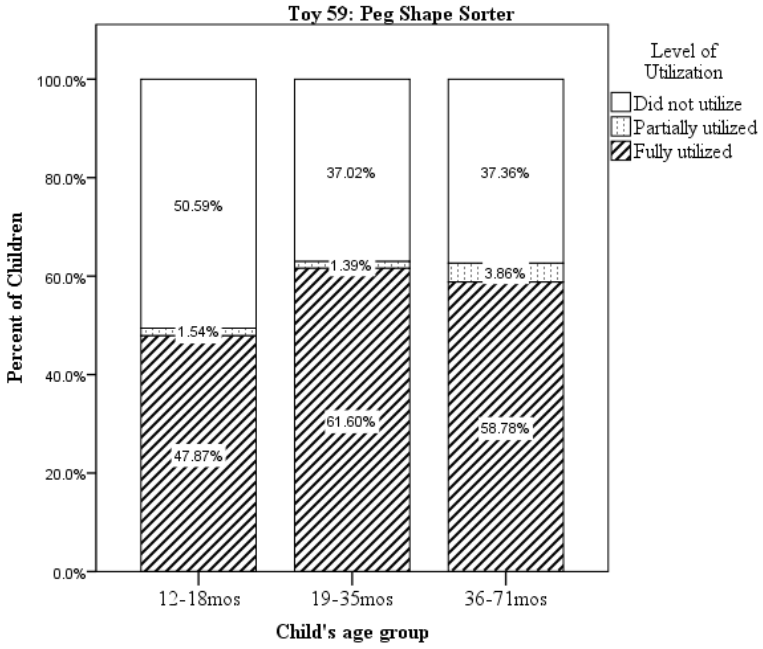


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps shape sorter over
- *Partially utilizing:* Takes shapes off and puts ring back on post, but it is not the right color post or child attempts to stick a piece over the post but fails (i.e., child is unable to align it quite right)
- *Fully utilizing:* Takes shapes off posts and puts back on in appropriate place

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 19-35 months children's abilities to sort and recognize colors emerges, meaning that they can now complete more complex peg-style shape sorters based on colors. Children in younger age groups may haphazardly put the pieces on the pegs without respect to sorting or color.

Toy #60: Noisemaking Shape Puzzle

Brief Toy Description	Puzzle with small plastic knobs and 9 geometric shape pieces (diamond, square, triangle, trapezoid, circle, rectangle, octagon, oval, pentagon) that can be removed and replaced to repeat the name of the shape put into the well. Shapes are yellow, red, purple, and green.
Packaging	Cellophane/ plastic bag
Materials	Hard plastic
	Wood
Other Features	Battery operated
	Produces sound (human voice)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

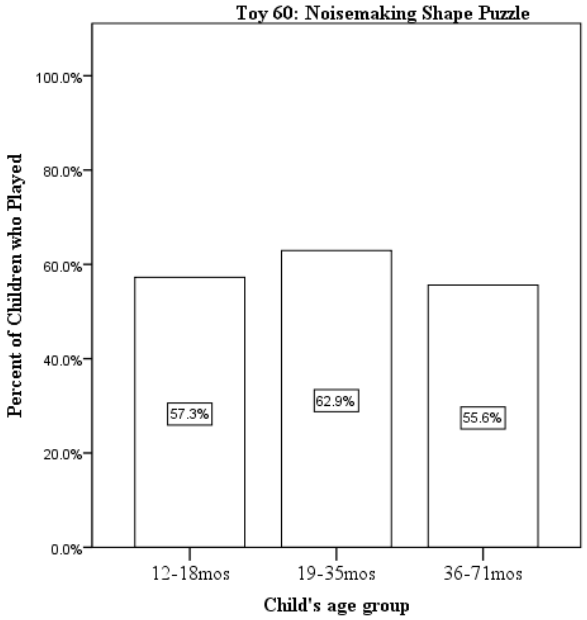
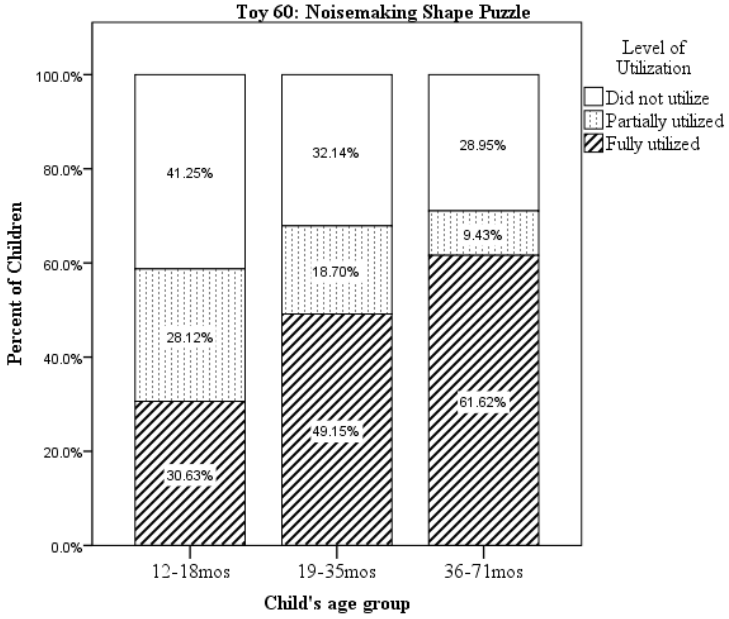


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dump puzzle over, throw pieces
- *Partially utilizing:* Child takes a piece out of the puzzle and tries to stick the piece back in but fails (e.g., child tries to put the square piece into the octagon notch in the puzzle or child tries to put the octagon piece in the octagon notch but the octagon is turned the wrong way)
- *Fully utilizing:* Takes pieces out and puts back in appropriate spots

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By 19-35 months, children have developed the fine motor skills and visual discrimination that are required to do inset puzzles. At this age, children benefit from obvious visual and physical cues that a piece is in place, like this puzzle that repeats the name of the object put in the well. At younger ages, children's cognitive skills will lead them to struggle with aligning the puzzle pieces correctly into the wells.

Toy #61: Story Board Book

Brief Toy Description	Board book that tells a story about animals and vehicles.
Packaging	No packaging
Materials	Cardboard
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

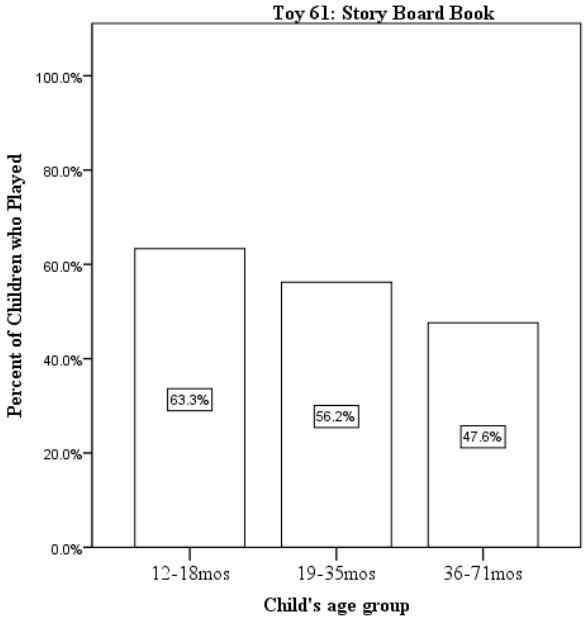
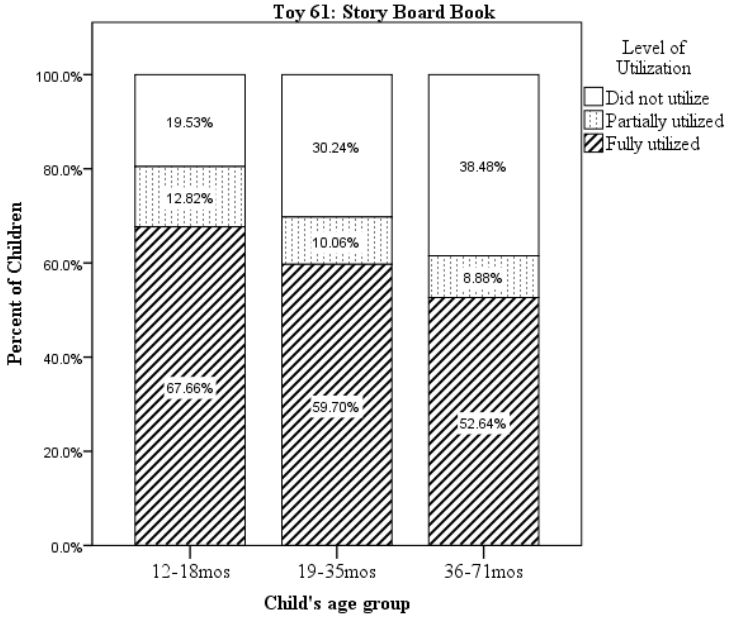


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws/carries book around
- *Partially utilizing:* Looks at interior of the book, touches the items on the page, or turns the pages, but the book is not oriented the right way
- *Fully utilizing:* Looks at the interior of the book, touches the items on the page, labels an object after looking at it, or turns pages of the book; book should be oriented the right way

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Story books are pleasing to children at 12-18 months. As children's one-word utterances expand during this age group, they will enjoy pointing to familiar objects in books and labeling them aloud.

Toy #62: Plastic Activity Cube

Brief Toy Description	Large orange, blue, green, red, and white plastic cube with interactive sides. Top of cube has a bead maze and a base for sticking interlocking bricks. Another side has interlocking blocks on inside that each have a letter written on them and will make the cube say that letter if put into a special well on another side of the box. Another side of the box has 15 buttons on it and the special interactive well for the blocks. There is a detachable phone on this side of the block and children can dial different numbers using the buttons. Another side of the block has a maze on it. The final side has gears, flaps, and a mirror.
Packaging	Developmental information written on package, real photos on package, cardboard with open front where toy can be touched
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (animal noises)
	Includes mirror
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

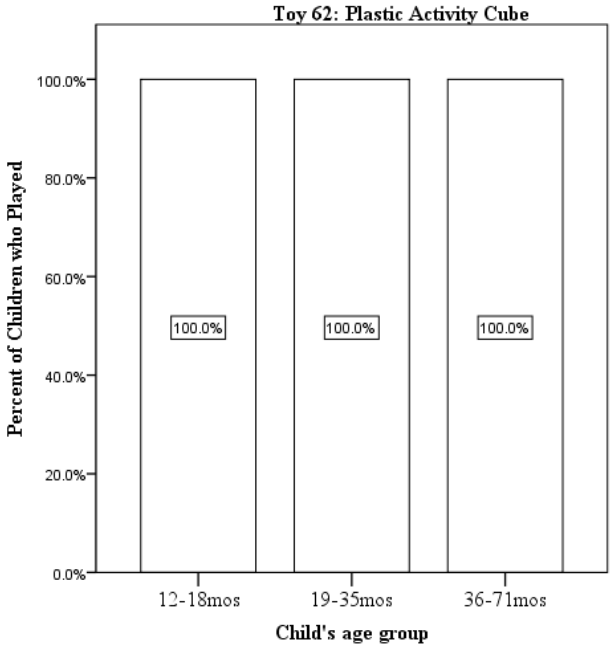
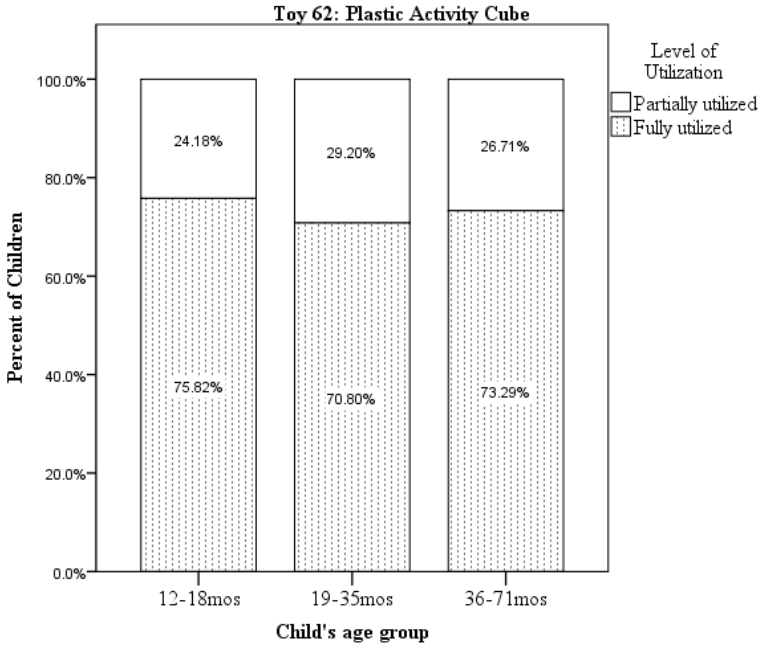


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws blocks around, tipping cube over
- *Partially utilizing:* Child only uses one side of the cube
- *Fully utilizing*: Pushes buttons, takes out blocks, pulls off phone, or turns dial or gears; must use at least 2 sides (top of cube does count as a side)

Age Determination:

Manufacturer's suggested age	9 mos-3 years
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By 12-18 months, children can use activity centers and the variety of actions they afford. Children have the fine motor skills needed to grab onto the beads in a bead maze and guide them through a simple path, open flaps, and press buttons.

Toy #63: Sliding Cell Phone with Buttons

Brief Toy Description	Orange and white plastic cell phone with 10 small buttons on the front. Half of phone slides up to reveal a full keyboard with letter buttons.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard with open front where toy can be touched
Materials	Hard plastic
	Soft plastic
Other Features	Battery operated
	Produces sound (animal noises)
	Produces sound (operational noise)
	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

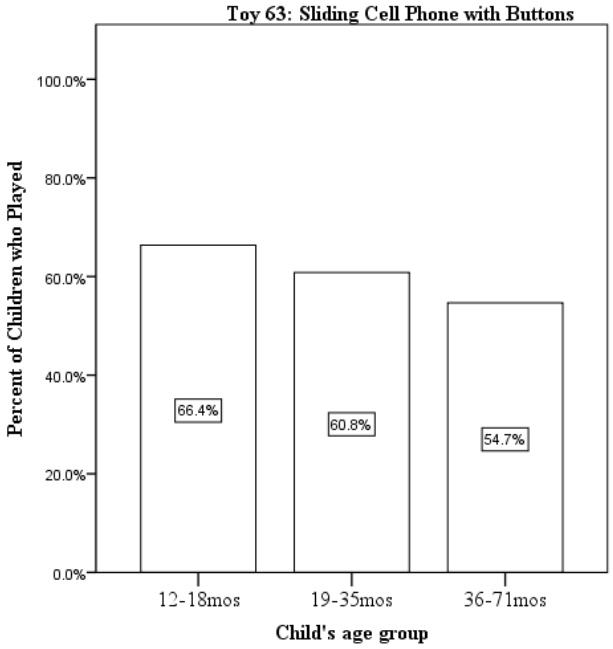
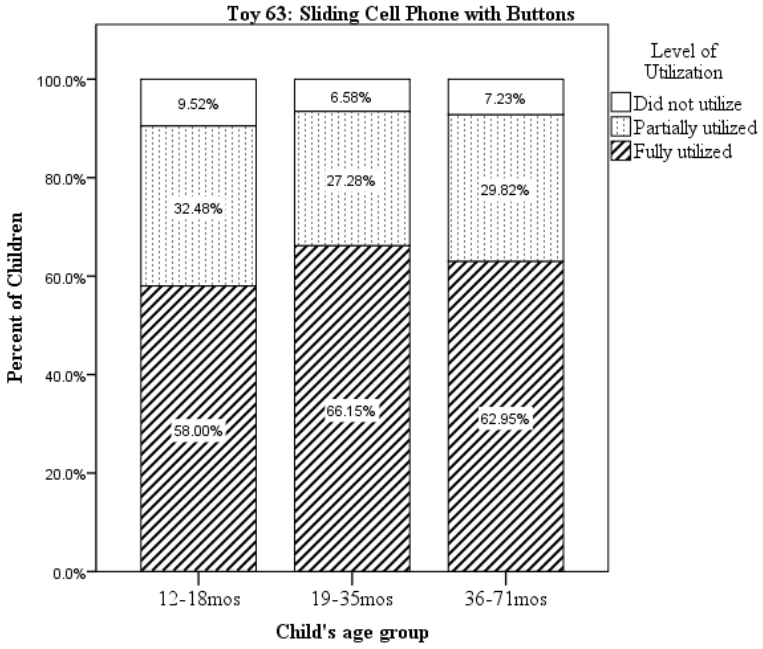


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws phone
- *Partially utilizing:* Pushes buttons or explores sliding function of toy but is unable to turn phone on
- *Fully utilizing:* Turns on and pushes buttons

Age Determination:

Manufacturer's suggested age	2-5 years
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 12-18 months, children have the rudimentary fine motor skills to use play cell phones with small buttons. Children will spend a fair amount of their time pressing the buttons repeatedly to hear the electronic sounds that come from the phone.

Toy #64: Bowling Set

Brief Toy Description	Six orange bowling pins with faces painted on them and yellow plastic bowling ball.
Packaging	In clear, reusable plastic duffle bag
Materials	Hard plastic
Other Features	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	5
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

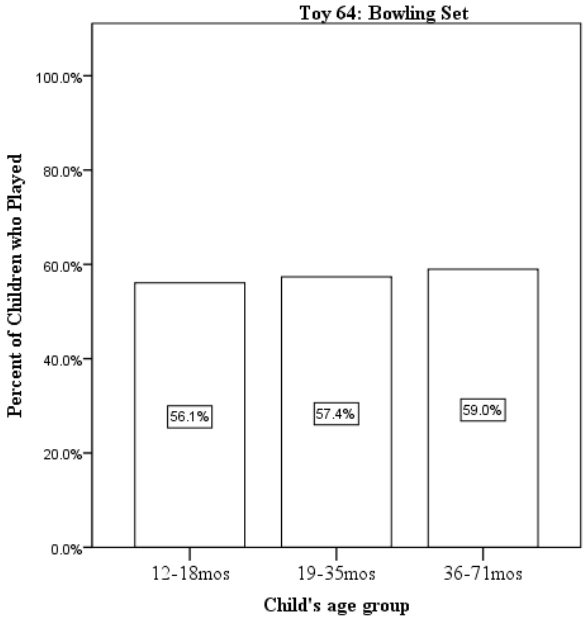
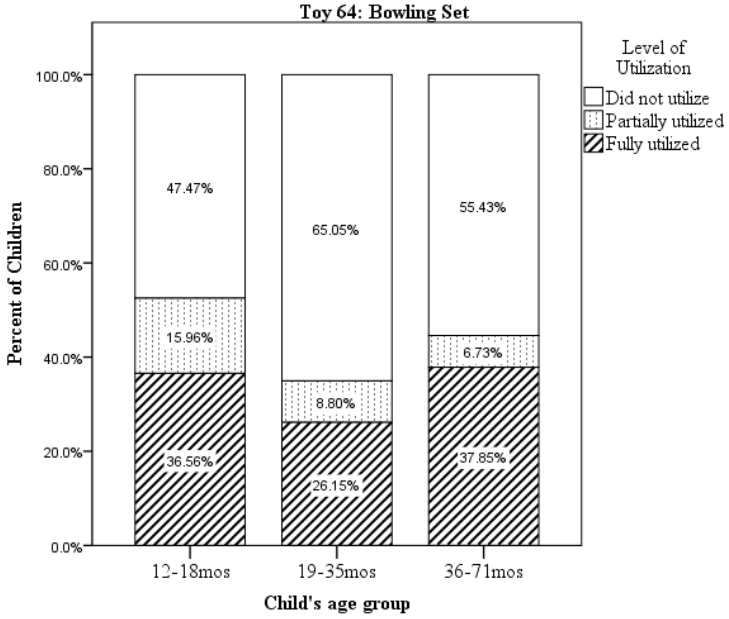


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child uses pins to make noise on the end table or as an imaginative play toy, only plays with the ball, or spends the whole time setting up the pins
- *Partially utilizing:* Child sets up the pins and knocks over pins but does not use the ball to knock them over (e.g., uses body) OR child sets up pins and attempts to knock them over with the ball but misses
- *Fully utilizing:* Sets up the pins in some fashion and uses the ball to knock them over

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 12-18 months, a lightweight bowling set is especially appealing, as throwing a ball and seeing objects fall down is exciting for this age group. At younger ages, children may try to knock over the pins using hands or feet instead of coordinating with a ball.

Toy #65: Large Basketball Hoop

Brief Toy Description	Large basketball hoop (3-4ft tall) and orange plastic basketball. Blue column, black base, white headboard, red hoop, and white net.
Packaging	Real photos on package, cardboard box, multilingual phrases
Materials	Hard plastic
	Rope
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	6
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

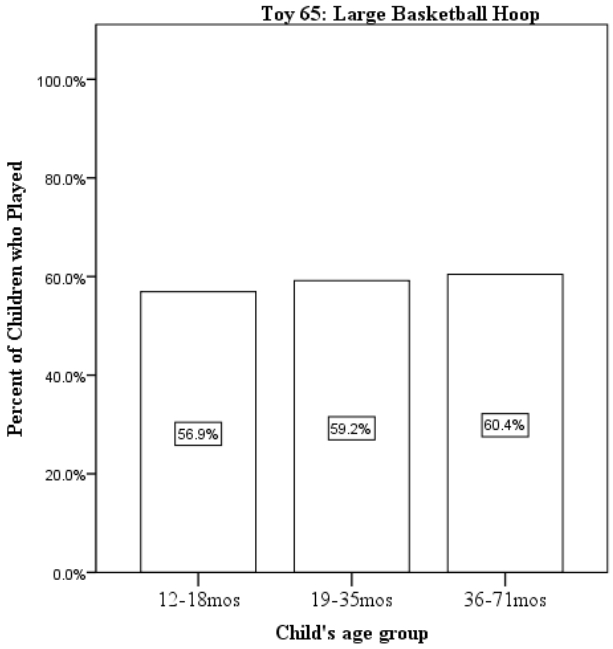
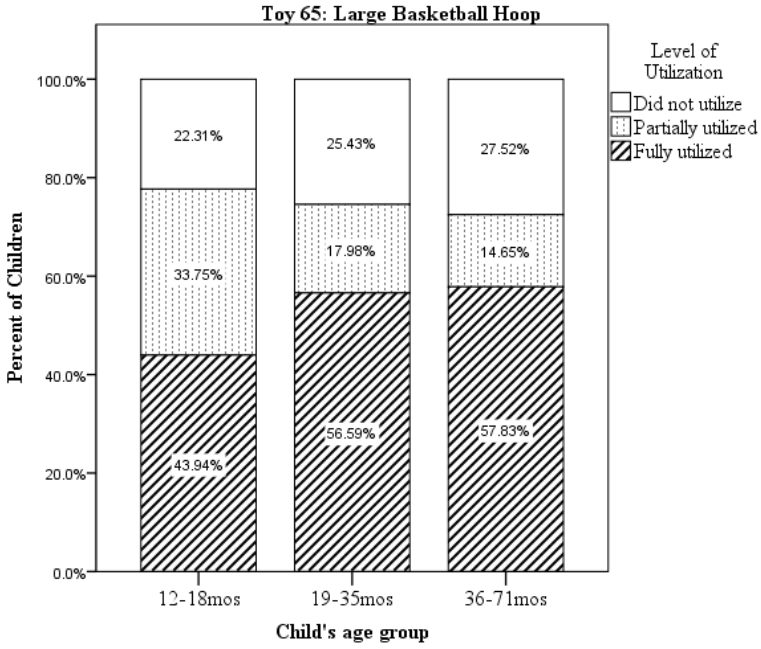


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child fiddles with white net
- *Partially utilizing:* Child throws, pushes, rolls, chases, or kicks ball but does not try to put the ball through the hoop OR the child tries to put the ball into the hoop, but misses
- *Fully utilizing:* Puts basketball through the hoop

Age Determination:

Manufacturer's suggested age	18 mos-5 years
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Larger basketball hoops become more appropriate at 12-18 months as children begin to reach higher and have mastered the gross motor skills needed to throw a ball into a hoop.

Toy #66: Spiked Light Up Balls

Brief Toy Description	Two spiky, squeezable translucent pastel balls that light up when bounced.
Packaging	Cellophane/ plastic bag, cardboard tag
Materials	Soft plastic
Other Features	Battery operated
	Produces light
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	1
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

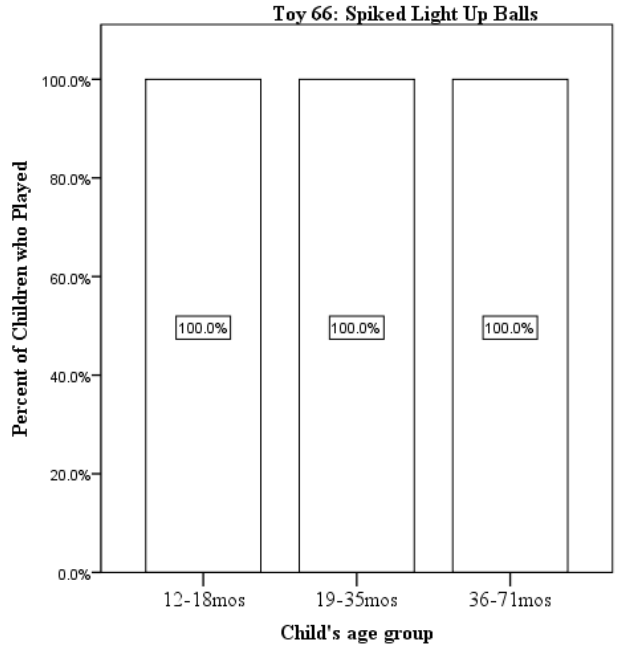
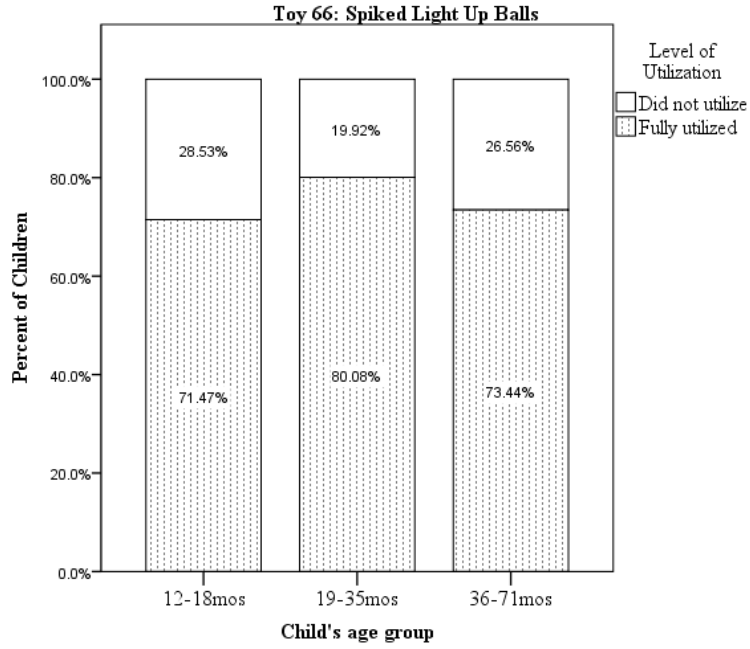


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child tries to mouth the ball
- *Partially utilizing:* Child throws, pushes, rolls, chases, or kicks the ball but not hard enough to make it light up
- *Fully utilizing:* Hits or bounces ball so that it lights up

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 19-35 months, children are interested in balls that light up or make noise when bounced. These balls should be lightweight and easy to throw given children's limited strength at this age. They should also be made of a soft material, such as rubber, as children lack the inhibition at this age to hold back from throwing the ball at people or fragile objects.

Toy #67: Talking Dinosaur

Brief Toy Description	Green plastic dinosaur. Talks when button is pressed on belly.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box, multilingual phrases
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (synthesized noise)
	Produces sound (operational noise)
	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

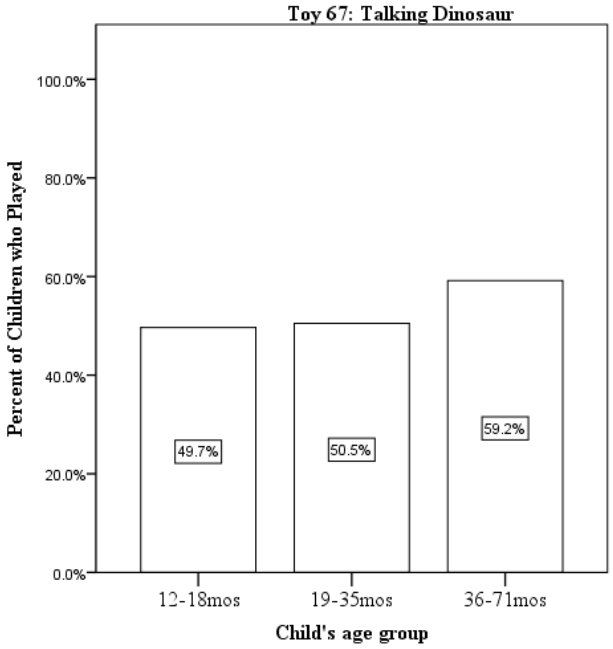
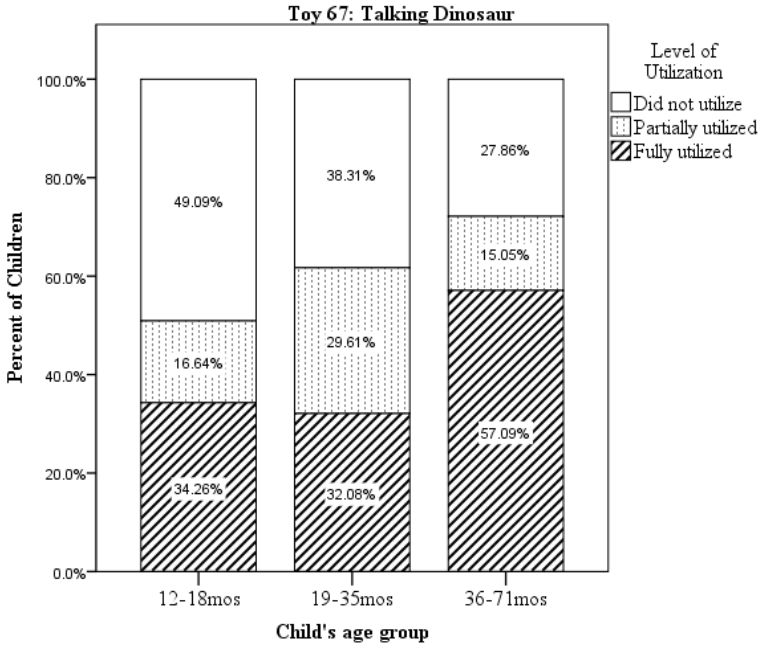


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Bangs against table, throws, or puts in mouth
- *Partially utilizing:* Spends the whole time pressing the button on the stomach or manipulating the wings with no pretense, rather, just to figure out how the wings activate the sound maker
- *Fully utilizing:* Moves mouth or uses for pretend play (e.g., makes it fly, eat, etc.)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Three-year-olds like to push buttons and to use devices that produce sound, lights or actions with dolls. Given children's cognitive skills that allow them to pretend at this age, children may use dolls or figurines to engage in behaviors typical of that figure. For example, if given a toy pterodactyl such as this one, a child may pretend to make the dinosaur fly or flap its wings.

Toy #68: Baby Bottles with Faux Liquid

Brief Toy Description	Two bottles with pink lids and liquid inside (one milk, one orange juice). Liquid disappears if bottles turned upside down. Presented with monkey baby doll.
Packaging	Cardboard backing with plastic
Materials	Hard plastic
	Liquid
Other Features	Battery operated
	Produces sound (animal noises)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	4
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

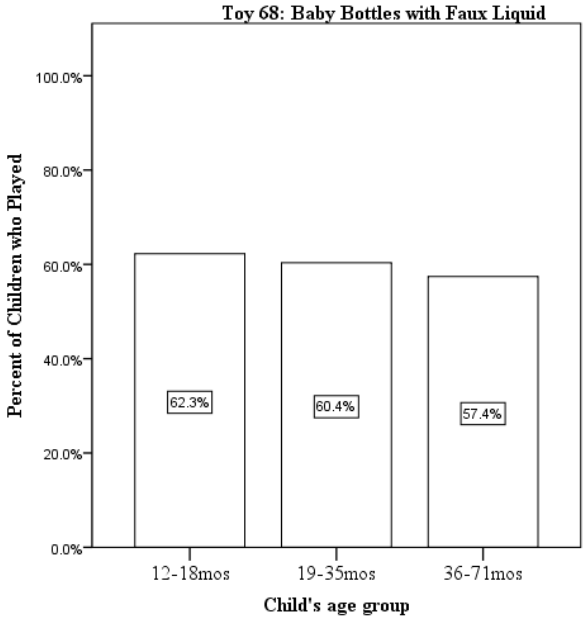
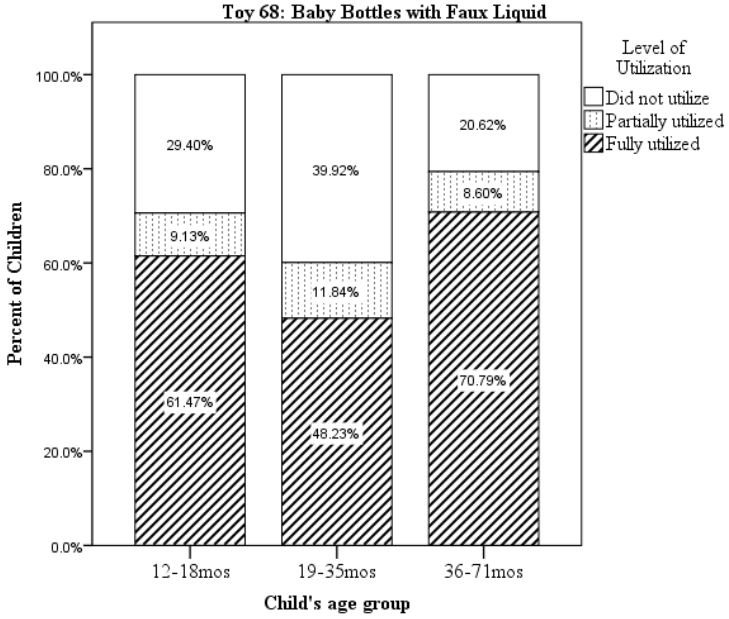


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws bottles, bangs them against the table, or tries to drink out of the bottles themselves (not pretending)
- *Partially utilizing:* Child flips bottles over and makes the liquid move around within the bottles OR child pretends (overtly) to drink out of the bottles
- *Fully utilizing:* Puts bottles to doll's mouth to feed
- *Special note: If the child only touches the accompanying monkey doll, the child receives a score of N/A—did not play with toy

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Children will pretend to feed a doll with a baby bottle at 36-71 months. Bottles with faux liquid inside that disappears when the bottle is flipped over adds to the detail in pretend play accessories that children begin to seek in this age group. At any younger age, children may try to drink out of the bottle themselves due to their realistic appearance.

Toy #69: Doll Stroller

Brief Toy Description	Mini red and black umbrella stroller presented with monkey baby doll inside.
Packaging	Cardboard tag
Materials	Hard plastic
	Nylon
	Hard metal (non-pliable)
Other Features	Battery operated
	Produces sound (human voice)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	3
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

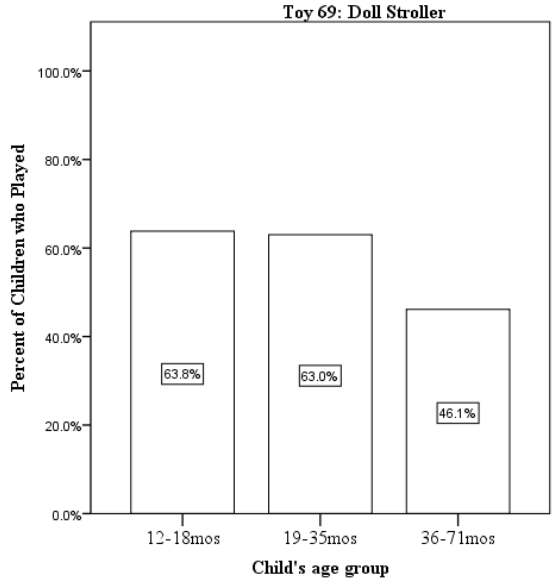
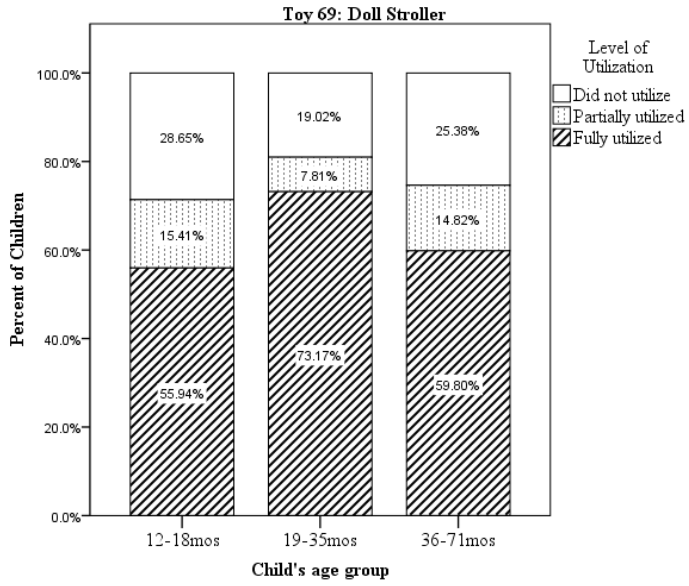


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child spends the whole time strapping/unstrapping the monkey doll in the stroller or child tries to sit in the stroller themselves
- *Partially utilizing:* Makes stroller move, but does not push it correctly by holding on to handles (e.g., child may grab the gray part and push), OR child pushes an empty stroller OR child pushes the stroller around with other non-creature objects in the stroller (i.e., play food, pieces of tea set).
- *Fully utilizing:* Grabs handles and pushes doll (or another creature the child has received) around in stroller
- *Special note: If the child only touches the accompanying monkey doll, the child receives a score of N/A—did not play with toy

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 19-35 months, children have the gross motor skills needed to stand and push strollers, and have also cognitively reached a stage where they can pretend to take dolls and stuffed animals on "walks" using the stroller.

Toy #70: Remote Controlled Monster Truck

Brief Toy Description	Yellow truck with handheld remote steering wheel. Steering wheel has two triangle buttons that propel the car and a yellow circle button in the middle that acts as the horn.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
Other Features	Battery operated
	Produces light
	Produces sound (synthesized noise)
	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	5
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

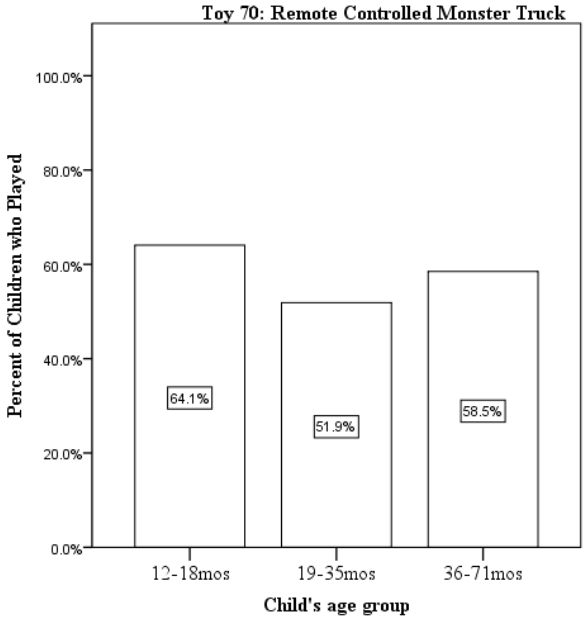
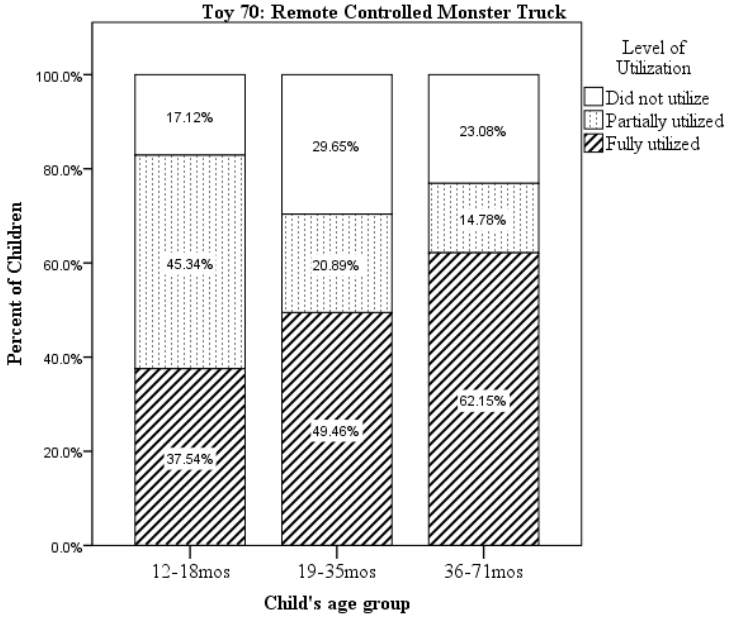


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries the car around or only pushes middle horn button on controller that makes noise but does not make the car move
- *Partially utilizing:* Pushes car around manually or presses red directional buttons on remote to make the car move, but child is not holding the remote with hands (e.g., it is laid on the floor or the table or mom is holding it)
- *Fully utilizing:* Holds remote with hands and pushes red directional buttons to make the truck move

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 12-18 months, children enjoy simple remote controlled devices that are operated by large buttons. Cognitively, children can understand that the press of a button on a remote control causes the vehicle to move. At this age, children have the fine and gross motor skills to hold remote controllers and press buttons at the same time, as any younger age child may have difficulty combining these two actions.

Toy #71: Firetruck

Brief Toy Description	Red firetruck. Makes noise, moves around, and blows bubbles *if* turned on. Movable ladder.
Packaging	Cartoon illustrations on package, cardboard with plastic window
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (synthesized noise)
	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	3
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

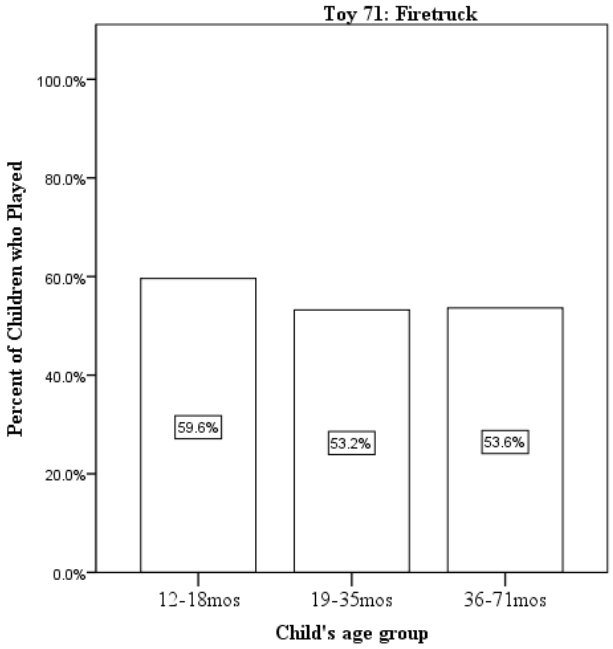
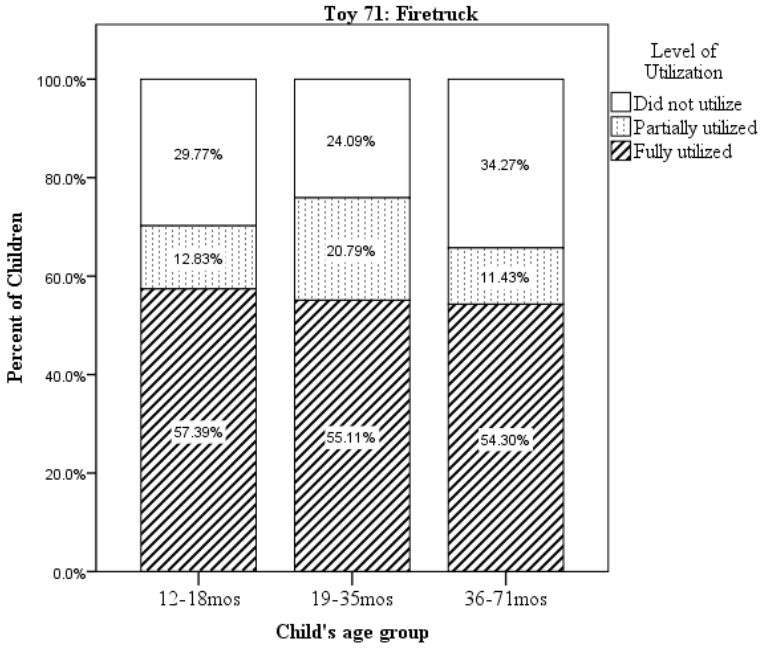


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries truck around
- *Partially utilizing:* Explores ladder or other details on the truck
- *Fully utilizing:* Moves truck back and forth or pushes it so it rolls

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Children 19-35 months old enjoy small vehicle toys that have a low to moderate level of cause-and-effect functionality, like pushing that produces sound, lights, or movement. They enjoy relatively large, simple, workable parts—like ladders, and propellers—as long as they require only a low degree of fine motor dexterity and control and are easily manipulated with a pincer grasp.

Toy #72: Moving and Talking Dump Truck

Brief Toy Description	Red truck with yellow plow on top and large, chunky black wheels. Talks and does a somersault if large yellow button on top of head is pressed.
Packaging	Cartoon illustrations on package, real photos on package, cardboard with open front where toy can be touched
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (synthesized noise)
	Produces sound (operational noise)
	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	6
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

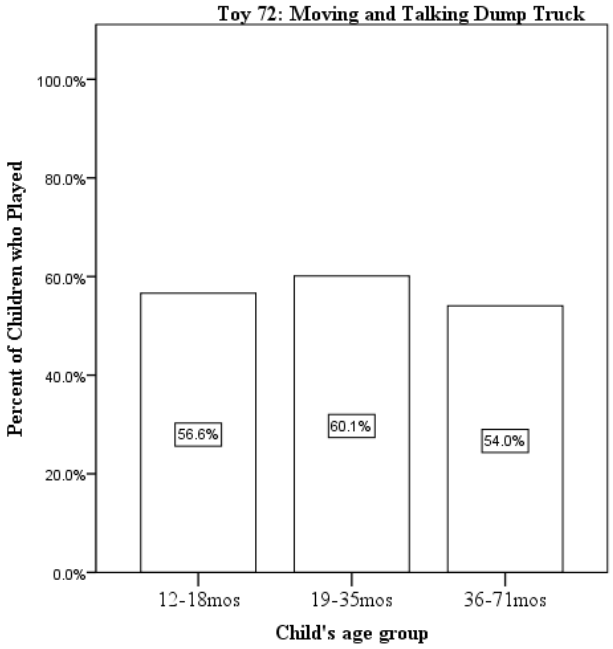
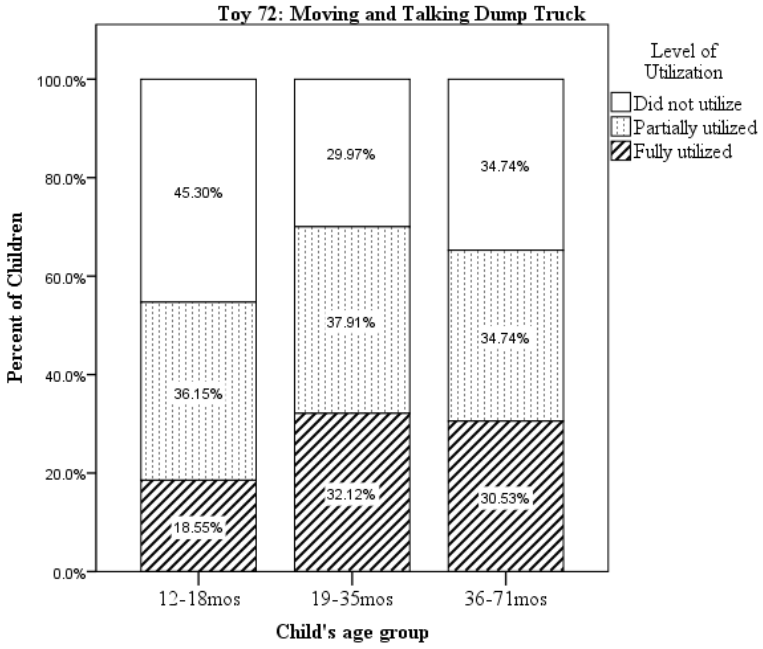


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries truck around
- *Partially utilizing:* Pushes truck around OR pushes button on toy but does not stand back to watch it move; rather, child gets in the way of the motion
- *Fully utilizing:* Pushes button on toy to make it go and stands back appropriately to watch the truck move

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Children 19-35 months old enjoy small vehicle toys that have a low to moderate level of cause-and-effect functionality, like pushing that produces sound, lights, or movement. Children at this age enjoy small vehicles that are battery operated and can perform simple tricks (e.g., tumbling, rotating when a button is pressed on them). At any younger age, children may not have the cognitive skills to move out of the way to allow the vehicle to pass and complete its action.

Toy #73: Sticker Pad

Brief Toy Description	Small sticky pad in primary colors. Comes with three paper cutouts in the shape of familiar objects (animals, vehicles, food) that can be stuck to tacky pad.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box, multilingual phrases
Materials	Sticker paper and paper
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

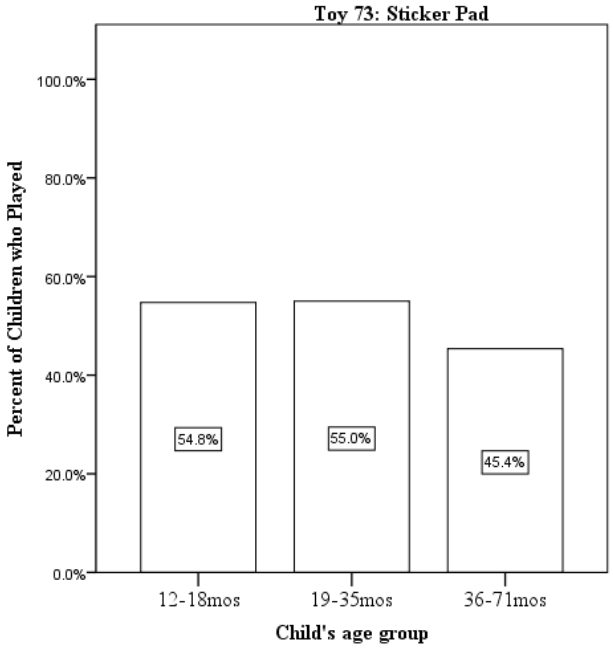
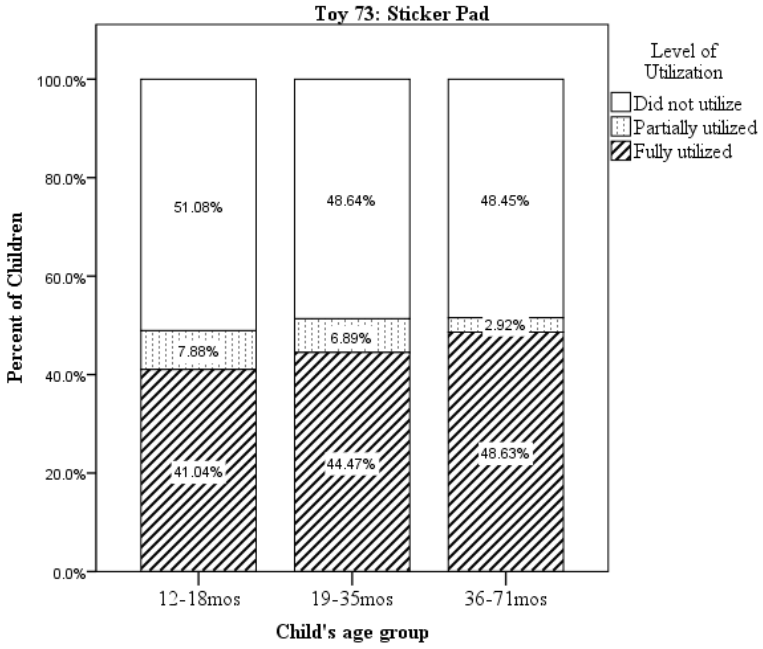


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Labels objects that are represented in the stickers or uses the stickers as pretend play pieces
- *Partially utilizing:* Peels off stickers but puts them on their shirt and/or body
- *Fully utilizing:* Places stickers or craft items on sticky square of paper

Age Determination:

Manufacturer's suggested age	18 mos +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Although children at 12-18 months are too young to use conventional stickers (they may be put in the mouth and they require dexterity to use), children can use pre-gummed sticker pads and attach large, easy to grip items to them.

Toy #74: Light Up Gel Pad with Stylus

Brief Toy Description	Purple and white touch pad filled with gel with yellow stick for doodling. When large yellow button is pressed music plays and the gel background lights up with neon colors.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Jelly
Other Features	Battery operated
	Produces light
	Produces sound (music)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

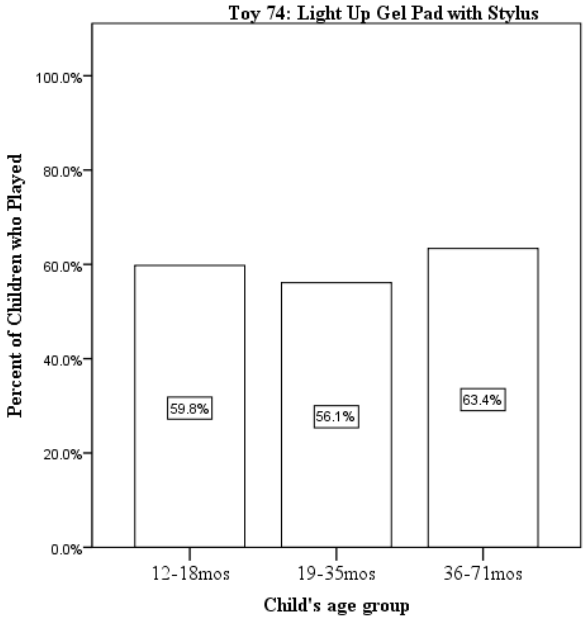
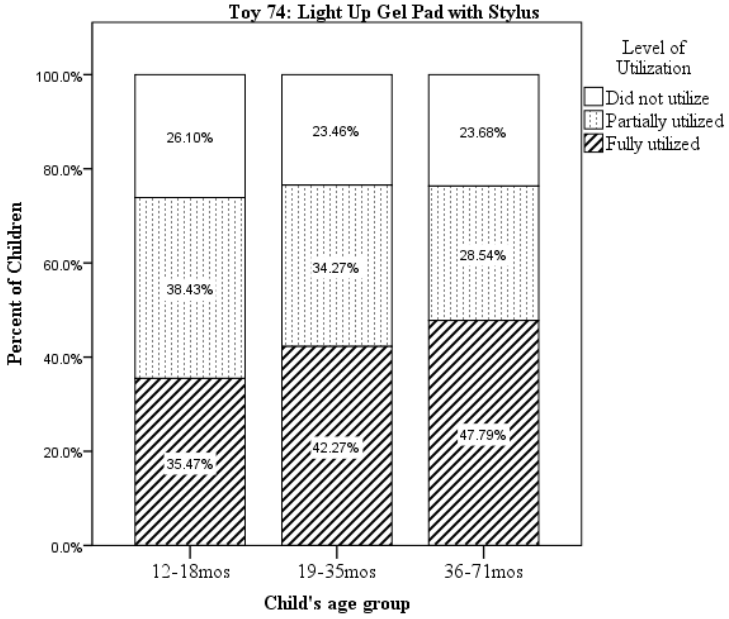


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Touches or pats the pad with no intention of making a design
- *Partially utilizing:* Pushes button, uses stylus to make design, uses stylus on another surface that is not the blue goo, uses finger as a stylus to press blue goo around, or uses another object in the room to make a design in the blue goo
- *Fully utilizing:* Pushes button and uses stylus to press the blue goo in the board to make line or shape

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 12-18 months, children can also hold tablets in their lap that have gel inside and can make designs using their finger or a stylus. Using fingers to make designs using these is appropriate at this age because it accommodates limited fine motor skills.

Toy #75: Finger Paint

Brief Toy Description	Blue plastic hand with colorful circles at the fingertips (red, orange, yellow, green, blue) filled with clear gel that only appears on special paper.
Packaging	Real photos on package, cardboard backing with plastic
Materials	Hard plastic
	Paper
	Jelly
Other Features	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

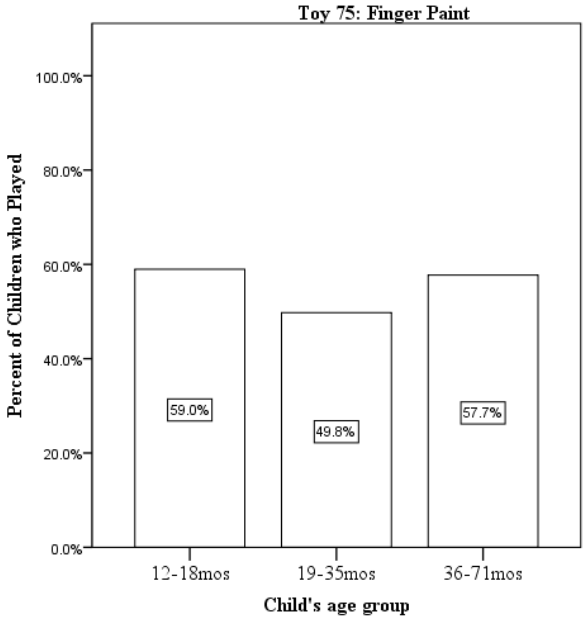
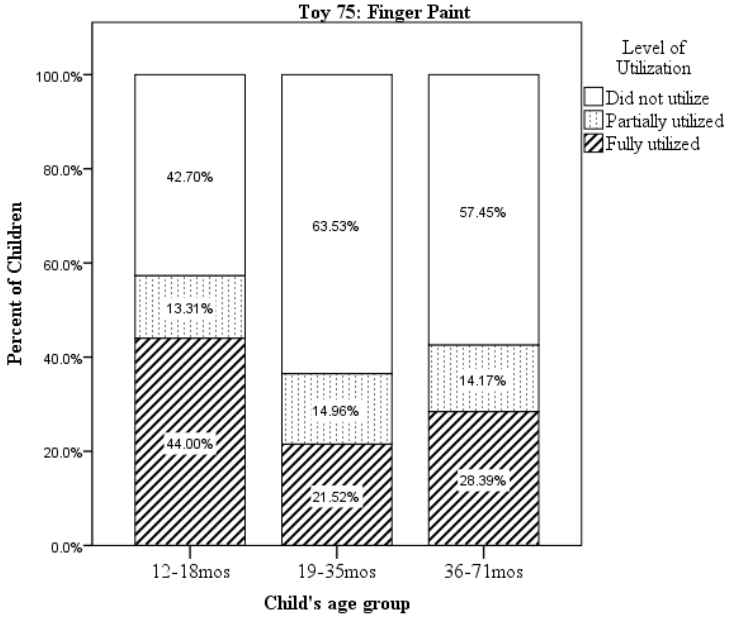


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Uses hand as pretend play object, labels colors of the paint lids, or opens the container, touches the goo, then wipes it off hand using other hand or clothing
- *Partially utilizing:* Opens containers and intentionally paints places other than the paper (e.g., on table, other toys)
- *Fully utilizing:* Opens containers and uses fingers to paint with the finger paint on the paper

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Finger painting with non-toxic, mess free (i.e., clear gel finger paint only activated on special paper) is appropriate at 12-18 months. Using fingers to make designs using this toy is appropriate at this age because it accommodates limited fine motor skills.

Toy #76: Plastic Trumpet

Brief Toy Description	Red and yellow plastic trumpet with three buttons.
Packaging	Cardboard tag, taken from larger band set packaged in clear, hard plastic drum
Materials	Hard plastic
Other Features	Produces sound (synthesized noise)
	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

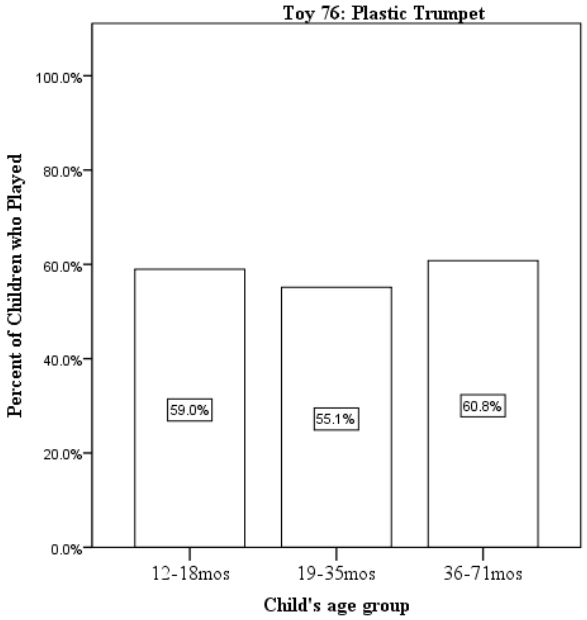
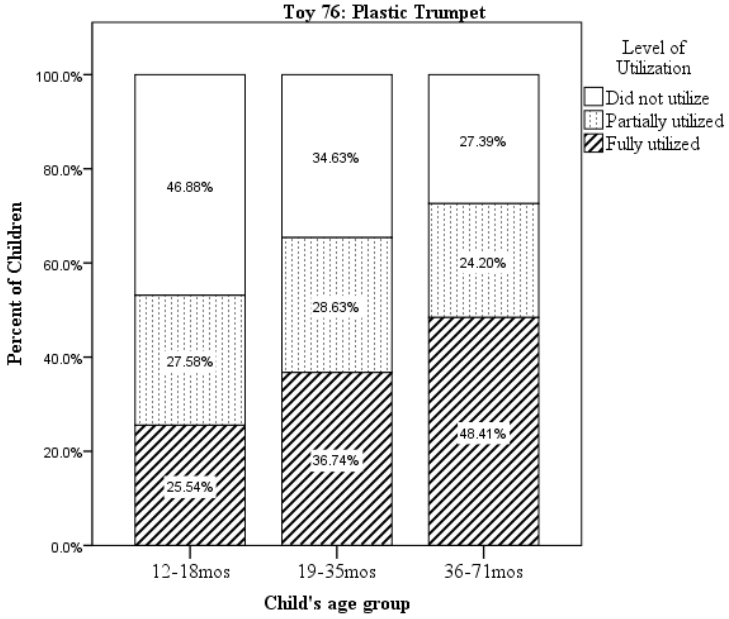


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Puts wrong side of horn to mouth
- *Partially utilizing:* Puts horn in mouth and makes noise but does not push down on valves OR blows into the correct side of the horn but does not make any noise OR puts horn in mouth and vocalizes a sound (i.e., not blowing a sound)
- *Fully utilizing:* Puts the horn in mouth, blows, and pushes down on valves to make a sound

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	This horn is properly sized for the 3-year-old preschooler to handle, has rounded edges, and is sturdy. Multi-sensory elements and cause-and-effect relationships afforded by the horn are very appealing at this age. Children at younger ages have trouble using a multistep horn that involves simultaneous blowing and pressing buttons to change the tone.

Toy #77: Band Set

Brief Toy Description	Six brown and blue band instruments (maracas, tambourine, kazoo, spoons, harmonica, hollow block with mallet) in clear bucket.
Packaging	Developmental information written on package, cartoon illustrations on package, in clear, hard plastic container
Materials	Hard plastic
	Wood
	Hard metal (non-pliable)
Other Features	Produces sound (synthesized noise)
	Produces sound (operational noise)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

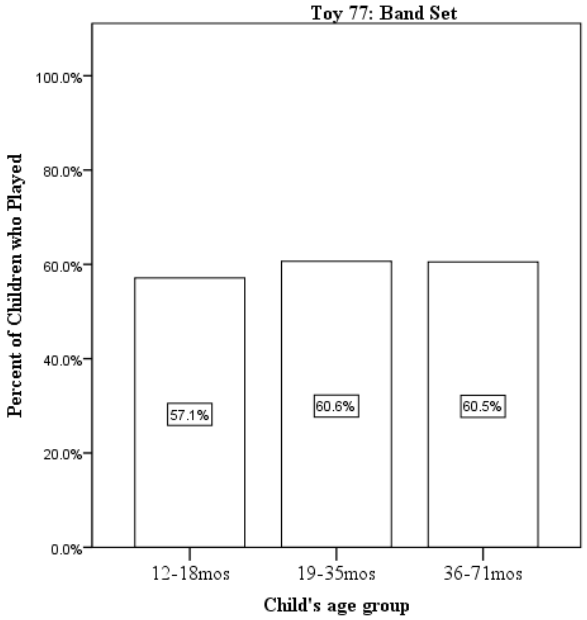
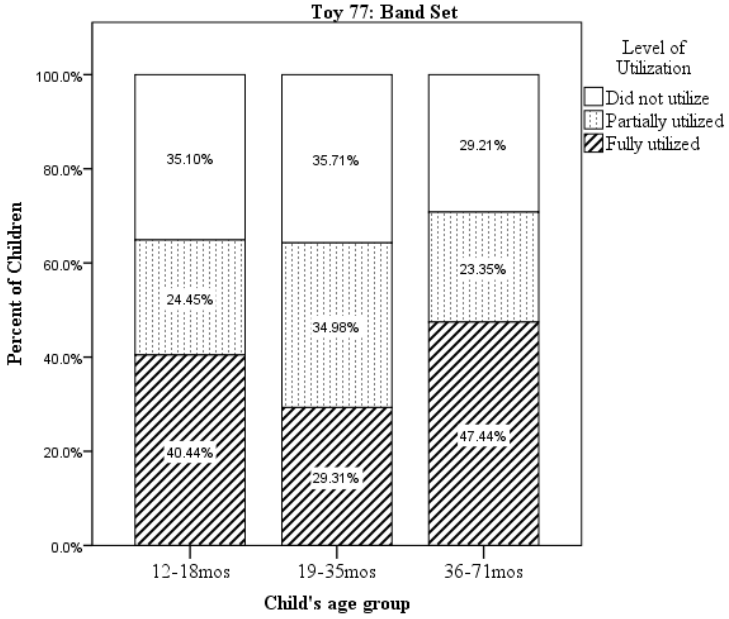


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps bucket over and throws all of the items back in the bucket
- *Partially utilizing:* Blows, shakes, or bangs the instruments but does not produce any sound OR uses only one instrument correctly
- *Fully utilizing:* Takes out and uses at least two of the instruments (i.e., blows into the kazoo or harmonica to make noise, shakes tambourine or maracas, or bangs spoons against hand or surface to make clicking noise)

Age Determination:

Manufacturer's suggested age	4 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Musical instruments (often packaged together as a band set) can be used effectively by children over the age of 3. At this age, children will take advantage of using multiple instruments in the band set, including maracas, tambourines, kazoos, and harmonicas.

Toy #78: Chunky Plastic Whistle

Brief Toy Description	Chunky orange whistle with white string.
Packaging	Cardboard tag, taken from larger band set packaged in clear, hard plastic drum
Materials	Hard plastic
	String
Other Features	Produces sound (operational noise)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	1
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

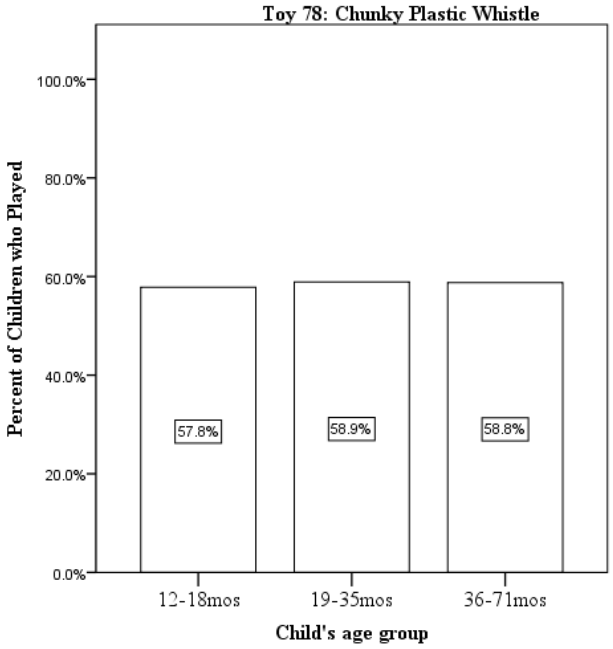
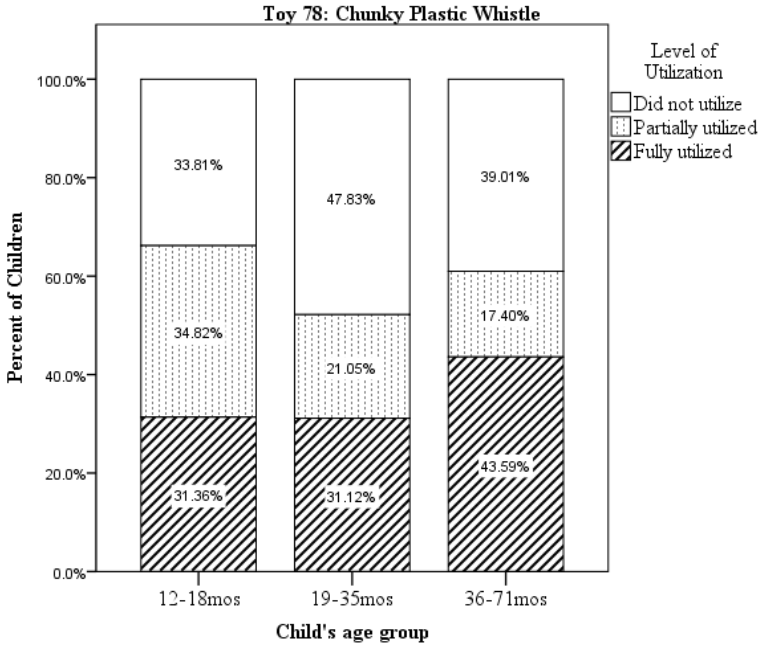


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws whistle, bangs it against end table
- *Partially utilizing:* Blows into whistle but does not make any sound or puts whistle in mouth and vocalizes a sound (i.e., does not blow a sound)
- *Fully utilizing:* Puts in mouth and blows to make whistle noise

Age Determination:

Manufacturer's suggested age	2 years +
Hypothesized age group	19-35 mos
Youngest suggested study age group based on data	12-18 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 12-18 months, children can begin to learn how to blow into chunky whistles. While still learning, children may mimic a whistle sound using their own voice while they pretend to blow into the whistle.

Toy #79: Foam Clay

Brief Toy Description	Moldable Styrofoam; three different neon colors given at testing session.
Packaging	Real photos on package, cardboard box
Materials	Soft foam
Other Features	None
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	6
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

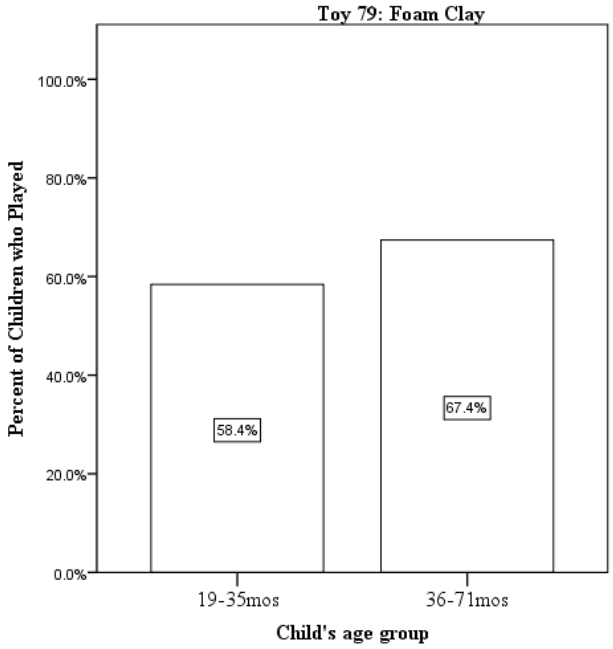
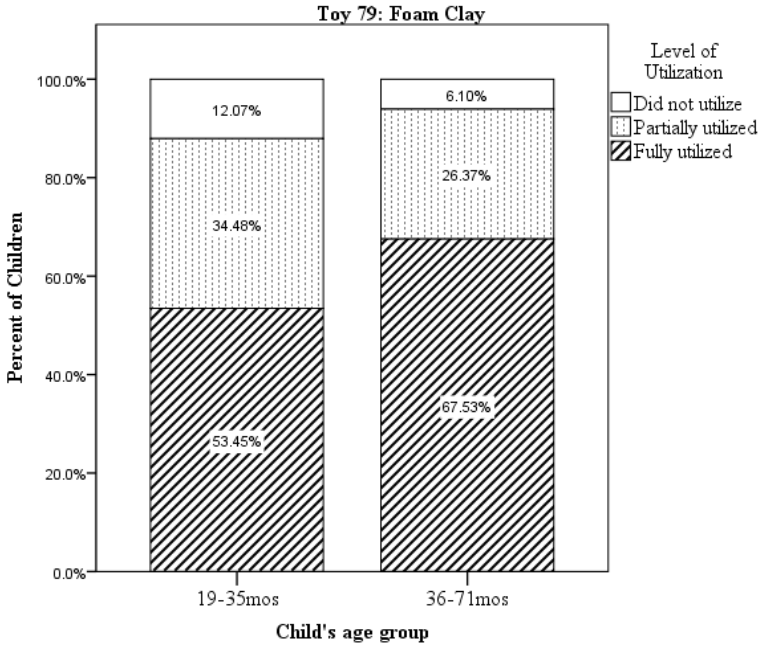


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child tries to eat foam
- *Partially utilizing:* Touches, pats, or rips foam apart
- *Fully utilizing:* Manipulate foam with hands enough to change its shape into something different than its original shape – does not need to be recognizable shape (i.e., can roll into ball, make a pancake, stretch, etc.)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By age 3, children enjoy squeezing foam clay between their hands. Age 3 is the youngest appropriate age for this toy, with younger children interpreting the clay as something that can be eaten. Younger children are also tempted to stick it onto inappropriate objects (their clothes, shoes) instead of using it as an exploratory medium in their hands.

Toy #80: Wooden Flap Toy

Brief Toy Description	Six flat wooden blocks attached horizontally with ribbon. Can be folded up. If held correctly, the blocks will fold upon themselves on the ribbon and "trickle" downwards.
Packaging	Cartoon illustrations on package, cellophane/ plastic bag, cardboard tag
Materials	String
	Wood
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

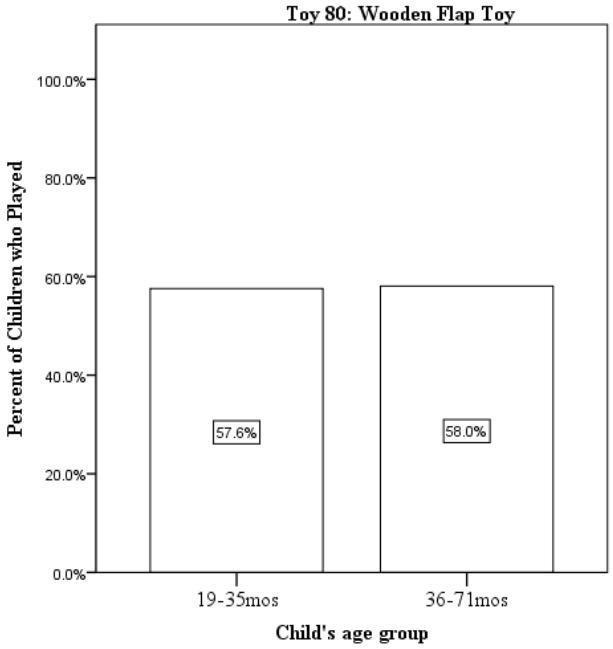
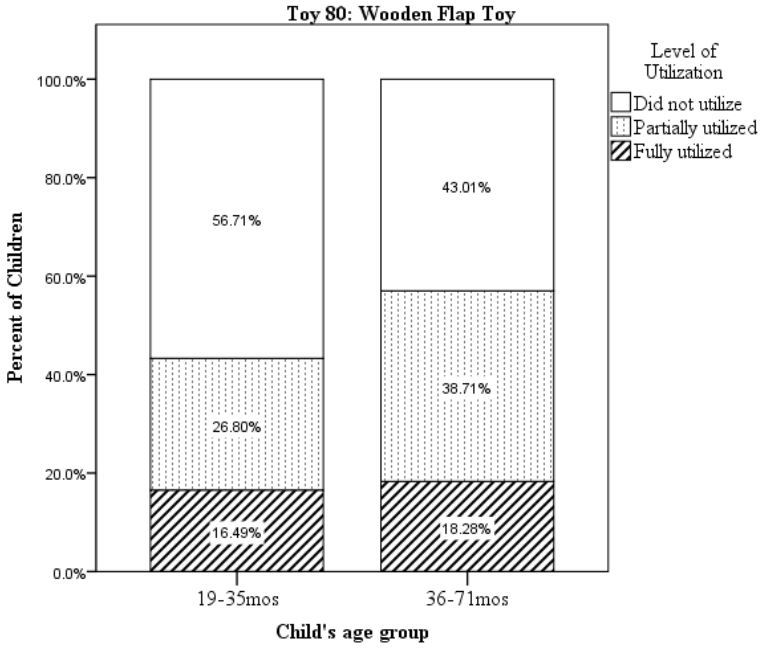


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws the toy
- *Partially utilizing:* Child folds it on the table and makes the pieces stack onto each other
- *Fully utilizing:* Holds up one end to make the various pieces move in a ladder effect

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Wooden flap toys are finally beginning to be understood at 36-71 mos. At any younger, children try to stack the flaps on top of each other as if they were blocks.

Toy #81: Clear Bubble Blaster

Brief Toy Description	Clear bubble gun that lights up when button pressed.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Liquid
Other Features	Battery operated
	Produces light
	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

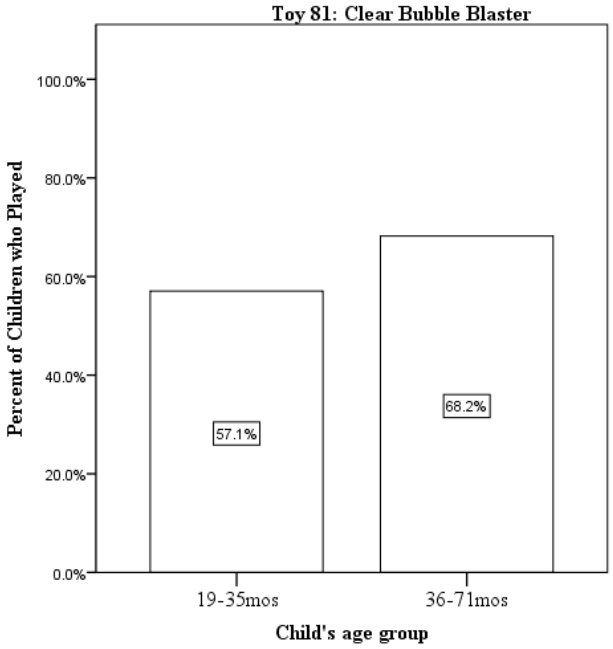
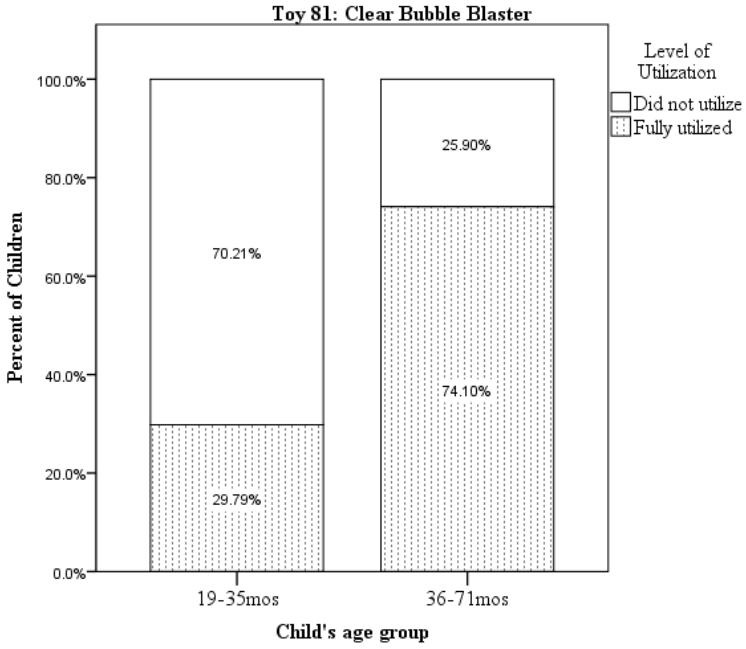


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child turns the toy upside down
- *Partially utilizing:* Child holds it in the correct way (i.e., upright) but is not able to press the button
- *Fully utilizing:* Pulls trigger so that bubbles come out

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By age 3, children can operate bubble guns with a trigger (both conventionally shaped and those in the shape of an animal). At any younger age, children do not have the strength or gross motor skills to hold up the gun and press the trigger at the same time, or lack the strength to press the trigger altogether.

Toy #82: Liquid Clock

Brief Toy Description	Clear container with red and blue liquid. Liquid trickles to bottom when container is flipped over.
Packaging	Cartoon illustrations on package, cardboard box
Materials	Hard plastic
	Liquid
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

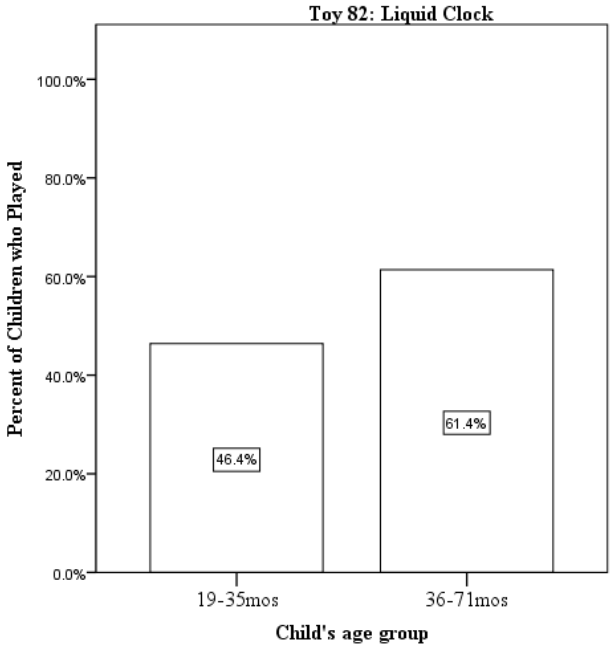
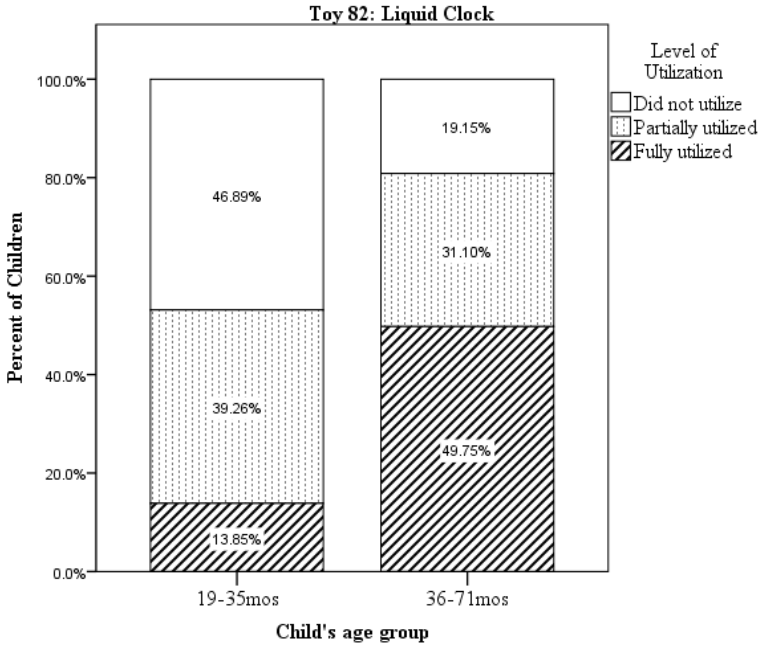


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws the clock
- *Partially utilizing:* Child shakes it to move the oil around but never flips it upside down
- *Fully utilizing:* Flips clock upside down to make oil move to the opposite end

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Liquid clocks are interesting exploratory toys for children aged 36-71 months—at any younger age, children do not know that flipping the clock over produces an effect that they can watch for enjoyment purposes.

Toy #83: Interlocking Bricks with Figurines

Brief Toy Description	Plastic interlocking brick blocks (23 pieces in yellow, pink, orange, green, brown). Contains 2 human figurines with accessories. Shapes of blocks can make an underwater scene or a garden playhouse. Shapes include rectangles as well as specific shapes for building a mountain or submarine.
Packaging	Cartoon illustrations on package, real photos on package, cardboard with plastic window
Materials	Hard plastic
	Soft plastic
Other Features	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

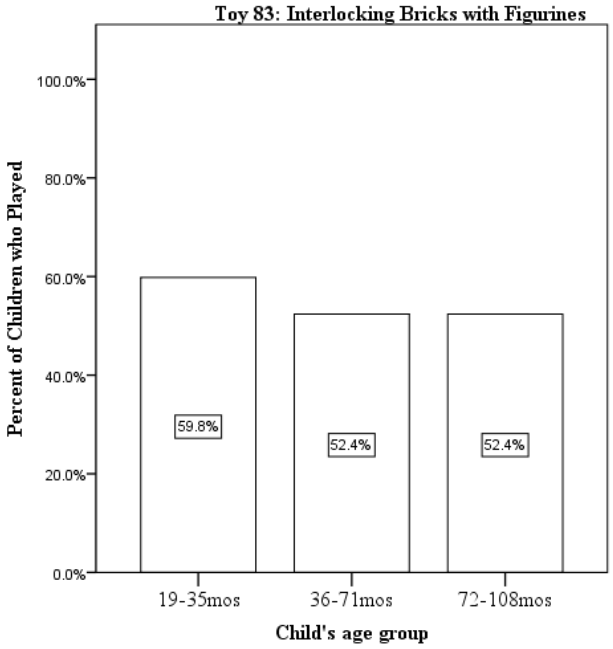
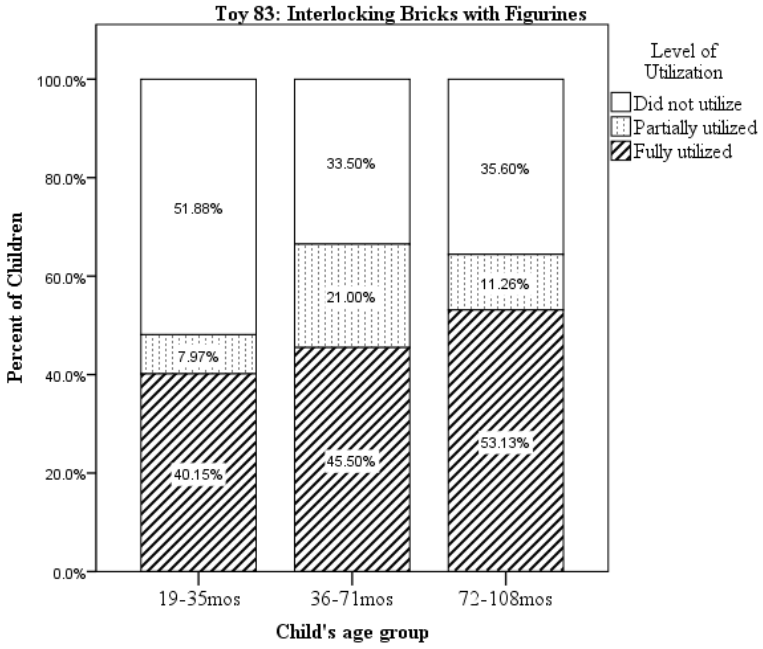


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps over bin or throws blocks
- *Partially utilizing:* Attempts to interlock the bricks but fails
- *Fully utilizing:* Clicks blocks together to make part of the set (e.g., the umbrella on to the table, part of the submarine, etc.)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By age 3, children's fine motor skills are developed to a sufficient degree to use interlocking bricks that are smaller (less than 1 inch in length) and simple snap-together building toys. They want their creations to become more realistic-looking, so variety in materials that can snap onto these interlocking bricks (for example, wheels, textures, miniature people, and model trees) is appealing. The addition of compatible figurines is appealing to this age group, as they enjoy pretend play that is afforded by these additional accessories. Children at any younger age may lack the fine motor skills needed to work with the interlocking pieces and choose to spend their time solely playing with the figurines.

Toy #84: Blocks with Vehicle Attachments

Brief Toy Description	Plastic truck piece attachments (wheels, plows) and rectangular neutral colored wooden blocks (5) that can be attached to the plastic pieces to build a vehicle. Four attachments to a wooden block makes a complete vehicle, and four vehicles can be built, for a total of 16 attachments. Attachments can make an orange backhoe, a green garbage truck, a red dump truck, and a blue cement truck.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Wood
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

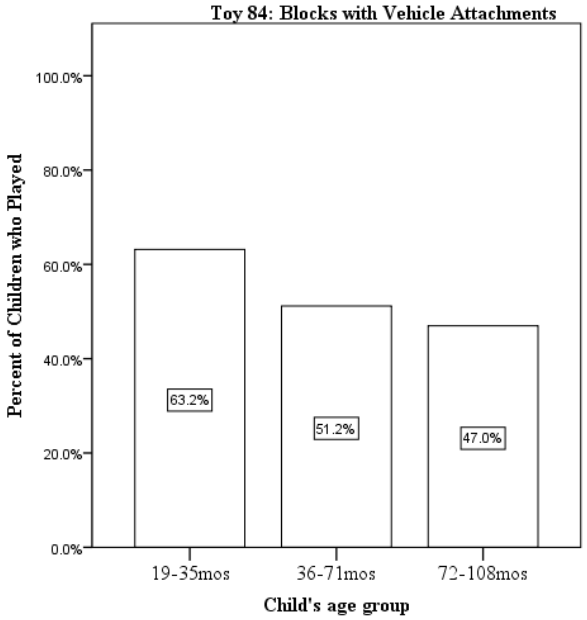
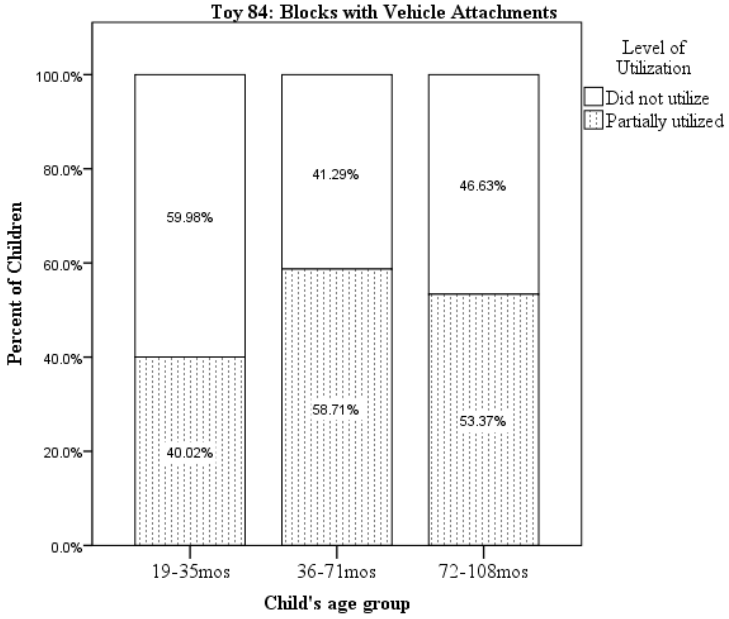


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps over bin, throws blocks, tries to make a line out of the wooden blocks, or starts using the vehicle attachments as small wheeled vehicles without first attaching them to the wooden block
- *Partially utilizing:* Child attempts to attach one of the wheel attachments to the wooden block but fails, causing it to fall off, OR child attempts to attach two of the plastic vehicle pieces together
- *Fully utilizing:* Puts wheels or top or front of truck onto the wooden blocks

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Children 36-71 months can insert flat pieces into slots and finally have the gross motor skills and strength to insert flat pieces into slots, as well as the fine motor skills to align them properly. These gross and fine motor skills are essential to the assembly of these trucks.

Toy #85: Dowel and Rod Building Set

Brief Toy Description	Plastic dowel pieces of varying lengths. Dowels can be stuck into the circular/half circle pieces with compatible holes to construct objects. Red, orange, yellow, green, purple, and white pieces. 65-piece set.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

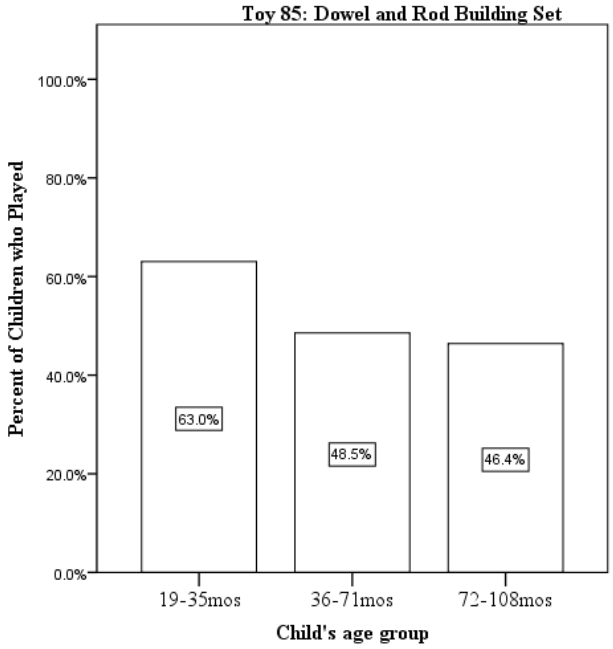
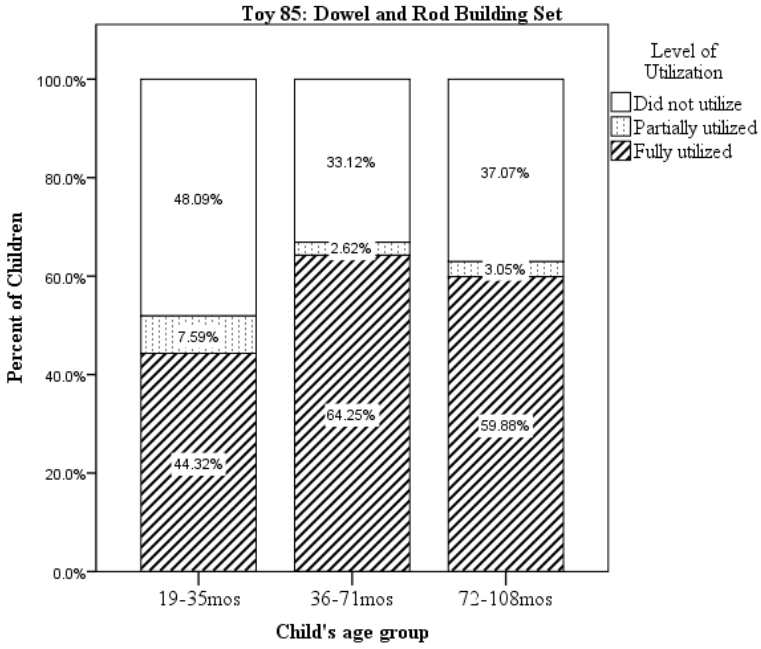


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over bin or spends the whole time reading the directions
- *Partially utilizing:* Child attempts to stick a rod into a circular piece but is unsuccessful and it does not stick
- *Fully utilizing:* Puts pieces of blocks together by sticking rod(s) into circular piece(s)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Rod and spool connector pieces require a fair amount of gross and fine motor skills that emerge around the age of 3—gross motor skills are needed to push and snap them together, and fine motor skills are necessary to align a dowel into the hole of a spool connector. Children may use rod and spool connector pieces to build familiar objects at this age, such as making a lollipop or a set of wheels.

Toy #86: Magnetic Puzzle

Brief Toy Description	Green wooden board with 10 magnetic puzzle pieces. Comes with a wooden "fishing rod" with a magnetic stick on the end of the string. Puzzle pieces are in the shape of bugs—grasshopper, butterfly, bee, ant, moth, ladybug, caterpillar, spider, dragonfly, lightning bug.
Packaging	Cellophane/ plastic bag
Materials	Wood
	Hard metal (non-pliable)
Other Features	Includes a face (two-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

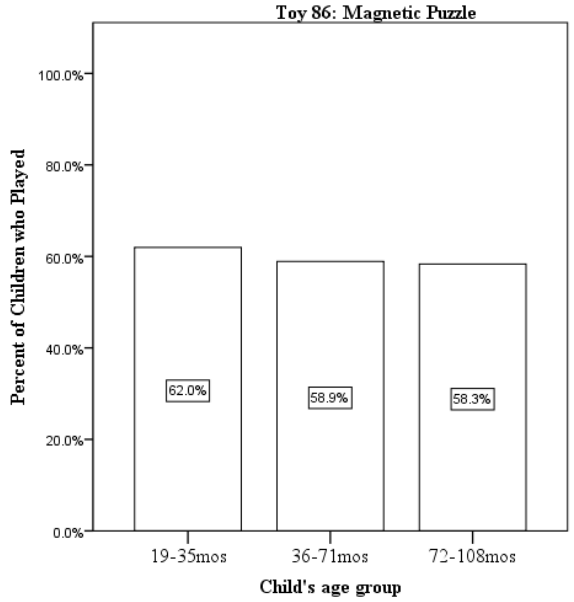
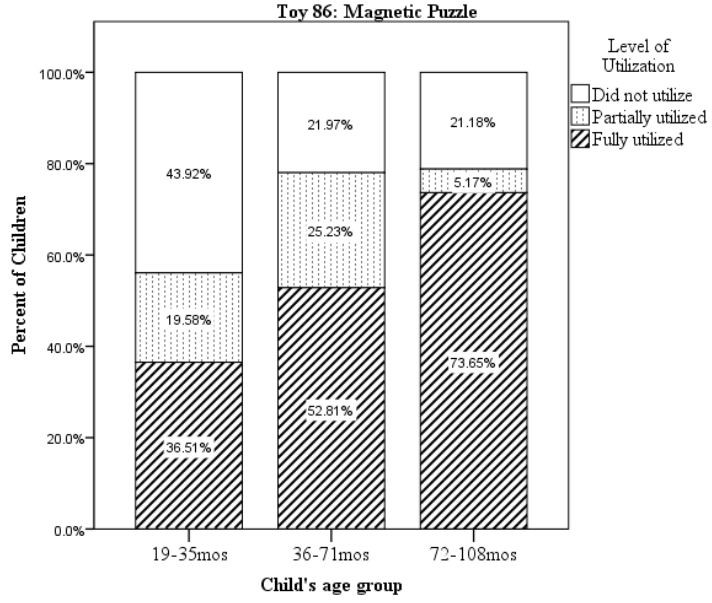


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps puzzle over or throws pieces
- *Partially utilizing:* Child attempts to use the magnet to take bug pieces out of the puzzle but fails OR child successfully uses magnet to take pieces out of the puzzle but is unable to put a bug piece back in the correct notch using either hands or the magnetic net (i.e., child is turning the bug the wrong way)
- *Fully utilizing:* Uses magnetic part of the net (either by holding the wooden net or the red magnetic stylus) to take bug pieces out of the puzzle and puts a bug piece back in the correct notch using either hands or the magnetic part of the net (using the wooden net or the red magnetic stylus)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At age three, children's fine motor skills are developed enough to align the magnetic wand with the metal in the puzzle piece to grab and maneuver the puzzle piece to where it belongs. Younger age groups may have trouble aligning the two magnets together with enough precision to complete the puzzle.

Toy #87: Matching Game

Brief Toy Description	Green and blue "pond" with 12 small yellow ducks. Each duck has a shape on the bottom (diamond, circle, triangle, square) that players keep track of and match to the side of the pond.
Packaging	Cartoon illustrations on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (animal noises)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	6
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

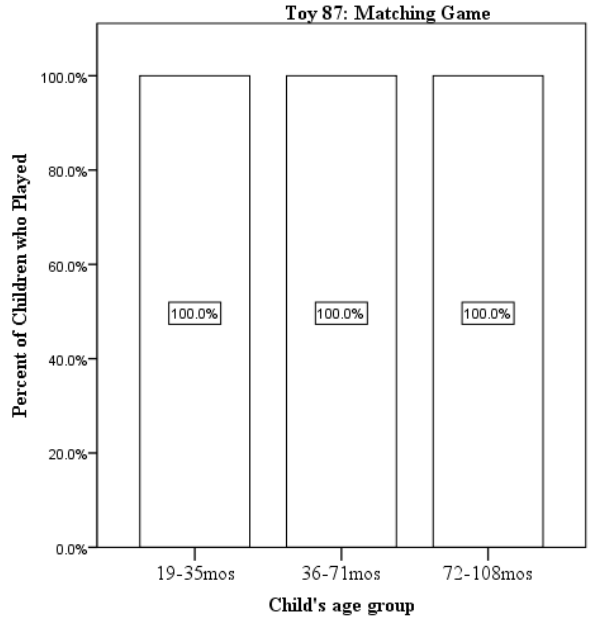
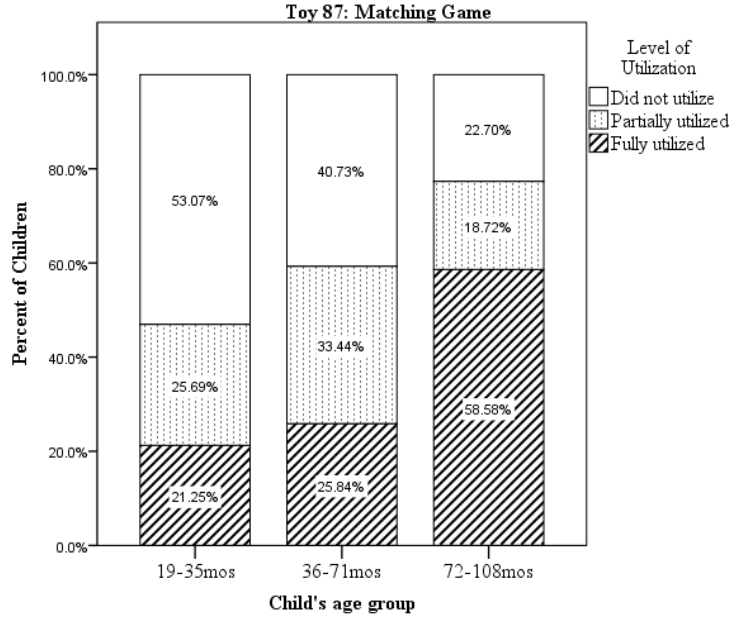


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Takes all of the ducks off the pond and puts them on the table, lines the ducks up in a line, dumps pond over so all of the ducks fall out, spends the whole time reading the directions, or only presses the orange button
- *Partially utilizing:* Presses orange button in center of pond and notices shape on bottom of duck by flipping it over
- *Fully utilizing:* Presses orange button in center of pond, notices shape on bottom of duck by flipping it over and matches this to a shape on the side of the pond

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	72-108 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 72-108 months, children enjoy matching and memory games that require them to follow a set of actions in a pattern. For example, children finally have the memory skills to flip over an object with a shape on it, turn it back over, and be able to relocate the shape later, where in previous age groups, children may focus on playing with the object itself instead of noticing the shape and remembering where it was located.

Toy #88: Handheld Water Game

Brief Toy Description	Clear yellow cylinder with small blue, green, and red balls inside cylinder that move around when button is pressed. Goal is to get the balls into the four "hoops" on the inside of the cylinder.
Packaging	Cardboard tag
Materials	Hard plastic
	Water
Other Features	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	4
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

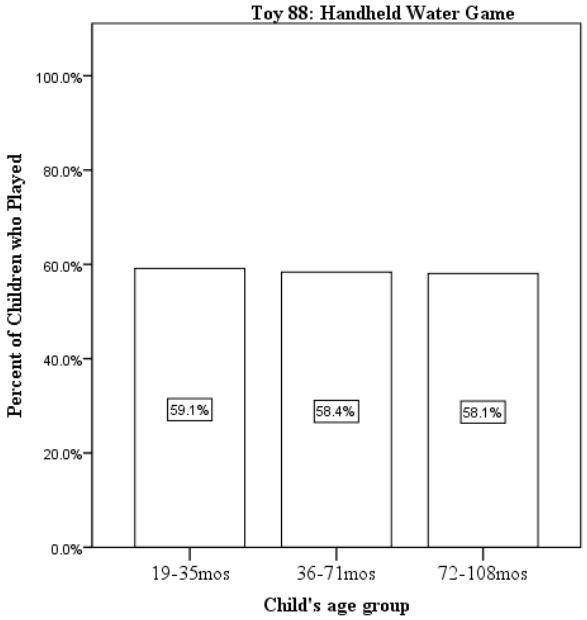
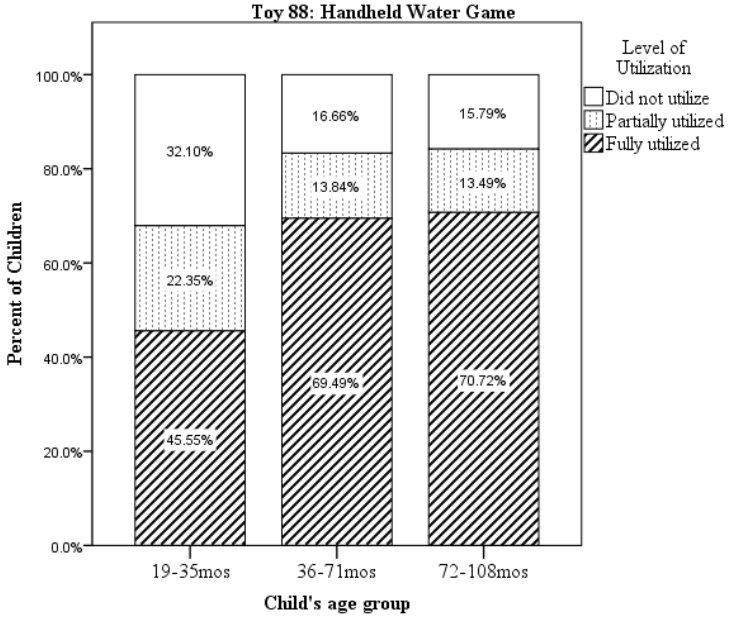


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Shakes the game to move the balls around or flips it upside down and looks at the balls move that way
- *Partially utilizing:* Holds game upside down but still presses white button to try to move the balls around
- *Fully utilizing:* Holds game right-side up and presses white button to move small balls around

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 36-71 months, children enjoy handheld games filled with water with a large button with the goal of launching small balls into baskets. Younger children may flip the handheld game over to move the balls around instead of using the strategy of button pressing.

Toy #89: Alphabet Magnets

Brief Toy Description	Large foam letters (12) in red, orange, yellow, green, blue, purple with magnetic back. Presented with magnetic board.
Packaging	Real photos on package, cellophane/ plastic bag, cardboard tag
Materials	Hard plastic
	Hard metal (non-pliable)
	Soft foam
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

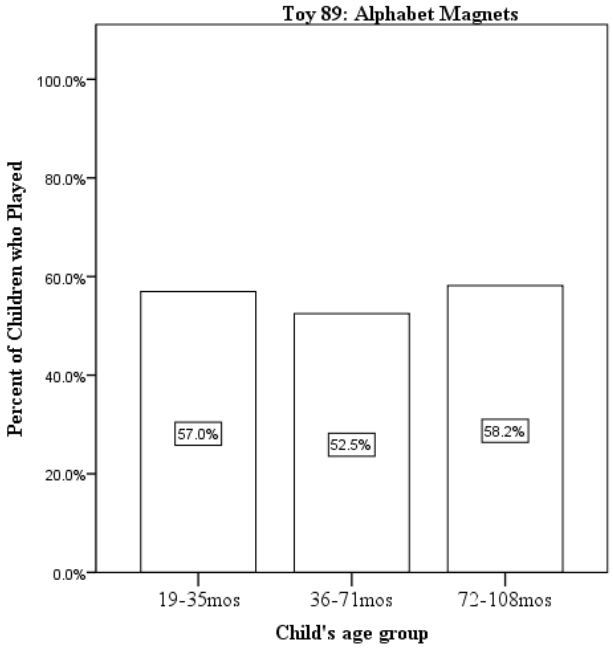
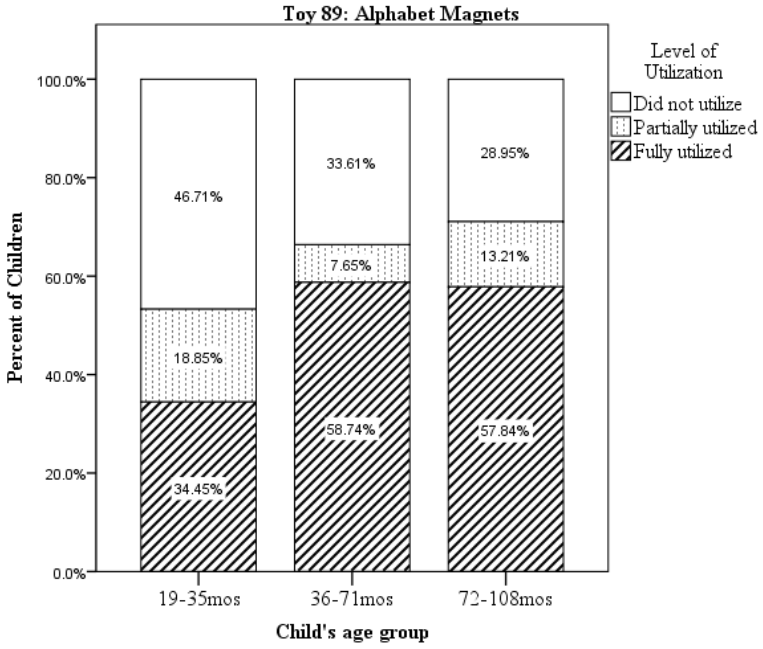


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Carries or throws the letters around or dumps over the bin containing the letters
- *Partially utilizing:* Takes letters out of the bin and names each letter or tries to spell something on another surface in the room that is not the white board
- *Fully utilizing:* Puts letters onto white board

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	In this 36-71-month age grouping, appropriate learning toys include those that teach simple letter concepts. When using alphabet magnets at this age, children will often search for the first letter of their name, or if they have practiced, may be able to spell their own name with alphabet magnets.

Toy #90: Abacus

Brief Toy Description	Wooden object with 10 rods and movable colored beads on rods. Each rod holds a different color of bead—red, orange, yellow, green, blue.
Packaging	Cellophane/ plastic bag
Materials	Wood
Other Features	None
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

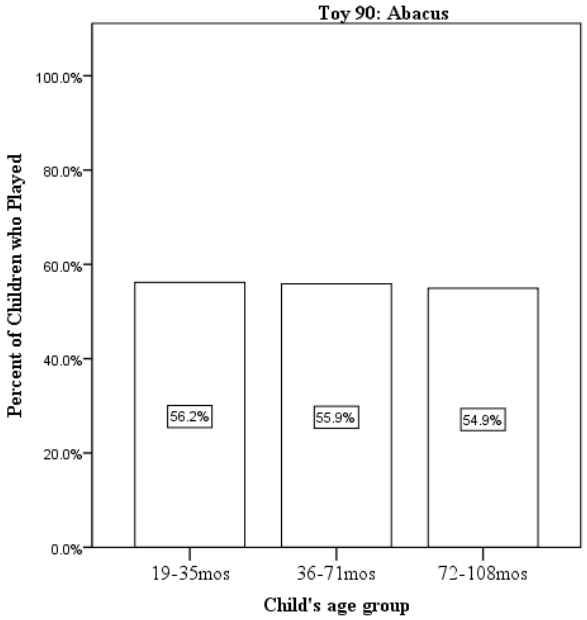
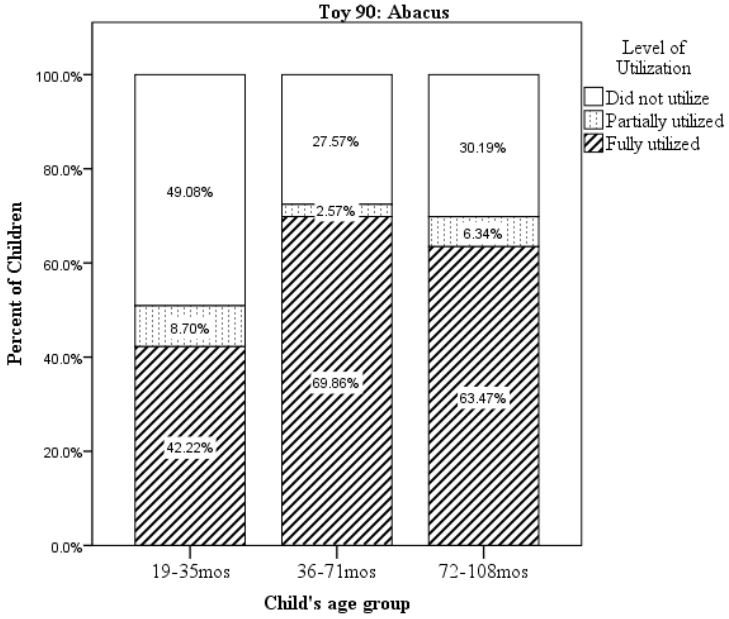


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Carries or throws abacus around or runs hand down the abacus along the beads in a vertical motion
- *Partially utilizing:* Moves beads over from one side to the other all at once with whole hand
- *Fully utilizing:* Counts beads out loud, moves one at a time from one side to the other, or carefully moves over one row at a time from one side to the other

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	In this 36-71-month age grouping, appropriate learning toys include those that teach simple number concepts. At this age, children have the cognitive skills to enjoy counting and will slowly move beads over on an abacus to practice numbers. At any younger age, children look at an abacus as a bead toy or maze (something that should be manipulated rather than counted).

Toy #91: Toy Camera with Viewfinder Function

Brief Toy Description	Red camera with green lens cap and brown backside. Lens is beveled for a special effect when child looks through lens.
Packaging	Developmental information written on package, cartoon illustrations on package, real photos on package, cardboard box
Materials	Fabric
	Wood
	Hard plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

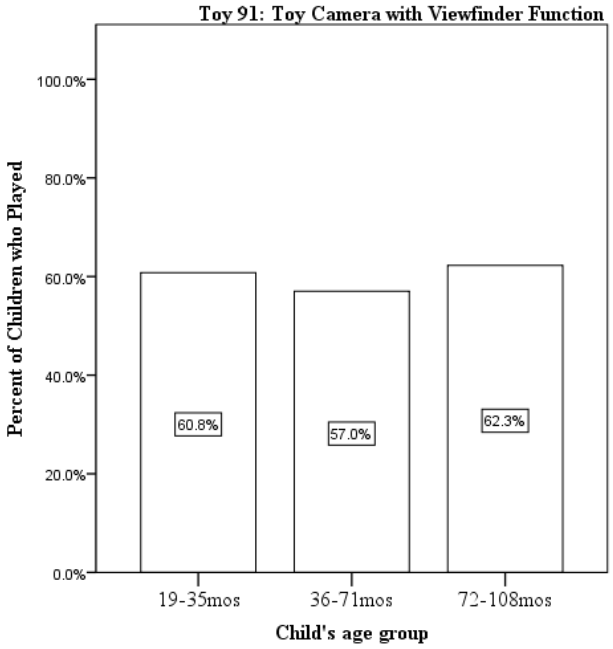
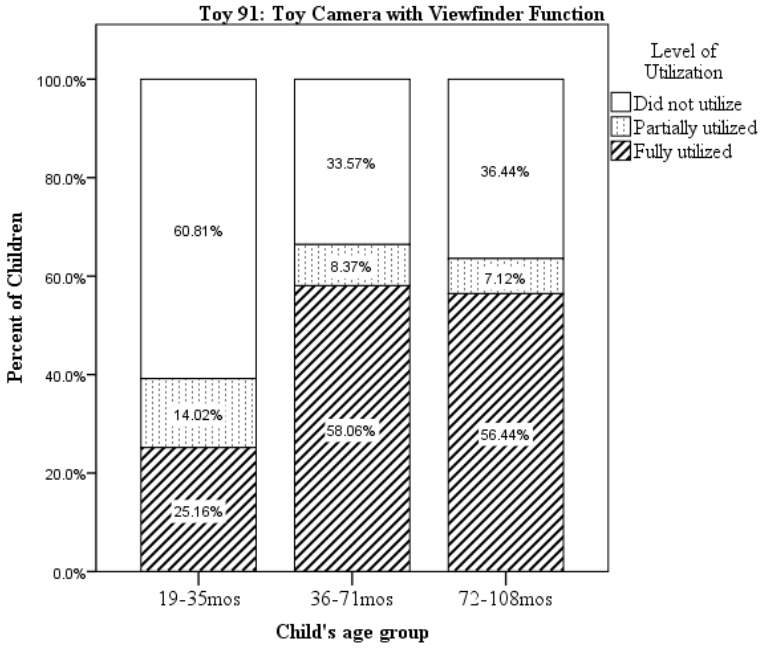


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Carries or throws camera
- *Partially utilizing:* Looks through viewfinder, but on the wrong side of the camera (i.e., child looks through lens in the front)
- *Fully utilizing:* Looks through viewfinder of camera

Age Determination:

Manufacturer's suggested age	18 mos +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Cameras with a viewfinder function can also be used properly at 36-71 months. Looking through the glass and pointing out objects is appealing at this age. At younger ages, children lack the cognitive skills to understand which side of the camera is the proper side to look through.

Toy #92: Velcro Ball and Mitt Set

Brief Toy Description	Two plush orange crabs with Velcro on one side. Crabs strap onto hands. Comes with two green plush balls wrapped with Velcro.
Packaging	Cartoon illustrations on package, cardboard backing with plastic
Materials	Fabric
Other Features	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	4
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

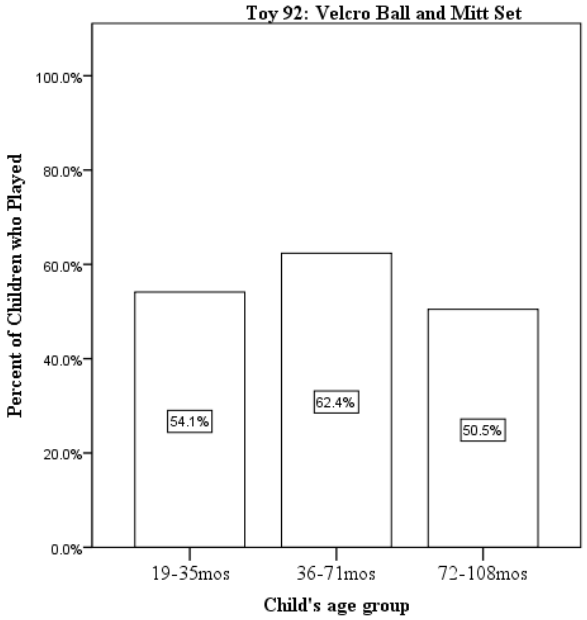
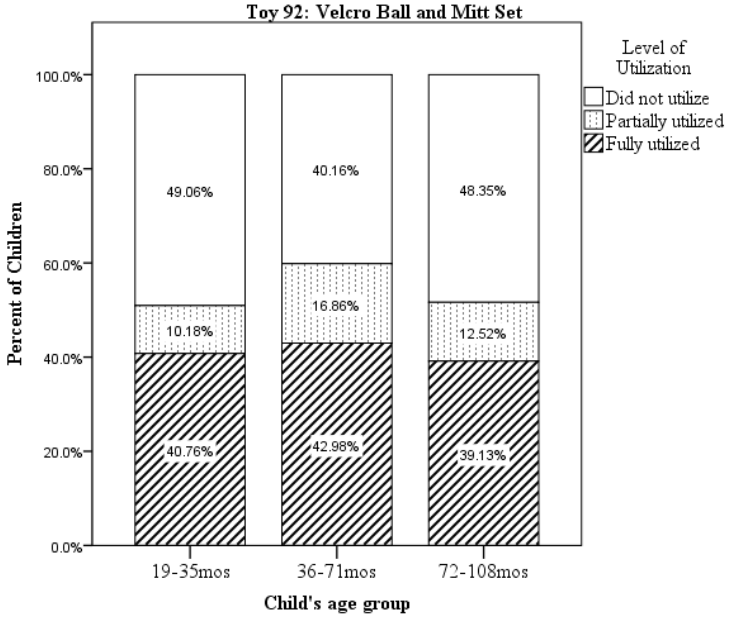


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child uses the mitts as imaginative play toys or rips the mitts apart without doing anything with the Velcro ball
- *Partially utilizing:* Child throws, pushes, rolls, chases, or kicks the ball but does not catch it with the Velcro mitt OR the child places the mitt on hand with the strap but does not try to throw and catch the Velcro ball OR child sticks and unsticks Velcro balls to the crabs
- *Fully utilizing:* Pulls mitts apart, removes ball, and attempts to throw and catch the ball with Velcro on mitts (note: can throw to oneself)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 36-71 months, children can use Velcro pad mitts that can 'catch' a Velcro ball, as they finally have the coordination needed to align a mitt with a ball that is coming their way.

Toy #93: Squishy Porcupine Yoyo

Brief Toy Description	Squeezable yoyo with tendrils.
Packaging	Real photos on package, cardboard box
Materials	Rubber
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	6
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

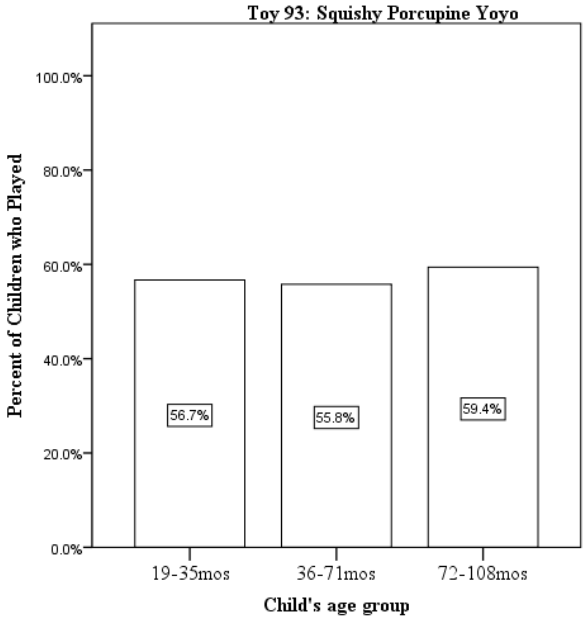
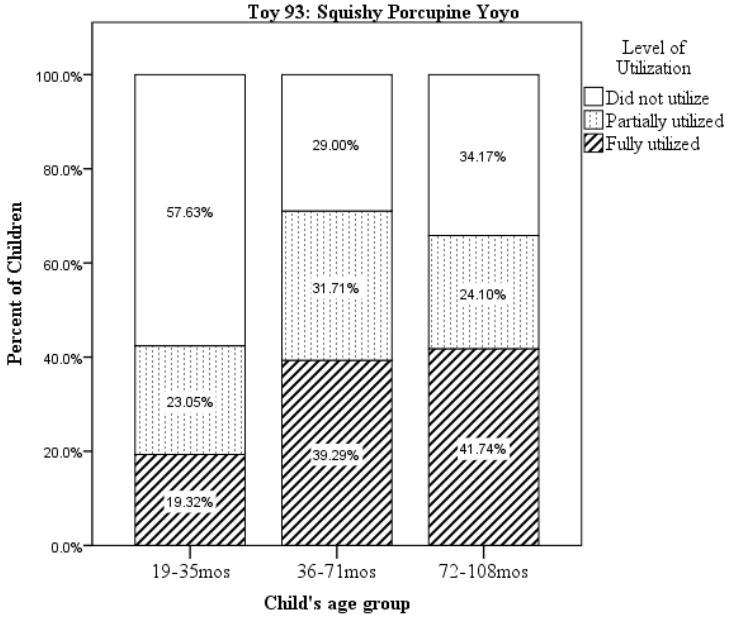


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child squeezes and squishes ball or stretches the string out by attaching the loop to some other object in the room (that is not their hand) and stretches it out OR child ignores the string and plays with the toy as a ball
- *Partially utilizing:* Child grabs one end of the string with one hand and the ball in the other hand and stretches it out OR child bounces ball up and down like a yoyo but does not put finger through the loop
- *Fully utilizing:* Child puts finger through the loop and bounces ball up and down

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Squishy yoyos with a bouncing string mechanism are also mastered at 36-71 mos. Children at younger ages may use the squishy yoyo and bounce it up and down without putting their finger through the loop due to lack of fine motor skills. They also may not understand the concept of a yoyo and only use the toy as a ball. Younger children will also be tempted to bite and chew on the yoyo material.

Toy #94: Crawl-Through Tunnel

Brief Toy Description	Yellow, green, blue, orange, red crawl-through enclosed tunnel placed on the floor.
Packaging	Cartoon illustrations on package, real photos on package, cellophane/ plastic bag
Materials	Nylon
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	1
How large are the parts, pieces, and components of the toy?	5
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

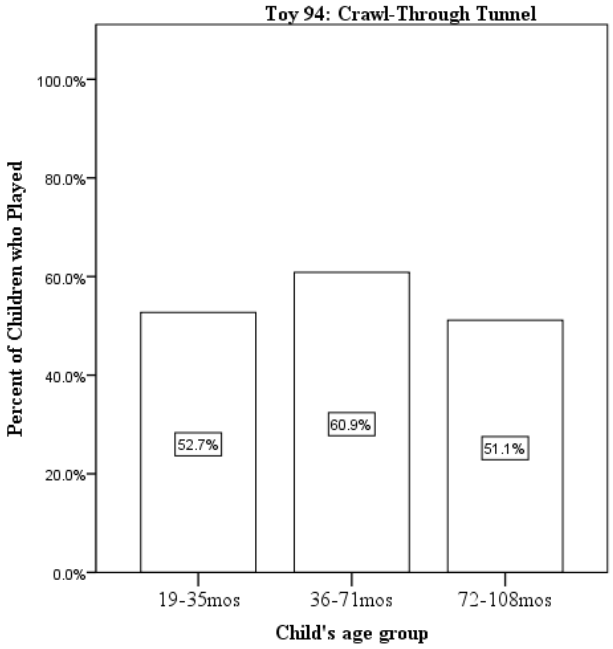
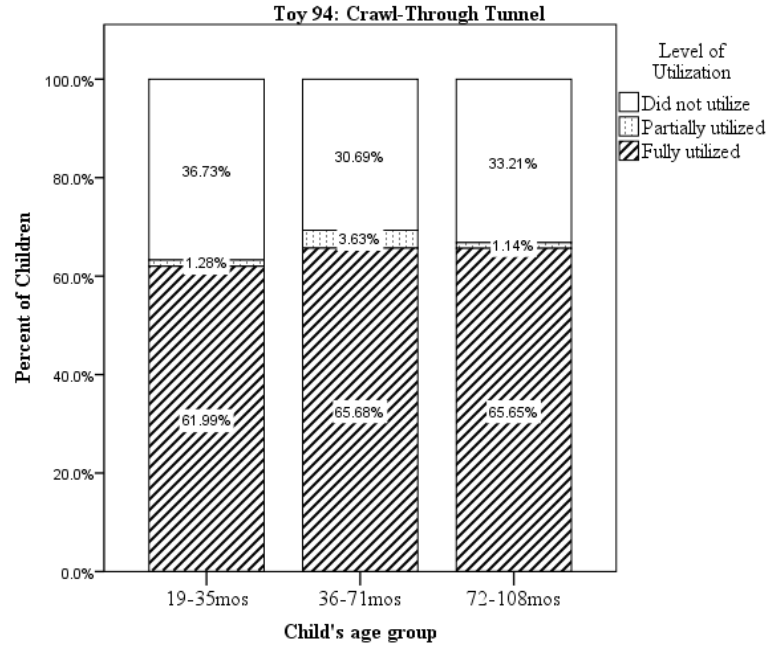


Figure 2. Of children who played with toy, utilization level by age group



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Key:

- *Not utilizing:* Child jumps on top of the tunnel
- *Partially utilizing:* Child gets in tunnel, stands up, and tries to walk around with the tunnel on them
- *Fully utilizing:* Crawls through tunnel

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Children enjoy climbing through enclosed tunnels at 36-71 months, at younger ages they may feel scared or intimidated to crawl through.

Toy #95: Doll with Accessories

Brief Toy Description	Doctor doll. Comes with desk, bag, and two small animals (white, pink, purple, blue).
Packaging	Cartoon illustrations on package, cardboard with plastic window
Materials	Hard plastic
	Fabric
Other Features	Battery operated
	Produces sound (human voice)
	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	6
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

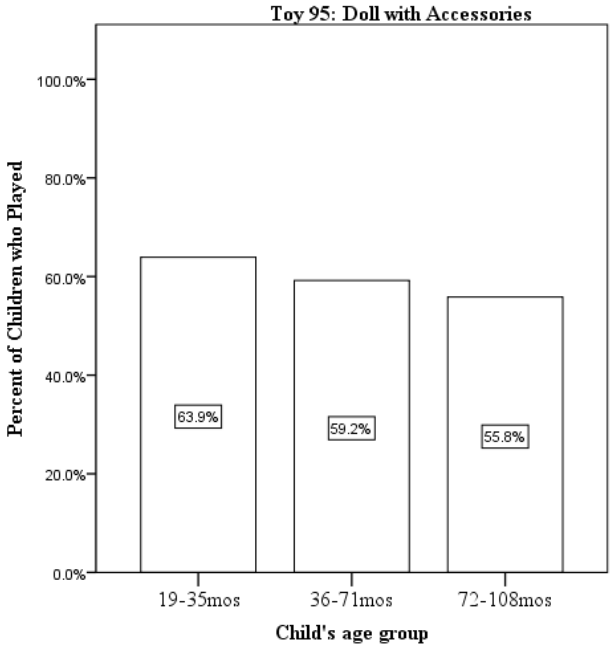
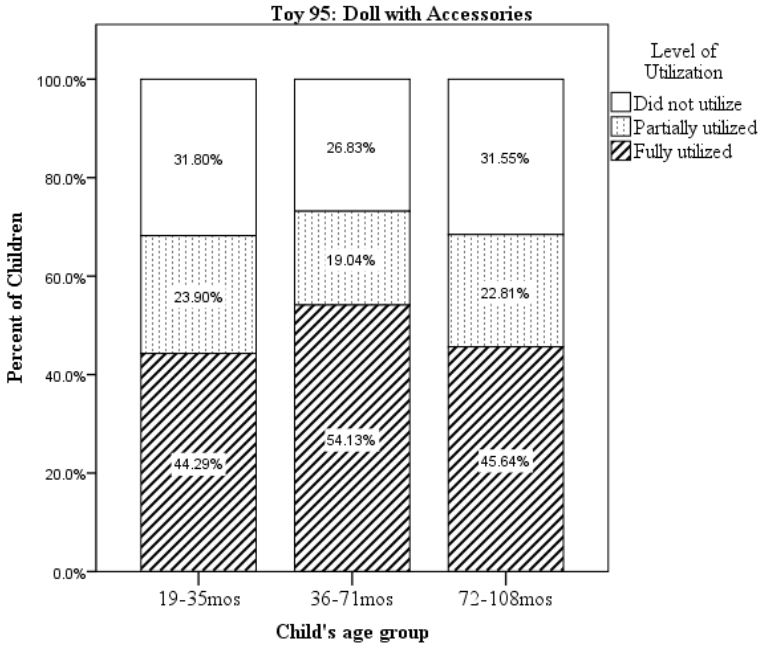


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws, carries, or bangs objects against table
- *Partially utilizing:* Child explores the accessories but shows no evidence of pretense (e.g., child presses the buttons repeatedly to make noise)
- *Fully utilizing:* Uses accessories for pretend play scene (e.g., puts animal on doctor bench or uses stethoscope on one of the animals)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 19-35 months, children start to have the cognitive skills to create pretend play scenes with dolls that come with props and accessories, such as using a doll with doctor supplies to take care of other dolls or figurines. If the doll portrays a familiar media character, children may act out familiar scenes that they have seen with the character in books or onscreen.

Toy #96: Play Food

Brief Toy Description	Wooden fruit & vegetables (7 pieces, life-sized), and sandwich ingredients (15 pieces-- bread slices, cheese, meat, etc.). Sandwich pieces are stuck together with small Velcro patch.
Packaging	Cartoon illustrations on package, cardboard with plastic window
Materials	Hard plastic
	Fabric
	Wood
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

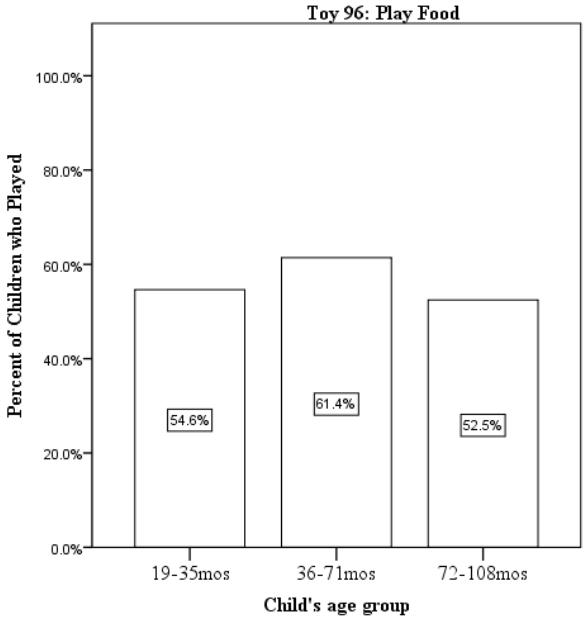
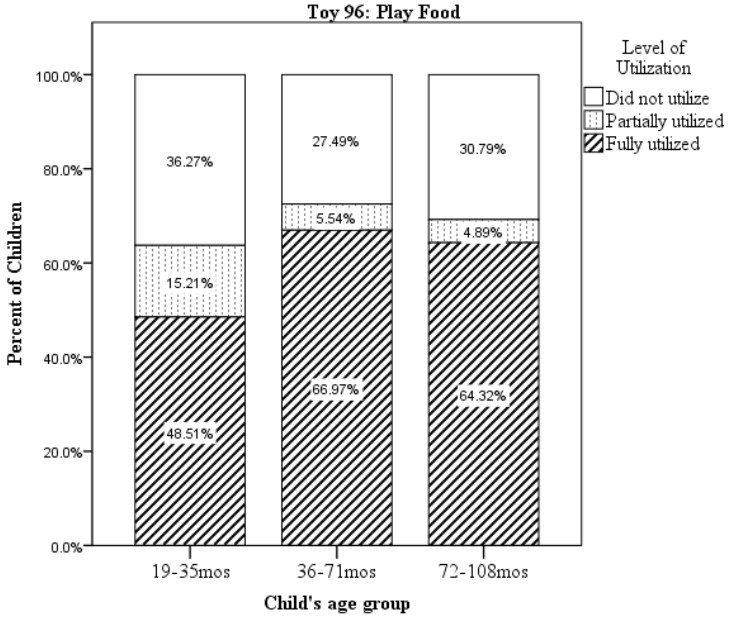


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws, carries, or bangs objects against the table
- *Partially utilizing:* Child attaches the sandwich pieces together but does not form a real sandwich pattern (e.g., the bread is on the outside or the child haphazardly makes a tower out of the pieces)
- *Fully utilizing:* Makes a sandwich with the correct sequence of pieces (i.e., bread cannot be the inside layer), pretends to eat sandwich, or pretends to feed the sandwich to something

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 36-71 months, children can use play food appropriately (e.g., mimic eating and imitate chewing, but not actually trying to bite, suck, or mouth the play food—a common occurrence at younger ages). Children now also have the fine motor skills needed to put together play food with multiple pieces and parts (e.g., putting together a sandwich using a kit that has a small piece of Velcro to connect the pieces together).

Toy #97: Dancing Figurine

Brief Toy Description	Yellow and blue figurine that walks, sings, and talks when button on belly is pressed.
Packaging	Cartoon illustrations on package, real photos on package, cardboard with plastic window
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (operational noise)
	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

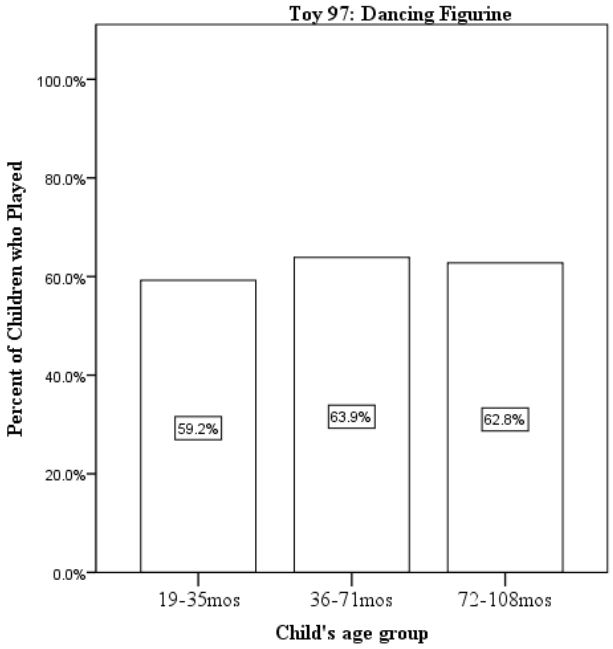
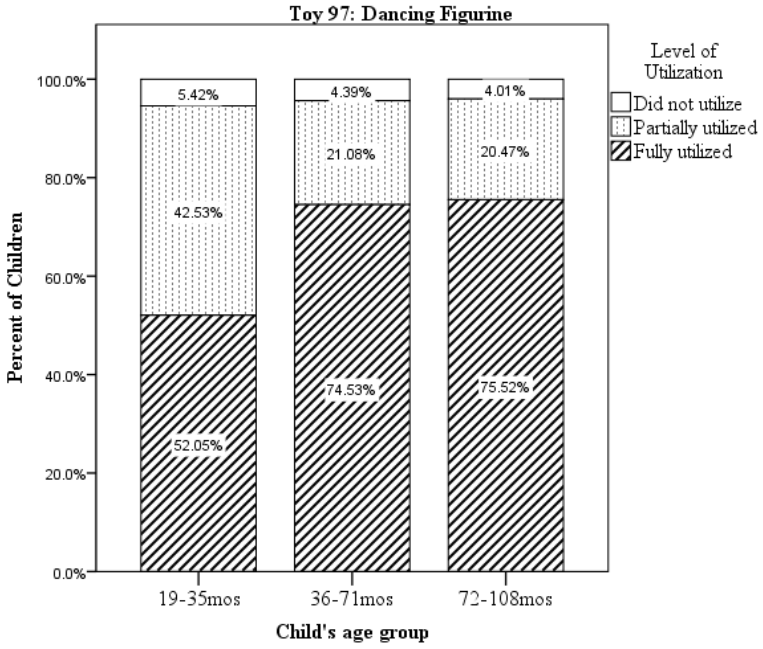


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws, carries, or bangs figurine against the table
- *Partially utilizing:* Child fiddles with the figurine's hands the whole time
- *Fully utilizing:* Presses button on figurine to make it dance OR moves it over accordingly on the table so it has room to dance OR watches it dance

Age Determination:

Manufacturer's suggested age	4 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 19-35 months, children will be interested in investigating figurine toys, particularly those that move, bounce, sing, talk, or dance with a button press or voice activation. At this age, children have the socioemotional capabilities of envisioning interactions between interactive figurines and other objects in the room (e.g., other dolls). However, any sound that is too loud, sudden or extreme coming from the doll could cause the child to avoid the toy.

Toy #98: Wind Up Toys

Brief Toy Description	Two wind up toys-- one with a key handle and one with a small stub handle.
Packaging	Cellophane/ plastic bag, cardboard tag
Materials	Hard plastic
Other Features	Produces sound (operational noise)
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

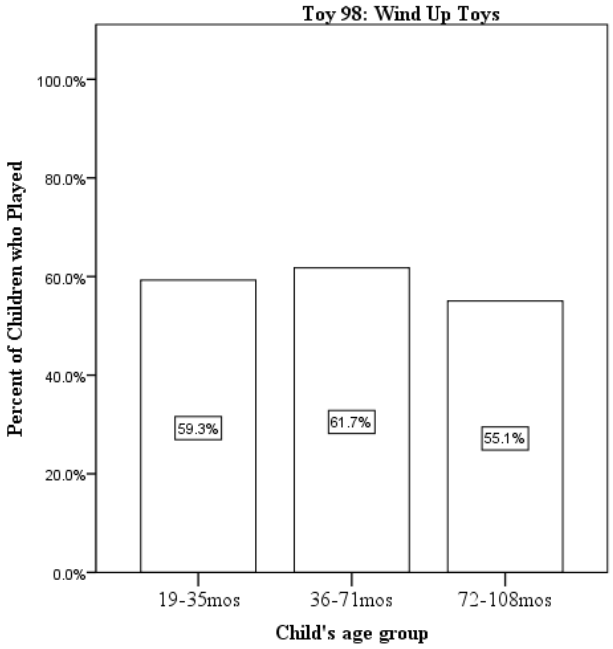
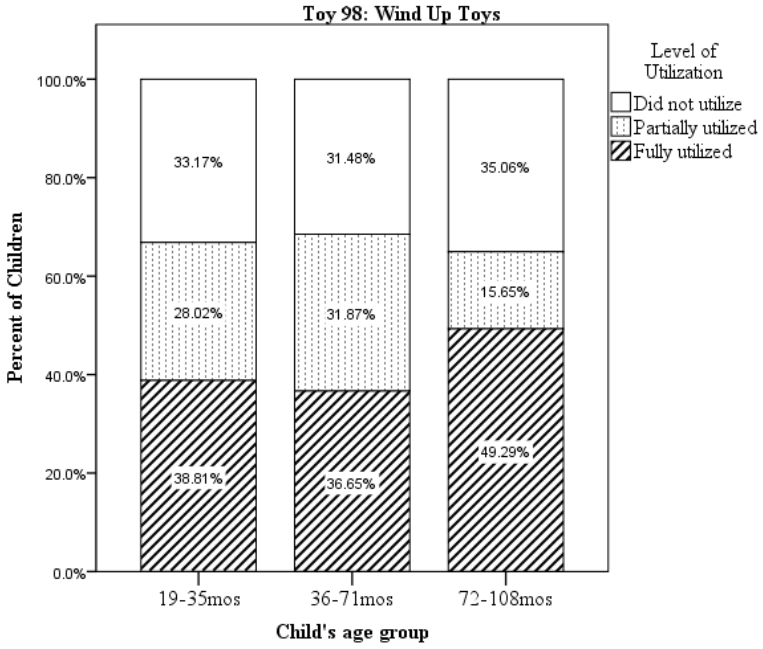


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries toy around
- *Partially utilizing:* Child pushes toy to propel it instead of using the wind up feature
- *Fully utilizing:* Turns gear enough on at least one of the wind up toys and makes them move

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 19-35 months, children enjoy vehicles that require a low to moderate degree of fine motor dexterity and control, including wind up toys. Children in this age group have developed the fine motor skills to use simple, one- or two-turn wind up mechanisms of low tension with a progressively higher rate of success as they progress towards 3 years of age.

Toy #99: Airplane

Brief Toy Description	Black, gray, and red airplane. Belly of plane has a compartment that can be opened and propellers that can be spun.
Packaging	Cartoon illustrations on package, cardboard with plastic window
Materials	Hard plastic
Other Features	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	3
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

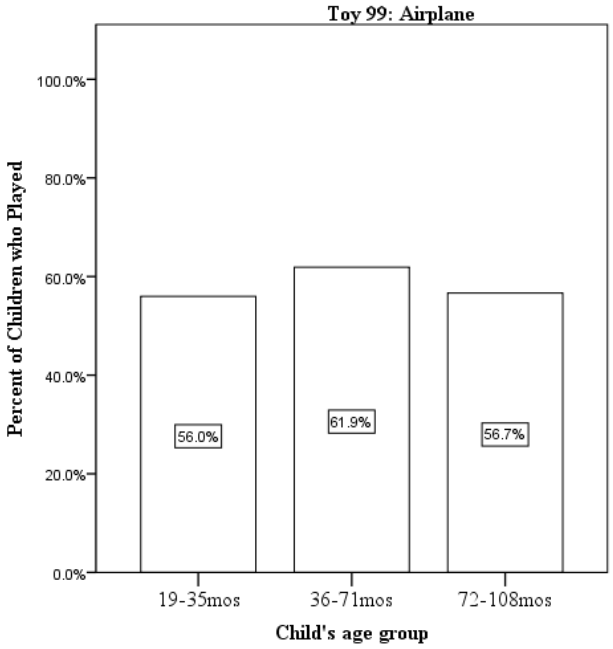
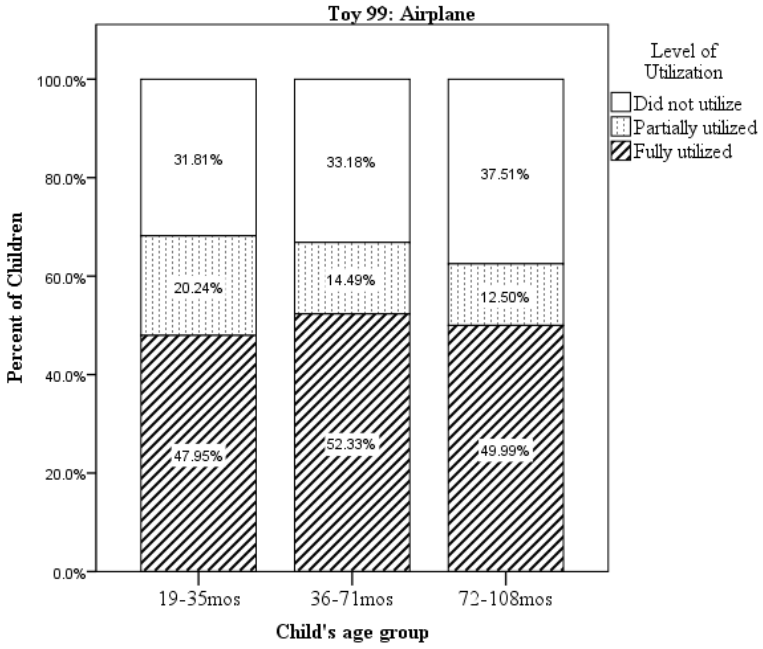


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries the toy around
- *Partially utilizing:* Child pushes the toy around on a surface to make the wheels move OR child spends the whole time checking out the details (e.g., opening the bottom compartment, spinning the propellers or wheels, etc.)
- *Fully utilizing:* Child lifts the airplane to make it "fly"

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 19-35 months, children enjoy relatively large, simple, workable parts that this airplane affords—like a hinged door and propellers—as long as they require only a low degree of fine motor dexterity and control and are easily manipulated with a pincer grasp. In addition, children at this age are able to lift the airplane and pretend to make it fly with their emerging cognitive skills that allow them to engage in pretend play.

Toy #100: Diecast Car Track

Brief Toy Description	Brown, tan, and green race track with small diecast vehicles and red handle that can crank the cars (6) up a hill.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Hard metal (non-pliable)
Other Features	Produces sound (operational noise)
	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	2
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

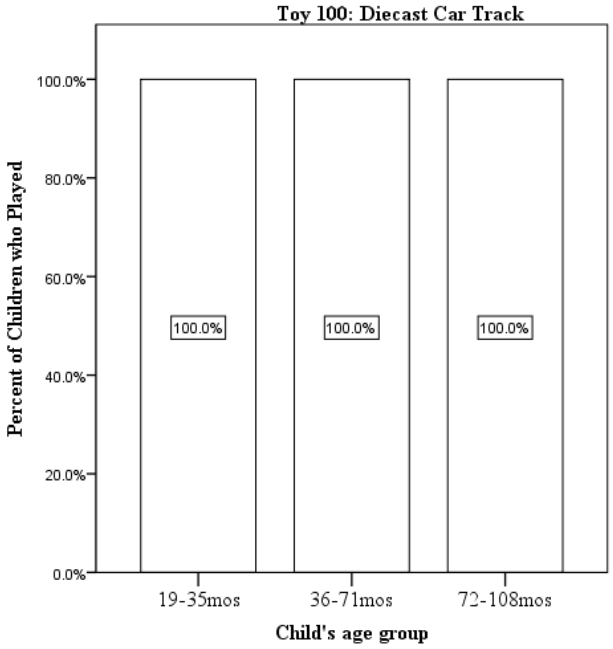
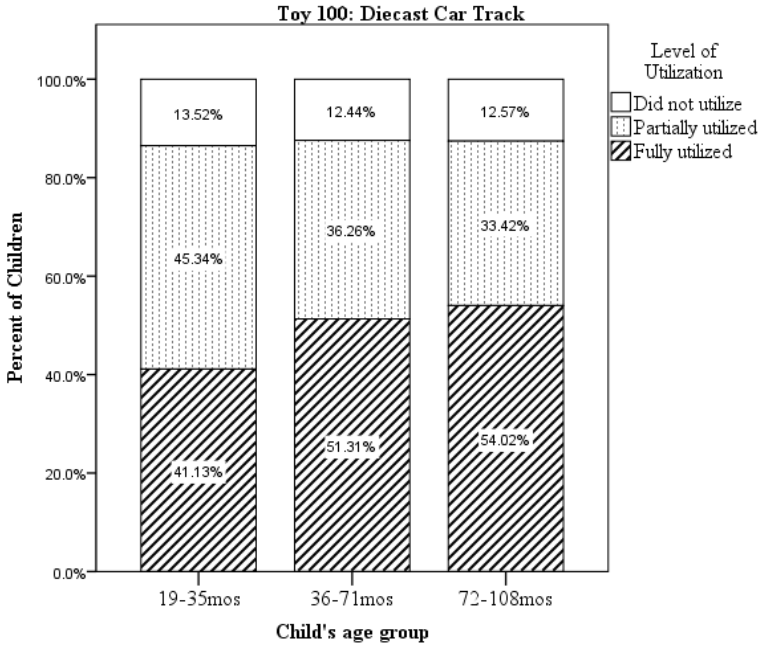


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Wheels cars around on other surfaces in the room
- *Partially utilizing:* Puts cars on the track and lets them roll down the hill but does not pull the lever to move them up the hill
- *Fully utilizing:* Puts cars on track and pulls lever to move them up the hill

Age Determination:

Manufacturer's suggested age	4 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	Children at 19-35 months enjoy tracks that can fit 2-4-inch cars and watch them go down slopes. Their fine motor skills at this age allow them to align the car correctly on the track. Younger children may have trouble aligning it correctly, or may attempt to put cars onto a track that are inappropriately sized for each other.

Toy #101: Clay with Molds

Brief Toy Description	Three pods of clay with three head-shaped molds that can grow "hair" when clay is pushed through them using a plastic barber chair with a crank. Two additional molds, scissors, and clipper are included. Neon colors.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Clay
Other Features	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

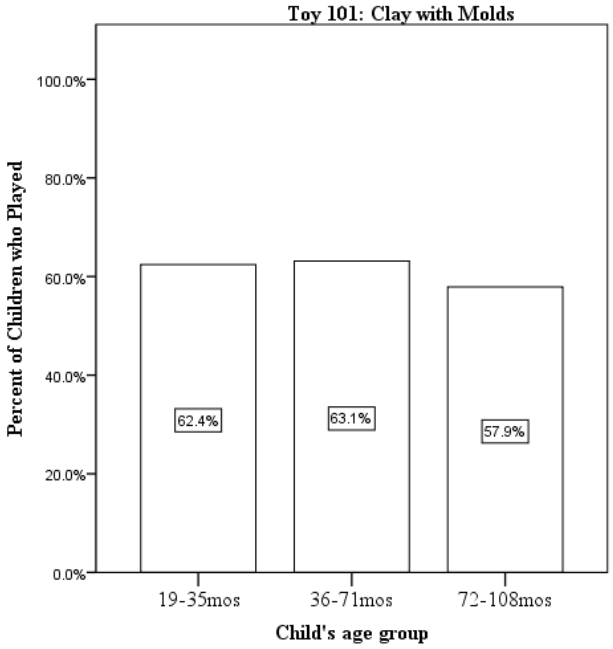
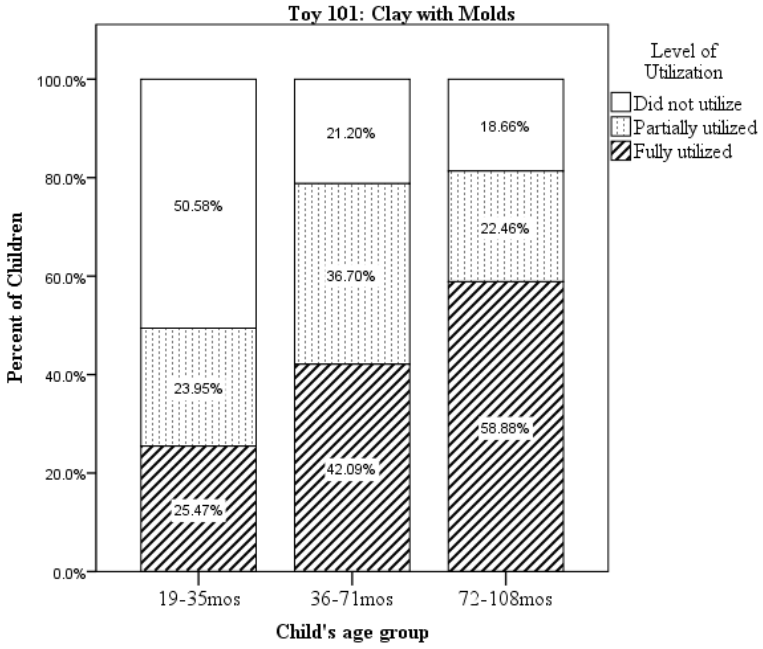


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over the box, puts clay into other toys presented, or only plays with the molds without the clay
- *Partially utilizing:* Feels and manipulates clay but does not use molds
- *Fully utilizing:* Uses hands to manipulate clay and put in mold to make shape

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By 36-71 months, children can begin to use clay and similar materials with molds to make shapes, whereas at younger ages, children may have only used the clay for manipulation instead of trying to make a specific shape using a mold.

Toy #102: Moldable Sand with Molds

Brief Toy Description	Three colors of moldable sand with four sea-themed molds (castle, seahorse, fish, turtle). Neon colors.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Clay
Other Features	None
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

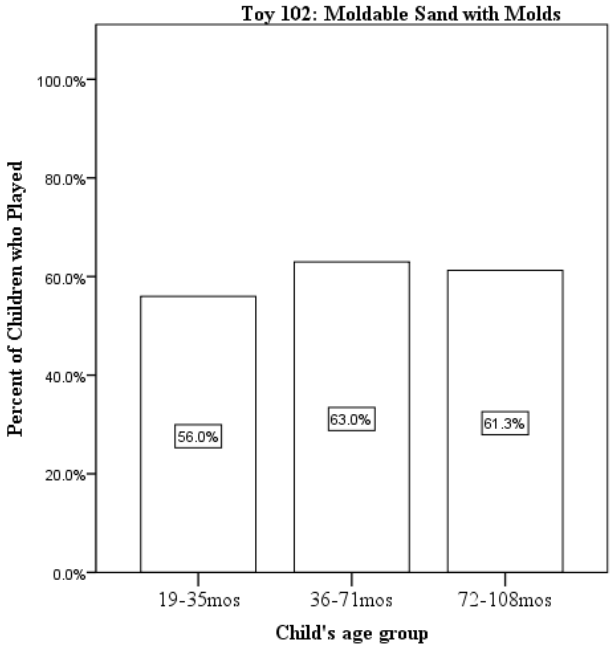
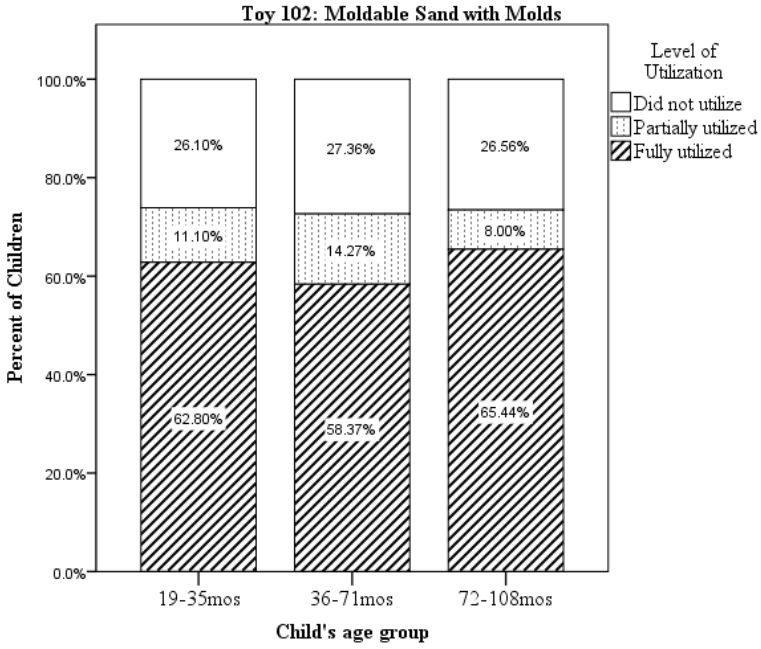


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over the box, puts the sand into other toys presented, or only plays with the mold(s) without the sand
- *Partially utilizing:* Feels and manipulates the sand but does not use mold(s)
- *Fully utilizing:* Uses mold(s) to create shape by either pressing the mold(s) directly into the sand or picking up the sand with hand(s) and loading it into the mold(s)

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	19-35 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	At 19-35 months, children thoroughly enjoy sand play and are able to pack sand into sand molds. Children at younger ages are more likely to eat the sand or dump it out of its container.

Toy #103: Coloring Book and Crayons

Brief Toy Description	Coloring book with 48-pack crayons. Animals, vehicles, and familiar scenes are portrayed. White cover with red, purple, green, and yellow accents.
Packaging	No packaging
Materials	Paper
	Wax
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	6
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

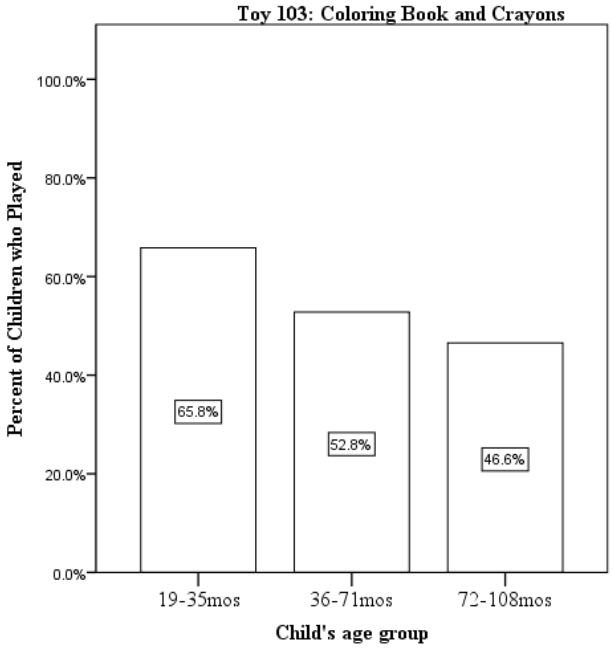
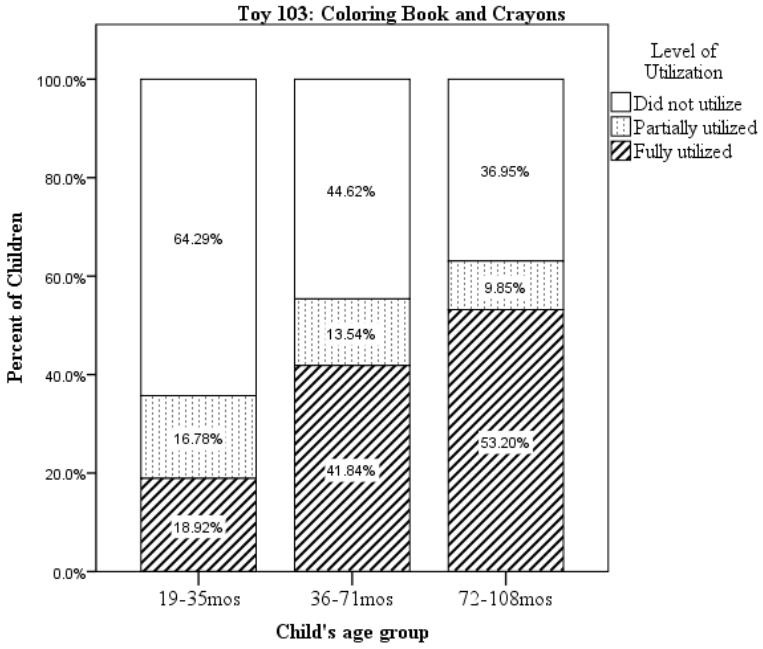


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over the box of crayons
- *Partially utilizing:* Grabs crayons and scribbles over the page with no respect to the outlines on the book OR uses crayons on another surface that is not the coloring book
- *Fully utilizing:* Opens crayon box, opens book, takes crayon from box, and colors the shapes on the pages (attempting to stay within the lines)

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By 72-107 months, children are able to use coloring books as intended. At younger ages, children are still interested in coloring books, but they do not have the appropriate fine motor skills to follow the outline, particularly with standard sized crayons. In addition, at younger ages, children lack the inhibitory control to keep working on a single picture—they may flip through each page of the book and scribble something on each picture.

Toy #104: Battery Powered Drum Pad

Brief Toy Description	Black electronic drum set with stool. Yellow, red, blue, and green circular drum pads (4) can be hit for sound. Additional buttons allow user to create background beat.
Packaging	Cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (music)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

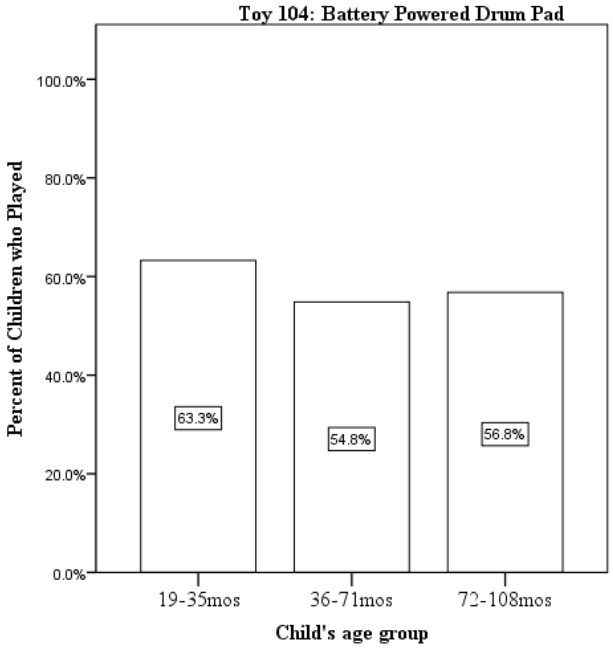
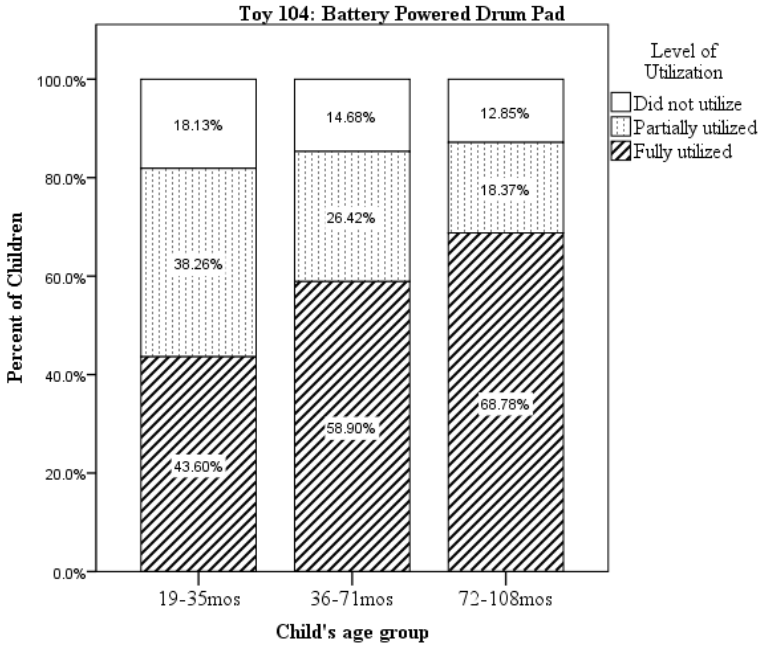


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Only pressing the buttons on the toy, only using the sticks on other objects in the room, or only using hands to bang on the pads
- *Partially utilizing:* Uses hands to bang on drums and presses buttons or only uses sticks on pads without pressing buttons
- *Fully utilizing:* Uses sticks to bang on drums and presses buttons to make music play

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By 36-71 months, children are able to follow the necessary steps needed to operate electronic drum pads that allow the user to first set the tempo and then beat along. Children in younger age groups are able to beat on drums, but may not have the cognitive skills needed to engage in the auxiliary functions such as rhythm setting that the electronic drum pad affords.

Toy #105: Symbol Book and Accompanying Piano

Brief Toy Description	Handheld red mini keyboard with 26 interactive symbol buttons as well as 14 traditional piano keys. Accompanied by two brightly colored story books with symbols interwoven through story that correspond to symbols on keyboard. Child can follow along in the storybook with the keyboard.
Packaging	Cartoon illustrations on package, cardboard with plastic window
Materials	Hard plastic
	Soft plastic
	Paper
Other Features	Battery operated
	Produces sound (music)
	Produces sound (synthesized noise)
	Includes licensed character
	Includes a face (two-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

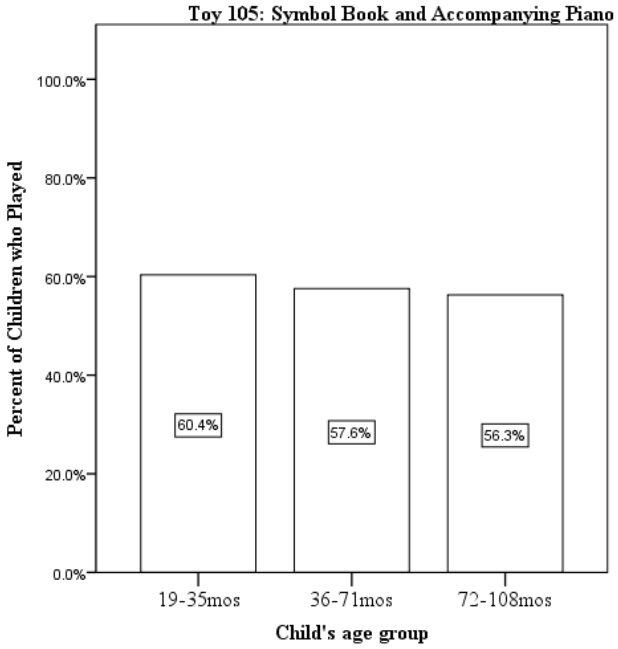
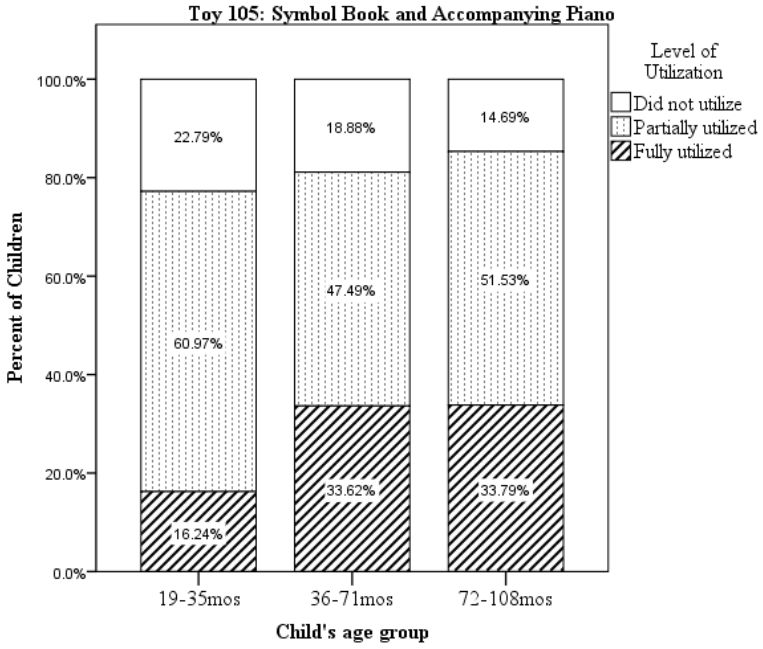


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws the piano around
- *Partially utilizing:* Presses keys on the piano without following along in the book OR only reads book
- *Fully utilizing:* Presses keys on the piano while following along in the book

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for two out of three age groups. Due to similarity, youngest age group out of these two is appropriate.
Justification for recommended age group	By 36-71 months, children now have the cognitive skills needed to be able to follow along in a symbol booklet that tells them what keys to press on a piano. Younger children will spend more of their time pressing the keys on the piano without regard to the symbol booklet.

Toy #106: Floor Piano

Brief Toy Description	Giant black, white, and red piano floor mat (14 white keys, 10 black keys), makes noise when stepped on.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
Other Features	Battery operated
	Produces sound (music)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	6
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

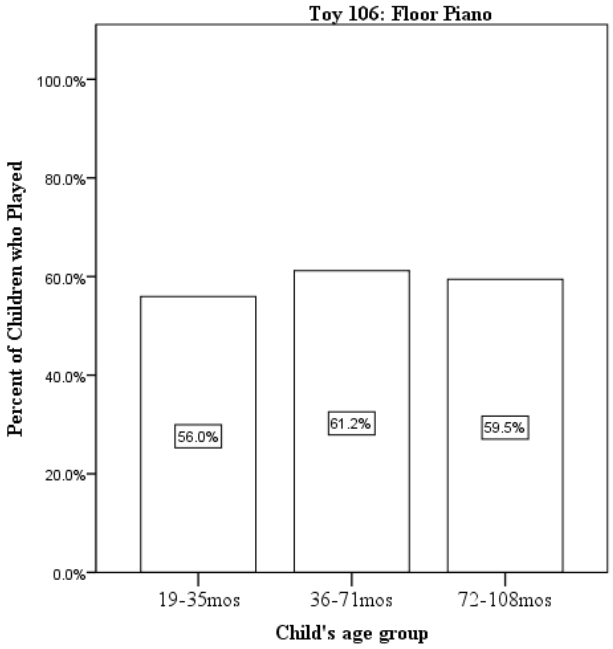
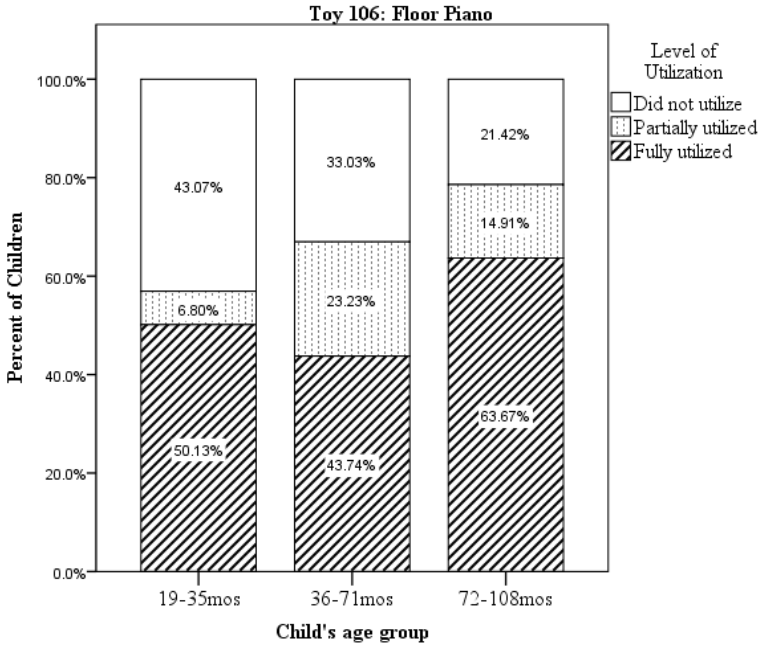


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Turns the switch on and off
- *Partially utilizing:* Makes noises on the piano only with hands
- *Fully utilizing:* Steps on keys with feet to make sound or crawls on pad to make sound

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	36-71 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Floor pianos also become appealing at 72-107 months, as children have the cognitive skills needed to understand that the floor pad is supposed to be stepped on to make individual notes. Younger aged children may roll on the mat, but lack the ability to step on the keys in a meaningful way.

Toy #107: Carnival Ride Building Set with Figurines

Brief Toy Description	Plastic gray circular object with 3 human figurines and 3 plastic spaceship vehicles in pink, green, and blue. Small plastic spaceship seat vehicles can attach to gray circular object to make a spinning solar system amusement park ride.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Sticker paper
Other Features	Battery operated
	Produces light
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

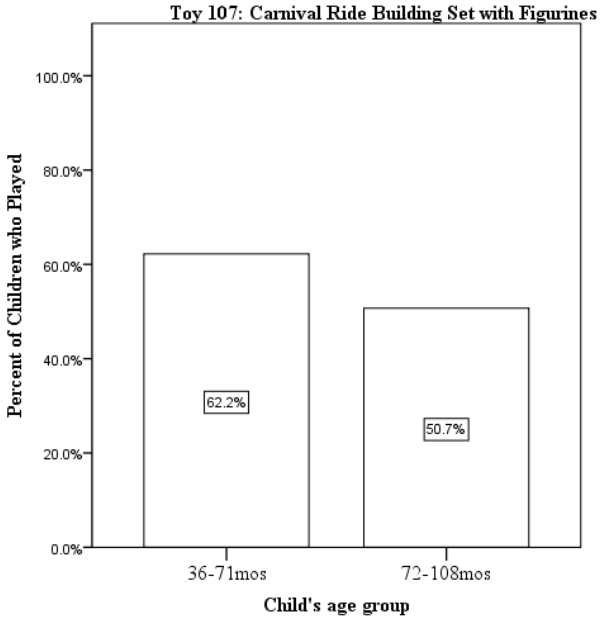
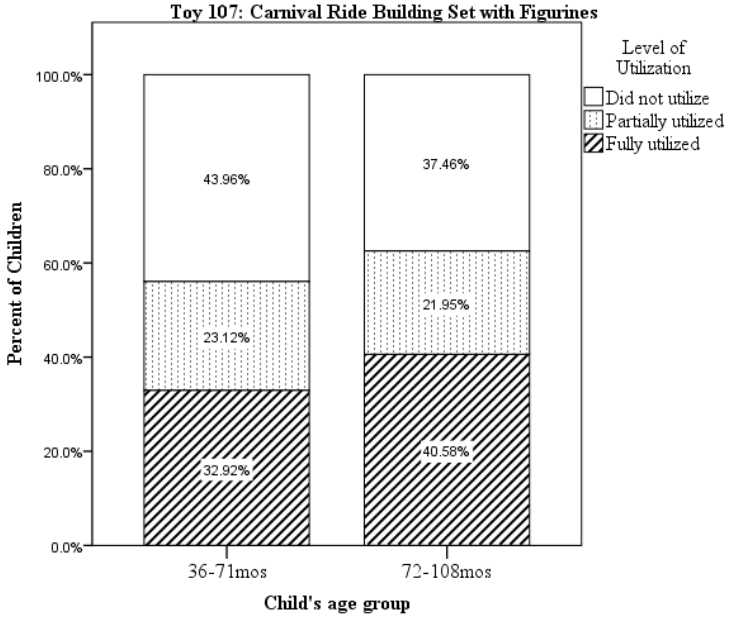


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps out the bin, only plays with the figurines, or spends the whole time reading the directions
- *Partially utilizing:* Child snaps together other pieces of the toy, child attempts to stick the figurine on the platform but cannot snap it on, or child spins the platform around but does not attach anything to it
- *Fully utilizing:* Puts together the set so the figurines are on the platform and can be rotated around; at least one figurine must be snapped on to count as utilization

Age Determination:

Manufacturer's suggested age	4-10 years
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Working on complex model kits such as this one is appropriate at 72-107 months. Because it is a theme-based kit, it holds a high level of appeal at this age. Fine motor skills are generally well developed, so small pieces present relatively little difficulty at this age.

Toy #108: Robotic Magnetic Building Cubes

Brief Toy Description	Six small cubes (gray, clear, green) that can magnetically attach to each other. Comes with square instruction cards. If blocks are attached together in certain sequences, effects occur such as a light on the block turning on or the wheels on the block spinning.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Hard metal (non-pliable)
	Paper/ sticker paper/ cardboard
Other Features	Battery operated
	Produces light
	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

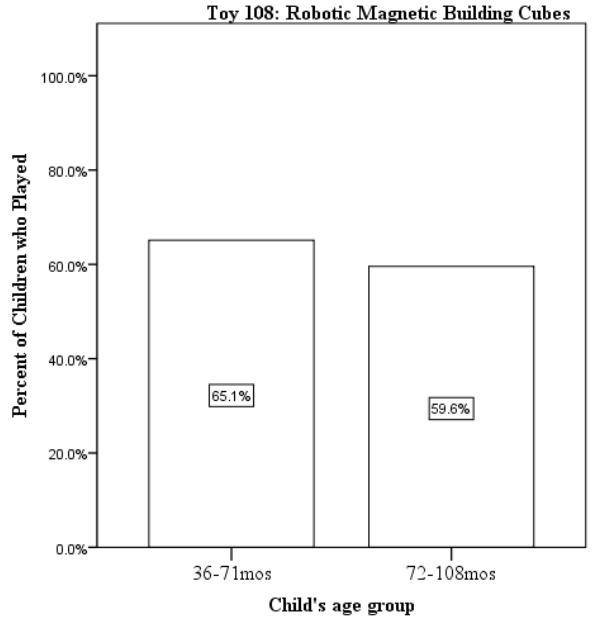
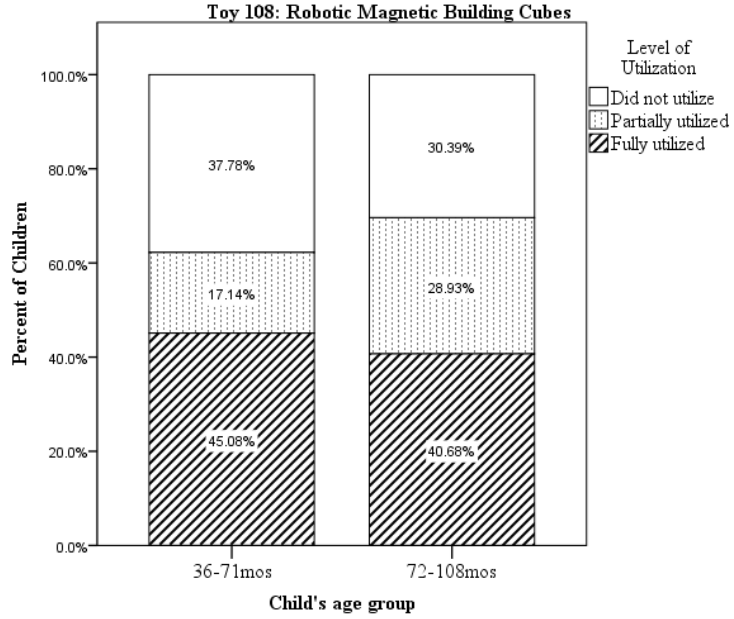


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child moves cubes around without snapping them together or child spends the whole time reading the instructions
- *Partially utilizing:* Child snaps the cubes together (understanding that they are magnetic) but does not produce some effect or make a shape shown on the accompanying cards
- *Fully utilizing:* Child puts the cubes together to either make into a shape shown on the accompanying cards or to produce an effect

Age Determination:

Manufacturer's suggested age	4 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 72-107 months, children can build structures using sets with moving, motorized, or computer chip-based components. Likewise, children are able to work with these robotic blocks that create certain effects (i.e., light, movement) when placed in a prescribed order. Children are much less interested in similar cubes that do not produce light and movement at this age.

Toy #109: Small Interlocking Bricks with Female Characters

Brief Toy Description	Tiny interlocking pieces (60+) that are pastel pink, purple, and white. Female figurines are included. Child can build a cruise ship with thick rectangles, thin rectangles, square, and cruise ship shaped pieces.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	6
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

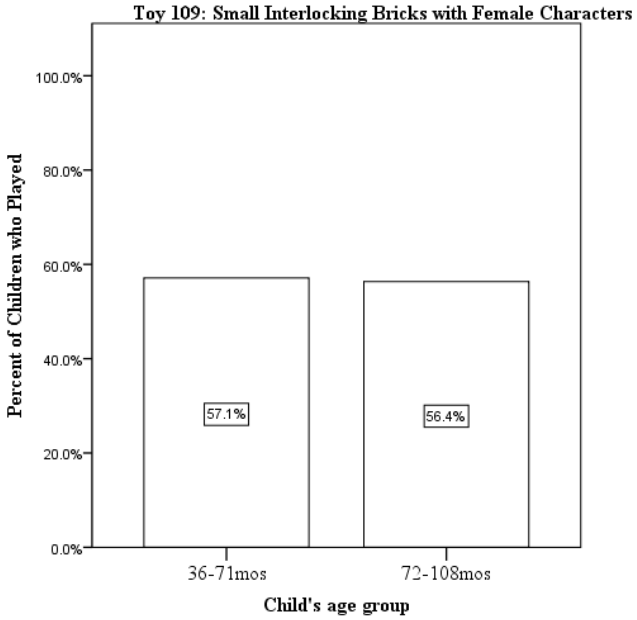
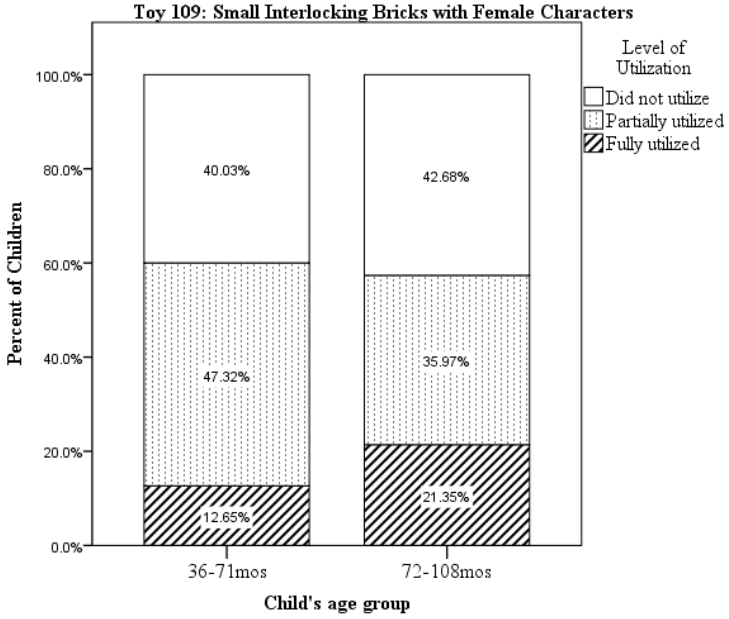


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps the box over or spends the whole time reading the instruction booklet
- *Partially utilizing:* Child clicks bricks together with no respect to the directions
- *Fully utilizing:* Child follows booklet to put together, or begin to put together, bricks in a pattern that follows (or somewhat resembles) the design of a boat detailed in the instructions

Age Determination:

Manufacturer's suggested age	7-12 years
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 36-71 months, children are capable of working most types of interlocking building systems such as snapping or pressing plastic bricks together. However, at this age, they also begin to refer to directions when looking for help in how to assemble a building kit, even if just studying pictures, which they may have trouble with at younger ages.

Toy #110: Light and Sound Pattern Pad

Brief Toy Description	Round, handheld game with yellow, blue, green, and red button sections on top of black base that light up. Player must echo the light pattern that the game gives to advance to the next round.
Packaging	Cardboard backing with plastic
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (synthesized noise)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	6
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

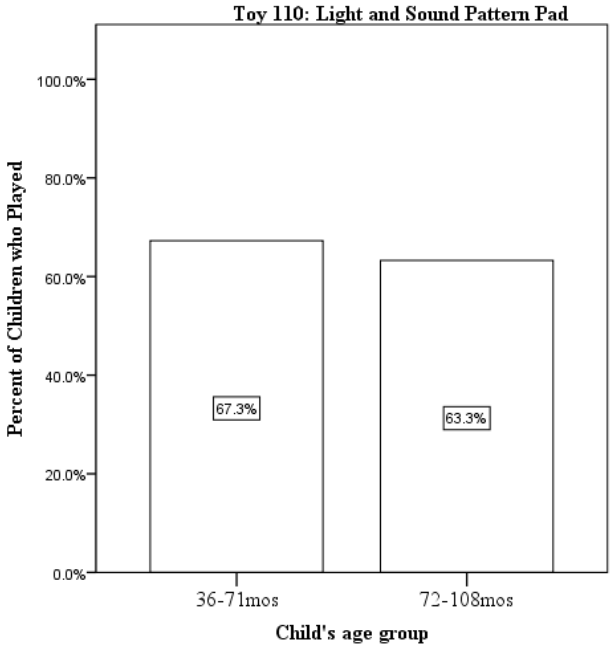
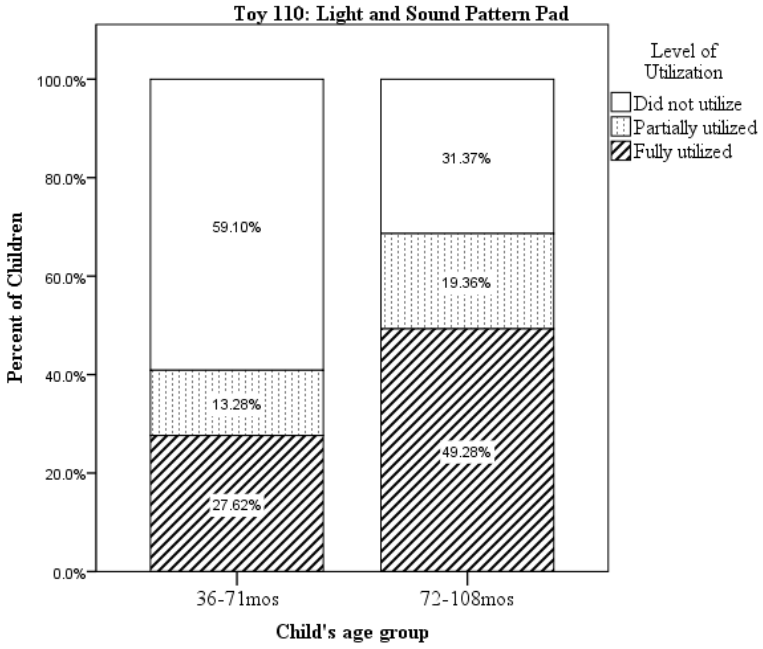


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Turns game on but child does not follow the light and sound pattern; child randomly presses the color pads without respect to the pattern
- *Partially utilizing:* Turns game on but child is only able to replicate one sound
- *Fully utilizing:* Turns game on and plays game by following the light and sound pattern displayed on the pad; child must replicate at least two sounds

Age Determination:

Manufacturer's suggested age	7 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 72-107 months, children enjoy matching and memory games that require them to follow a set of actions in a pattern. In addition, light and sound pattern pads are usable by children at this age, as they have the cognitive skills to follow a pattern for multiple steps (at least two) in sequence. When given a light and sound pattern pad, children at younger ages do not have the inhibition to wait for the prompts and keep pressing the buttons without regard to the pattern.

Toy #111: 3D Maze Ball

Brief Toy Description	Clear plastic ball with white maze on inside and small metal marble.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Hard metal (non-pliable)
Other Features	None
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	5
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

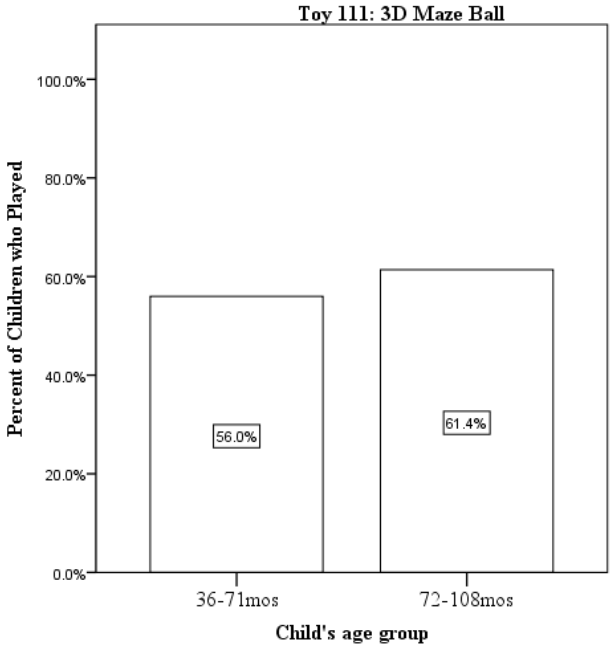
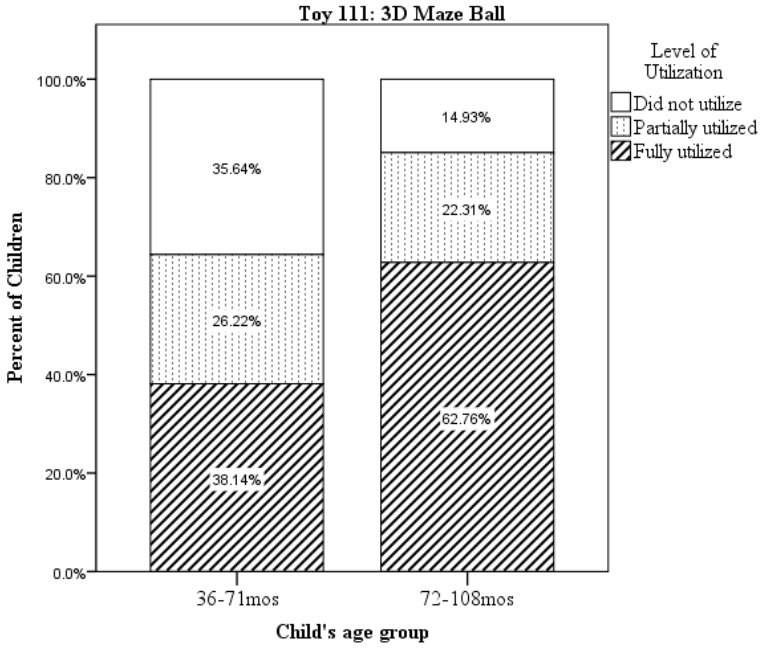


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child uses the toy as a ball and kicks or throws it around the room
- *Partially utilizing:* Child shakes the ball with no purposeful attempt to move the ball around the inner maze, but child is still trying to make the interior ball move around
- *Fully utilizing:* Child makes a purposeful attempt at moving the ball around the inner maze

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Children at 72-107 months can make fine motor movements needed to navigate labyrinth or maze games that require maneuvering a marble along a pathway, as well as cognitively strategize how to get the ball through the maze most efficiently. At younger ages, children lacking these motor and cognitive skills may be more likely to use a 3D maze ball as a ball instead of a maze by throwing or kicking it around.

Toy #112: 48 Piece Puzzle

Brief Toy Description	Wooden 48 piece jigsaw puzzle with a green rainforest scene painted on it.
Packaging	Cellophane/ plastic bag
Materials	Wood
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	5
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

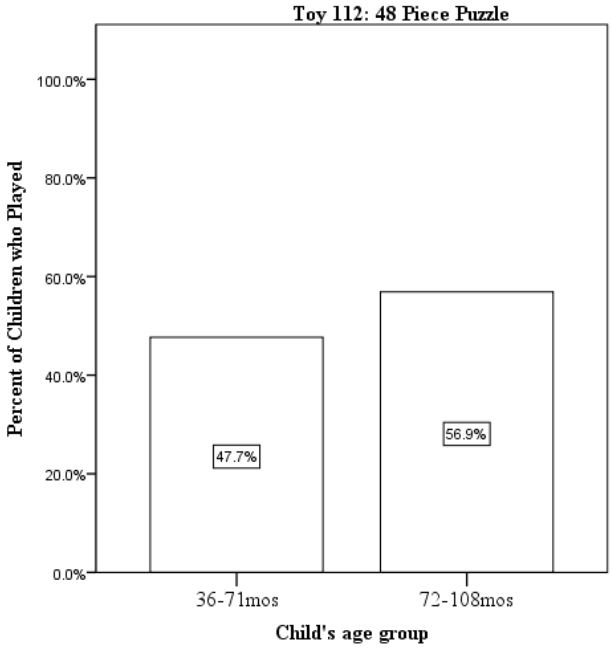
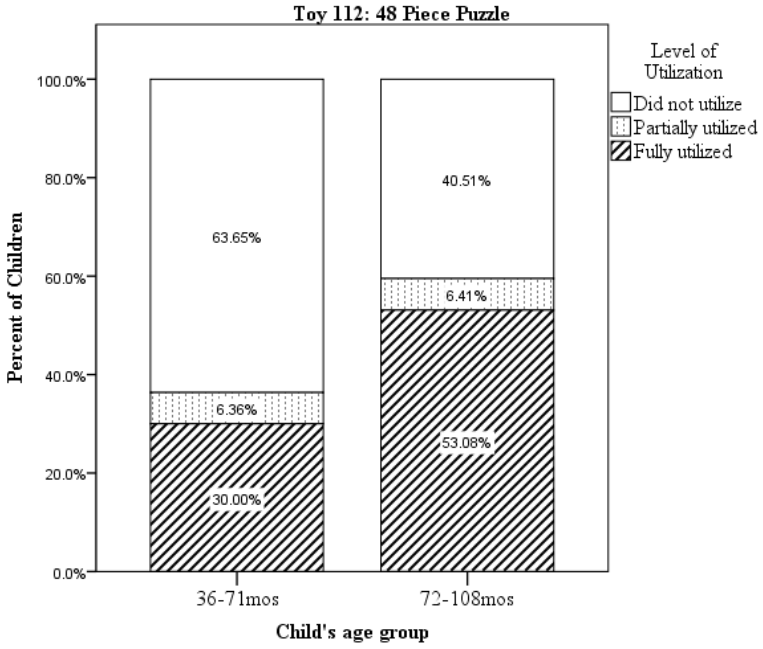


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps puzzle over
- *Partially utilizing:* Child puts together 2–5 pieces of the puzzle
- *Fully utilizing:* Child puts together one-eighth (i.e., 6 pieces) of the puzzle

Age Determination:

Manufacturer's suggested age	4 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By 72-107 months, children have developed the cognitive ability to work jigsaw type puzzles. They can identify pieces based on where they go in the puzzle, can sort pieces, and have more systematic methods of testing pieces for the puzzle. They can complete puzzles with up to 100 pieces.

Toy #113: Science Kit Experiment

Brief Toy Description	Red paper tube. Comes with a yellow sheet of paper with instructions to conduct visual science experiment.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Paper
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

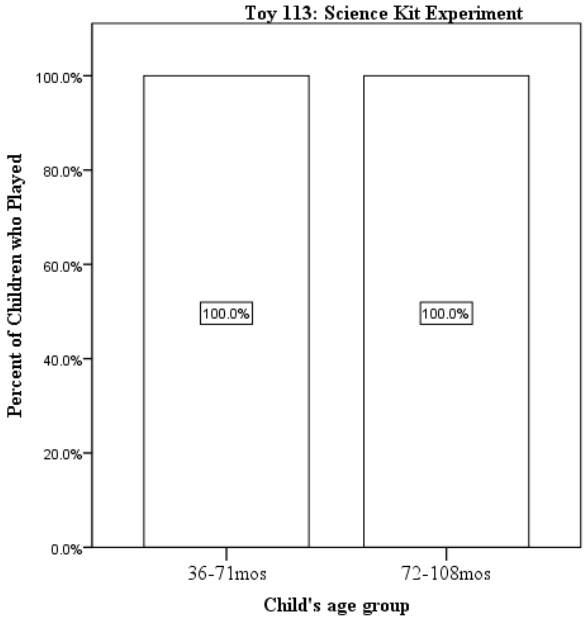
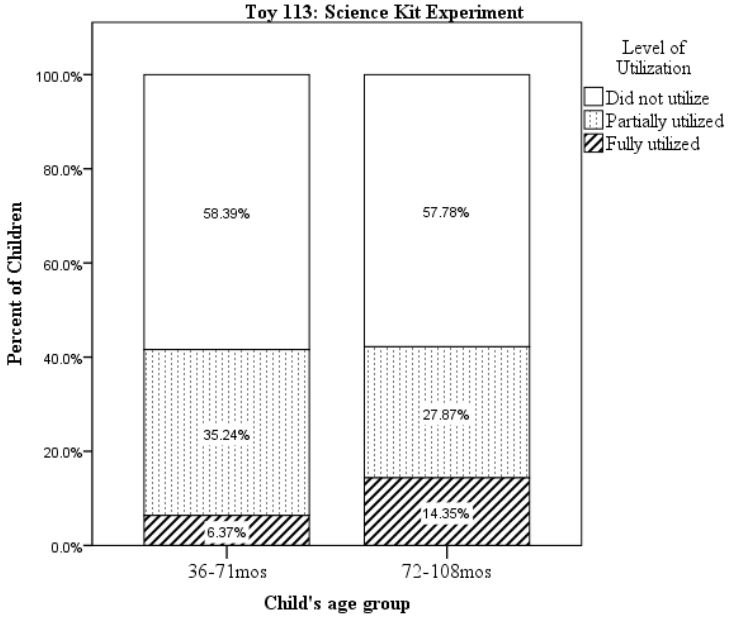


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child carries or throws the kit around or spends the whole time reading the instructions
- *Partially utilizing:* Child looks through the tube but does not cover other eye as instructed in the directions
- *Fully utilizing:* Child looks through the tube with hand at the side of it (replicating the picture in the instructions)

Age Determination:

Manufacturer's suggested age	5-12 years
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Starting at 36-71 months, children enjoy science materials. Science experiments with a few steps are manageable at this age group, as children are able to follow along with directions. Any younger age would have trouble following directions in a kit.

Toy #114: Microscope

Brief Toy Description	Gray microscope with blue accents and with 10 pre-prepared slides. Light turns on in bottom and reflects off a mirror.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Hard metal (non-pliable)
	Mirror
Other Features	Produces light
	Includes mirror
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

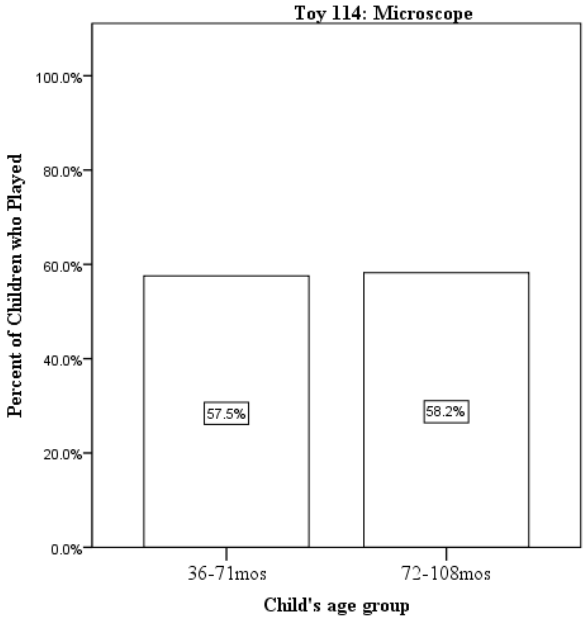
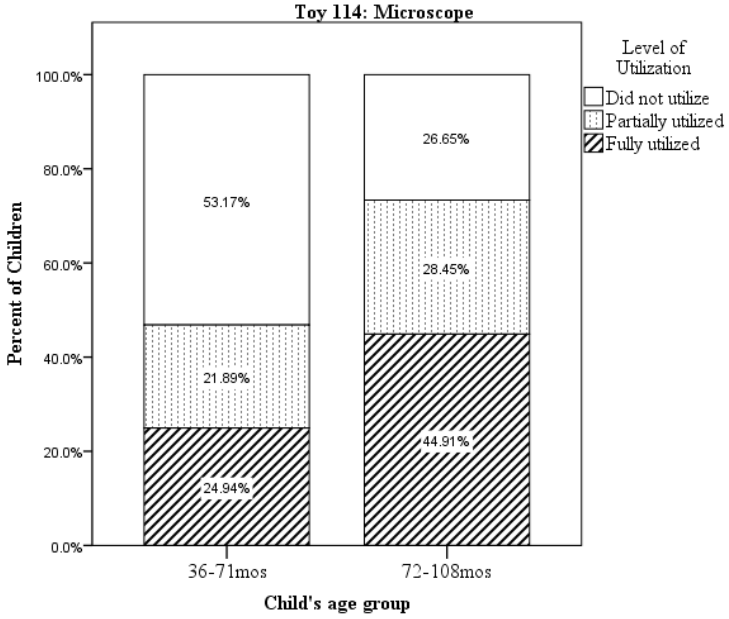


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child spends the whole time taking the non-microscope tools and slides out of the case and looking at them or spends the whole time reading the instructions
- *Partially utilizing:* Child looks through the lens by putting eye right on the eyepiece of the microscope but does not insert a slide
- *Fully utilizing:* Child inserts slide and looks through the lens by putting eye right on the eyepiece of the microscope

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By 72-107 months, children can use more sophisticated science tools, including microscopes. They are interested in their own anatomy and elements in the world, so scientific exploration sets that allow this are highly attractive. At younger ages, children have trouble connecting the steps of putting a slide in the microscope, and then subsequently looking through the eyepiece.

Toy #115: Educational Mats with Wipe Off Crayons

Brief Toy Description	Four wipe-able table mats with information about history, geography, solar system. Crayons (5) can be used to complete activities.
Packaging	Cellophane/ plastic bag
Materials	Hard plastic
	Soft plastic
	Wax
Other Features	Includes a face (two-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

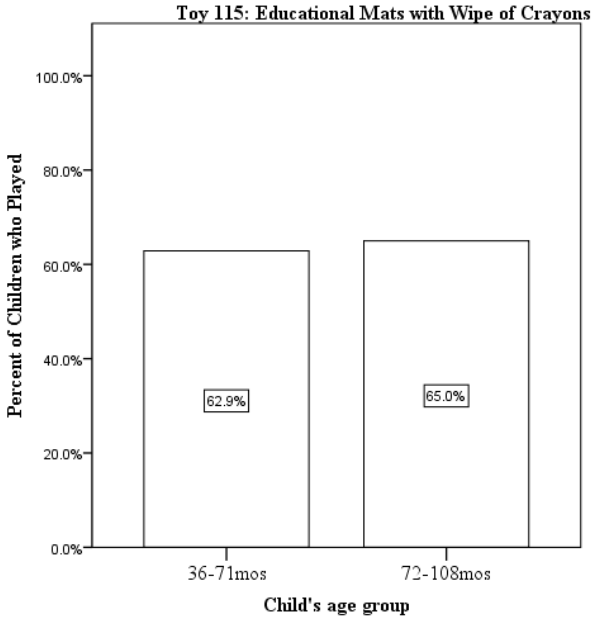
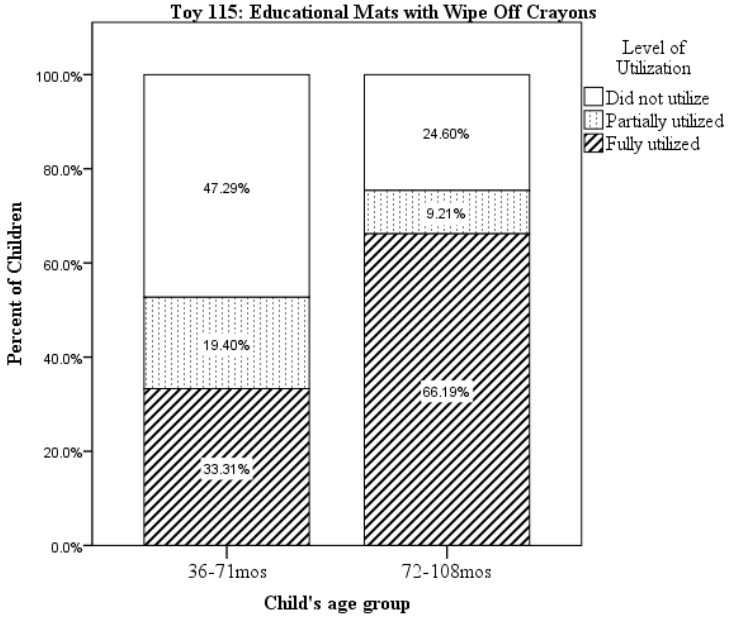


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps over the box of crayons
- *Partially utilizing:* Child takes out crayons and starts to color, but does not have purpose OR child pays no attention to the shapes and does not label anything OR child verbally labels items on the mats but does not use crayons
- *Fully utilizing:* Takes out crayons and colors in picture(s) with purpose and with attention to the shapes; child may verbally label something, although this verbal element is not required

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 72-107 months, children find toys that focus on astronomy and the solar system, geography, or history interesting, such as these educational mats with wipe-off crayons. Children at younger ages may only use mats with wipe off crayons as coloring spaces instead of absorbing the content.

Toy #116: Bean Bag Toss

Brief Toy Description	Large blue object with multiple nets. Comes with 3 red and 3 blue bean bags.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Canvas and mesh
	Hard metal (non-pliable)
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	5
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	5
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

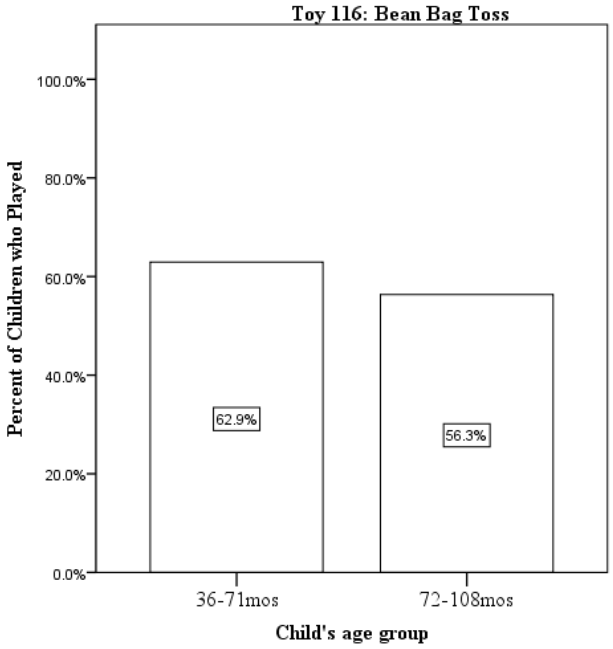
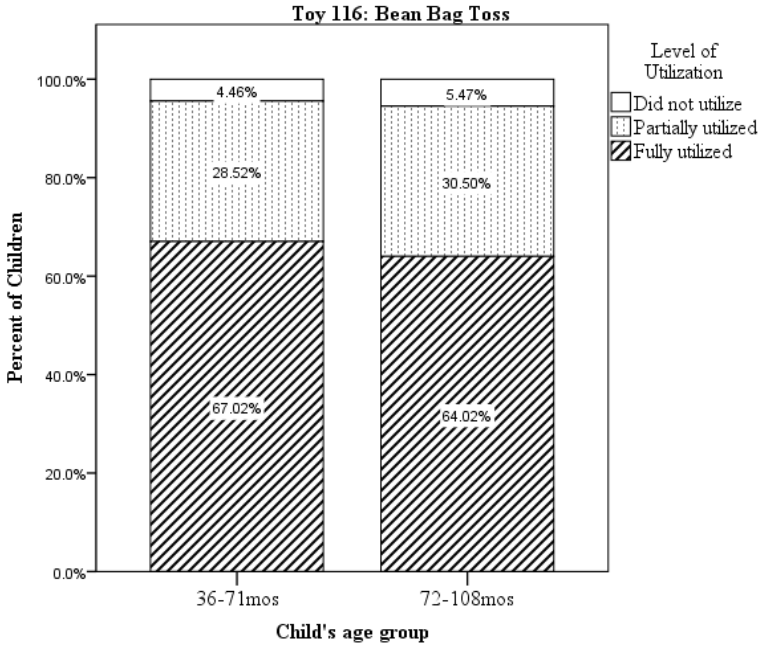


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Picks up the bean bags and holds or looks at them
- *Partially utilizing:* Throws the bean bags but does not make it into the holes OR stands close to the net and drops/places them into the holes OR throws other toys presented in the trial into the nets
- *Fully utilizing:* Takes bean bags out and throws them into holes

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Bean bag tosses are very appealing at 36-71 months. Children have the appropriate gross motor skills to aim when they throw bean bags and successfully make it into a net or hole by this age. If the net has a point value for different holes that the child hits, the child may start to count their total number of points.

Toy #117: Floor Launcher

Brief Toy Description	Two green and orange plastic rockets with soft, round tops. Rockets attach to black holder. Child steps on orange pedal at end of cord to launch rocket.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Soft foam
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	2
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	2
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

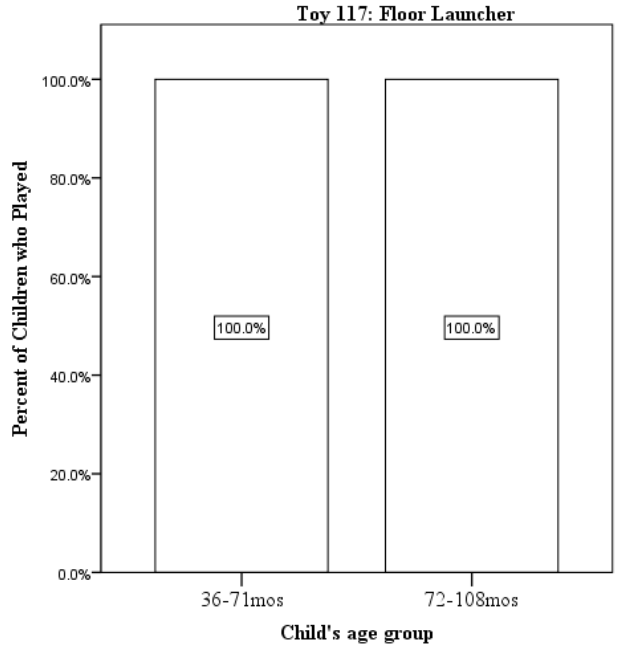
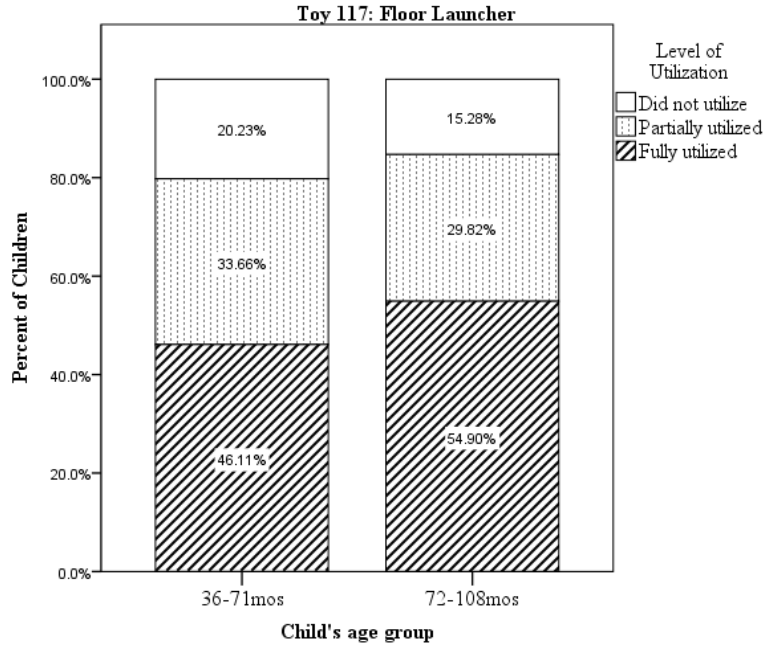


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws rocket across the room
- *Partially utilizing:* Presses hand to orange part OR stomps on rocket but it does not release
- *Fully utilizing:* Stomps on orange part so that rocket is released

Age Determination:

Manufacturer's suggested age	5 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Air-propelled floor launchers with soft foam projectiles that are activated when a child steps on a pumping pad are very exciting to 36-71-month-olds. Children may experiment with the air pumping mechanism to blow at other objects in the room. At younger ages, children may lack the gross motor skills needed to step on the pad hard enough to propel the rocket.

Toy #118: Table Hockey

Brief Toy Description	Portable table hockey game with rods that can be moved to manipulate 12 plastic blue and red players on white ice.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
Other Features	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	6
Is the toy a game? How many game-like qualities does the toy have?	6
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	3
How masculine is the toy?	4
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

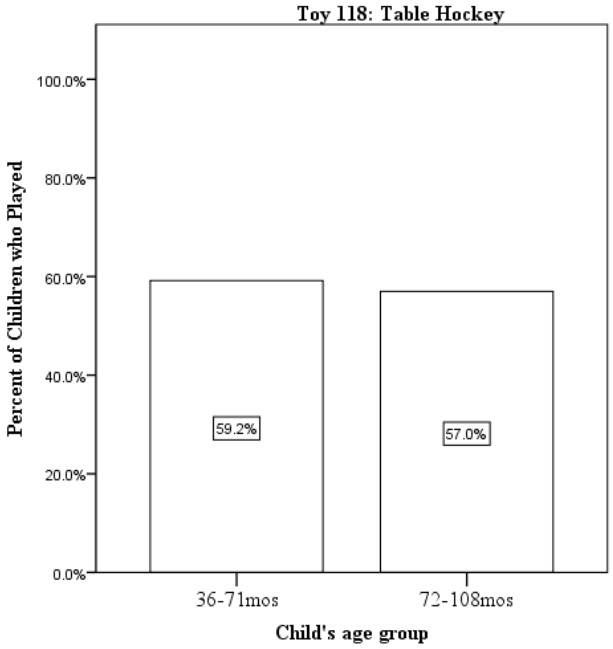
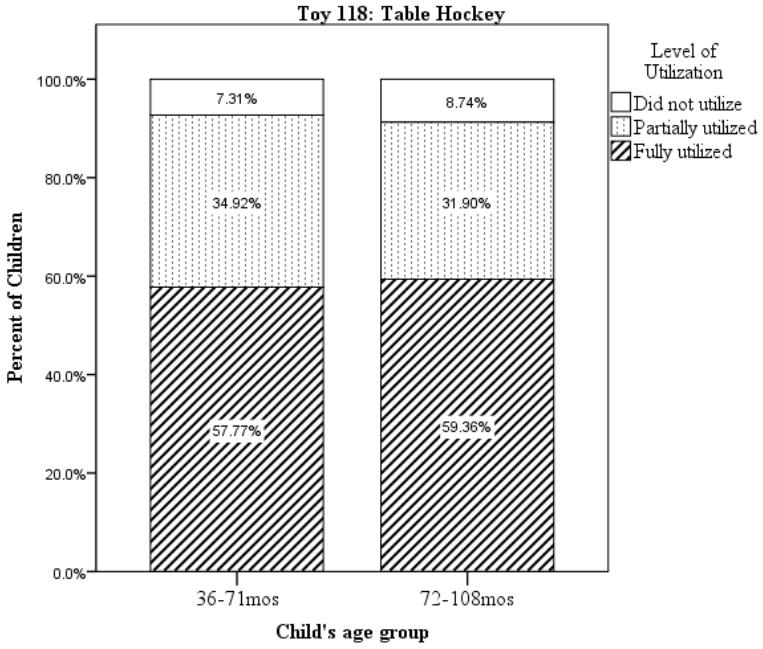


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Grabs pucks and throws them around the room
- *Partially utilizing:* Pulls on handle to move the player(s) back and forth but does not hit the puck
- *Fully utilizing:* Pulls on handle to move the player(s) back and forth and uses player(s) to hit the puck

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 36-71 months, children have the fine motor skills needed to align the figurines with the puck using levers if the table is set to the appropriate height for them. Children at younger ages may lack the fine motor skills and patience to align players to hit the pucks and instead spend the whole time pulling the levers. Given the peak of imaginative play at this age, children may even start to pretend that the players on the table game are interacting with each other and develop a pretend play scene centering around sports.

Toy #119: Puppet Theatre and Puppets

Brief Toy Description	Plush puppets (one male, one female) with rod to control arm. Presented with wooden puppet theatre with red curtains and black accents.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Fabric
	Wood
Other Features	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	5
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

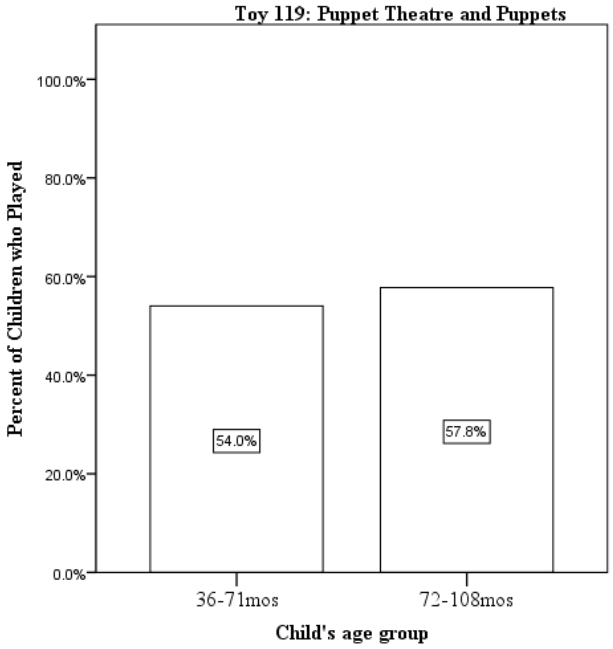
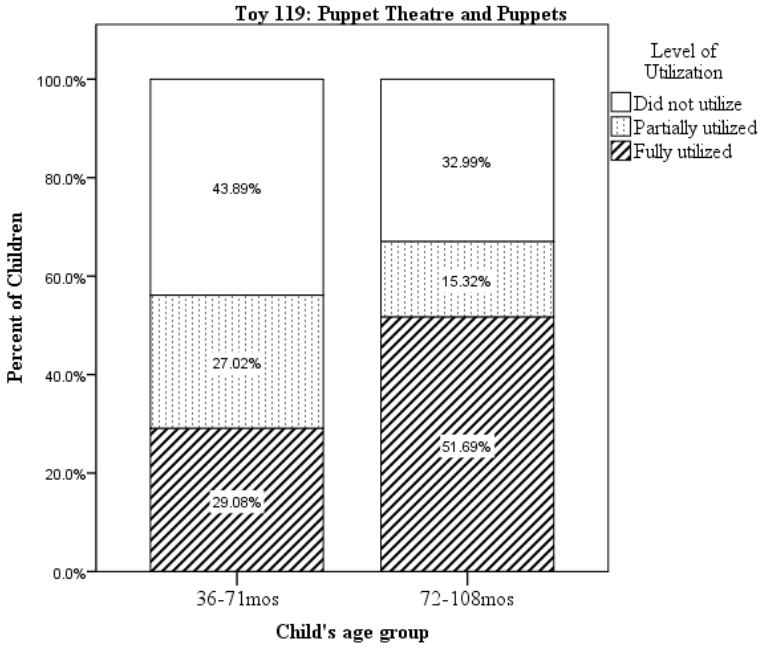


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child spends the whole time rearranging the curtains or working the clock on the front of the theatre
- *Partially utilizing:* Child makes a pretend play scene but does not put hand in back of puppet(s) (i.e., uses the puppet(s) as doll(s) instead of puppet(s))
- *Fully utilizing:* Child makes pretend play scene by putting hand in back of puppet(s)

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	By 72-107 months, children have the strength and gross motor skills needed to hold up the rod puppet. Children also have the proper coordination between both of their hands to fully control the puppet (one hand on the rod, one hand in the puppet's mouth).

Toy #120: Animatronic Interactive Animal

Brief Toy Description	Furry orange animal-like character that talks and can move legs, mouth and ears. Eyes are a digital screen and convey the animal's mood.
Packaging	Cellophane/ plastic bag
Materials	Hard plastic
	Fabric
Other Features	Battery operated
	Produces light
	Produces sound (animal noises)
	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	1
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	1
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

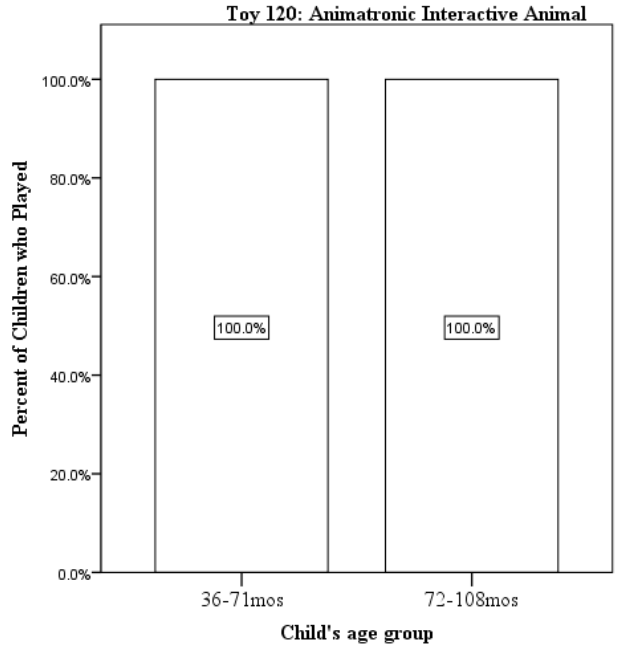
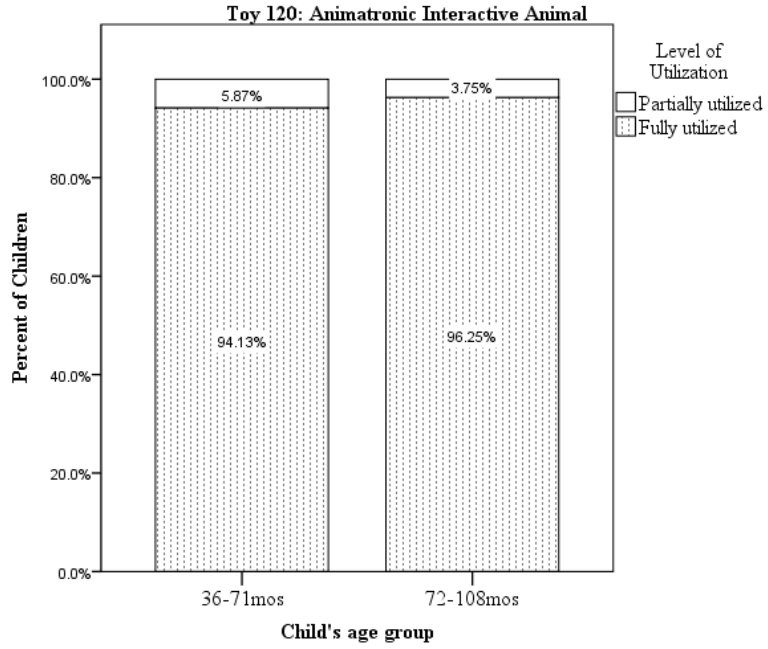


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws, carries, or bangs animal against the table
- *Partially utilizing:* Child fiddles with the animal's ears the whole time
- *Fully utilizing:* Child tickles, pets, or feeds animal with finger, talks to it, watches it dance, or moves it over accordingly on the table so it has room to dance

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Animatronic animals and other figurines or dolls that can respond contingently to users are appealing to children ages 36-71 months because of the level of realism they afford. Children can set up scenarios where the doll interacts with other objects in the room to create a more complex play scene, a strong desire which peaks around age 4 when children are at the height of using their imaginations. At any younger age, children may focus too much on the toy's interactive qualities in a non-representational way (i.e., spending time fiddling with the toy's moving ears or legs without any pretense).

Toy #121: Foldable Figurine

Brief Toy Description	Small green and black figurine that can be folded into either a robot or a dinosaur.
Packaging	Cartoon illustrations on package, real photos on package, cardboard backing with plastic
Materials	Hard plastic
Other Features	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	2
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

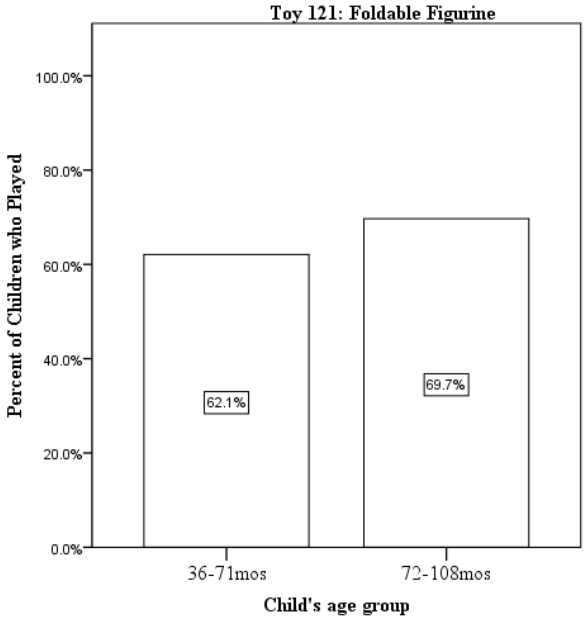
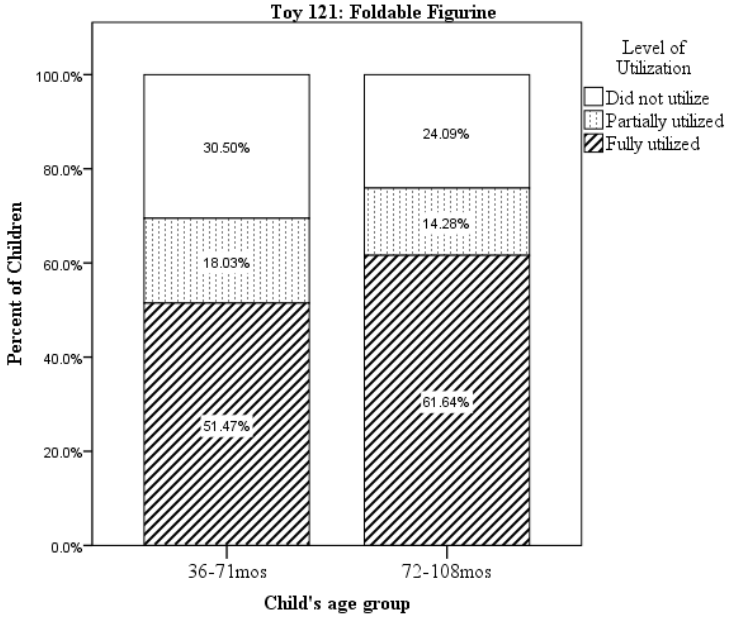


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws, carries, or bangs figurine against the table OR spends the whole time reading the directions
- *Partially utilizing:* Child attempts to move around the parts of the robot but fails (e.g., child pulls the arm off) OR the child uses the figurine for imaginative play but does not move the parts so that it transforms
- *Fully utilizing:* Child moves the parts so that it transforms into whichever version of the toy it was not in when given to the child

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Foldable figurines that can morph into two separate characters are appealing at ages 72-107 months. The ability to change the character in their play scene is exciting at this age, adding a layer of complexity that appeals to this age group. Foldable figurines also allow for children to exercise their fine motor skills when gripping the tiny pieces that need to be held when changing the character.

Toy #122: 18-Inch Doll with Wheelchair Accessories

Brief Toy Description	Female doll with a wheelchair, crutches (2), an arm and leg cast. Doll is wearing jeans, brown boots, and a vest. Wheelchair is silver and dark blue-purple.
Packaging	Cartoon illustrations on package, real photos on package, cardboard with plastic window
Materials	Hard plastic
	Soft plastic
	Fabric
Other Features	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	3
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

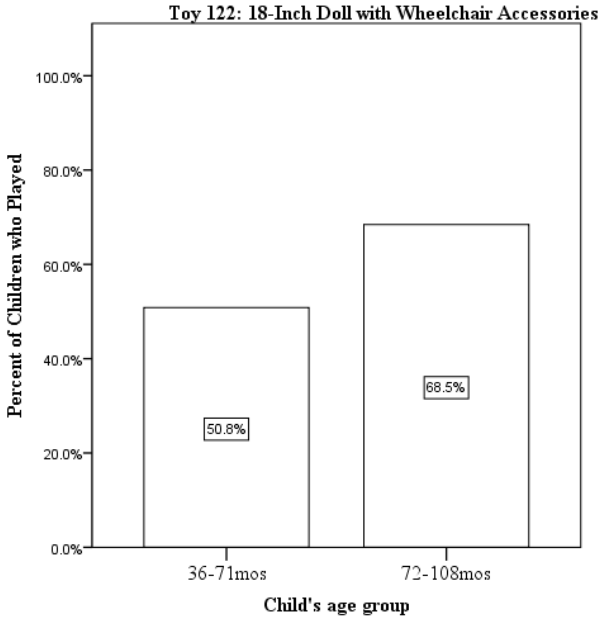
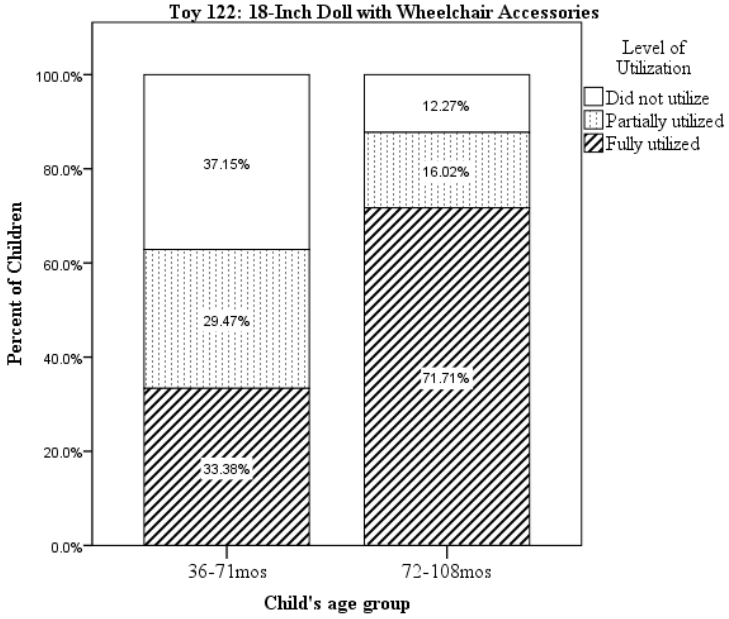


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws, carries, or bangs objects against the table
- *Partially utilizing:* Child explores the accessories but shows no evidence of pretense (e.g., child uses the wheelchair but moves it very fast as though the toy is a small wheeled vehicle instead of a pretend play object)
- *Fully utilizing:* Uses accessories for pretend play scene (e.g., puts cast on doll or slowly wheels her around in the wheelchair)

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	18-inch thematic dolls with realistic additional parts are appropriate at 72-107 months, as they are often one of the few dolls that older children will no longer consider too "babyish". The large variety of accessories and clothing available for these dolls that portrays them in real-life, mature activities that the child may have experienced or wish to do when they get older (gymnastics, swimming, ice skating, soccer). These varied accessories allow children to create different types of play scenes that are no longer solely based on nurturance (e.g., feeding, tucking doll into crib) but rather, activities that they enjoy doing in real life.

Toy #123: Motorcycle with Figurine Rider

Brief Toy Description	Yellow figurine on small motorcycle.
Packaging	Cartoon illustrations on package, cardboard backing with plastic
Materials	Hard plastic
	Hard metal (non-pliable)
Other Features	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	2
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

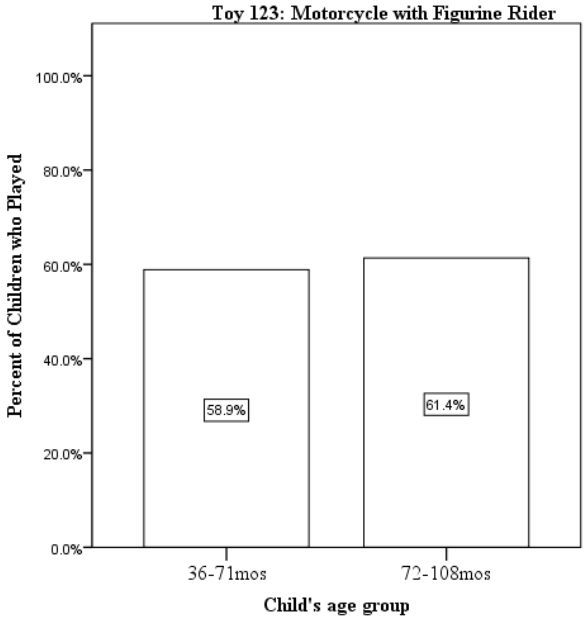
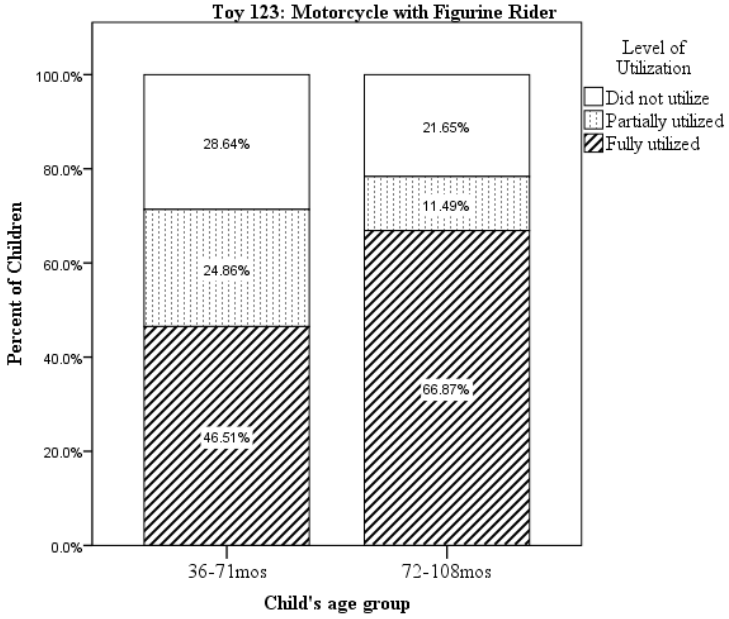


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws or carries around the toy or only plays with the figurine in imaginative play
- *Partially utilizing:* Child moves the motorcycle on the table without the figurine or spends the whole time examining the details of the motorcycle (e.g., spinning the wheels, snapping hands of figure onto handlebars, etc.)
- *Fully utilizing:* Child puts figurine on motorcycle and "drives" it on the table or other surface

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 72-107 months, children prefer highly elaborate small motorcycles such as this one. Younger children playing with a motorcycle may spend the whole time examining the details of the motorcycle or the figurine without spending time wheeling it around.

Toy #124: Remote Controlled Sedan

Brief Toy Description	Red car with black handheld remote controller with two small joysticks.
Packaging	Cartoon illustrations on package, cardboard with plastic window
Materials	Hard plastic
Other Features	Battery operated
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	5
How much violence is depicted in the toy?	1
How masculine is the toy?	6
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

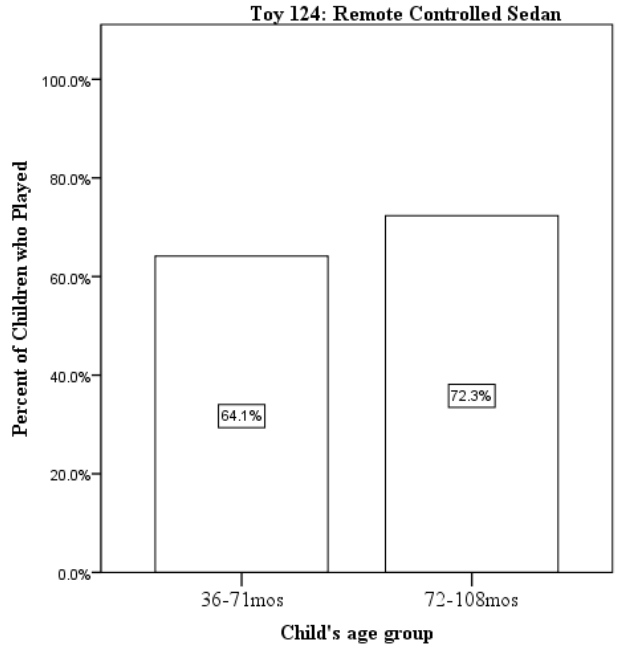
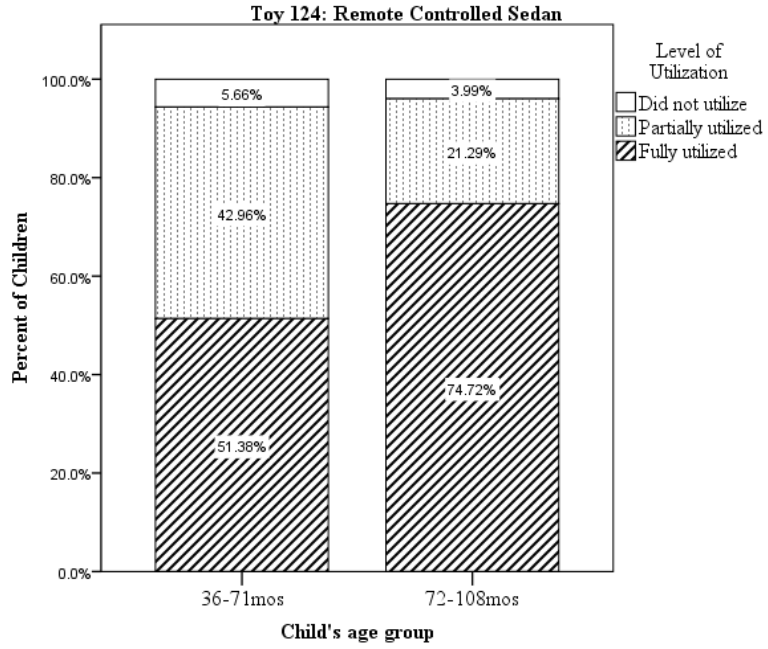


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws or carries the toy around
- *Partially utilizing:* Wheels car around on a surface but does not use the remote or child drives the car but does not hold the remote in hands (i.e., the remote is laid on the floor or table)
- *Fully utilizing:* Holds remote with hands to drive the car

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 36-71 months, children enjoy small vehicle toys with numerous accessories that are highly complex in cause-and-effect functionality, such as joysticks on a remote control. At this age, children have the cognitive skills to become creative in their play with these types of vehicles and may develop unique paths in a room for the vehicle to drive—for example, navigating a remote-controlled vehicle underneath a table and behind a couch is a challenging, yet exciting task.

Toy #125: Launching Vehicle Track

Brief Toy Description	Green and blue race car track. Comes with a snail with wheels on the bottom that can be launched around the track after child cranks a handle in a circular motion.
Packaging	Cartoon illustrations on package, real photos on package, cardboard with plastic window
Materials	Hard plastic
	Hard metal (non-pliable)
Other Features	Includes licensed character
	Includes a face (three-dimensional)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	2
How much rapid movement or speed could the toy exhibit?	5
How much violence is depicted in the toy?	1
How masculine is the toy?	3
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

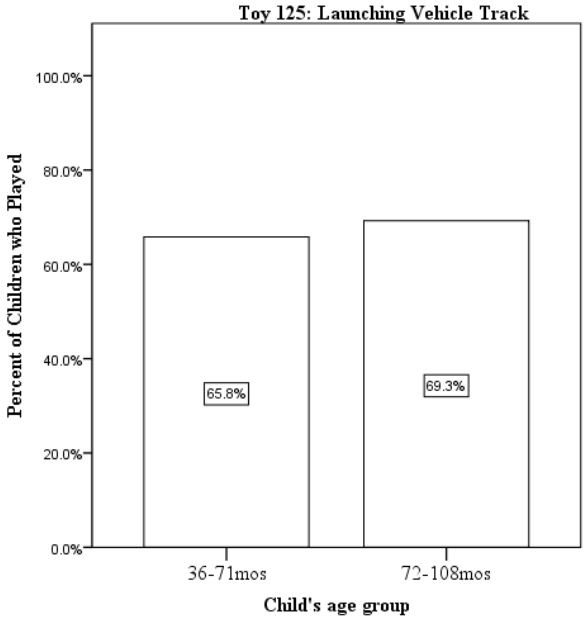
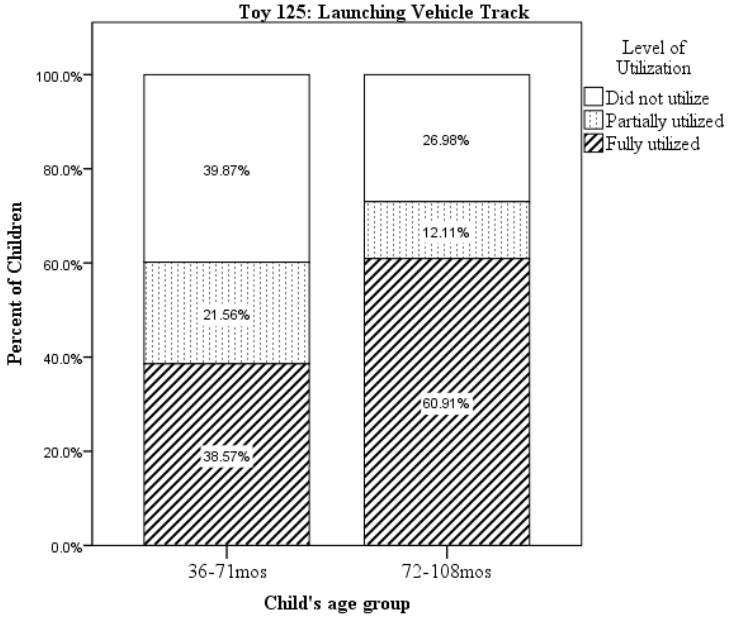


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws or carries the toy around
- *Partially utilizing:* Puts vehicle on track so that it moves around the track but is not propelled by the crank OR child moves the crank around in a circle but not enough so that it is able to launch the vehicle
- *Fully utilizing:* Puts vehicle on track so that it moves around track and is propelled using the crank

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	At 72-107 months, children prefer highly elaborate small or medium sized vehicles with moderately complex configurations. Vehicle tracks that can quickly launch cars using cranking mechanisms are especially appealing. At this age, children are able to use their gross motor skill strength to use the crank.

Toy #126: Diecast Double Decker Bus

Brief Toy Description	Small red double decker bus. Rolls if pulled back and released.
Packaging	Cellophane/ plastic bag
Materials	Hard plastic
	Soft plastic
	Hard metal (non-pliable)
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

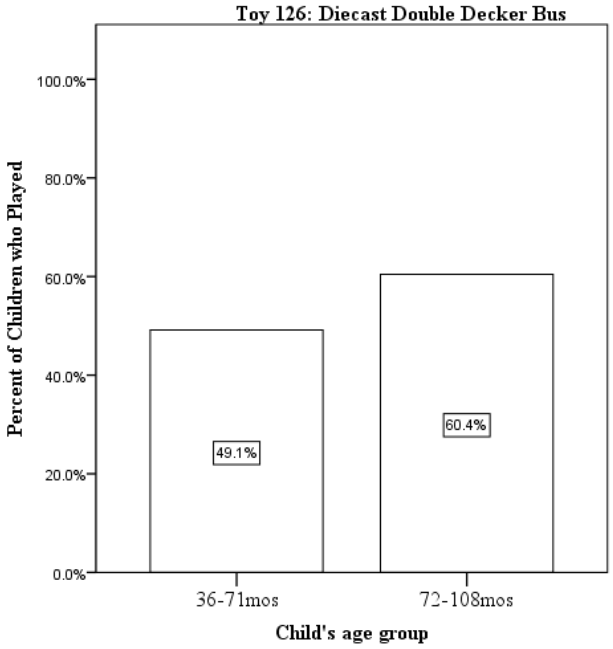
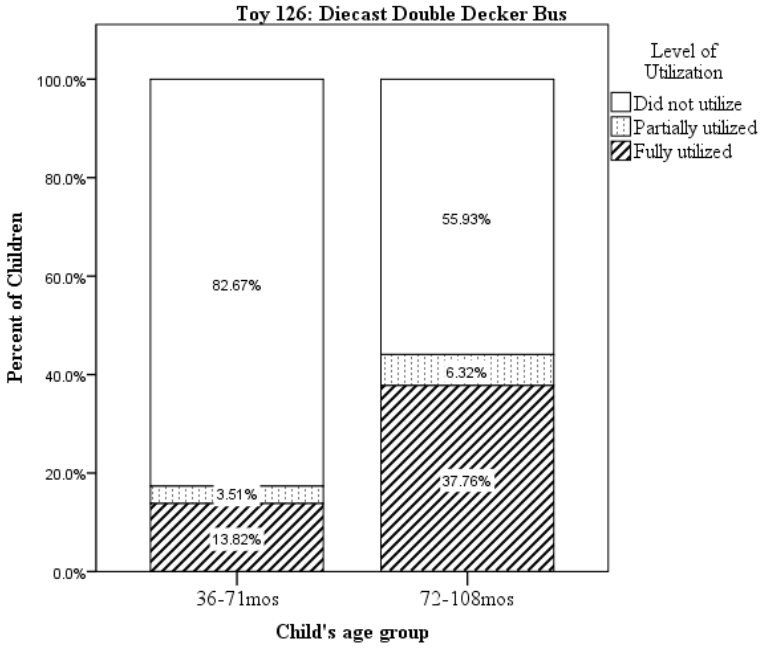


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Throws or carries bus around
- *Partially utilizing:* Spins tires with hands
- *Fully utilizing:* Child moves the bus back and forth or pushes it so it rolls

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Children 72-107 months are attracted to small vehicles that are highly realistic, minutely detailed, and highly functional. They use these highly detailed vehicles in intended ways (e.g., wheeling them around) instead of spending time studying the details (e.g., examining the tires).

Toy #127: Yarn Loom

Brief Toy Description	Square wooden loom with rainbow yarn for weaving into teeth of loom.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	String
	Wood
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	6
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	2
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

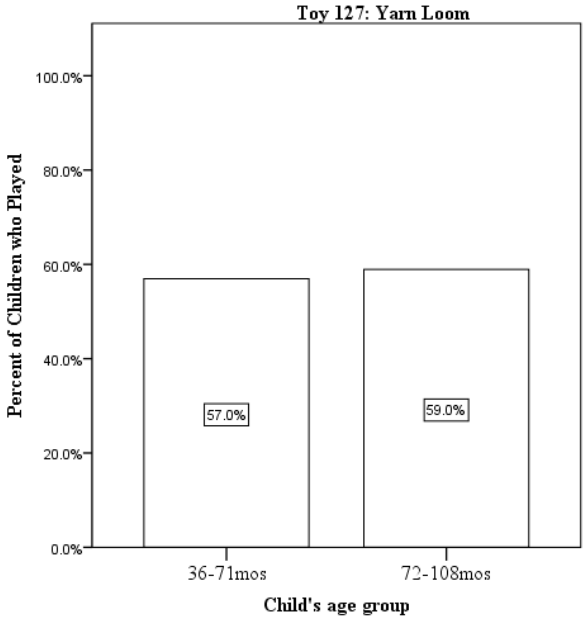
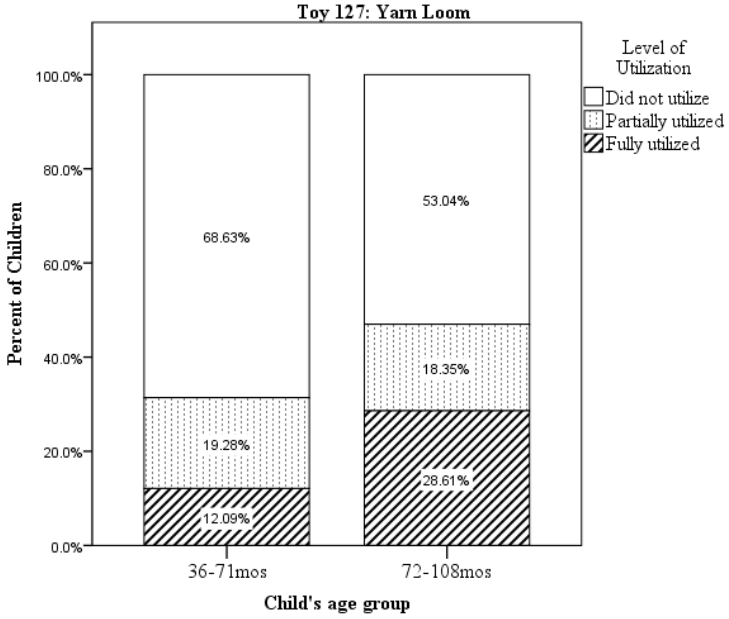


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child wraps string around the table or other objects or spends the entire time reading the instructions
- *Partially utilizing:* Wraps string around the loom but not in the grooves as demonstrated in the instructions
- *Fully utilizing:* Weaves yarn around the grooves of the wooden loom as demonstrated in the instructions

Age Determination:

Manufacturer's suggested age	7 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Children have the patience and fine motor skills at 72-107 months to properly use a loom that requires them to lace a string of yarn through teeth on a loom. Children can line up the yarn on the teeth and create a design. When children at younger ages wrap yarn around the loom, they often disregard the importance of putting the yarn in the teeth and are unable to complete the task.

Toy #128: Rubber Loom

Brief Toy Description	Clear plastic loom consisting of small prongs sticking out of a board. Tiny vinyl rubber bands (50; multiple neon colors) can be woven around the prongs to make jewelry and other objects.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Vinyl
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	6
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	2
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

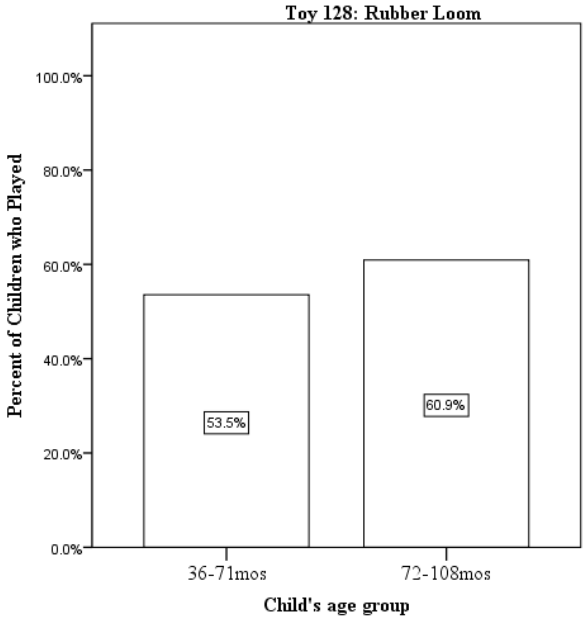
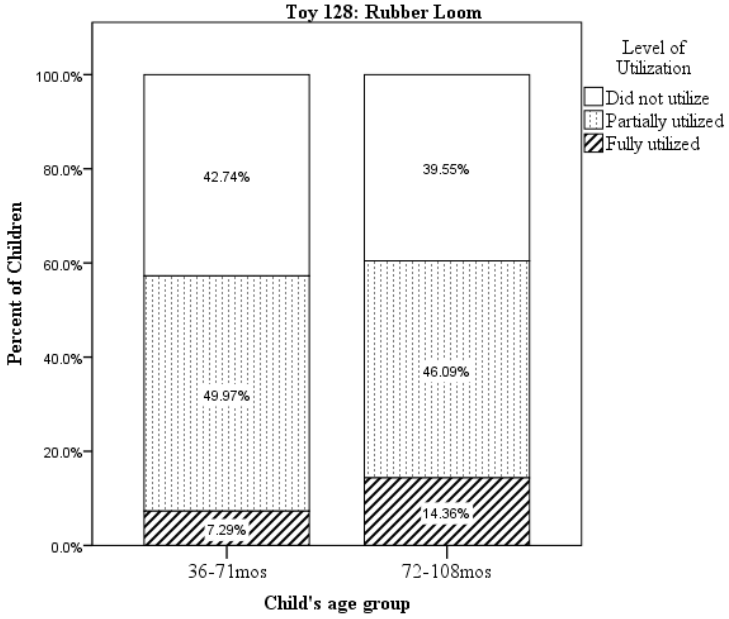


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps over the box of rubber bands, attaches the rubber bands to other objects in the room, or spends the entire time reading the instructions
- *Partially utilizing:* Weaves rubber bands around the clear plastic section of the loom or around the stylus weaver but never makes a detachable chain OR child uses fingers to weave a detachable chain
- *Fully utilizing:* Child makes a chain out of the small rubber bands using either the clear plastic section of the loom or the stylus weaver

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 36-71 months, children can begin to use looms with small loops for weaving. Their fine motor skills allow them to put small loops onto a loom and arrange them in an appropriate way for making bracelets and other items.

Toy #129: Magnetic Art Board

Brief Toy Description	Red magnetic board with two white knobs that activate magnets and make line designs when knobs are turned.
Packaging	Cartoon illustrations on package, cardboard with open front where toy can be touched
Materials	Hard plastic
Other Features	None
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

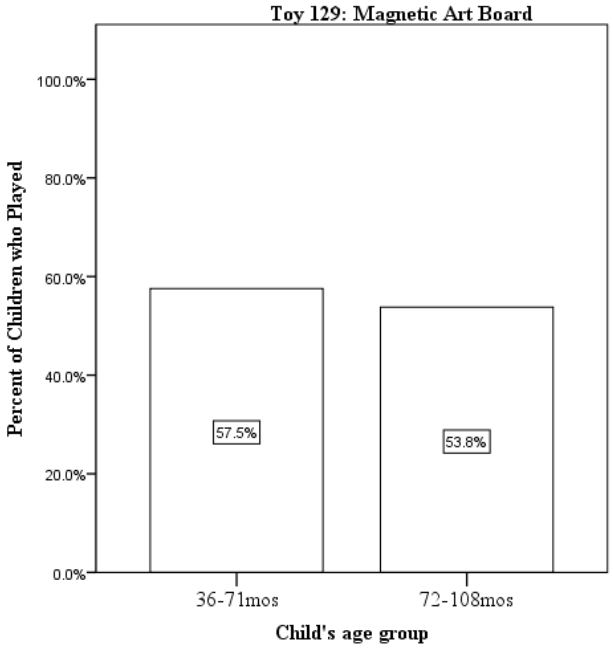
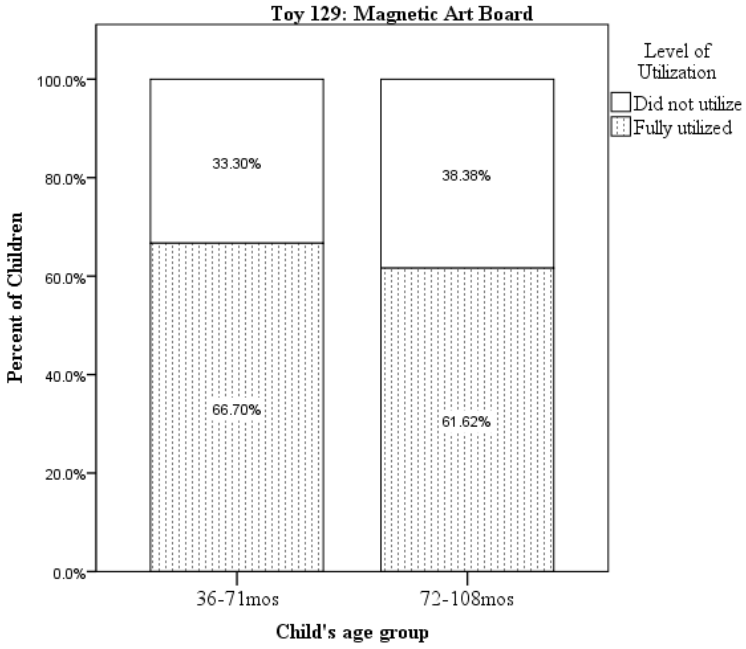


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child shakes the toy to listen to the noise it makes
- *Partially utilizing:* Child only uses one dial to make a line on the screen
- *Fully utilizing:* Child uses fingers to turn both dials and make lines on the screen

Age Determination:

Manufacturer's suggested age	3 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	By 36-71 months, children are also good at manipulating boards with magnetic shavings controlled by knobs to make designs. Fine motor skills at this age allow children to maneuver both knobs at the same time.

Toy #130: Wooden Ukulele

Brief Toy Description	Small wooden guitar with five strings.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Pliable metal
	Wood
	Hard metal (non-pliable)
Other Features	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

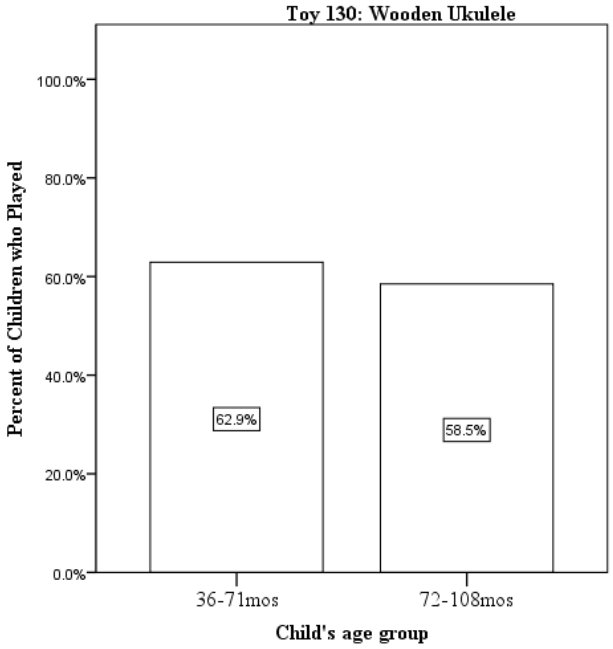
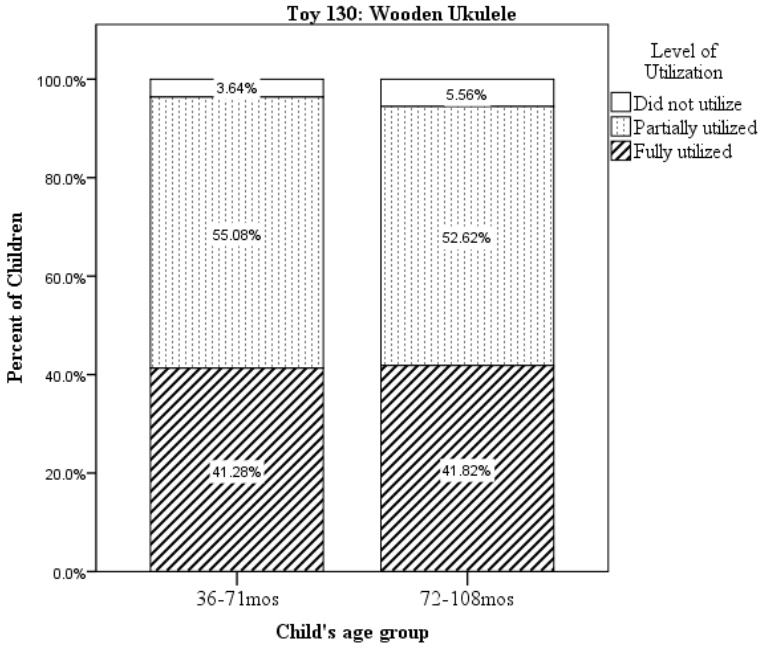


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child fiddles with the white knobs at the base of the ukulele
- *Partially utilizing:* Child either lays the ukulele on the table or holds it incorrectly and strums the strings
- *Fully utilizing:* Child holds the ukulele using the correct technique and strums the strings

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	Small guitars or ukuleles become appealing in the 36-71-month age bracket, since children will now have the fine motor skills to properly strum the strings, as well as the coordination needed to cradle the instrument properly in their arms while playing it. Children at younger ages may spend too much of their time trying to detach the strings from the guitar instead of strumming, and have difficulty holding it properly.

Toy #131: Mini Accordion

Brief Toy Description	Blue and white accordion with black top and bottom. White buttons (10) on side must be pressed to activate noise.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Canvas
	Hard metal (non-pliable)
Other Features	Produces sound (operational noise)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

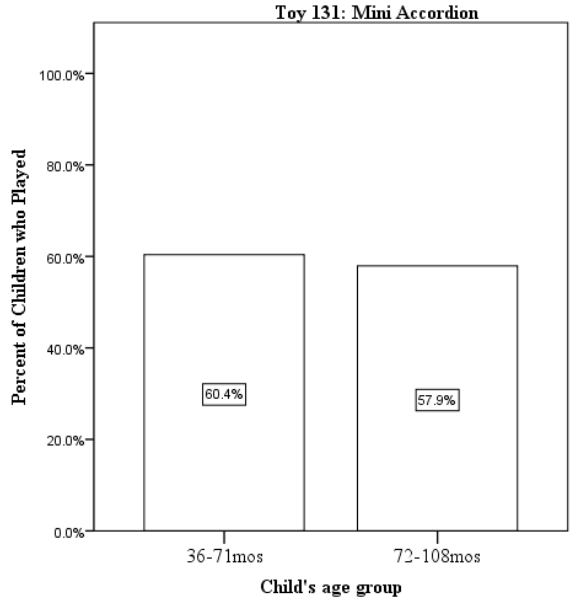
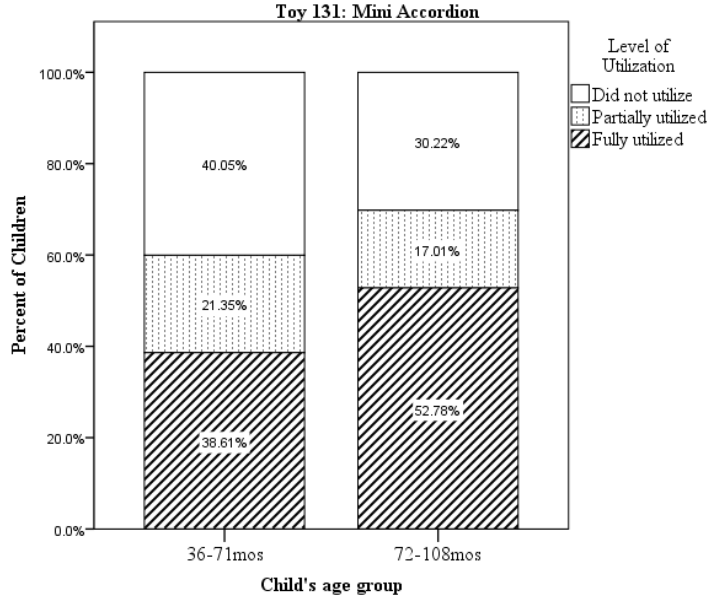


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child spends time pressing the small white buttons and fiddling with the straps or plays with the stretchy part of the bellow but does not hold the accordion in the proper way
- *Partially utilizing:* Child spends the whole time pulling apart and pushing the bellow back together while holding the accordion in the proper way, but does not push the white buttons, thus failing to create sound
- *Fully utilizing:* Holding the accordion in the proper way, the child pulls apart and pushes the toy back together while simultaneously pressing a white button to make noise (note: the accordion will not make noise unless a white button is pressed while the bellow is compressed in and out)

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	72-107 mos
Utilization report	The cumulative score of fully and partially utilizing is highest in this age group.
Justification for recommended age group	Accordions with two motions (button pressing and pulling apart), are also mastered by 72-107 months. Children at younger ages may not have the combination of gross motor skills (pulling) and fine motor skills (button pressing) needed to activate the accordion.

Toy #132: Karaoke Machine

Brief Toy Description	Light-making white karaoke machine with microphone attached to device with black cord. 13 buttons are included to control lights, volume, etc.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Hard metal (non-pliable)
Other Features	Battery operated
	Produces light
	Produces sound (music)
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	1
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

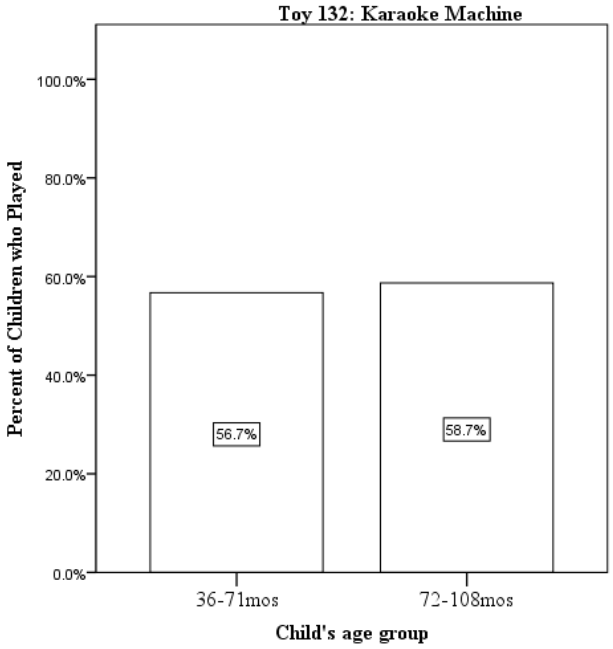
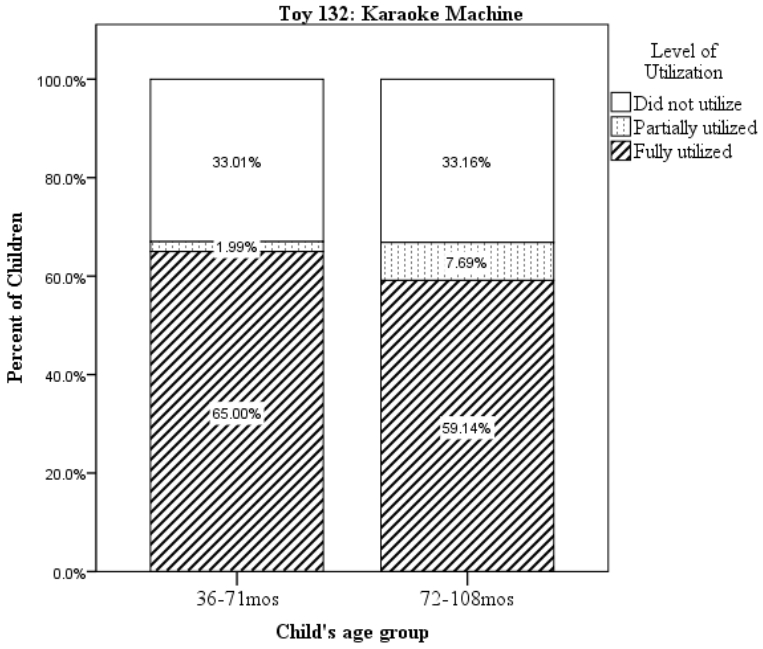


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child only presses the buttons on the console
- *Partially utilizing:* Child makes noises with the sound potential of the microphone not by talking or singing but, rather, tapping hand or finger on microphone OR child spends the whole time singing along to music without the microphone
- *Fully utilizing:* Child puts microphone to mouth and talks or sings

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	72-107 mos
Youngest suggested study age group based on data	36-71 mos
Utilization report	The cumulative score of fully and partially utilizing is comparable (within 5%) for age groups. Due to similarity, youngest age group is appropriate.
Justification for recommended age group	At 36-71 months, children are able to understand that a microphone is for talking and singing into. Children will enjoy singing tunes that they already know at this age and put on a show for any bystanders. They may also enjoy making announcements with the microphone instead of singing.

Toy #133: Motorized Amusement Park Ride Building Set

Brief Toy Description	Small, multicolored (green, blue, orange, yellow, white), connectable plastic pieces (100+), most of which are gear and dowel-shaped.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
Other Features	Battery operated
	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	6
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	2

Figure 1. Percent of children who played with toy by age group

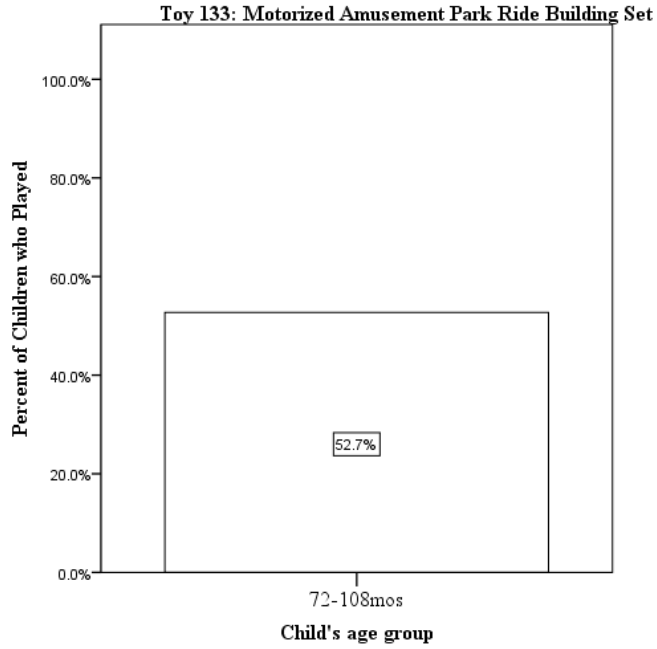
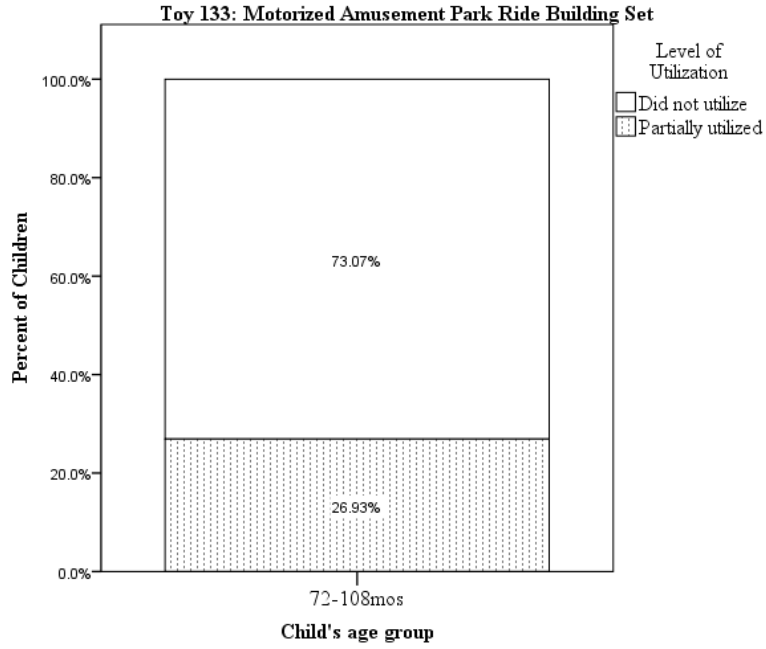


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps box over or spends whole time reading the booklet
- *Partially utilizing:* Child clicks blocks together with no respect to the directions
- *Fully utilizing:* Child follows booklet to put together (or begin to put together) the set

Age Determination:

Manufacturer's suggested age	7 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (26.93%) partially utilized the toy. Most children (73.07%) did not utilize the toy.
Justification for recommended age group	This set has very complex directions and is a less common type of building set than others in the study, with unfamiliar shapes and interlocking mechanisms. A very high percentage of children spent the whole time studying the booklet or dumping the box over to look at the pieces. For the few children who moved forward from this point, they were not likely to follow along with the directions, rather, they just inspected the shapes and clicked the pieces together to explore how they worked.

Toy #134: Animal Tiny Brick Building Set

Brief Toy Description	Brightly colored (green, blue, red, yellow) tiny interlocking pieces in rectangle, square, and triangle shapes (215) that can create an animal that lives in the tropics.
Packaging	Cartoon illustrations on package, real photos on package, cardboard box
Materials	Hard plastic
Other Features	Includes a face (three-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	5
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

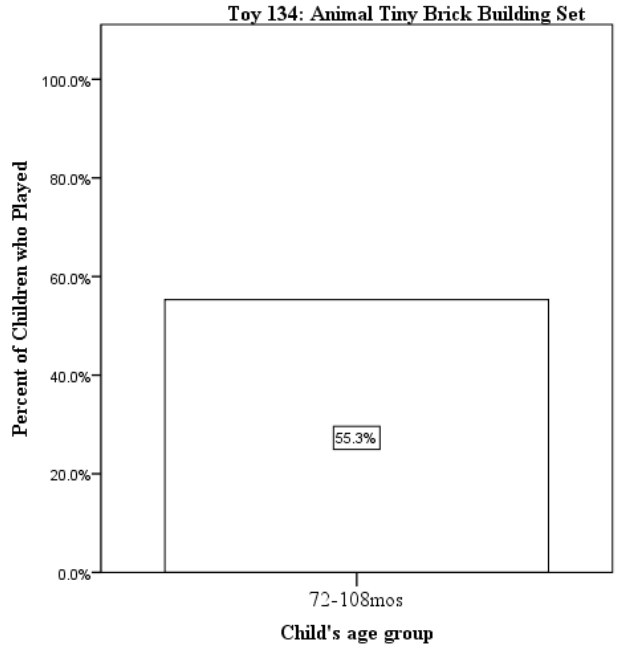
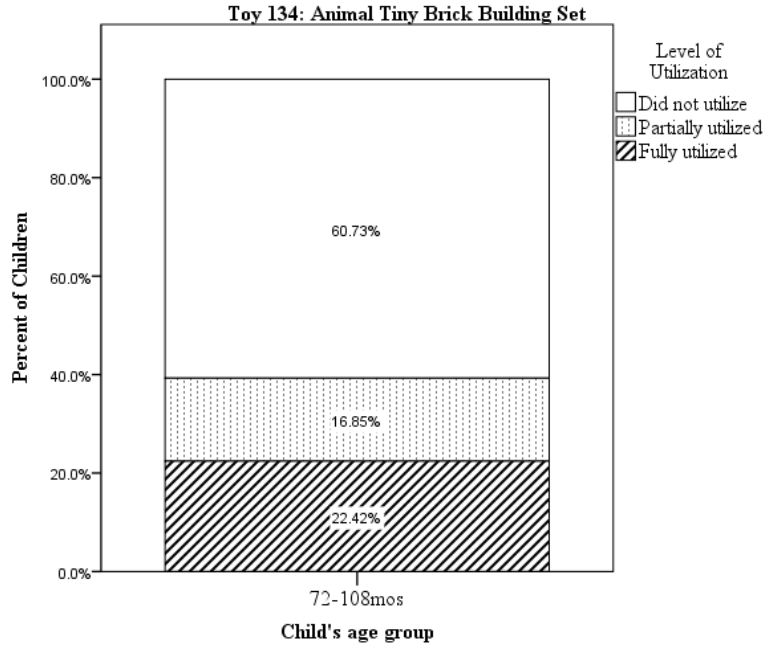


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps over the container of bricks or spends the entire time reading the instructions in the booklet
- *Partially utilizing:* Child clicks bricks together with no respect to the directions
- *Fully utilizing:* Child follows booklet to put together (or begin to put together) the animal

Age Determination:

Manufacturer's suggested age	6-12 years
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (22.42%) fully utilized this toy. An additional 16.85% of children partially utilized the toy. Most children (60.73%) did not utilize the toy.
Justification for recommended age group	Many children spent their time reading the directions without assembling the blocks. It is possible that they were trying to familiarize themselves with what the blocks would eventually create, but when they figured it out, they moved on to the next toy or trial. Those who partially utilized the toy may have been confident in their knowledge of the use of the bricks with prior experience and chose to click them together with no respect to the directions.

Toy #135: Tower Tiny Brick Building Set

Brief Toy Description	Black, tan, and gray tiny interlocking pieces (346 large and small rectangles, squares, cylinders, flat sheets) that can build a tower.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	6
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	3
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

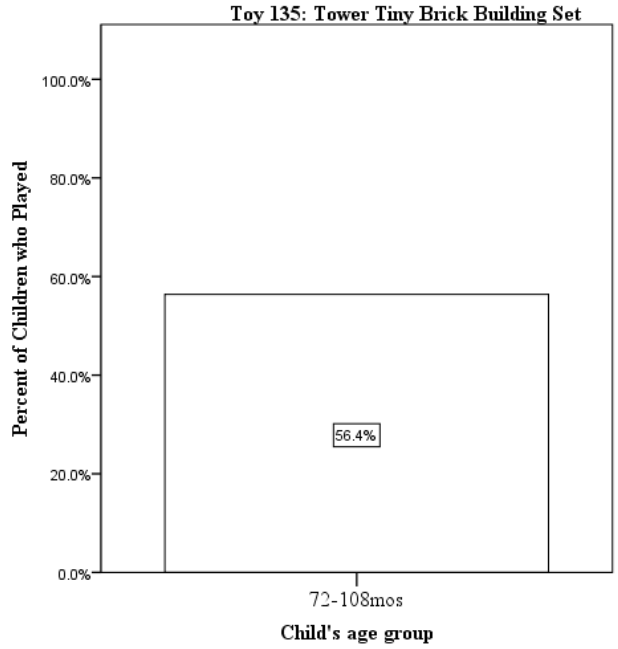
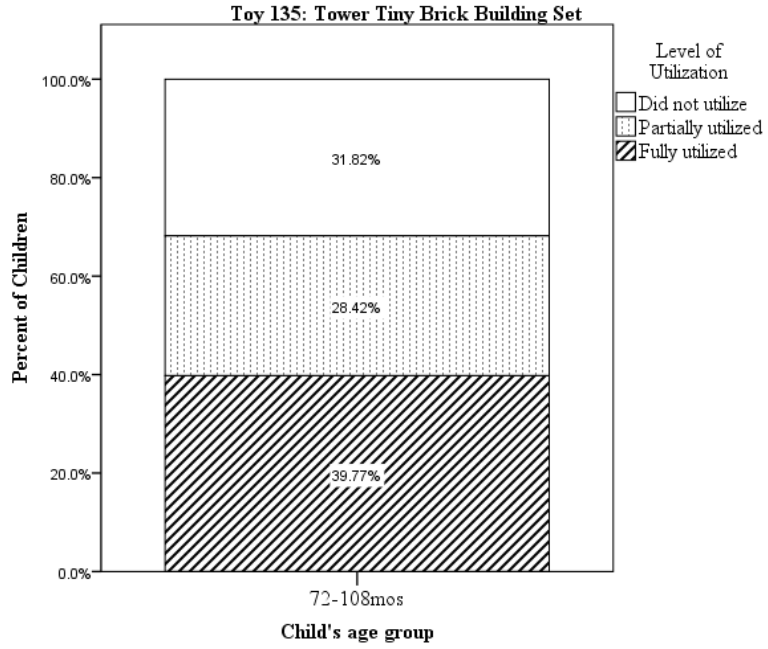


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child dumps over the container of bricks or spends the entire time reading the instructions in the booklet
- *Partially utilizing:* Child clicks blocks together with no respect to the directions
- *Fully utilizing:* Child follows the booklet to put together (or begin to put together) the tower

Age Determination:

Manufacturer's suggested age	12 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (39.77%) fully utilized this toy. An additional 28.42% of children partially utilized the toy. Most children (31.82%) did not utilize the toy.
Justification for recommended age group	This brick building set resulted in more children partially or fully utilizing it than the rainforest building set (Toy #134), even though this building set had a higher manufacturer's suggested age. It is possible that the novelty of this set (given that it was a set intended for older children that participants were likely never given at home) was motivating to children and caused them to utilize it further by reading the directions and putting the pieces together accordingly.

Toy #136: Handheld Electronic Trivia Game

Brief Toy Description	Light blue and white handheld game with green buttons on top. Prompts child to answer trivia questions.
Packaging	Real photos on package, cardboard backing with plastic
Materials	Hard plastic
Other Features	Battery operated
	Produces light
	Produces sound (music)
	Produces sound (synthesized noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	6
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

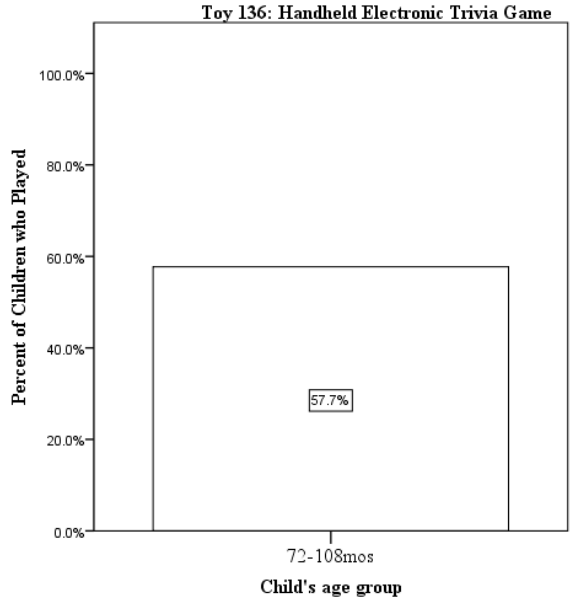
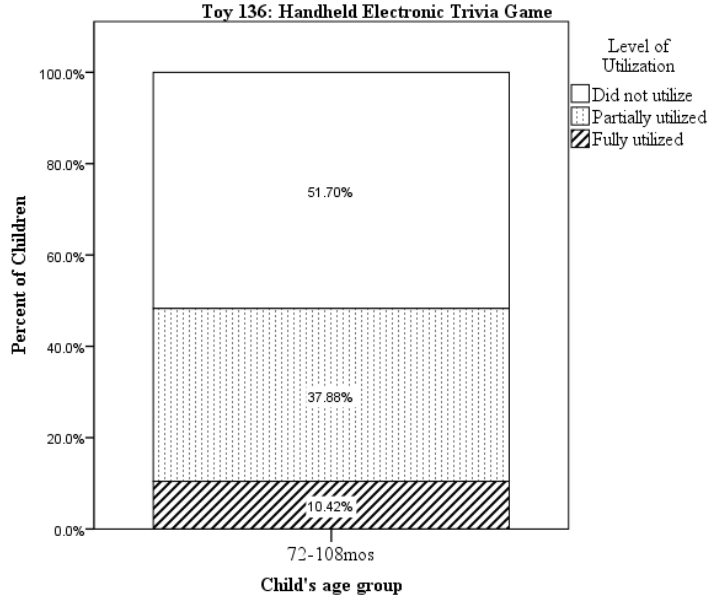


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child throws the game around, repeatedly presses the buttons without pausing in between, or spends the entire time reading the instructions
- *Partially utilizing:* Child does not verbalize the answers or read the instructions and go back to the game; instead, child presses the button once without reading the instructions, waits, and then presses the button again (i.e., child is not pressing the buttons quickly)
- *Fully utilizing:* Child presses button and tries to shout out the answer to one of the prompts on the screen, says something like “Got it!” or “Aww, missed it” (verbalization must happen), or child looks at the instructions, looks back at the game, presses a button, and reads the screen

Age Determination:

Manufacturer's suggested age	12 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (10.42%) fully utilized this toy. An additional 37.88% of children partially utilized the toy. Most children (51.70%) did not utilize the toy.
Justification for recommended age group	It is possible that over half of children did not utilize the toy at all because 6-8-year-olds lack the patience to sit and think of answers to trivia prompts (hence the repeated button pressing). In addition, the subject matter is too difficult for 6-8-year-olds, which could explain the additional 37% of children who read the screen and passed on to the next prompt.

Toy #137: Handheld Electronic Follow the Prompts Game

Brief Toy Description	Small white handheld game with four interactive pieces on each corner that need to be activated (e.g., spun, pressed, pulled, shaken) in a certain order to advance to the next round.
Packaging	Cardboard backing with plastic
Materials	Hard plastic
Other Features	Battery operated
	Produces sound (human voice)
	Produces sound (synthesized noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	3
Is the toy a game? How many game-like qualities does the toy have?	6
How much rapid movement or speed could the toy exhibit?	2
How much violence is depicted in the toy?	2
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

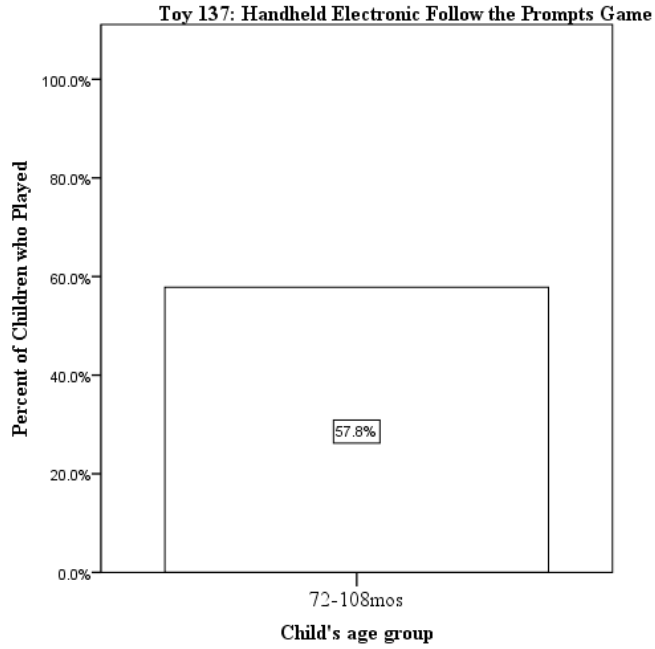
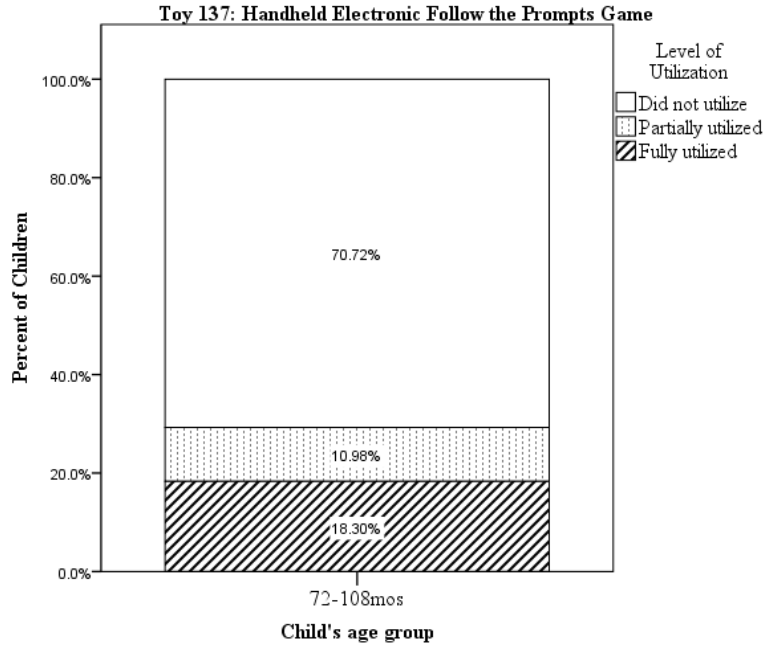


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child picks up the toy but is unable to activate any of the levers
- *Partially utilizing:* Child activates one of the levers but does not follow along the sequence after that (i.e., child only completes one action)
- *Fully utilizing:* Child follows the commands of the game and activates at least two levers

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (18.30%) fully utilized this toy. An additional 10.98% of children partially utilized the toy. Most children (70.72%) did not utilize the toy.
Justification for recommended age group	Most children picked up the toy but were unable to activate any of the levers. These could be difficult levers for the fine motor skills of the 6-8-year-olds in the study. Furthermore, it was unlikely that children partially utilized the toy and were only able to activate one lever. If children did activate a lever, they were generally able to follow more than two lever prompts (18.3%). In sum, this likely means that following a pattern is not as difficult for this age group as much as figuring out how to activate the levers and executing it in a timely manner to follow the pattern.

Toy #138: 3-D Ball Puzzles

Brief Toy Description	Plastic, multicolored pieces (red, orange, yellow, green, blue, purple) that can form a ball or a star if put together strategically. Shapes are jagged edge prisms, smooth edge prisms, and half circles with rounded edges.
Packaging	Cellophane/ plastic bag
Materials	Hard plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	5
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	4
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

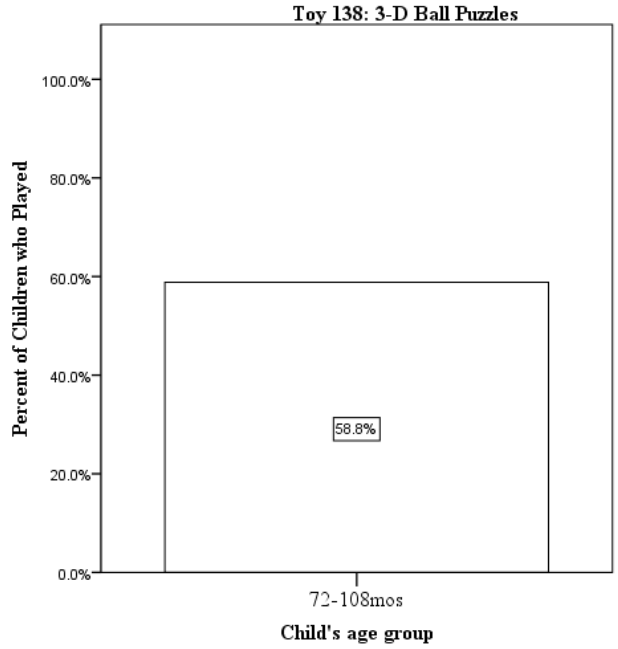
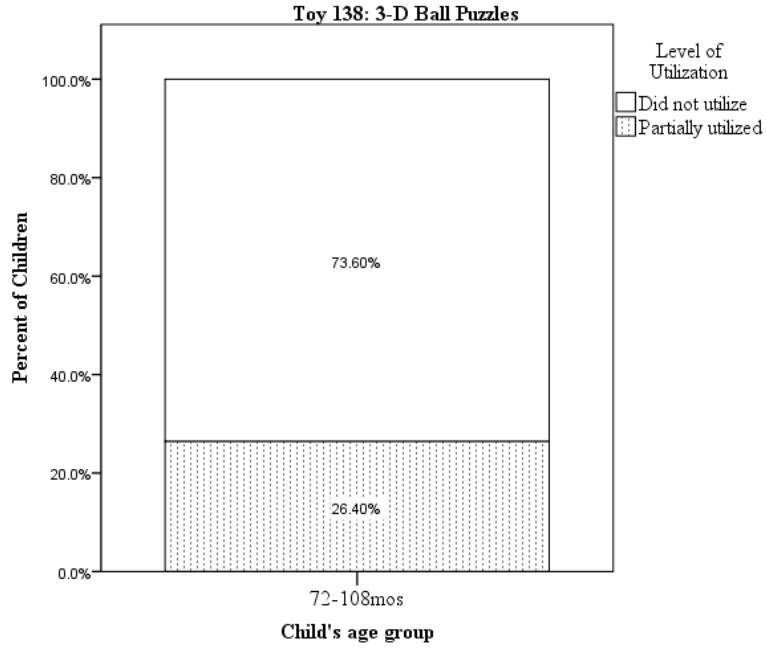


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child takes the ball apart or spends the entire time reading the instructions
- *Partially utilizing:* Child puts together at least two of the puzzle pieces but is unable to remake a full ball
- *Fully utilizing:* Child puts the pieces of the ball puzzle back together in its original shape

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (26.40%) partially utilized the toy. Most children (73.60%) did not utilize the toy.
Justification for recommended age group	These puzzles are very difficult to put together at 6-8 years. No children fully utilized the toy, while just a few children (26%) could put together just a couple of the pieces, at most. This puzzle likely takes cognitive skills of being able to reason about 3-dimensional objects that are not yet developed at 6-8 years.

Toy #139: Electronic Circuit Board

Brief Toy Description	Tan object with several wire knobs (60+) and a grid of holes into which wires can be inserted to create special effects (e.g., a light turns on). Two wires are given.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Pliable metal or wire/ inflated plastic
Other Features	Battery operated
	Produces light
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	6
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	4
Do you need to follow a path or sequence of steps to play with the toy as intended?	6

Figure 1. Percent of children who played with toy by age group

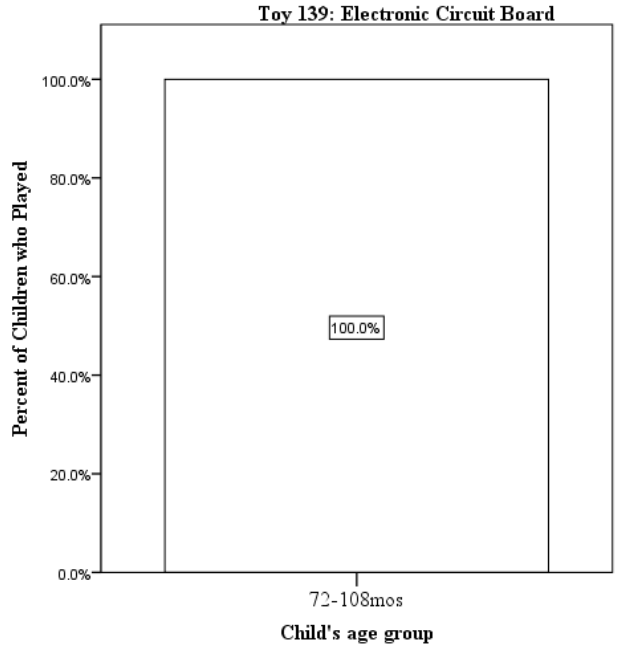
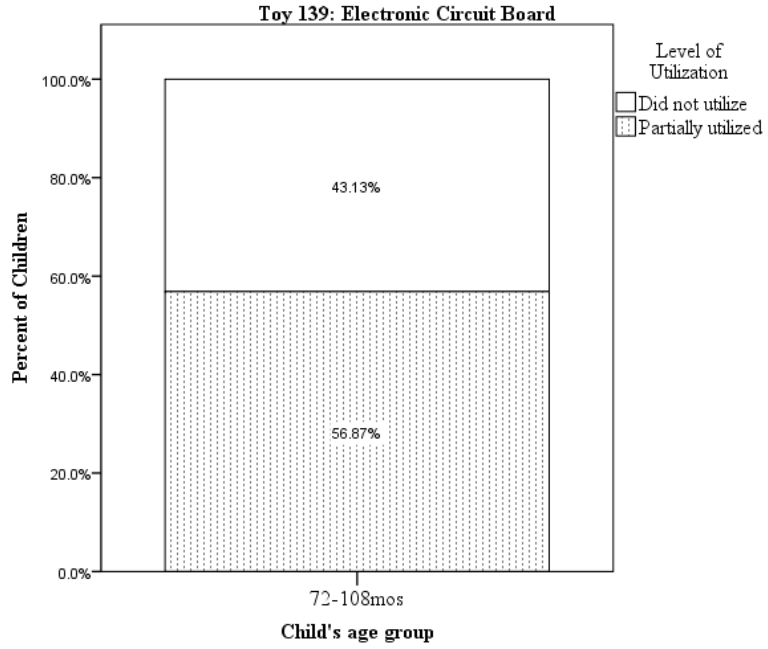


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Bends wires, presses buttons on the console, or spends the entire time reading the instructions
- *Partially utilizing:* Picks up the wires and tries to stick them into various places in the console but fails to make them stay in place
- *Fully utilizing:* Reads the instructions and puts wires between the coils as indicated

Age Determination:

Manufacturer's suggested age	10 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Most children (56.87%) partially utilized the toy. An additional 43.13% of children did not utilize the toy.
Justification for recommended age group	No children in the 6-8-year-old group could fully utilize this toy suggested for children ages 10+. The set of steps and instructions needed to complete the task is far too difficult. Some children understood the general concept that the wires were supposed to go in the holes, but following the directions and doing the wire placement correctly was a concept too complicated for 6-8-year-old children.

Toy #140: Machine Building Kit

Brief Toy Description	Plastic pieces that can be assembled to create a lever. Includes red square base, gray cylinder, two blue circular objects, and gray balancing screw.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	3
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

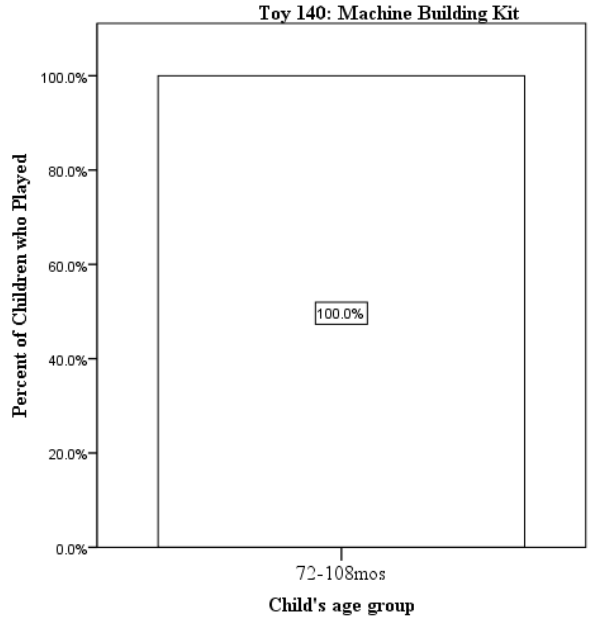
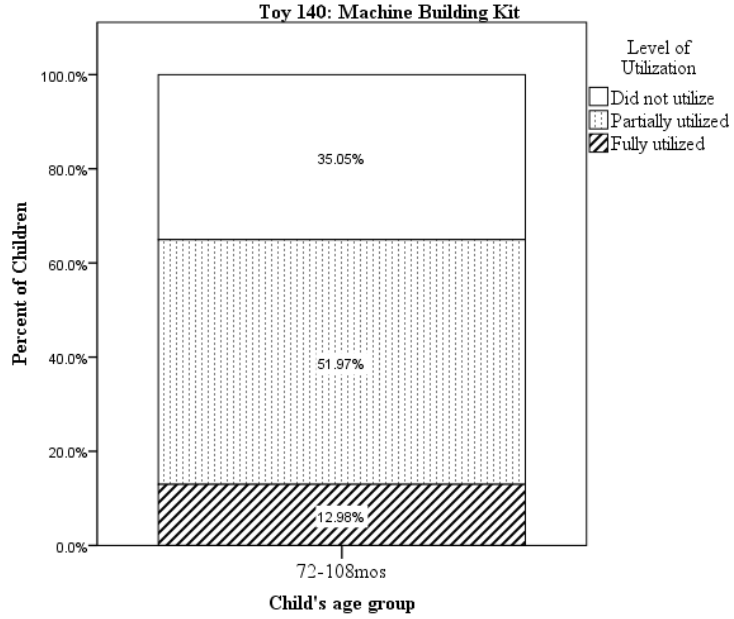


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Dumps over the box containing the pieces or spends the entire time reading the instructions
- *Partially utilizing:* Attaches the pegs into the holes on objects in set or screws the washer onto the peg (i.e., child attaches two pieces together in some way) but fails to create the lever
- *Fully utilizing:* Creates the lever as detailed in the instructions

Age Determination:

Manufacturer's suggested age	10 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (12.98%) fully utilized this toy. Most children (51.97%) partially utilized the toy. Some children (35.05%) did not utilize the toy.
Justification for recommended age group	The 6-8-year-olds in the study found this toy somewhat usable given that almost half of children were able to partially utilize the toy. Still, completing the full action of creating a lever as detailed in the instructions was usually too difficult for this age group. This is likely due to the complexity of the instructions than the difficulty in putting the pieces together, as the pieces are chunky, and there are only 5 pieces that children have to put together correctly to complete the task.

Toy #141: Architecture Kit

Brief Toy Description	Tracing template to create the floorplan of a room, as well as plexiglass walls (6) and window clings (5), and plastic bases (6) to build an architectural structure.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
	Wood
	Paper
	Graphite
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

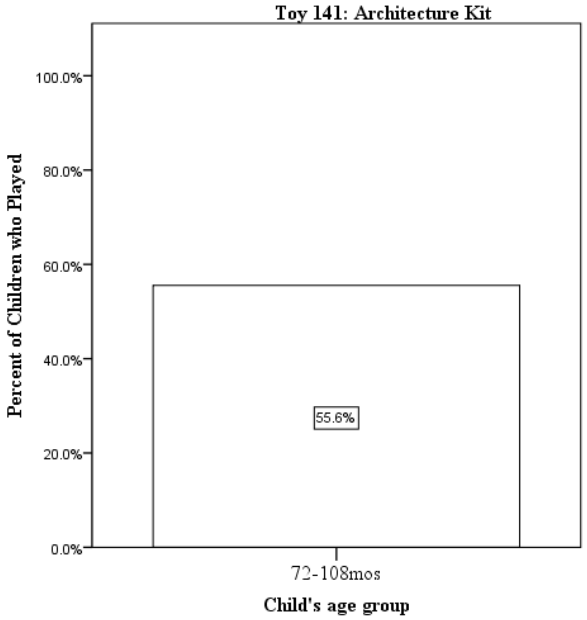
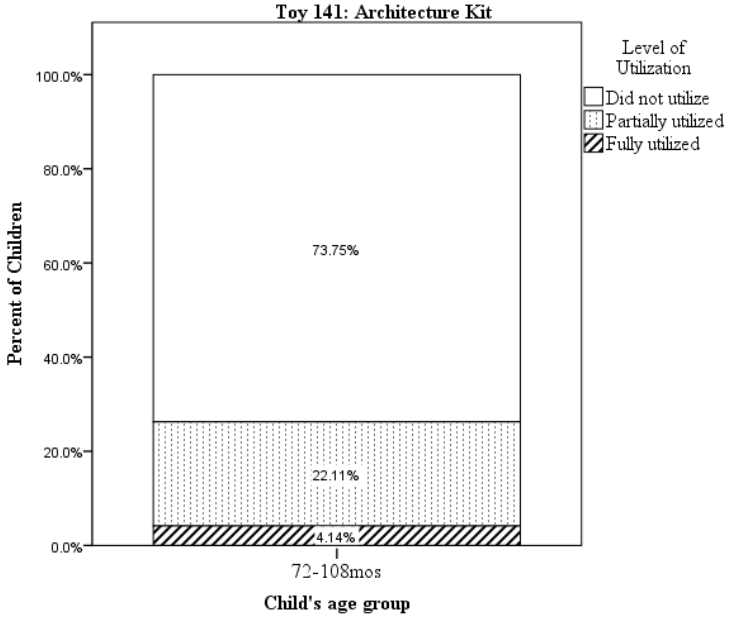


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Starts to create a tower out of the plastic pieces, draws random pictures on the piece of paper with the pencil, or spends the entire time reading the instructions
- *Partially utilizing:* Only traces the outline of the walls from the stencil onto the paper or only sets up the plastic stand-up walls
- *Fully utilizing:* Traces the outline of the walls from the stencil onto the paper and, based on the stencil, sets up the plastic stand-up walls

Age Determination:

Manufacturer's suggested age	8 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (4.14%) fully utilized this toy. An additional 22.11% of children partially utilized the toy. Most children (73.75%) did not utilize the toy.
Justification for recommended age group	Most children spent their time playing with the architecture set materials in unintended ways. At 6-8 years, some children were able to start with the tracing and plastic stand-up walls. Still, only a small number of children were able to set up the architecture kit, which is probably due to the complicated nature of the directions.

Toy #142: Splatting Ball

Brief Toy Description	Green, squishy frog ball that will "splat" into a flat shape if thrown forcefully at a hard surface.
Packaging	Cellophane/ plastic bag
Materials	Rubber
	Liquid
Other Features	Includes a face (three-dimensional)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	2
How large are the parts, pieces, and components of the toy?	2
How much mastery of gross motor skills is needed to play with the toy?	3
How much mastery of fine motor skills is needed to play with the toy?	1
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	1

Figure 1. Percent of children who played with toy by age group

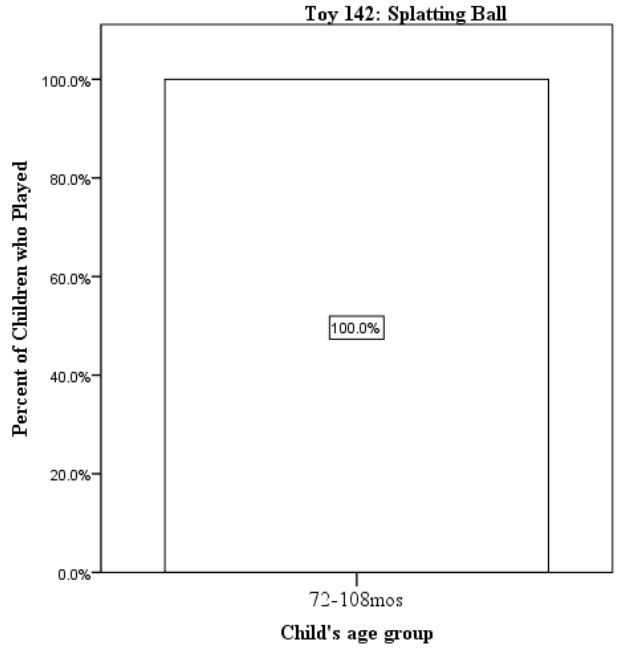
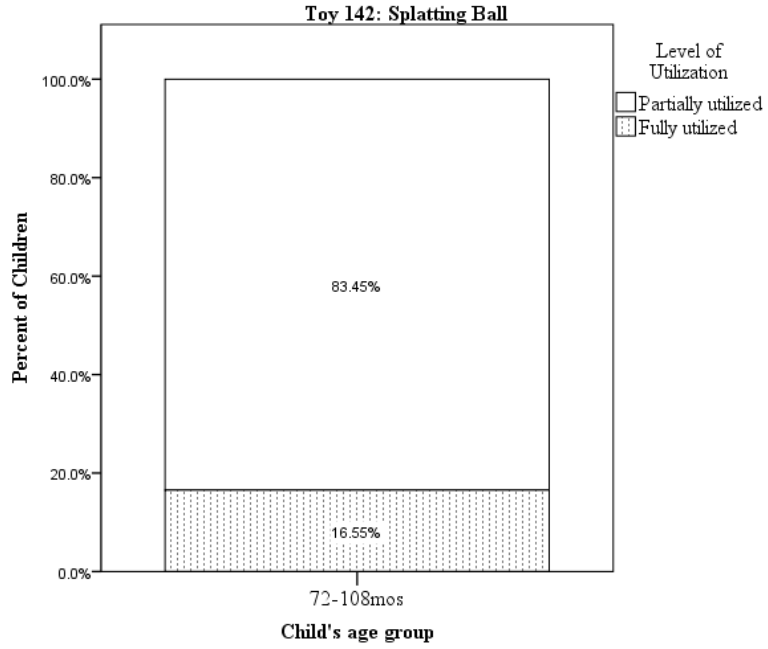


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Tries to chew on the ball
- *Partially utilizing:* Throws ball anywhere else in the room but not against a surface OR spends the entire time squishing the ball so that a bubble forms on the toy
- *Fully utilizing:* Child throws the ball against a surface so that it "splats"

Age Determination:

Manufacturer's suggested age	5 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (16.55%) fully utilized this toy. Most children (83.45%) partially utilized the toy.
Justification for recommended age group	This toy was chosen because it was a novelty sports & recreational toy that older children would still find appealing. While most children found this toy fun to throw and squish as a ball, few discovered the concept that it would splat if thrown into a hard surface. It is possible that children had lack of experience and this caused the result, it could also mean that children found it more fun to squeeze and use as a ball than throw against a hard surface at this age.

Toy #143: Ping Pong Set

Brief Toy Description	Two black, blue, and wood colored ping pong paddles and two white balls. A gray and black tennis net is also included that can be unfolded and installed on a table.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Mesh
	Wood
Other Features	None
Responsiveness	Some response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	4
Is the toy a game? How many game-like qualities does the toy have?	5
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	2
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

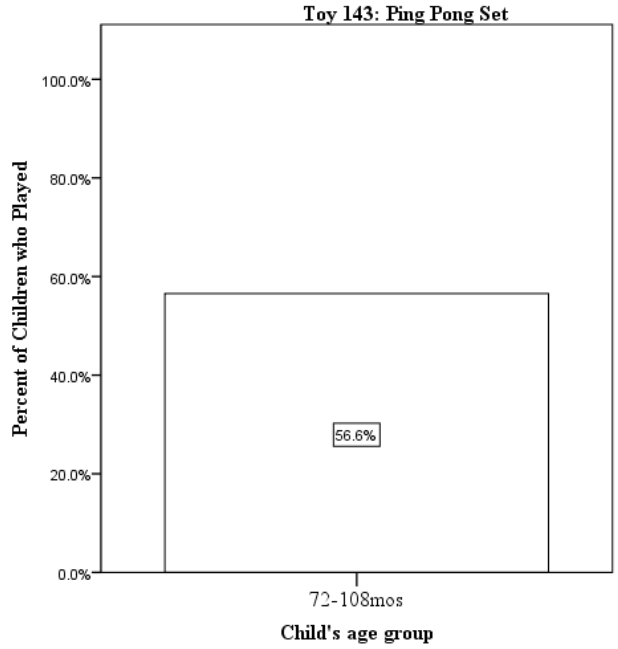
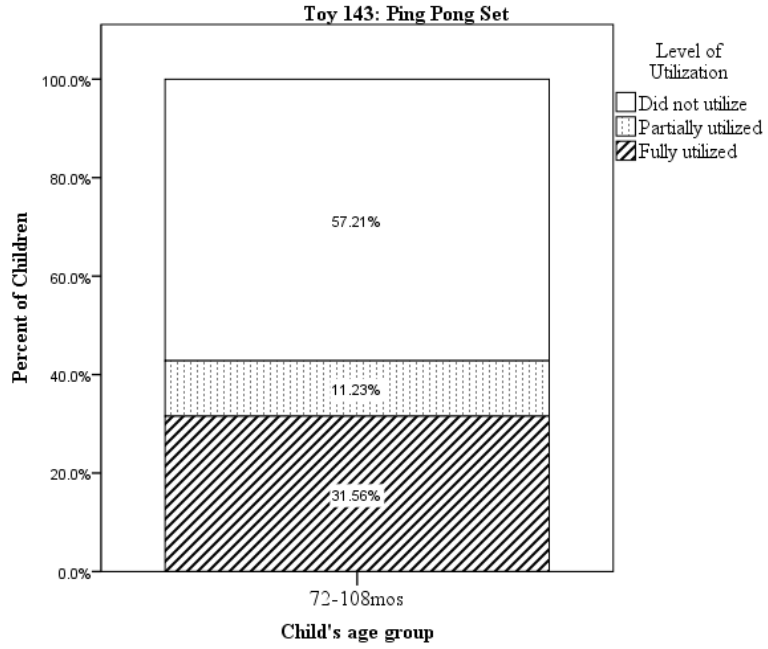


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Grabs ball and throws it or hits other objects in the room with the paddle
- *Partially utilizing:* Child throws the ball up and swings the paddle but is unable to hit the ball with the paddle
- *Fully utilizing:* Hits ball with the paddle (note: child is not required to set up the net)

Age Determination:

Manufacturer's suggested age	6 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (31.56%) fully utilized this toy. An additional 11.23% of children partially utilized the toy. Most children (57.21%) did not utilize the toy.
Justification for recommended age group	It appears that by 6-8 years, about half of children are using the paddle to hit the ball (or at least attempting to), while some still choose to use it in unconventional ways. Motor coordination at this age may not be good enough to align the ball with the paddle.

Toy #144: Bean Bag Slingshot

Brief Toy Description	Set contains a green and blue "launcher," two hacky sacks, and six cups that can be stacked in a tower and knocked over.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Elastic
	Fabric
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	6
How much mastery of fine motor skills is needed to play with the toy?	6
Is the toy a game? How many game-like qualities does the toy have?	5
How much rapid movement or speed could the toy exhibit?	4
How much violence is depicted in the toy?	3
How masculine is the toy?	4
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

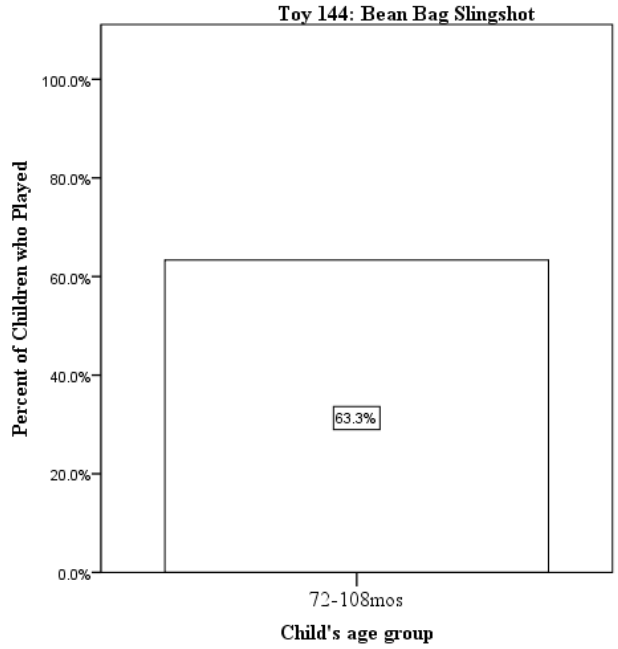
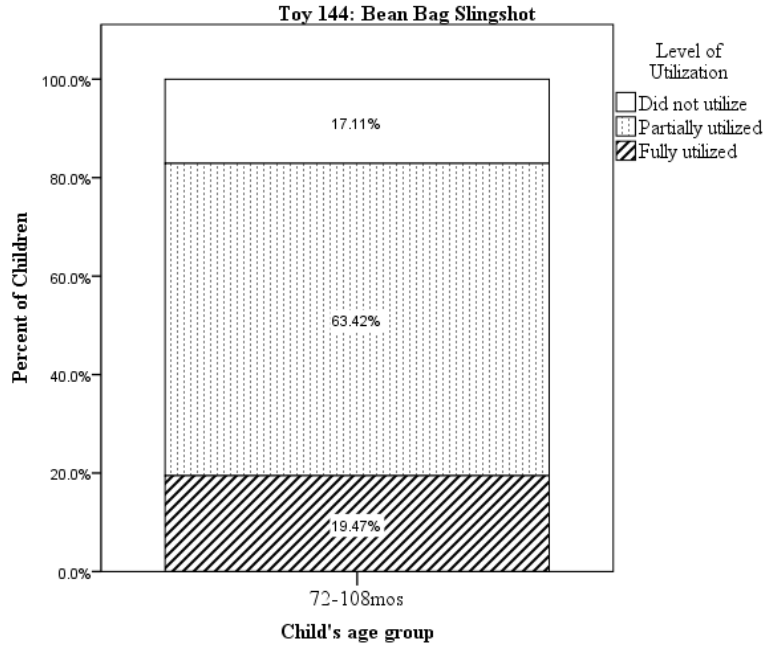


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Child grabs ball and throws it or only plays with the cups
- *Partially utilizing:* Child uses the slingshot but is unable to knock over the cups or throws the ball without the slingshot to knock over the cups
- *Fully utilizing:* Child uses slingshot to knock over cups

Age Determination:

Manufacturer's suggested age	5 years +
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (19.47%) fully utilized this toy. Most children (63.42%) partially utilized the toy. Some children (17.11%) did not utilize the toy.
Justification for recommended age group	By 6-8 years of age, most children are not quite able to combine the action of using the slingshot to knock over the cups, but they still enjoy using the slingshot alone (or knocking over the cups alone). It is likely that children understand how the toy is supposed to work, but they are still developing the coordination needed to hit the targets using a slingshot device.

Toy #145: Fine Marker Coloring Kit

Brief Toy Description	Set contains a cardboard picture with very detailed outlining, 8 skinny markers in bright colors for coloring, and a spiral notebook with directions for which specific markers to use on the various parts of the drawing.
Packaging	Cartoon illustrations on package, cardboard box
Materials	Hard plastic
	Sponge
	Sticker paper and cardboard
Other Features	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	5
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

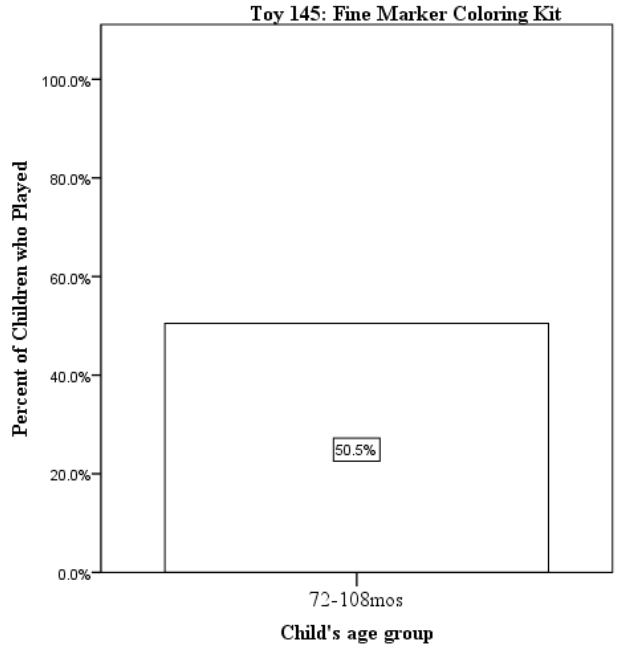
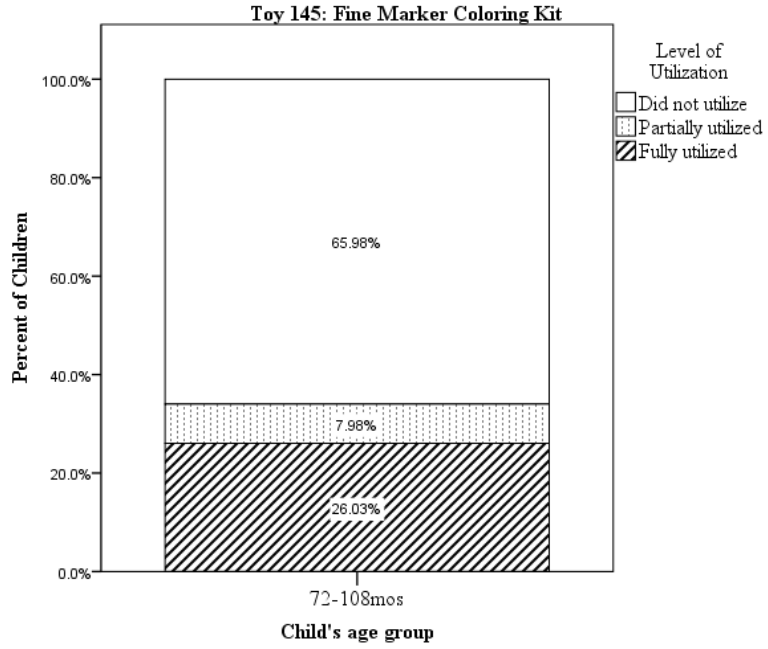


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Spends the whole time looking through the book
- *Partially utilizing:* Grabs markers and scribbles over the page with no respect to the outlines in the book or uses markers on another surface that is not the outline
- *Fully utilizing:* Uses skinny markers to color the intricate outline within the lines

Age Determination:

Manufacturer's suggested age	No age, but 0-3 warning
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (26.03%) fully utilized this toy. An additional 7.98% of children partially utilized the toy. Most children (65.98%) did not utilize the toy.
Justification for recommended age group	It is clear that at 6-8 years of age, children either choose to color within the lines neatly, or they just look through instructions. At this age, however, they typically will not just scribble on the photo, especially with the fine markers used here, as indicated by the fact that very few children partially utilized this toy.

Toy #146: Origami Kit

Brief Toy Description	Several squares of brightly patterned paper that can be folded into animal shapes according to instruction booklet.
Packaging	Cartoon illustrations on package, cardboard box
Materials	Paper
Other Features	None
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	4
How much mastery of fine motor skills is needed to play with the toy?	6
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	4
How colorful is the toy?	3
How realistic is the toy? What is the level of realism?	3
Do you need to follow a path or sequence of steps to play with the toy as intended?	4

Figure 1. Percent of children who played with toy by age group

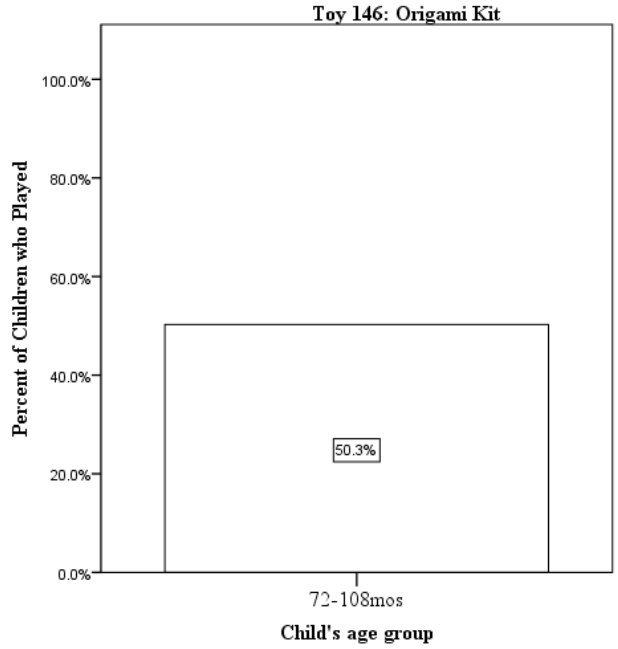
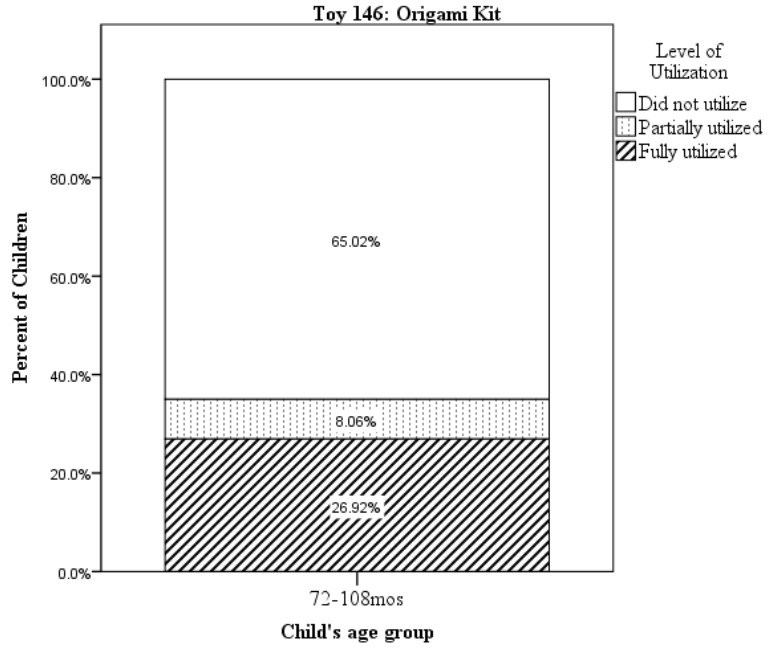


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Spends the entire time looking through the book or throws the paper around the room
- *Partially utilizing:* Makes a fold in the paper
- *Fully utilizing:* Looks at instructions and follows steps for folding paper or creates a purposeful shape with the paper without the instructions

Age Determination:

Manufacturer's suggested age	7-97 years
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (26.92%) fully utilized this toy. An additional 8.06% of children partially utilized the toy. Most children (65.02%) did not utilize the toy.
Justification for recommended age group	Origami is a task that few children seem to be able to complete in the 6-8-year age group. Much of this may be dependent on their past experience with origami, which may explain why there are more children that fully utilize the toy than partially utilize it. Being able to follow directions on a 3D piece of paper based on 2D instructions may be difficult at this age.

Toy #147: Learn to Draw Booklet

Brief Toy Description	Book with step-by-step instructions for sketching cartoon characters. Paper and bright colored pencils (8) are included.
Packaging	Cartoon illustrations on package, cardboard box
Materials	Paper
	Graphite
Other Features	Includes licensed character
	Includes a face (two-dimensional)
Responsiveness	No response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	5
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	6
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	5
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

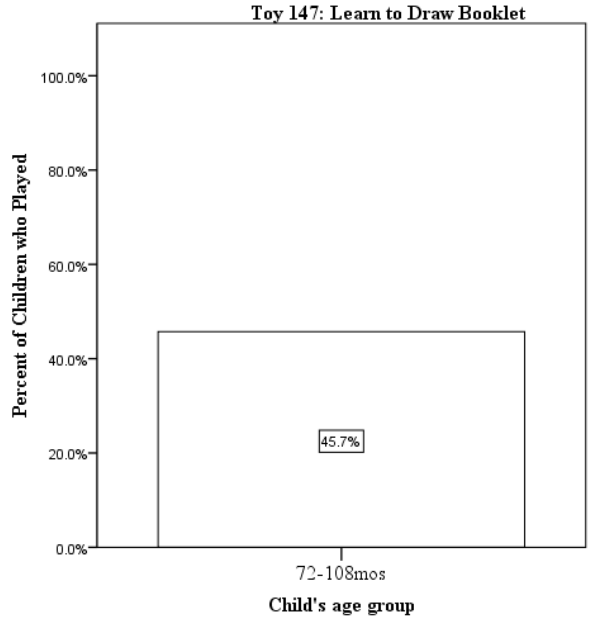
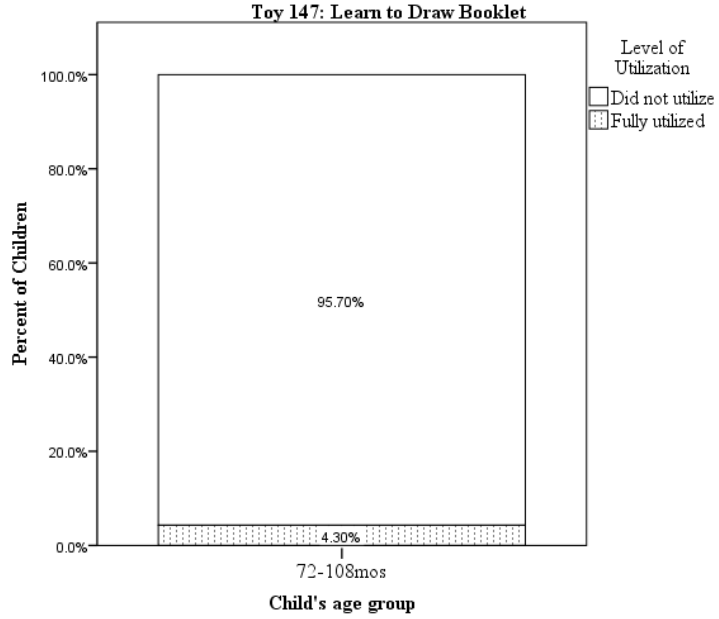


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Spends the entire time looking through the book
- *Partially utilizing:* Scribbles on paper with no respect to the illustration designs in the guidebook or uses pencils on another surface that is not the paper that comes with the kit
- *Fully utilizing:* Draws or begins to draw according to one of the illustration designs in the guidebook

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (4.30%) fully utilized this toy. Most children (95.70%) did not utilize the toy.
Justification for recommended age group	The results from this study confirm that it is very difficult for children ages 6-8 to sketch, particularly in accordance with a design in a guidebook. More developed fine motor skills are needed, and it is possible that the 4% who fully utilized the toy had some aptitude for drawing. At this age, children are more interested in looking at the drawing models than trying to make it themselves.

Toy #148: Violin

Brief Toy Description	Wooden violin with bow in black carrying case.
Packaging	In canvas carrying case
Materials	Hard plastic
	Pliable metal
	Canvas
	Wood
	Hard metal (non-pliable)
Other Features	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	4
How much mastery of gross motor skills is needed to play with the toy?	5
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

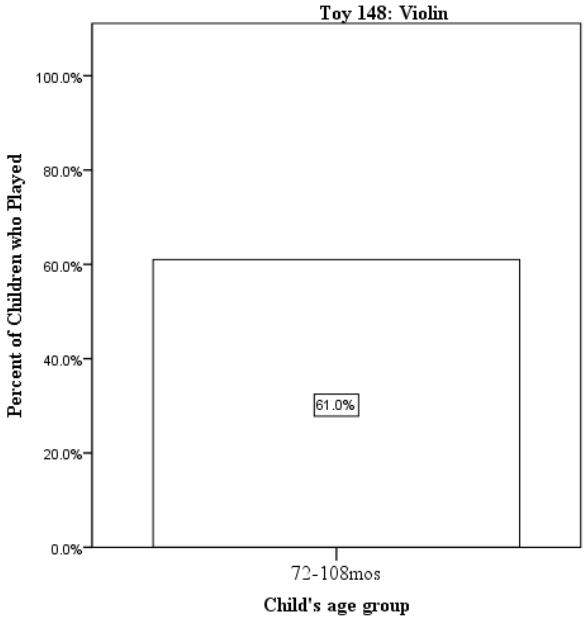
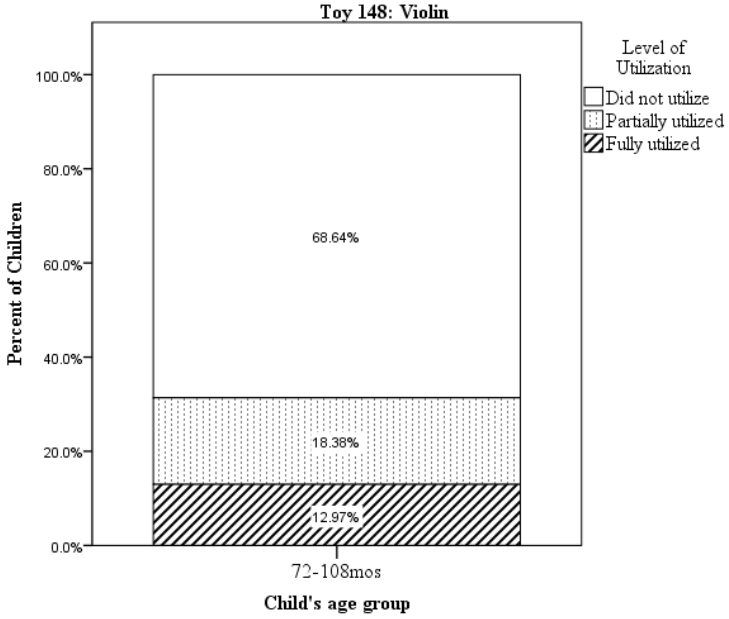


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Spends the entire time putting the wax on the strings or tries to pluck the strings like a guitar (i.e., does not use the bow)
- *Partially utilizing:* Child does not hold the violin appropriately and moves the bow across the strings or puts it on the table and moves the bow across the strings
- *Fully utilizing:* Puts chin rest under chin, holds up appropriately, and moves bow across strings

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Some children (12.97%) fully utilized this toy. An additional 18.38% of children partially utilized the toy. Most children (68.64%) did not utilize the toy.
Justification for recommended age group	Very few 6-8-year-olds ventured into either fully or partially utilizing this toy. Most of them did not know how to use the bow or spent time examining the details of the violin without attempting to play it or even hold it the correct way.

Toy #149: Keyboard

Brief Toy Description	Full sized keyboard (26 white keys, 18 black keys) with additional functional knobs and buttons (24) that can start a back beat or change the tempo of a tune.
Packaging	Real photos on package, cardboard box
Materials	Hard plastic
	Soft plastic
Other Features	Battery operated
	Produces sound (music)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	4
How large are the parts, pieces, and components of the toy?	3
How much mastery of gross motor skills is needed to play with the toy?	2
How much mastery of fine motor skills is needed to play with the toy?	5
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	1
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	2
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	3

Figure 1. Percent of children who played with toy by age group

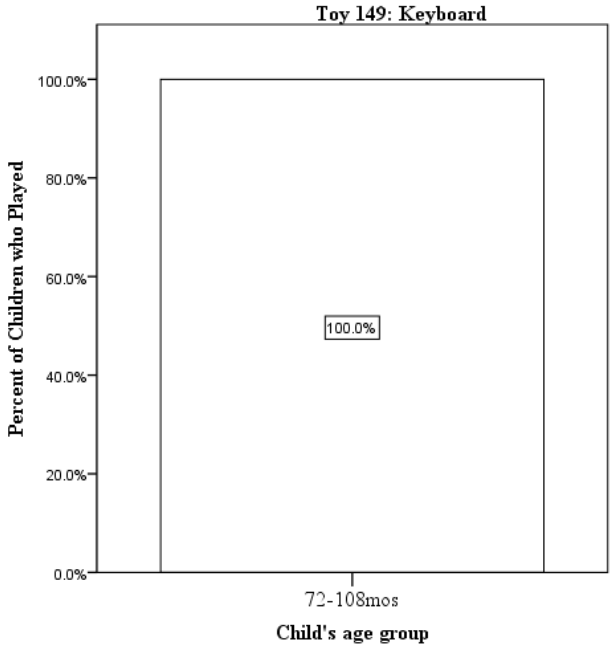
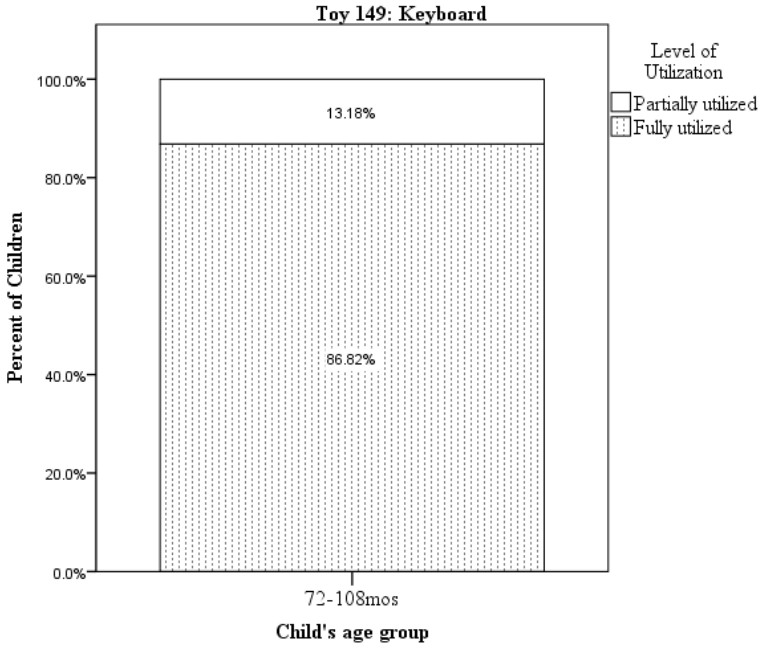


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Spends the entire time switching toy on and off
- *Partially utilizing:* Presses on keys of keyboard but does not use a secondary button OR only uses secondary button
- *Fully utilizing:* Presses on keys of the keyboard to make noise and presses a secondary button OR plays a legitimate tune or song by pressing the keys of the keyboard

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Most children (86.82%) fully utilized this toy. An additional 13.18% of children partially utilized the toy.
Justification for recommended age group	While this toy has no suggested age, it is likely that it would be appropriate for at least the 6-8-year-old age group that played with the toy in the study, as most children were able to fully utilize the toy, and any other remaining children partially utilized the toy. Children had the cognitive skills needed to turn on secondary buttons as well as press the larger buttons on the keyboard.

Toy #150: Drum Kit

Brief Toy Description	Drum kit that looks like a standard adult drum set but smaller. Blue sides and white drum tops. Contains cymbal, snare drums (2), and foot pedal activated base drum.
Packaging	Cardboard box
Materials	Hard plastic
	Soft plastic
	Fabric
	Wood
	Hard metal (non-pliable)
Other Features	Produces sound (operational noise)
Responsiveness	Immediate response
Qualities of Toys (Likert scale 1-6; 6 is greatest)	
How many parts, pieces, and components does the toy have?	3
How large are the parts, pieces, and components of the toy?	5
How much mastery of gross motor skills is needed to play with the toy?	6
How much mastery of fine motor skills is needed to play with the toy?	2
Is the toy a game? How many game-like qualities does the toy have?	1
How much rapid movement or speed could the toy exhibit?	3
How much violence is depicted in the toy?	1
How masculine is the toy?	1
How feminine is the toy?	1
How colorful is the toy?	1
How realistic is the toy? What is the level of realism?	6
Do you need to follow a path or sequence of steps to play with the toy as intended?	5

Figure 1. Percent of children who played with toy by age group

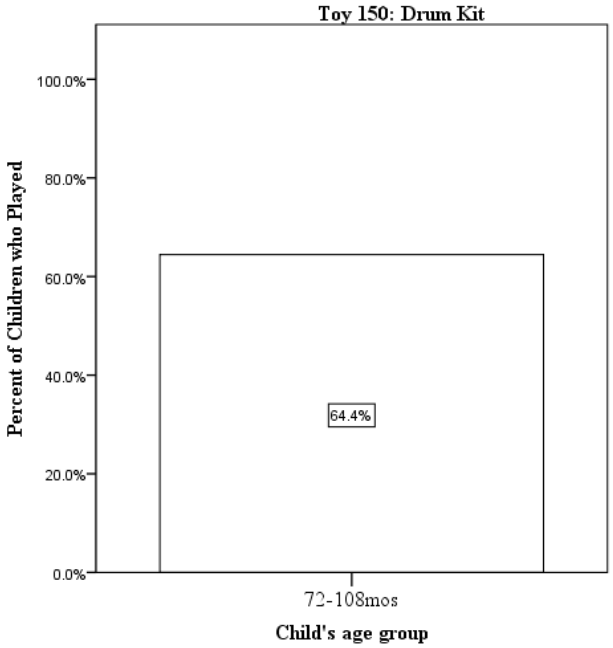
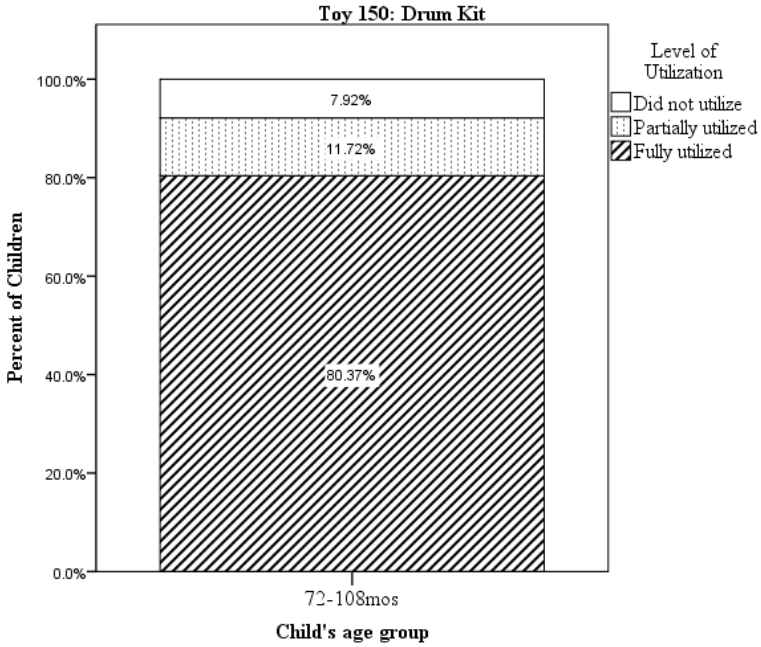


Figure 2. Of children who played with toy, utilization level by age group



Key:

- *Not utilizing:* Only uses foot pedal, only uses sticks on other surfaces of the room, or only uses hands to bang on drums
- *Partially utilizing:* Uses hands to bang on drums and also uses foot pedal OR only uses sticks on drums without using the foot pedal
- *Fully utilizing:* Child uses drumsticks to bang on drums and uses foot pedal

Age Determination:

Manufacturer's suggested age	No age
Hypothesized age group	108-144 mos
Recommended age group	Insufficient data
Utilization report	Most children (80.37%) fully utilized this toy. An additional 11.72% of children partially utilized the toy. Only 7.92% of children did not utilize the toy.
Justification for recommended age group	While this toy has no suggested age, it is likely that it would be appropriate for at least the 6-8-year-old age group that played with the toy in the study, as most children were able to fully utilize the toy, and most other remaining children partially utilized the toy. Children had motor skills needed to hit the drums using the drumsticks and use the foot pedal appropriately.

Summary Tables

Table 1. Toys by hypothesized age category

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Exploratory	Baby keys (1); Rattle and ring manipulative (2); Soft manipulative cube (3)	Wooden flower wheel (25); Wooden bead maze cube (26); Bead and elastic squeeze toy (27)	Gear toy (52); Bubble wand and receptacle (53); Chunky animal bubble blaster (54)	Foam clay (79); Wooden flap toy (80); Clear bubble blaster (81); Liquid clock (82)	--	--
Building	Soft cube blocks (4); Connecting suction cup rattles (5); Building half spheres (6)	Large foam blocks (28); Chunky interlocking bricks (29); Wooden blocks with internal magnet connectors (30)	Suction cup building pieces (55); Wooden train with stackable pieces (56); Colorful wooden blocks (57)	Interlocking bricks with figurines (83); Blocks with vehicle attachments (84); Dowel and rod building set (85)	Carnival ride building set with figurines (107); Robotic magnetic building cubes (108); Small interlocking bricks with female characters (109)	Motorized amusement park ride building set (133); Animal tiny brick building set (134); Tower tiny brick building set (135)
Games & Puzzles	Soft shape sorter (7);	Soft fishing game (31);	Nesting cups (58); Peg shape sorter (59);	Magnetic puzzle (86); Matching game (87);	Light and sound pattern pad (110);	Handheld electronic trivia game (136);

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
	Soft stacker with rainbow rings (8); Plastic shape sorter (9)	Puzzle with chunky knob handles (32); Egg puzzle (33)	Noisemaking shape puzzle (60)	Handheld water game (88)	3D maze ball (111); 48 piece puzzle (112)	Handheld electronic follow the prompts game (137); 3-D ball puzzles (138)
Instructional	Flip phone with buttons (10); Bead triangle (11); Soft peek-a-boo book (12)	Animal and letter spinning sphere (34); Vocabulary board book (35); Play touchscreen phone (36)	Story board book (61); Plastic activity cube (62); Sliding cell phone with buttons (63)	Alphabet magnets (89); Abacus (90); Toy camera with viewfinder function (91)	Science kit experiment (113); Microscope (114); Educational mats with wipe off crayons (115)	Electronic circuit board (139); Machine building kit (140); Architecture kit (141)
Sports, Recreational, & Outdoor	Textured balls (13); Tiny basketball hoop (14); Moving and noisemaking electronic ball (15)	Push toy (37); Basketball and soccer combination sport center (38); Small indoor slide (39)	Bowling set (64); Large basketball hoop (65); Spiked light up balls (66)	Velcro ball and mitt set (92); Squishy porcupine yoyo (93); Crawl-through tunnel (94)	Bean bag toss (116); Floor launcher (117); Table hockey (118)	Splatting ball (142); Ping pong set (143); Bean bag slingshot (144);

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Imaginative	Plush baby doll (16); Cow hand puppet (17); Beanbag dog (18);	Play vacuum (40); Tea set (41); Light up star wand (42)	Talking dinosaur (67); Baby bottles with faux liquid (68); Doll stroller (69)	Doll with accessories (95); Play food (96); Dancing figurine (97)	Puppet theatre and puppets (119); Animatronic interactive animal (120); Foldable figurine (121); 18-inch doll with wheelchair accessories (122)	--
Small Vehicles	Rolling snail (19) Plastic train with removable pieces (20); Worm with wheels (21)	Wooden cars (43); Talking monster truck (44); Car with rattle controller (45)	Remote controlled monster truck (70); Firetruck (71); Moving and talking dump truck (72)	Wind up toys (98); Airplane (99); Diecast car track (100)	Motorcycle with figurine rider (123); Remote controlled sedan (124); Launching vehicle track (125); Diecast double decker bus (126)	--

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Arts & Crafts	--	Animal marker (46); Gel art board (47); Spherical crayons (48)	Sticker pad (73); Light up gel pad with stylus (74); Finger paint (75)	Clay with molds (101); Moldable sand with molds (102); Coloring book and crayons (103)	Yarn loom (127); Rubber loom (128); Magnetic art board (129)	Fine marker coloring kit (145); Origami kit (146); Learn to draw booklet (147)
Musical	Plush animal chime ball (22); Circular musical touch pad (23); Soothing music machine (24)	Xylophone (49); Bongos (50); Plastic electronic guitar (51)	Plastic trumpet (76); Band set (77); Chunky plastic whistle (78)	Battery powered drum pad (104); Symbol book and accompanying piano (105); Floor piano (106)	Wooden ukulele (130); Mini accordion (131); Karaoke machine (132)	Violin (148); Keyboard (149); Drum kit (150)

Note. -- = No toys were appropriate for the condition.

Table 2. Summary of age recommendations

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Exploratory	▬Baby keys (1) ▬Rattle and ring manipulative (2) ▬Soft manipulative cube (3)	▲Wooden flower wheel (25) √Wooden bead maze cube (26) ▲Bead and elastic squeeze toy (27) ▼Bubble wand and receptacle (53)	▼Gear toy (52)	√Foam clay (79) √Wooden flap toy (80) √Clear bubble blaster (81) ● Liquid clock (82) √Chunky animal bubble blaster (54)	--	--
Building	▬Soft cube blocks (4) ▬Connecting suction cup rattles (5) ▬Building half spheres (6)	▲Large foam blocks (28) √Wooden blocks with internal magnet connectors (30) ▼Wooden train with stackable pieces (56) ▼Colorful wooden blocks (57)	▲Chunky interlocking bricks (29)	√Interlocking bricks with figurines (83) √Blocks with vehicle attachments (84) √Dowel and rod building set (85) √Suction cup building pieces (55) ▼Small interlocking bricks with female characters (109)	▲Carnival ride building set with figurines (107) ▲Robotic magnetic building cubes (108)	▬Motorized amusement park ride building set (133) ▬Animal tiny brick building set (134) ▬Tower tiny brick building set (135)

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Games & Puzzles	—Soft shape sorter (7) —Soft stacker with rainbow rings (8) —Plastic shape sorter (9)	—Soft fishing game (31) √Egg puzzle (33)	▲Nesting cups (58) ▼Peg shape sorter (59) ▼Noisemaking shape puzzle (60) ▲Puzzle with chunky knob handles (32)	√Magnetic puzzle (86) √Handheld water game (88)	▼Light and sound pattern pad (110) ▼3D maze ball (111) ▲Matching game (87) ▲48 piece puzzle (112)	—Handheld electronic trivia game (136) —Handheld electronic follow the prompts game (137) —3-D ball puzzles (138)
Instructional	—Flip phone with buttons (10) —Bead triangle (11) —Soft peek-a-boo book (12)	√Vocabulary board book (35) ▼Play touchscreen phone (36) ● Story board book (61) ▲Plastic activity cube (62) ▼Sliding cell phone with buttons (63) ▲Plastic activity cube (62)	▲Animal and letter spinning sphere (34)	■Alphabet magnets (89) √Abacus (90) ▲Toy camera with viewfinder function (91) ▼Science kit experiment (113)	▼Microscope (114) √Educational mats with wipe off crayons (115)	—Electronic circuit board (139) —Machine building kit (140) —Architecture kit (141)

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Sports, Recreational, & Outdoor	▬Textured balls (13) ▬Tiny basketball hoop (14) ▬Moving and noisemaking electronic ball (15)	√Push toy (37) √Basketball and soccer combination sport center (38) √Small indoor slide (39) ▼Bowling set (64) ▼Large basketball hoop (65)	▼Spiked light up balls (66)	√Velcro ball and mitt set (92) ■Squishy porcupine yoyo (93) √Crawl-through tunnel (94) ▼Bean bag toss (116) ▼Floor launcher (117) ▼Table hockey (118)		▬Splatting ball (142) ▬Ping pong set (143) ▬Bean bag slingshot (144)
Imaginative	▬Plush baby doll (16) ▬Cow hand puppet (17) ▬Beanbag dog (18)	▼Tea set (41) ■Light up star wand (42)	■Doll stroller (69) ▲Play vacuum (40) ▼Doll with accessories (95) ▼Dancing figurine (97)	√Play food (96) √Talking dinosaur (67) ▲Baby bottles with faux liquid (68) ▼Animatronic interactive animal (120)	▼Puppet theatre and puppets (119) √Foldable figurine (121) √18-inch doll with wheelchair accessories (122)	--

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Small Vehicles	▬Rolling snail (19) ▬Plastic train with removable pieces (20) ▬Worm with wheels (21) ▬Plush animal chime ball (22)	√Wooden cars (43) ▼Talking monster truck (44) ▲Car with rattle controller (45) ▼Remote controlled monster truck (70)	▼Firetruck (71) ▼Moving and talking dump truck (72) ■Wind up toys (98) ▼Airplane (99) ▼Diecast car track (100)	▼Remote controlled sedan (124)	▼Motorcycle with figurine rider (123) ▲Launching vehicle track (125) ● Diecast double decker bus (126)	--
Arts & Crafts	--	√Animal marker (46) √Gel art board (47) √Spherical crayons (48) ▼Sticker pad (73) ▼Light up gel pad with stylus (74) ▼Finger paint (75)	▼Moldable sand with molds (102)	√Clay with molds (101) ▼Rubber loom (128) √Magnetic art board (129)	▼Yarn loom (127) ● Coloring book and crayons (103)	▬Fine marker coloring kit (145) ▬Origami kit (146) ▬Learn to draw booklet (147)

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Musical	—Plush animal chime ball (22) —Circular musical touch pad (23) —Soothing music machine (24)	√Xylophone (49) √Bongos (50) √Plastic electronic guitar (51) ▼Chunky plastic whistle (78)		● Battery powered drum pad (104) √Symbol book and accompanying piano (105) ▲Plastic trumpet (76) ▼Band set (77) ▼Wooden ukulele (130) ●Karaoke machine (132)	■Mini accordion (131) ▲Floor piano (106)	—Violin (148) —Keyboard (149) —Drum kit (150)

Note. -- = No toys were appropriate for the condition.

Key: ▼Recommended age lower than manufacturer's suggested age
▲Recommended age higher than manufacturer's suggested age
√ Recommended age matches manufacturer's suggested age
● No manufacturer's suggested age
■ No manufacturer's suggested age, but 0-3 warning
— Insufficient data from study to make determination

Table 3. Toys with recommended ages lower than manufacturer's recommended ages

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
36	Play Touchscreen Phone	Blue and white plastic cell phone with a fake touchscreen on the front. There are 9 'app' buttons and one conventional button.	18 mos-4 years	12-18 mos	At 12-18 months, children have the rudimentary fine motor skills to use play cell phones with fake touchscreen square 'app' buttons and they can also press a conventional button. Children will spend a fair amount of their time pressing the buttons repeatedly to hear the electronic sounds that come from the phone.
41	Tea Set	Blue, yellow, and red plastic tea set with tea pot (1), cups (4), saucers (4), and spoons (4), sugar dish (1), cream pourer (1).	2 years +	12-18 mos	At 12-18 months, children are able to readily imitate the simple actions that they have seen adults do (e.g., stir, pour, feed) with the objects available in a tea set.
44	Talking Monster Truck	Chunky red monster truck with black wheels. Talks if top bottom is pressed.	3 years +	12-18 mos	By 12-18 months, children are able to roll and wheel vehicles around, and they enjoy small vehicle toys with a small degree of cause and effect, such those with push buttons that produce simple sounds.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
52	Gear Toy	Wood board with 7 spinning, multicolored gears (red, orange, yellow, green, blue, purple, magenta) and a black background. Gears are magnetic and can be taken off of board and reattached.	2 years +	19-35 mos	At 19-35 months, children use their budding fine motor skills to spin gears and grasp them to create a design of their choosing, which they may not accomplish at any younger age. Some children may use their cognitive skills to sort the gears into different colors.
53	Bubble Wand and Receptacle	Pink and purple cylindrical container with removable wand. If flipped over, bubble solution will not come out.	18 mos +	12-18 mos	By 12-18 months, some children are able to use simple bubble wands, but may be frustrated if they cannot produce bubbles on their own. Sources of frustration can include too frequent dipping of the wand into the bubble container to make the solution too sudsy to produce bubbles, as well as the child's difficulty in blowing into the wand softly enough to produce a bubble. Still, use of this toy is appropriate at this age.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
56	Wooden Train with Stackable Pieces	Wooden train with red rolling wheels, three segments, and stackable blocks that connect on dowels coming out of top of train. Blocks are blue, green, yellow, and red cubes, arches, rectangles, and triangles (15 pieces).	2 years +	12-18 mos	By 12-18 months, children are becoming capable of making combinations of two to three objects. Children have the physical motor and coordination skills necessary to understand that the blocks go together in a predetermined way. At this age, children are able to use their fine motor skills to grasp lightweight blocks and subsequently stack them onto chunky dowels.
57	Colorful Wooden Blocks	Multicolored (green, blue, yellow, red) and multi-shaped (square, rectangle, triangle, cylinder, thin rectangle, arch, half circle) smooth wooden blocks. 100 piece set.	3 years +	12-18 mos	Children in the 12- to 18-month age group can begin to line up these medium lightweight non-interlocking blocks or stack them, or they may attempt to stack or line up blocks in an orderly way. Note that success with stacking or lining up blocks is not necessary as this still shows that children in this age group are making use of the blocks in a building play setting. Based on child observations, little to no mastery of fine or gross motor skills was required for stacking or lining up blocks in the set, making it appropriate for children in this age group. Block sets with many pieces is not necessarily a deterrent to this age group as they show they are comfortable making use of a partial set.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
59	Peg Shape Sorter	Long wooden rectangle with five prongs (red, blue, yellow, purple, green). Red prong can fit 5 red octagon shaped pieces, blue prong can fit 4 blue square pieces, yellow prong can fit 3 yellow triangle pieces, purple can fit 2 purple rectangle pieces, green prong can fit one green circle piece.	2 years +	19-35 mos	At 19-35 months children's abilities to sort and recognize colors emerges, meaning that they can now complete more complex peg-style shape sorters based on colors. Children in younger age groups may haphazardly put the pieces on the pegs without respect to sorting or color.
60	Noisemaking Shape Puzzle	Puzzle with small plastic knobs and 9 geometric shape pieces (diamond, square, triangle, trapezoid, circle, rectangle, octagon, oval, pentagon) that can be removed and replaced to repeat the name of the shape put into the well. Shapes are yellow, red, purple, and green.	2 years +	19-35 mos	By 19-35 months, children have developed the fine motor skills and visual discrimination that are required to do inset puzzles. At this age, children benefit from obvious visual and physical cues that a piece is in place, like this puzzle that repeats the name of the object put in the well. At younger ages, children's cognitive skills will lead them to struggle with aligning the puzzle pieces correctly into the wells.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
63	Sliding Cell Phone with Buttons	Orange and white plastic cell phone with 10 small buttons on the front. Half of phone slides up to reveal a full keyboard with letter buttons.	2-5 years	12-18 mos	At 12-18 months, children have the rudimentary fine motor skills to use play cell phones with small buttons. Children will spend a fair amount of their time pressing the buttons repeatedly to hear the electronic sounds that come from the phone.
64	Bowling Set	Six orange bowling pins with faces painted on them and yellow plastic bowling ball.	2 years +	12-18 mos	At 12-18 months, a lightweight bowling set is especially appealing, as throwing a ball and seeing objects fall down is exciting for this age group. At younger ages, children may try to knock over the pins using hands or feet instead of coordinating with a ball.
65	Large Basketball Hoop	Large basketball hoop (3-4ft tall) and orange plastic basketball. Blue column, black base, white headboard, red hoop, and white net.	18 mos-5 years	12-18 mos	Larger basketball hoops become more appropriate at 12-18 months as children begin to reach higher and have mastered the gross motor skills needed to throw a ball into a hoop.
66	Spiked Light Up Balls	Two spiky, squeezable translucent pastel balls that light up when bounced.	3 years +	19-35 mos	At 19-35 months, children are interested in balls that light up or make noise when bounced. These balls should be lightweight and easy to throw given children's limited strength at this age. They should also be made of a soft material, such as rubber, as children lack the inhibition at this age to hold back from throwing the ball at people or fragile objects.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
70	Remote Controlled Monster Truck	Yellow truck with handheld remote steering wheel. Steering wheel has two triangle buttons that propel the car and a yellow circle button in the middle that acts as the horn.	2 years +	12-18 mos	At 12-18 months, children enjoy simple remote controlled devices that are operated by large buttons. Cognitively, children can understand that the press of a button on a remote control causes the vehicle to move. At this age, children have the fine and gross motor skills to hold remote controllers and press buttons at the same time, as any younger age child may have difficulty combining these two actions.
71	Firetruck	Red firetruck. Makes noise, moves around, and blows bubbles *if* turned on. Movable ladder.	3 years +	19-35 mos	Children 19-35 months old enjoy small vehicle toys that have a low to moderate level of cause-and-effect functionality, like pushing that produces sound, lights, or movement. They enjoy relatively large, simple, workable parts—like ladders, and propellers—as long as they require only a low degree of fine motor dexterity and control and are easily manipulated with a pincer grasp.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
72	Moving and Talking Dump Truck	Red truck with yellow plow on top and large, chunky black wheels. Talks and does a somersault if large yellow button on top of head is pressed.	3 years +	19-35 mos	Children 19-35 months old enjoy small vehicle toys that have a low to moderate level of cause-and-effect functionality, like pushing that produces sound, lights, or movement. Children at this age enjoy small vehicles that are battery operated and can perform simple tricks (e.g., tumbling, rotating when a button is pressed on them). At any younger age, children may not have the cognitive skills to move out of the way to allow the vehicle to pass and complete its action.
73	Sticker Pad	Small sticky pad in primary colors. Comes with three paper cutouts in the shape of familiar objects (animals, vehicles, food) that can be stuck to tacky pad.	18 mos +	12-18 mos	Although children at 12-18 months are too young to use conventional stickers (they may get put in the mouth and they require dexterity to use), children can use pre-gummed sticker pads and attach large, easy to grip items to them.
74	Light Up Gel Pad with Stylus	Purple and white touch pad filled with gel with yellow stick for doodling. When large yellow button is pressed music plays and the gel background lights up with neon colors.	2 years +	12-18 mos	At 12-18 months, children can also hold tablets in their lap that have gel inside and can make designs using their finger or a stylus. Using fingers to make designs using these is appropriate at this age because it accommodates limited fine motor skills.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
75	Finger Paint	Blue plastic hand with colorful circles at the fingertips (red, orange, yellow, green, blue) filled with clear gel that only appears on special paper.	3 years +	12-18 mos	Finger painting with non-toxic, mess free (i.e., clear gel finger paint only activated on special paper) is appropriate at 12-18 months. Using fingers to make designs using this toy is appropriate at this age because it accommodates limited fine motor skills.
77	Band Set	Six brown and blue band instruments (maracas, tambourine, kazoo, spoons, harmonica, hollow block with mallet) in clear bucket.	4 years +	36-71 mos	Musical instruments (often packaged together as a band set) can be used effectively by children over the age of 3. At this age, children will take advantage of using multiple instruments in the band set, including maracas, tambourines, kazoos, and harmonicas.
78	Chunky Plastic Whistle	Chunky orange whistle with white string.	2 years +	12-18 mos	At 12-18 months, children can begin to learn how to blow into chunky whistles. While still learning, children may mimic a whistle sound using their own voice while they pretend to blow into the whistle.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
95	Doll with Accessories	Doctor doll. Comes with desk, bag, and two small animals (white, pink, purple, blue).	3 years +	19-35 mos	At 19-35 months, children start to have the cognitive skills to create pretend play scenes with dolls that come with props and accessories, such as using a doll with doctor supplies to take care of other dolls or figurines. If the doll portrays a familiar media character, children may act out familiar scenes that they have seen with the character in books or onscreen.
97	Dancing Figurine	Yellow and blue figurine that walks, sings, and talks when button on belly is pressed.	4 years +	19-35 mos	At 19-35 months, children will be interested in investigating figurine toys, particularly those that move, bounce, sing, talk, or dance with a button press or voice activation. At this age, children have the socioemotional capabilities of envisioning interactions between interactive figurines and other objects in the room (e.g., other dolls). However, any sound that is too loud, sudden or extreme coming from the doll could cause the child to avoid the toy.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
99	Airplane	Black, gray, and red airplane. Belly of plane has a compartment that can be opened and propellers that can be spun.	3 years +	19-35 mos	At 19-35 months, children enjoy relatively large, simple, workable parts that this airplane affords—like a hinged door and propellers—as long as they require only a low degree of fine motor dexterity and control and are easily manipulated with a pincer grasp. In addition, children at this age are able to lift the airplane and pretend to make it fly with their emerging cognitive skills that allow them to engage in pretend play.
100	Diecast Car Track	Brown, tan, and green race track with small diecast vehicles and red handle that can crank the cars (6) up a hill.	4 years +	19-35 mos	Children at 19-35 months enjoy tracks that can fit 2-4-inch cars and watch them go down slopes. Their fine motor skills at this age allow them to align the car correctly on the track. Younger children may have trouble aligning it correctly, or may attempt to put cars onto a track that are inappropriately sized for each other.
102	Moldable Sand with Molds	Three colors of moldable sand with four sea-themed molds (castle, seahorse, fish, turtle). Neon colors.	3 years +	19-35 mos	At 19-35 months, children thoroughly enjoy sand play and are able to pack sand into sand molds. Children at younger ages are more likely to eat the sand or dump it out of its container.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
109	Small Interlocking Bricks with Female Characters	Tiny interlocking pieces (60+) that are pastel pink, purple, and white. Female figurines are included. Child can build a cruise ship with thick rectangles, thin rectangles, square, and cruise ship shaped pieces.	7-12 years	36-71 mos	At 36-71 months, children are capable of working most types of interlocking building systems such as snapping or pressing plastic bricks together. However, at this age, they also begin to refer to directions when looking for help in how to assemble a building kit, even if just studying pictures, which they may have trouble with at younger ages.
110	Light and Sound Pattern Pad	Round, handheld game with yellow, blue, green, and red button sections on top of black base that light up. Player must echo the light pattern that the game gives to advance to the next round.	7 years +	72-107 mos	At 72-107 months, children enjoy matching and memory games that require them to follow a set of actions in a pattern. In addition, light and sound pattern pads are usable by children at this age, as they have the cognitive skills to follow a pattern for multiple steps (at least two) in sequence. When given a light and sound pattern pad, children at younger ages do not have the inhibition to wait for the prompts and keep pressing the buttons without regard to the pattern.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
111	3D Maze Ball	Clear plastic ball with white maze on inside and small metal marble.	8 years +	72-107 mos	Children at 72-107 months can make fine motor movements needed to navigate labyrinth or maze games that require maneuvering a marble along a pathway, as well as cognitively strategize how to get the ball through the maze most efficiently. At younger ages, children lacking these motor and cognitive skills may be more likely to use a 3D maze ball as a ball instead of a maze by throwing or kicking it around.
113	Science Kit Experiment	Red paper tube. Comes with a yellow sheet of paper with instructions to conduct visual science experiment.	5-12 years	36-71 mos	Starting at 36-71 months, children enjoy science materials. Science experiments with a few steps are manageable at this age group, as children are able to follow along with directions. Any younger age would have trouble following directions in a kit.
114	Microscope	Gray microscope with blue accents and with 10 pre-prepared slides. Light turns on in bottom and reflects off a mirror.	8 years +	72-107 mos	By 72-107 months, children can use more sophisticated science tools, including microscopes. They are interested in their own anatomy and elements in the world, so scientific exploration sets that allow this are highly attractive. At younger ages, children have trouble connecting the steps of putting a slide in the microscope, and then subsequently looking through the eyepiece.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
116	Bean Bag Toss	Large blue object with multiple nets. Comes with 3 red and 3 blue bean bags.	6 years +	36-71 mos	Bean bag tosses are very appealing at 36-71 months. Children have the appropriate gross motor skills to aim when they throw bean bags and successfully make it into a net or hole by this age. If the net has a point value for different holes that the child hits, the child may start to count their total number of points.
117	Floor Launcher	Two green and orange plastic rockets with soft, round tops. Rockets attach to black holder. Child steps on orange pedal at end of cord to launch rocket.	5 years +	36-71 mos	Air-propelled floor launchers with soft foam projectiles that are activated when a child steps on a pumping pad are very exciting to 36-71-month-olds. Children may experiment with the air pumping mechanism to blow at other objects in the room. At younger ages, children may lack the gross motor skills needed to step on the pad hard enough to propel the rocket.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
118	Table Hockey	Portable table hockey game with rods that can be moved to manipulate 12 plastic blue and red players on white ice.	6 years +	36-71 mos	At 36-71 months, children have the fine motor skills needed to align the figurines with the puck using levers if the table is set to the appropriate height for them. Children at younger ages may lack the fine motor skills and patience to align players to hit the pucks and instead spend the whole time pulling the levers. Given the peak of imaginative play at this age, children may even start to pretend that the players on the table game are interacting with each other and develop a pretend play scene centering around sports.
119	Puppet Theatre and Puppets	Plush puppets (one male, one female) with rod to control arm. Presented with wooden puppet theatre with red curtains and black accents.	8 years +	72-107 mos	By 72-107 months, children have the strength and gross motor skills needed to hold up the rod puppet. Children also have the proper coordination between both of their hands to fully control the puppet (one hand on the rod, one hand in the puppet's mouth).

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
120	Animatronic Interactive Animal	Furry orange animal-like character that talks and can move legs, mouth and ears. Eyes are a digital screen and convey the animal's mood.	6 years +	36-71 mos	Animatronic animals and other figurines or dolls that can respond contingently to users are appealing to children ages 36-71 months because of the level of realism they afford. Children can set up scenarios where the doll interacts with other objects in the room to create a more complex play scene, a strong desire which peaks around age 4 when children are at the height of using their imaginations. At any younger age, children may focus too much on the toy's interactive qualities in a non-representational way (i.e., spending time fiddling with the toy's moving ears or legs without any pretense).
123	Motorcycle with Figurine Rider	Yellow figurine on small motorcycle.	8 years +	72-107 mos	At 72-107 months, children prefer highly elaborate small motorcycles such as this one. Younger children playing with a motorcycle may spend the whole time examining the details of the motorcycle or the figurine without spending time wheeling it around.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
124	Remote Controlled Sedan	Red car with black handheld remote controller with two small joysticks.	8 years +	36-71 mos	By 36-71 months, children enjoy small vehicle toys with numerous accessories that are highly complex in cause-and-effect functionality, such as joysticks on a remote control. At this age, children have the cognitive skills to become creative in their play with these types of vehicles and may develop unique paths in a room for the vehicle to drive—for example, navigating a remote-controlled vehicle underneath a table and behind a couch is a challenging, yet exciting task.
127	Yarn Loom	Square wooden loom with rainbow yarn for weaving into teeth of loom.	7 years +	72-107 mos	Children have the patience and fine motor skills at 72-107 months to properly use a loom that requires them to lace a string of yarn through teeth on a loom. Children can line up the yarn on the teeth and create a design. When children at younger ages wrap yarn around the loom, they often disregard the importance of putting the yarn in the teeth and are unable to complete the task.

Toy Number	Name of toy	Description of Toy	Manufacturer's Suggested Age	Youngest Suggested Study Age Group Based on Data	Additional Explanation/ Justification
128	Rubber Loom	Clear plastic loom consisting of small prongs sticking out of a board. Tiny vinyl rubber bands (50; multiple neon colors) can be woven around the prongs to make jewelry and other objects.	8 years +	36-71 mos	At 36-71 months, children can begin to use looms with small loops for weaving. Their fine motor skills allow them to put small loops onto a loom and arrange them in an appropriate way for making bracelets and other items.
130	Wooden Ukulele	Small wooden guitar with five strings.	6 years +	36-71 mos	Small guitars or ukuleles become appealing in the 36-71-month age bracket, since children will now have the fine motor skills to properly strum the strings, as well as the coordination needed to cradle the instrument properly in their arms while playing it. Children at younger ages may spend too much of their time trying to detach the strings from the guitar instead of strumming, and have difficulty holding it properly.

Unresolved Problems

Although this project produced a large amount of information about how children play with toys, there are some limitations to the scope of this work. Future research should be conducted to address the following shortcomings.

Number of toys

A multitude of toys is available to children and parents in the U.S. marketplace. We could not test every toy available or popular today. During our toy selection process we used a representative sample of toys available in the marketplace, but more research could test additional toys that we did not include in the study.

Water, outdoor, and media based toys

Due to the constraints of indoor testing within standard size rooms, children could not play with water, bath, or outdoor-use-only toys. Furthermore, it was outside the scope of the project to test the age appropriateness of media based toys, such as mobile apps or videos for children. Future research should focus on evaluating the age appropriateness of these specific toy categories.

Age groups

We did not work with 0- to 11-month-olds, or children over the age of 9 years. Children in the middle age groups needed the most clarification in revising of the *Guidelines* and were prioritized for inclusion in the study. Further research projects could study how these other age groups play with toys.

Long-term play

Children had a limited amount of time to play with each toy, and it is possible that play studied over a longer period of time (such an hour or more) could produce different results. Upcoming research could examine children's play with toys over longer periods of time.

Recommendations for Future Work

In addition to conducting supplementary research to address the unresolved problems in the previous section, we recommend that the CSPC gather more information about toy play behaviors and parent concerns about toy safety.

Parent focus groups

Small focus groups of parents could help to determine the more qualitative factors that parents consider when selecting toys for their children, particularly difficulties in understanding what toys are best for their child's age or their thoughts about how to interpret and act on manufacturer suggested ages. For example, our survey data indicates that parents have a fair amount of skepticism about the accuracy of a manufacturer's suggested age.

Analysis of online shopping

As indicated in our parent report data, shopping online is one of the most common ways parents procure toys. Online retailers sometimes incorrectly post the manufacturer's age (or do not post it at all). We are aware of one online retailer that takes a different approach and publishes a graph of age appropriateness based on parent reviews and flags the parts of the graph that are under the manufacturers' suggested age. Unless the photo of the toy online contains a picture of the packaging, manufacturers' suggested age may be difficult to ascertain for consumers. Future research should be done on how many manufacturers' suggested ages are incorrectly listed on retailer websites, and whether or not parents notice and take this discrepancy into consideration.

Understanding manufacturers' suggested age

Our parent survey indicated that parents wish they had more information about why a particular age was printed on a toy's box. It is not always clear if the age distinction is due to safety or developmental skill level. This can be particularly relevant for children

in the 2- to 3-year age range, when a child can fully utilize the affordances of the toy developmentally but could be at risk for small part hazards. Clarification with toy manufacturers about why they choose certain ages for toys could reduce confusion for toy consumers.

New toy technologies

New technologies in toy innovation are constantly emerging. High-tech, virtual reality, and internet-connected toys should be studied further as they emerge as prominent facets of the toy market and continue to change the landscape in which children play. Research should delve into the cutting-edge technologies available to children, their safety and privacy implications, and the ages at which their use is appropriate.

Age manipulation

We examined how children played with toys that were more or less mature for them (by one age group). More information about age appropriateness could emerge if future research examined a larger child-age to toy-suggested-age disparity.

Play partners

In the empirical study, children over the age of 19 months played alone with their toys. In naturalistic settings, children typically play with peers or other adults as well. Partners could affect play behaviors with certain toys, and the ability to use a toy appropriately, particularly if the play partner is an adult. Future research should investigate play in partner settings.

Focus on the features

If there are certain features of a toy that are of particular interest to age appropriateness determinations (e.g., ability to pull a trigger, follow directions in a booklet, the ability to throw a ball), a separate study on that particular action should be conducted to determine the exact age at which children can achieve that action.

Judging toys without a label

Our research indicates that many parents acquire toys either secondhand or online. In both situations parents may not see the packaging that comes with the toy at the time of purchase. A simple guide could be written and made available to parents about how to judge the age appropriateness of toys without their packaging.

Appendix A. References

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Appendix B. Tables from Empirical Study

Table 1. Toys by hypothesized age category

	6-11 months	1-1.5 years	1.6-2 years	3-5 years	6-8 years	9-12 years
Exploratory	Baby keys (1); Rattle and ring manipulative (2); Soft manipulative cube (3)	Wooden flower wheel (25); Wooden bead maze cube (26); Bead and elastic squeeze toy (27)	Gear toy (52); Bubble wand and receptacle (53); Chunky animal bubble blaster (54)	Foam clay (79); Wooden flap toy (80); Clear bubble blaster (81); Liquid clock (82)	--	--
Building	Soft cube blocks (4); Connecting suction cup rattles (5); Building half spheres (6)	Large foam blocks (28); Chunky interlocking bricks (29); Wooden blocks with internal magnet connectors (30)	Suction cup building pieces (55); Wooden train with stackable pieces (56); Colorful wooden blocks (57)	Interlocking bricks with figurines (83); Blocks with vehicle attachments (84); Dowel and rod building set (85)	Carnival ride building set with figurines (107); Robotic magnetic building cubes (108); Small interlocking bricks with female characters (109)	Motorized amusement park ride building set (133); Animal tiny brick building set (134); Tower tiny brick building set (135)
Games & Puzzles	Soft shape sorter (7); Soft stacker with rainbow rings (8); Plastic shape sorter (9)	Soft fishing game (31); Puzzle with chunky knob handles (32); Egg puzzle (33)	Nesting cups (58); Peg shape sorter (59); Noisemaking shape puzzle (60)	Magnetic puzzle (86); Matching game (87); Handheld water game (88)	Light and sound pattern pad (110); 3D maze ball (111); 48 piece puzzle (112)	Handheld electronic trivia game (136); Handheld electronic follow the prompts game (137); 3-D ball puzzles (138)
Instructional	Flip phone with buttons (10); Bead triangle (11); Soft peek-a-boo book (12)	Animal and letter spinning sphere (34); Vocabulary board book (35); Play touchscreen phone (36)	Story board book (61); Plastic activity cube (62); Sliding cell phone with buttons (63)	Alphabet magnets (89); Abacus (90); Toy camera with viewfinder function (91)	Science kit experiment (113); Microscope (114); Educational mats with wipe off crayons (115)	Electronic circuit board (139); Machine building kit (140); Architecture kit (141)
Sports, Recreational, & Outdoor	Textured balls (13); Tiny basketball hoop (14); Moving and noisemaking electronic ball (15)	Push toy (37); Basketball and soccer combination sport center (38); Small indoor slide (39)	Bowling set (64); Large basketball hoop (65); Spiked light up balls (66)	Velcro ball and mitt set (92); Squishy porcupine yoyo (93); Crawl-through tunnel (94)	Bean bag toss (116); Floor launcher (117); Table hockey (118)	Splatting ball (142); Ping pong set (143); Bean bag slingshot (144);
Imaginative	Plush baby doll (16); Cow hand puppet (17); Beanbag dog (18)	Play vacuum (40); Tea set (41); Light up star wand (42)	Talking dinosaur (67); Baby bottles with faux liquid (68); Doll stroller (69)	Doll with accessories (95); Play food (96); Dancing figurine (97)	Puppet theatre and puppets (119); Animatronic interactive animal (120); Foldable figurine (121); 18-inch doll with wheelchair accessories (122)	--
Small Vehicles	Rolling snail (19); Plastic train with removable pieces (20); Worm with wheels (21)	Wooden cars (43); Talking monster truck (44); Car with rattle controller (45)	Remote controlled monster truck (70); Firetruck (71); Moving and talking dump truck (72)	Wind up toys (98); Airplane (99); Diecast car track (100)	Motorcycle with figurine rider (123); Remote controlled sedan (124); Launching vehicle track (125); Diecast double decker bus (126)	--
Arts & Crafts	--	Animal marker (46); Gel art board (47); Spherical crayons (48)	Sticker pad (73); Light up gel pad with stylus (74); Finger paint (75)	Clay with molds (101); Moldable sand with molds (102); Coloring book and crayons (103)	Yarn loom (127); Rubber loom (128); Magnetic art board (129)	Fine marker coloring kit (145); Origami kit (146); Learn to draw booklet (147)
Musical	Plush animal chime ball (22); Circular musical touch pad (23); Soothing music machine (24)	Xylophone (49); Bongos (50); Plastic electronic guitar (51)	Plastic trumpet (76); Band set (77); Chunky plastic whistle (78)	Battery powered drum pad (104); Symbol book and accompanying piano (105); Floor piano (106)	Wooden ukulele (130); Mini accordion (131); Karaoke machine (132)	Violin (148); Keyboard (149); Drum kit (150)

Note. -- = No toys were appropriate for the condition.

Table 2. Proportions of children who played with toys by age group and age-appropriateness of the toys

	Age-appropriateness	1-1.5 yrs	1.6-2 yrs	3-5 yrs	6-8 yrs	All children
Exploratory	Younger	.54	.71	.57	--	.61
	Age appropriate	.73	.60	.64	--	.66
	Older	.57	.55	--	--	.56
Building	Younger	.61	.52	.48	.49	.52
	Age appropriate	.60	.59	.51	.56	.56
	Older	.64	.62	.61	.55	.61
Games & Puzzles	Younger	.73	.70	.58	.72	.68
	Age appropriate	.69	.56	.72	.61	.65
	Older	.56	.74	.57	.58	.61
Instructional	Younger	.58	.59	.67	.58	.61
	Age appropriate	.58	.72	.55	.74	.65
	Older	.77	.58	.73	.85	.73
Sports, Recreational, & Outdoor	Younger	1.00	.76	.73	.54	.76
	Age appropriate	.76	.72	.60	.71	.70
	Older	.71	.55	.74	.73	.68
Imaginative	Younger	.56	.58	.54	.57	.56
	Age appropriate	.59	.58	.62	.74	.64
	Older	.59	.59	.67	--	.62
Small Vehicles	Younger	.58	.57	.55	.71	.60
	Age appropriate	.57	.55	.75	.66	.63
	Older	.60	.72	.59	--	.63
Arts & Crafts	Younger	--	.72	.55	.55	.61
	Age appropriate	.78	.54	.60	.58	.62
	Older	.58	.61	.56	.49	.56
Musical	Younger	.70	.75	.60	.58	.66
	Age appropriate	.73	.58	.58	.58	.62
	Older	.58	.60	.60	.75	.63
All Toys	Younger	.66	.66	.59	.59	.62
	Age appropriate	.67	.61	.62	.65	.64
	Older	.62	.61	.63	.66	.63

Note. -- = No toys were appropriate for the condition.

Table 3. Of children who played with the toys, the proportions of children who fully utilized toys by age group and age-appropriateness of the toys

	Age-appropriateness	1-1.5 yrs	1.6-2 yrs	3-5 yrs	6-8 yrs	All children
Exploratory	Younger	**.49$_a$**	**.70$_a$**	.47	--	.56
	Age appropriate	**.71$_{ab}$**	**.41$_a$**	.54	--	**.56$_a$**
	Older	**.29$_b$**	.29	--	--	**.29$_a$**
Building	Younger	**.15$_a$**	.41	.50	.38	.35
	Age appropriate	**.44$_a$**	.43	.36	.34	**.40$_a$**
	Older	.39	.28	.31	.21	**.30$_a$**
Games & Puzzles	Younger	.13	**.27$_a$**	.58	.66	.40
	Age appropriate	.20	**.55$_{ab}$**	.45	**.55$_a$**	**.43$_a$**
	Older	.37	**.32$_b$**	.32	**.10$_a$**	**.28$_a$**
Instructional	Younger	**.36$_a$**	.60	.66	**.59$_a$**	.56
	Age appropriate	**.60$_a$**	**.67$_a$**	**.62$_a$**	**.37$_{ab}$**	**.56$_a$**
	Older	.68	**.34$_a$**	**.19$_a$**	**.06$_b$**	**.31$_a$**
Sports, Recreational, & Outdoor	Younger	**.69$_a$**	.47	.60	.49	.57
	Age appropriate	**.39$_a$**	.59	.50	**.59$_a$**	**.52$_a$**
	Older	.55	.40	.55	**.21$_a$**	**.43$_a$**
Imaginative	Younger	.48	.41	.63	.62	.53
	Age appropriate	.36	.53	.66	.74	.59
	Older	.52	.48	.60	--	.54
Small Vehicles	Younger	.41	.49	.49	.52	.47
	Age appropriate	.50	.45	.48	.53	**.52$_a$**
	Older	.38	.42	.39	--	**.40$_a$**
Arts & Crafts	Younger	--	.34	.41	**.60$_a$**	.44
	Age appropriate	.42	.37	**.48$_a$**	**.34$_a$**	**.41$_a$**
	Older	.40	.34	**.29$_a$**	.20	**.31$_a$**
Musical	Younger	.49	.43	.47	.56	.48
	Age appropriate	.40	.32	.45	.51	.42
	Older	.32	.36	.48	.65	.47
All Toys	Younger	.41	.46	.54	.56	.49
	Age appropriate	.45	**.49$_a$**	**.50$_a$**	**.53$_a$**	**.49$_a$**
	Older	.44	**.36$_a$**	**.40$_a$**	**.24$_a$**	**.37$_a$**

Note. -- = No toys were appropriate for the condition. Bolded proportions that share subscripts within age group and toy category conditions were significantly different.

Table 4. Pooled logistic regression coefficients across imputations

	Contrast	1-1.5 yrs		1.6-2 yrs		3-5 yrs		6-8 yrs		All children	
		B(SE)	FMI	B(SE)	FMI	B(SE)	FMI	B(SE)	FMI	B(SE)	FMI
Exploratory	Y vs. AA	-.97(.40)*	.59	1.21(.40)**	.54	-.27(.34)	.52	--	--	.02(.20)	.38
	O vs. AA	-1.82(.49)***	.65	-.51(.39)	.55	--	--	--	--	-1.13(.25)***	.50
Building	Y vs. AA	-1.54(.44)***	.43	-.09(.41)	.51	.58(.45)	.63	.18(.40)	.42	-.20(.20)	.44
	O vs. AA	-.22(.37)	.48	-.68(.40)	.47	-.24(.42)	.57	-.66(.42)	.44	-.42(.19)*	.43
Games & Puzzles	Y vs. AA	-.50(.47)	.47	-1.17(.42)**	.63	.55(.39)	.58	.46(.35)	.50	-.10(.16)	.42
	O vs. AA	.84(.43)	.51	-.94(.39)*	.57	-.57(.40)	.59	-2.47(.48)***	.29	-.67(.18)***	.34
Instructional	Y vs. AA	-.97(.37)**	.45	-.27(.36)	.48	.15(.42)	.59	.89(.35)*	.57	-.00(.17)	.41
	O vs. AA	.38(.40)	.62	-1.39(.42)***	.56	-1.99(.49)***	.69	-2.30(.55)***	.54	-1.04(.18)***	.47
Sports, Recreational, & Outdoor	Y vs. AA	1.24(.31)***	.53	-.50(.33)	.52	.41(.38)	.56	-.40(.37)	.49	.24(.16)	.43
	O vs. AA	.65(.35)	.59	-.79(.42)	.59	.23(.36)	.54	-1.67(.36)***	.53	-.34(.17)*	.44
Imaginative	Y vs. AA	.50(.38)	.49	-.49(.38)	.47	-.12(.42)	.61	-.53(.35)	.47	-.26(.18)	.48
	O vs. AA	.66(.43)	.58	-.18(.37)	.53	-.26(.35)	.57	--	--	-.22(.18)	.51
Small Vehicles	Y vs. AA	-.34(.35)	.49	.14(.35)	.49	.07(.38)	.55	-.38(.36)	.57	-.15(.17)	.47
	O vs. AA	-.48(.40)	.59	-.11(.37)	.50	-.36(.37)	.60	--	--	-.48(.19)**	.48
Arts & Crafts	Y vs. AA	--	--	-.10(.45)	.67	-.27(.41)	.54	1.07(.40)**	.49	.15(.20)	.47
	O vs. AA	-.10(.34)	.47	-.09(.44)	.63	-.80(.38)*	.50	-.75(.44)	.44	-.40(.19)*	.46
Musical	Y vs. AA	.36(.37)	.65	.48(.36)	.54	.06(.39)	.54	.18(.41)	.56	.25(.17)	.48
	O vs. AA	-.34(.39)	.61	.19(.43)	.56	.11(.39)	.55	.58(.35)	.53	.19(.18)	.52
All Toys	Y vs. AA	-.13(.12)	.50	-.12(12)	.61	.14(.13)	.57	.12(.12)	.54	-.01(.06)	.49
	O vs. AA	-.00(.12)	.58	-.53(.13)***	.54	-.42(.13)***	.58	-1.24(.12)***	.45	-.49(.06)***	.40

Note. Pooled coefficients over 100 imputations. FMI = Fraction of missing information (γ). Relative efficiency of the parameter estimates was > .99 for all analyses. -- = No toys were appropriate for the condition. Y = Younger toys. AA = Age-appropriate toys. O = Older toys.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Appendix C. Figures from Empirical Study

Figures 1-10 present data about how all the children in the study played with younger, age appropriate, and older toys (if they did play with that particular toy). In Figure 10, we also aggregate across toy category to indicate how children played with the three age levels of toys, regardless of the toy category.

Figure 1. Of children who played with toy, utilization level of exploratory toys by age appropriateness

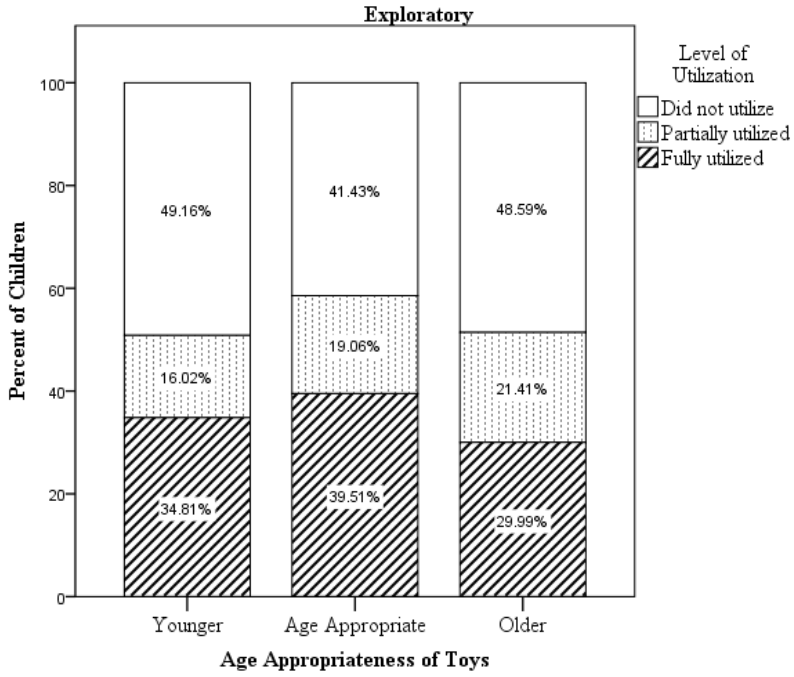


Figure 2. Of children who played with toy, utilization level of building toys by age appropriateness

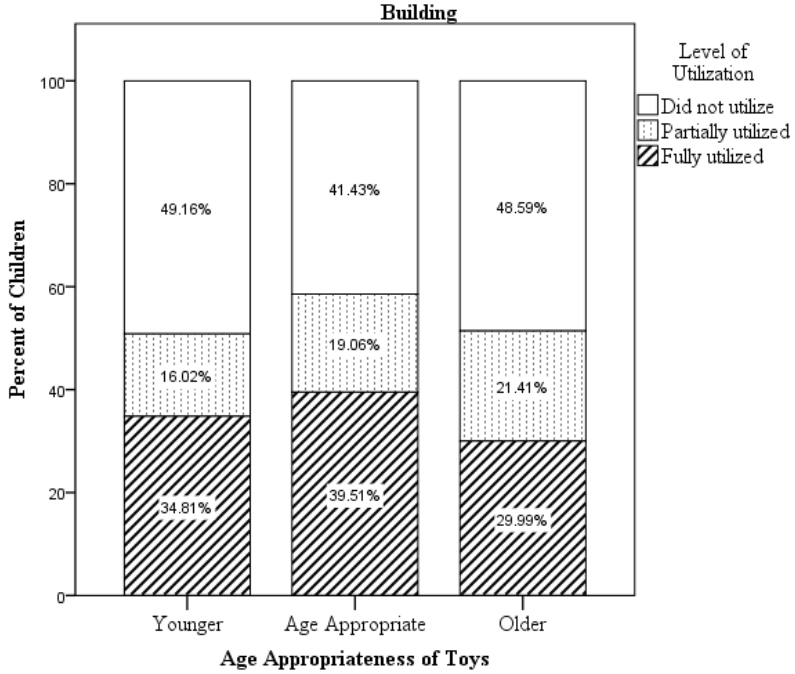


Figure 3. Of children who played with toy, utilization level of games and puzzle toys by age appropriateness

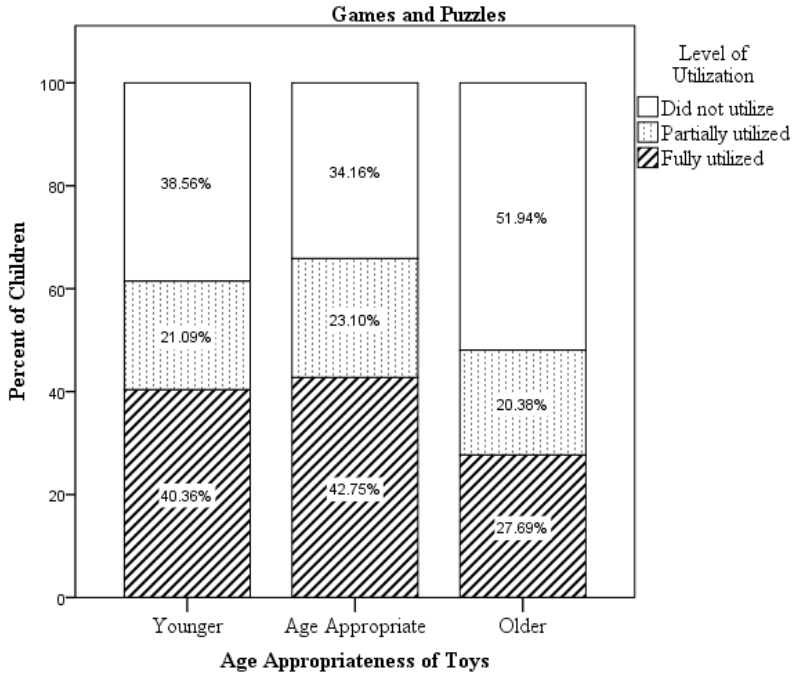


Figure 4. Of children who played with toy, utilization level of instructional toys by age appropriateness

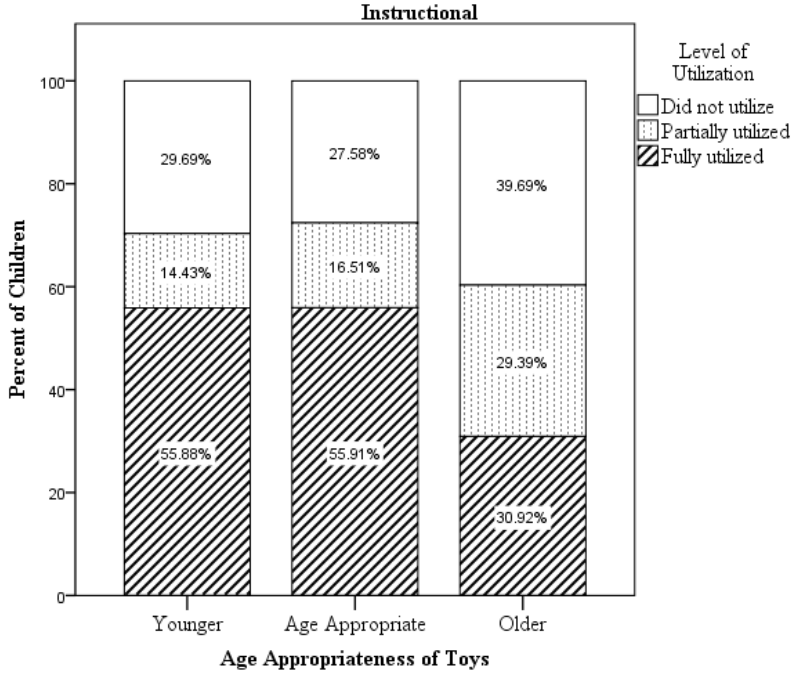


Figure 5. Of children who played with toy, utilization level of sports, recreational, and outdoor equipment toys by age appropriateness

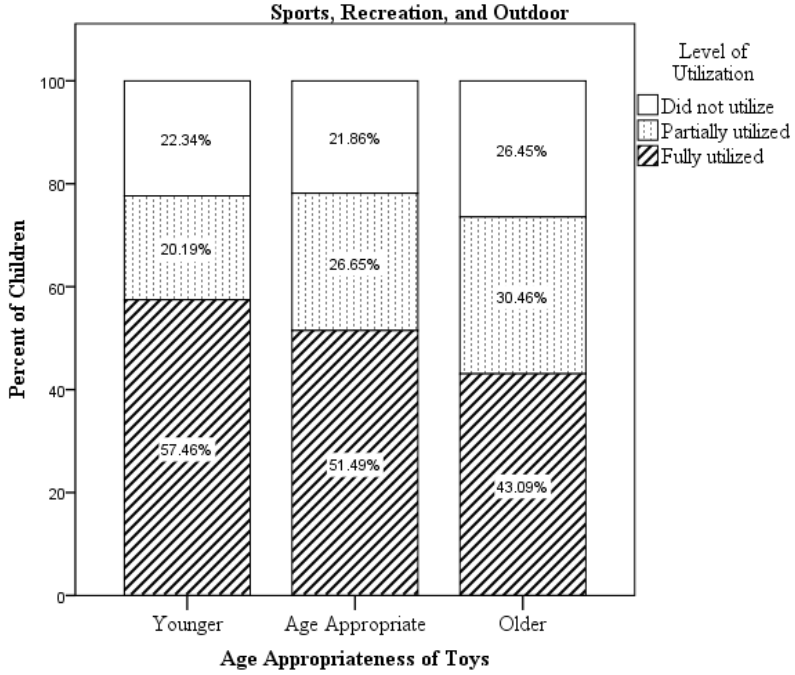


Figure 6. Of children who played with toy, utilization level of imaginative toys by age appropriateness

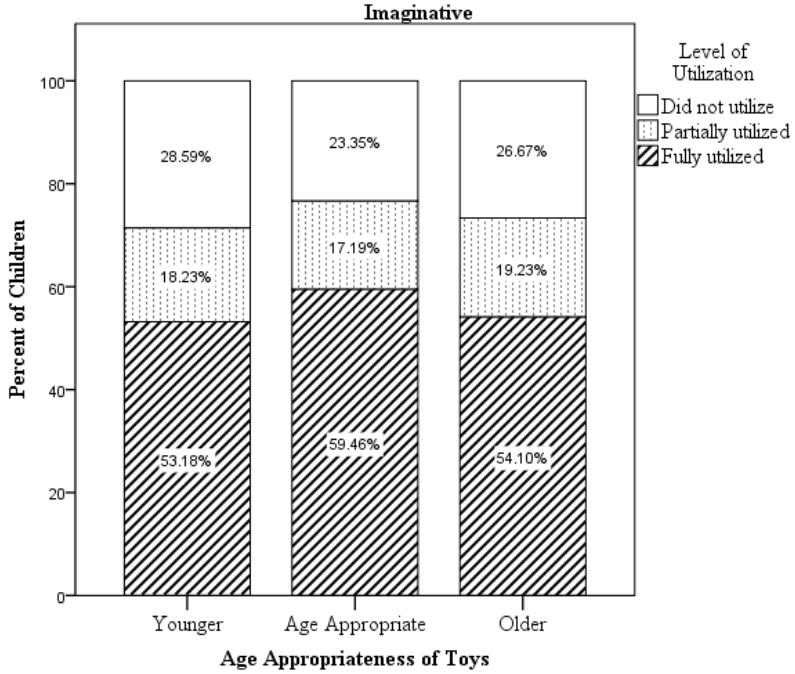


Figure 7. Of children who played with toy, utilization level of small vehicle toys by age appropriateness

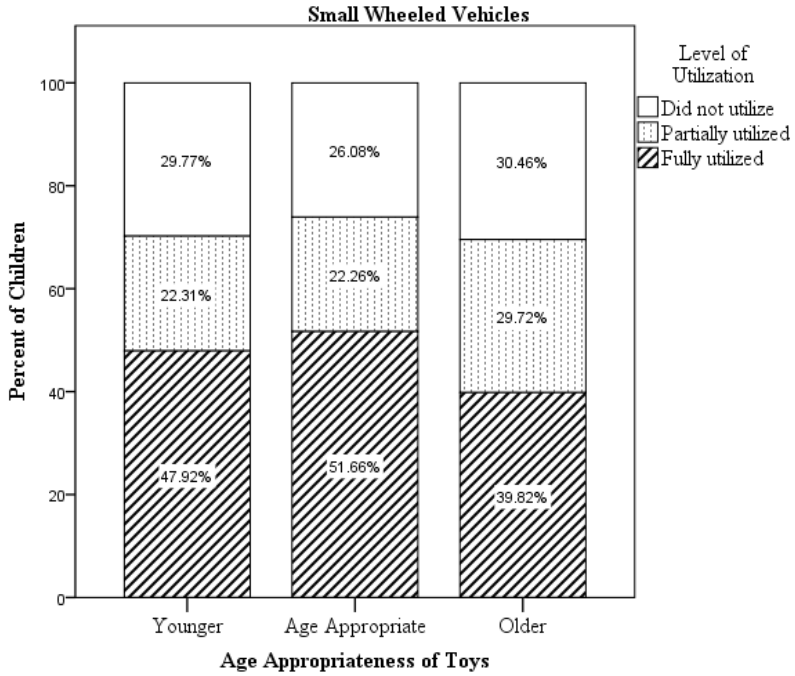


Figure 8. Of children who played with toy, utilization level of art and craft toys by age appropriateness

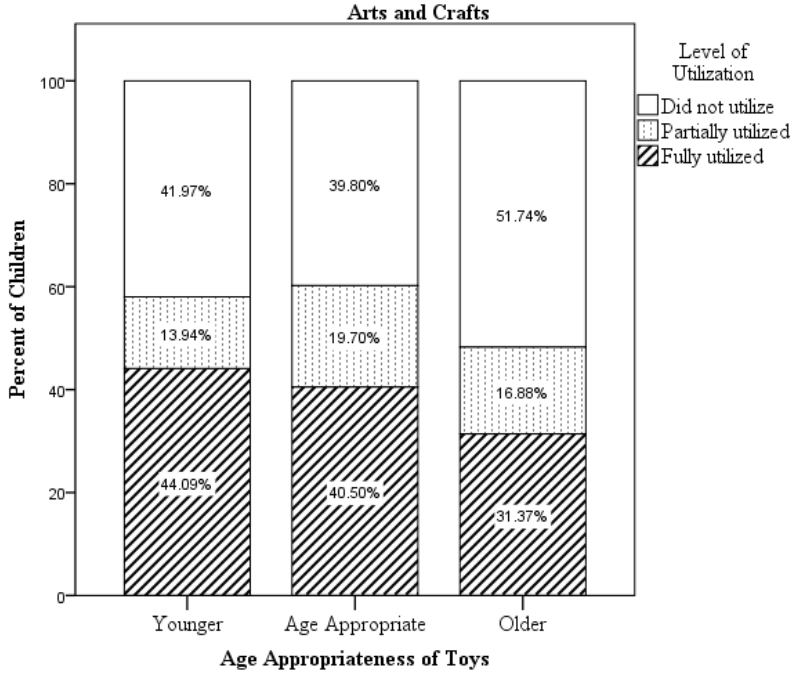


Figure 9. Of children who played with toy, utilization level of musical toys by age appropriateness

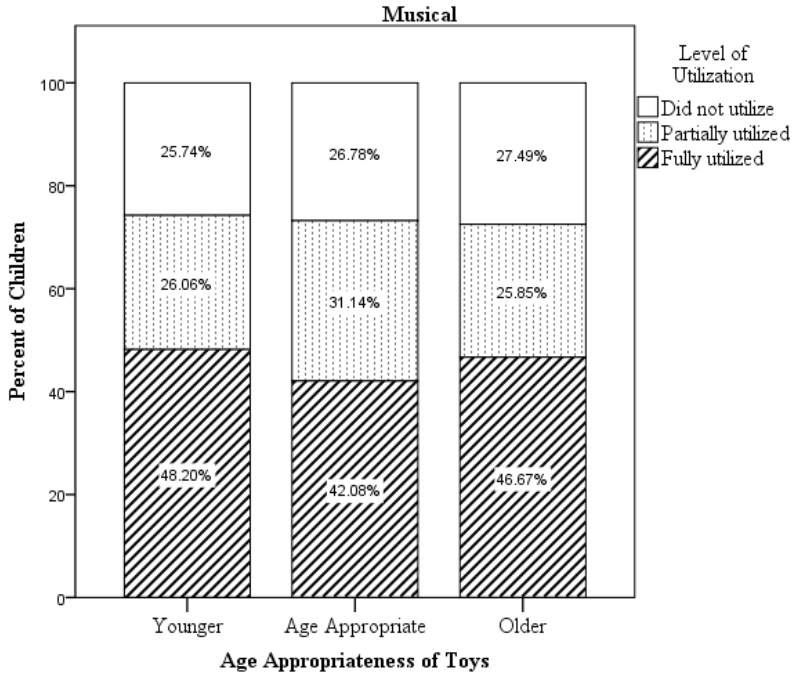
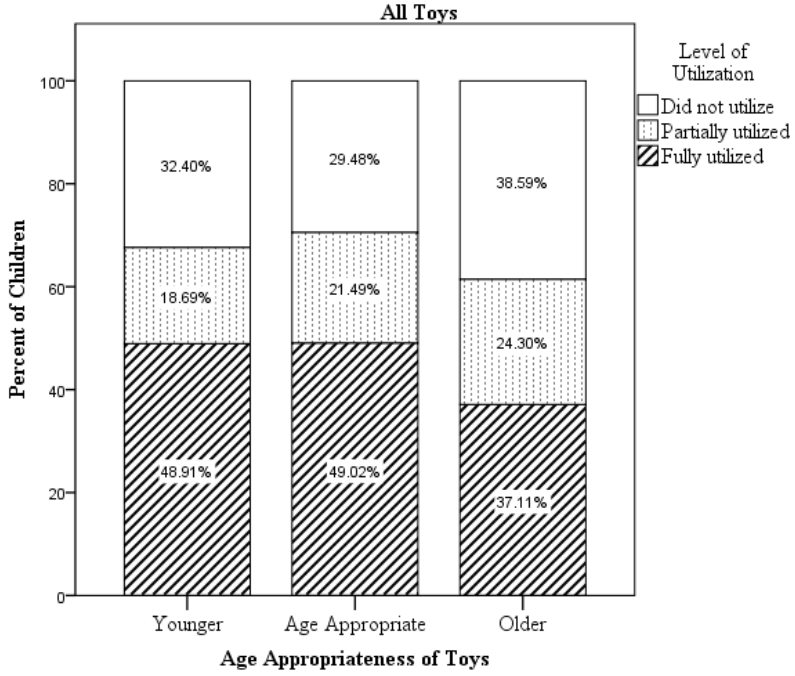


Figure 10. Of children who played with toy, utilization level of all categories of toys by age appropriateness



Appendix D. Qualities of Toys Coding Manual

How many **parts, pieces, and components does the toy have?**

- This item accounts for the *number* of distinct parts, pieces, and components of the toy, including freestanding pieces of the toy (e.g., a 20 piece block set) but also components permanently attached to the toy that can be moved and manipulated freely (e.g., buttons, knobs, ribbons, the floppy ears on a stuffed dog).
- Note that the toy's parts, pieces, and components still include objects that can be seen but not touched by the child (e.g., beads inside a clear compartment).
- End point reference: 1 = exercise ball, a solid figurine with no moveable limbs, play-mat with road drawn on; 6 = 1,000 piece puzzle, cabin building kit set with 800 toothpicks, etc.

How large **are the parts, pieces, and components of the toy?**

This item accounts for the *size* of distinct parts, pieces, and components of the toy, including freestanding pieces of the toy (e.g., a 20 piece block set) but also components permanently attached to the toy that can be moved and manipulated freely (e.g., buttons, knobs, ribbons). Note that the toy's parts, pieces, and components still include objects that can be seen but not touched by the child (e.g., beads inside a clear compartment).

Some of the pieces, parts, and components of the toy differ greatly. When choosing a rating for this question, you should consider the size of all the pieces of the toy on average.

- First, try to think of the pieces of the toy as either small (1-2), medium (3-4), or large (5-6):
  - 1 = Bead kit with beads small enough to be threaded with a needle, tiny toothpicks in construction set
  - 2 = Tiny bricks, thin cards in a standard deck
  - 3 = Standard wooden building blocks, chunky interlocking bricks, books with thick cardboard pages
  - 4 = 18" doll, infant ring stacker, pots and pans in a play kitchen, tea set with chunky pieces
  - 5 = Baby push walker toys, toddler and infant ride on toys
  - 6 = Large ball over 3 feet high, indoor slides and climbers, pogo stick

- Note: If a toy could fit it the small parts testing tube used by the CPSC, it should not receive a score over 2.

How much mastery of gross motor skills is needed to play with the toy?

- The National Library of Medicine defines gross motor control as "the ability to make large, general movements (such as waving an arm or lifting a leg)." For example, major gross motor milestones are sitting without support, standing alone, walking alone, running, kicking, throwing, skipping, jumping. How much does the toy require mastery of these gross motor skills? Note that a "1" requires no gross motor skills and could be given to a person laying in a bed, a "2" could be mastered by someone sitting at a table in a chair/highchair, and a "3" involves crawling and moving around.

How much mastery of fine motor skills is needed to play with the toy?

- The National Library of Medicine defines fine motor control as "the coordination of muscles, bones, and nerves to produce small, precise movements. An example of fine motor control is picking up a small item with the index finger and thumb." How much does the toy require mastery of handling objects with dexterity and detail?
- End point reference: 1 = None/little mastery 6 = full mastery.

Is the toy a game? How many game-like qualities does the toy have?

- Is there a score or competition involved with this toy? Could it be considered a game? Are there rules that players can violate? End point reference: 1 = craft kit, doll, etc.; 6 = board game, card game, etc.

How much rapid movement or speed could the toy exhibit?

- End point reference: 1 = friendship bracelet kit, doll, etc.; 6 = dart gun, remote control helicopter, etc.
- Note that if the user has an ability to change the speed of the movement of the toy (e.g., a wheeled vehicle; a ball), then the toy should be coded as a "3" or "4".
- The light in the toy should not be coded under movement.

How much violence is depicted in the toy?

- End point reference: 1=No or very little violence/slightly violent 6=Extremely violent

How masculine is the toy?

- Pay special attention to color and toy type. Do not think about whether boys or girls SHOULD play with this particular toy, or whether boys or girls MAY PREFER the toy over others, but rather who the toy manufacturer meant as the intended audience. For reference: Studies looking at gender differences (e.g., O'Brien & Huston, 1985) typically consider these types of toys "masculine": weapons, tools, a train, and a truck.
- End point reference: 1=Gender neutral 6=Very masculine

How feminine is the toy?

- Pay special attention to color and toy type. Do not think about whether boys or girls SHOULD play with this particular toy, or whether boys or girls MAY PREFER the toy over others, but rather who the toy manufacturer meant as the intended audience. For reference: Studies looking at gender differences (e.g., O'Brien & Huston, 1985) typically consider these types of toys "feminine": baby doll, dollhouse, tea set.
- End point reference: 1=Gender neutral 6=Very feminine

How colorful is the toy?

- Accessories, including remote controls which may go along with the main part of the toy, should also be coded for colors.
- Neutral colors should not factor into the number of colors in the toy.
- Some toys might change color throughout play (baby doll's cheeks turn pink; chemistry set creates a differently colored liquid). In situations like these, you want to code the color that the toy looks like without being used.
- End point reference: 1=One color 6=Many colors

How realistic is the toy? What is the level of realism?

- How much complexity is in the illustration or portrayal? How cartoonish is the toy? This is NOT to be confused with the number of parts. Even a toy with 1-2 parts may have very highly detailed illustration. For example—
- Are certain salient parts of an object or illustration depicted in the toy? For example, does the doll have eyes, a mouth, fingers, shoes, eyebrows? Does the play house have windows, and do these windows have cross squares? (see Gardner, Feldman, and Krechevsky, 1998).
- Are "lines of varied thickness used to texturize several elements in the drawing? A certain effect (e.g., shading or shadow) may be produced." (see Gardner et al., 1998).

- In other words, if the toy is a play-food apple—is the object just a wood cut-out of a cartoonish apple, or is it a complexly molded plastic apple that looks like it could be real?
- If it is a toy car, is it just a simple box with chunky wheels on it, or does it have intricate painting on it, with stripes, shading, shadowing, small, detailed hubcaps, and a realistic looking steering wheel?
- If the toy has one large free standing part and other supplementary parts (a board game featuring a large board and play cards containing small realistic illustrations), all parts should be taken into account for this item.
- End point reference: 1 = solid colored balls, bricks, or blocks; 6 = professional art studio, world map containing topography, etc.

Do you need to follow a path or sequence of steps to play with the toy as intended?

- How many degrees of freedom does the toy afford? Are there limiting factors? How open-ended is play with the toy? When scoring this item, code for the extent to which the child must adhere to a set path or sequence while playing with the toy.
- End point reference: 1 = ball, basic figurine/doll, etc.; 6 = chemistry set, complicated board game, etc.