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The role of shape and specificity in young children's object substitution

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Abstract

Children often substitute one object for another during play. They may substitute a stick for a sword or a box for a car, often favouring substitutes that are shaped like the needed object. The current study looked at the roles of shape and specificity, the degree to which a possible substitute resembles something else, in children's object substitutions. We asked whether children would favour generic, similarly shaped substitutes (those with low specificity) over specific ones and whether generic objects would elicit a great variety of potential substitutes than their specific counterparts. Three-, 4-, and 5-year-olds (N = 66) saw objects that varied by shape (round versus rectangular) and by specificity (generic versus specific) and were asked to help a story character find a series of objects. Children were also given an object and asked to generate a list of possible things for which the object could be substituted. Overall, children, especially 5-year-olds, strongly favoured the generic, same-shaped substitutes over other objects and regularly used them for multiple substitutions. Children did not generate a longer list of potential substitutes when given a generic object. Findings suggest that children may pass over specific objects in favour generic ones when making object substitutions during play.

Highlights

- Researchers examined the roles of shape and specificity in young children's choice of object substitutions.
- Children were asked to help a story character find four objects using four substitutes that varied in shape and specificity.

- Children used generic shapes to be used as multiple needed objects more than those designed to look like something specific.

KEYWORDS

children, object substitution, preschool, shape, specificity

1 | INTRODUCTION

In object substitution, children use an object as something other than what it is (e.g., call a shell a hat or use a clipboard as a plate; Leslie, 1987; Lillard, 2015). In order to substitute one object for another, a child shows awareness of the purpose of each object, demonstrating an impressive understanding of things in their world. Furthermore, to transform one object to another demonstrates a child's creativity and ability to look beyond physical qualities of objects (Fein, 1981; Howe, Abuhatoum, & Chang-Kredl, 2014).

Children progress in complexity of object substitution with age (Elder & Pederson, 1978). Children as young as 19 months can participate in object substitution but with objects very similar to the needed object (Lillard, 2015). As they get older, children are able to substitute with objects that are less realistic (Elder & Pederson, 1978). For example, older preschool children are able to substitute imaginary symbols for needed objects (i.e., brush teeth with an imaginary toothbrush; Elder & Pederson, 1978; Lillard, 2015; Mizuguchi & Sugai, 2002).

One topic explored in the object substitution literature is how young children select objects to use as substitutes. Much of this research examines how form and function relate to those selections. Form is described as the appearance of an object (i.e., shape), and function is described as how an object is used (e.g., a phone is used to call another person). Studies often emphasize the importance that form, function, or both have on object substitution (Bigham & Bourchier-Sutton, 2007; Elder & Pederson, 1978; Hopkins, Smith, Weisberg, & Lillard, 2016; Jackowitz & Watson, 1980). In Jackowitz and Watson (1980), for example, young children were asked to pretend (i.e., drink from a cup) with four sets of objects. In one set, the objects were similar in both form and function (i.e., toy cup); in another, they were similar in form but not in function (i.e., shell); in another, they were similar in function but not in form (i.e., canteen); and in the final set, they were dissimilar in both form and function (i.e., a car). Children readily substituted objects that were similar to the needed object in both form and function. In addition, children substituted with objects that were similar in either form or function but dissimilar in the other. Children did not tend to substitute object that were dissimilar to the needed object in both form and function (Jackowitz & Watson, 1980).

Bigham and Bourchier-Sutton (2007) further examined the role of form and function in object substitution. Children, ages 3 to 8 years, witnessed an act of pretence using five different types of substitute objects. For example, children watched as an experimenter attempted to write using a pen (i.e., similar form and function), a wood block akin to a pen (i.e., similar form, ambiguous function), a screw driver (i.e., similar form, dissimilar function), a wood block distinct from a pen (i.e., dissimilar form, ambiguous function), or a cup (i.e., dissimilar form, dissimilar function). Children were then asked, "What am I doing or pretending to do?" Children's responses showed that form and function were equally important in children's understanding of object substitution and that substitutions were easier to understand when substitutes were similar in form and function to the target (Bigham & Bourchier-Sutton, 2007). Such findings emphasize that young children are mindful in their decisions regarding possible object substitutions, and their decisions lay heavily on the appearance and purpose of an object.

Shape is an important component of form and one that is often used when substituting objects (Diesendruck & Bloom, 2003; McLoyd, 1980; Smith & Jones, 2011). McLoyd (1980) examined fantasy play in preschool children and

noted the children often used blocks during object substitution and the selection of the block was not random. The children compared the available and needed object and selected an available substitute that had similar shape or form as the needed object (McLoyd, 1980). This could be because children use their perception of an object's shape to determine how to substitute it as another object (Smith & Jones, 2011). Some argue that shape is a cue for one's membership into a category, and if two objects share a similar shape, the objects must share other properties too (Bloom, 2000; Diesendruck & Bloom, 2003). The idea is that shape is an especially important cue for indicating what something is (Diesendruck & Bloom, 2003).

There is some evidence that children use shape with other characteristics when making decisions about objects (Son, Smith, & Goldstone, 2008). Son et al. (2008) examined children's use of shape for learning categories. Children who learned about object categories with simple shaped objects learned to generalize objects to categories based on shape better than children who learned about categories with objects featuring more detail or design (Son et al., 2008). This highlights how important a child's perception of an object is in regard to their ability to use that object as something else (Tomasello, Striano, & Rochat, 1999). For instance, young children have more difficulty allowing an object with a conventional use (e.g., car) to serve as a symbol for another object with different conventional use (e.g., phone; Tomasello et al., 1999).

According to DeLoache (1995), such difficulty for children to use a detailed object as a symbol comes from children's lack of ability to separate an object from its material, creating a conflict in using it as a symbol. In other words, as an object becomes more easily identified as a specific thing, children have more difficulty considering that object as an abstract representation for something else (DeLoache, 1995). For young children, perception of the object (i.e., specificity to be a certain thing) is important because variables of a symbol and a referent can be fused making object substitution more difficult (Liben, 2005).

Son et al. (2008) provide support for the notion that simplification to shape might actually increase children's generalization of objects to different categories. Whether this is the case for object substitution is not known. Studies have not extensively examined how a feature like object specificity (i.e., the degree to which an object resembles a specific thing) might influence the likelihood that an object could serve as a substitute for another object or, perhaps, several other objects. Might generic objects, those that are plain with no markings, be more likely to be used as a substitute for another object or for multiple substitutions compared with specific objects, those with clearly identifiable markings?

1.1 | The present study

The purpose of the present study examines how object shape and specificity might influence if, and how, an object gets used during substitution. Specifically, we explored two main questions. First, we asked if children favour substitutes that are both generic and match the target's shape. Second, we asked whether generic objects might elicit a greater variety of novel potential substitutions than specific objects.

To address these questions, 3-, 4-, and 5-year-old children completed four object substitution tasks during a story. Children were introduced to a main character who needed help finding four lost items (i.e., a phone, button, juice box, and tyre). Children chose between four blocks: (a) a plain, generic circle, (b) a plain, generic rectangle, (c) a circle painted specifically to look like a clock, and (d) a rectangle painted specifically to look like a book. The object needed in the story always matched two of the available blocks in shape; one of which was generic, plain with no markings, and one of which was specific, with detailed markings. Finally, children were given an object, one that was either generic or specific, and asked to generate a list of possible substitutes for which it could serve. Given preferences identified in previous studies, we hypothesized that children would favour substitutes that were both similarly shaped and generic (i.e., the generic shape match) compared with those that were dissimilar in shape and/or specific and that children would generate a longer list of novel potential substitutions when given a generic shape.

2 | METHOD

2.1 | Participants

Sixty-six preschool-aged children (36 female and 30 male) participated in the study. There were a total of 22 three-year-olds, 22 four-year-olds, and 22 five-year-olds. Participating children were recruited from preschools and kindergartens near a university campus in the south-eastern region of the United States. A majority were White and from middle-class families. Parent consent and child assent were obtained for each participating child. There were no special inclusion/exclusion criteria for participation, and all children who assented completed the full testing session.

2.2 | Materials

Study materials consisted of four blocks (see Figure 1) and a story. Two of the blocks were round measuring 2 in. in diameter. The only difference between the two round blocks was that one had a clock face drawn on it (i.e., a "specific" object) and the other was blank (i.e., a "generic" object); otherwise they were identical (e.g., in size, shape, and colour). The other two blocks were rectangle measuring 3 in. tall by 2 in. wide. The only difference between the rectangle blocks was that one had a book drawn on it (i.e., a "specific" object) and the other was blank (i.e., a "generic" object); otherwise there were identical (e.g., in size, shape, and colour). The story featured a boy named Tommy who needed different objects (e.g., a button, a tyre, a phone, and a juice box). At each point in the story when Tommy needed an object, children were asked to select which of the four blocks he should use.

2.3 | Procedure

Testing occurred in a quiet location at the child's school. Participants sat across from an adult experimenter at a table and completed the 5-min testing session. Each session included a warm-up, a substitution task (which included for trials), and a list task. The two tasks were separated by a brief transition activity.

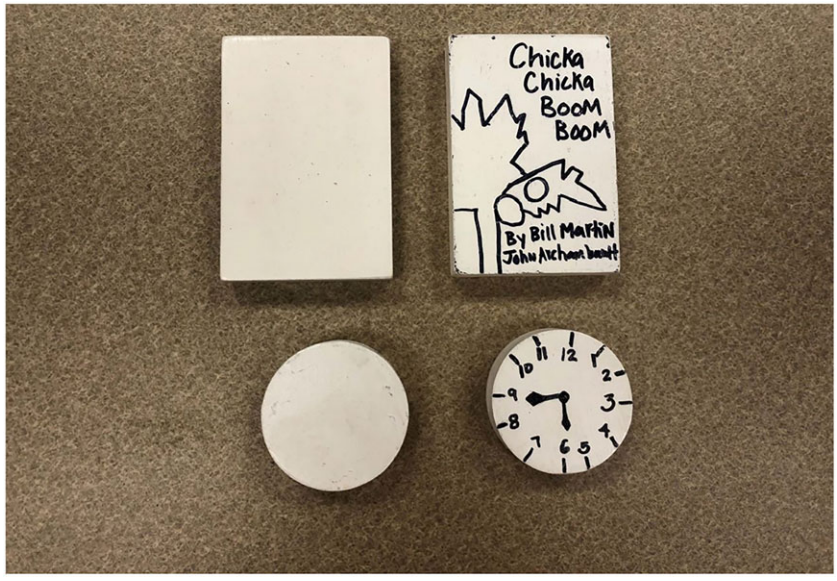

FIGURE 1 An image of the four blocks that served as study materials

2.3.1 | Warm-up task

The warm-up featured a simple game of *I Spy* intended to build rapport between the child and the experimenter. During the game, children saw a picture of a picnic scene and took turns with the experimenter describing and identifying things in the picture.

2.3.2 | Story and substitution task

Following the warm-up, the experimenter placed four blocks in an array on the table and introduced the child to the story task. Said the experimenter, "Today, I am going to tell you a story about a little boy who is your age. His name is Tommy. During the story, you will use these [blocks] to help answer some questions." The experimenter then recited Tommy's story (see Appendix A for a script of the story). In the story, Tommy is looking for several missing objects (e.g., a phone, juice box, tyre, and button). For each missing object, the child is asked to identify which of the four blocks could serve as a substitute for that object. For example, the story might say, "Tommy's coat is missing a button," and the experimenter would ask, "Which one of these could be a button?" In response, the child pointed to one of the four objects. After each selection, the blocks were rearranged and the story continued. The arrangement of the blocks on the table was always random, and the order of the objects requested in the story was counterbalanced.

2.3.3 | Transition task

The transition featured another round of *I Spy* intended to minimize children's reliance on information from the substitution task when completing the final, list task.

2.3.4 | List task

During the list task, children were presented with one of the four blocks (chosen randomly). The block was placed in front of the child and, whether it was a generic or specific, labelled explicitly as a clock or a book depending on the shape. The decision to label each object was intended to give each object the same starting point. Then the experimenter simply asked, "Can it be anything else, or is that it?" The child was free to list any possible idea of what else the block could be used as a substitute for. After each idea, the child was asked again, "Can it be anything else, or is that it?" This continued until the child said, "That is it" or stopped responding. Credit was given for any substitution provided it was novel (i.e., not mentioned earlier in the story or procedure: phone, circle, rectangle, clock, juice box, tyre, button, or book) and not repeated.

3 | RESULTS

The results focused on analysing data related to two primary questions. First, we asked whether children favoured substitutes that were both generic and matched the target's shape. Here, we compared selection of the generic shape match to chance with the selection of the other objects, and across age. Children who favour the combination of both features should choose the generic shape match more often than would be expected from guessing and more often than any other object. Additionally, children might be more likely to select the generic shape match as their first choice, and they might select it more than once. Second, we asked whether generic objects might elicit a greater variety of novel potential substitutions than specific objects. Children were credited for any substitution that was novel (i.e., not mentioned earlier in the story or procedure: phone, circle, rectangle, clock, juice box, tyre, button, or book) and not repeated (e.g., saying "ball" twice only scored a 1). We hypothesized that children would generate a longer list of novel potential substitutions when given a generic object than when given a specific one.

3.1 | Do children favour substitutes that are both generic and match the target's shape?

Children completed four trials. Because there were always four objects to choose from, children who simply guessed had a one in four chances of choosing the generic shape match on each trial. Overall, there was less than a 1% chance that children would choose the generic shape match (object "*x*") on all four trials if they were guessing ($x^4 = ¼^4$ or 0.004). Conversely, children who guessed on a trial had a three in four chance of choosing one of the other objects (objects "*y*"). There was nearly a 32% chance that children would select an "other" object on all four trials if they were guessing ($y^4 = ¾^4$ or 0.316). To determine the full set of likelihoods, we used the binomial expression $(x + y)^4$, which, when expanded, equals $x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$. This expanded expression allowed us to calculate the likelihood of seeing any particular pattern of choices. See Table 1.

These likelihoods were entered into a chi-square to determine whether the number of children who actually showed each pattern was different from chance. According to this analysis, the distribution of patterns did indeed differ from what would be expected had children been guessing, χ^2 (df = 4, N = 66) = 912.79, p = 0.000. In particular, note that the number of children who chose the generic shape match on two, three, or four trials far exceeded the number expected from guessing. Chi-square analysis also showed differences among the age groups, χ^2 (df = 8, N = 66) = 18.93, p = 0.015. Follow-up comparisons found that 5-year-olds chose the generic shape match more than 3-year-olds, χ^2 (df = 4, N = 44) = 9.74, p = 0.045 but found no differences between the other age groups. See Table 2 for cell values.

In addition, a non-parametric Friedman Test comparing children's selection from among the four objects indicated that each object was not equally likely to be chosen, χ^2 (df = 3, N = 66) = 113.61, p = 0.000. Pairwise comparisons using the Wilcoxon Signed Ranks Test with a Bonferroni adjusted alpha of 0.0167 (0.05/3) indicated that children favoured choosing the generic shape match over the other three objects, ps = 0.000, including over the specific shape match. By-age analysis found that 3-year-olds did not favour the generic shape match over the specific shape match, p = 0.947, whereas both 4- and 5-year-olds did, ps = 0.000.

TABLE 1 Likelihood of the different patterns for choosing the generic shape match (*x*) or an "other" object (*y*) across the four trials

Choice pattern			
x	*y*	Equations	Likelihoods
4	0	$x^4 = (¼)^4$	1/256 or.004
3	1	$4x^3y = 4(¼)^3(¾)$	12/256 or.047
2	2	$6x^2y^2 = 6(¼)^2(¾)^2$	54/256 or.211
1	3	$4xy^3 = 4(¼)(¾)^3$	108/256 or.422
0	4	$y^4 = (¾)^4$	81/256 or.316
Total		$x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$	256/256 or 1

TABLE 2 Number of children by age who chose the generic shape match on 0, 1, 2, 3, or 4 trials

No. of trials	Three-year-olds	Four-year-olds	Five-year-olds	Overall observed counts	Overall expected counts
4	2	3	10	15	0.3
3	4	7	5	16	3.1
2	8	11	5	24	13.9
1	4	0	1	5	27.9
0	4	1	1	6	20.9
	N = 22	N = 22	N = 22	N = 66	

A preference for the generic shape match could also be seen on children's first choice for each object set, χ^2 (2, N = 66) = 189.19, p = 0.000. For example, when first asked to choose a substitute for the button (or tyre, whichever was first), 70% of children chose the plain circle. Interestingly, this same preference was seen on children's second choice too, χ^2 (2, N = 66) = 149.26, p = 0.000. That is, when later asked to choose a substitute for the tyre (or button, whichever was second), 64% of children chose the plain circle. In fact, the overall likelihood that the generic shape match was chosen second did not differ statistically from the likelihood that it was chosen first, McNemar's test, p = 0.10.

Many individual children also chose the generic shape match multiple times. In some cases (48 out of 132, 36%), a child chose it for both their first and second choices within an object set, χ^2 (1, N = 132) = 204.29, p = 0.000. For example, a child who chose the plain circle as the button would often also choose it as the tyre. Of these, more than half of cases (25 of 48, 52%) were produced by 5-year-olds. Additionally, some children (15 out of 66, 23%) chose the generic shape match on all four trials, χ^2 (1, N = 66) = 825.84, p = 0.000. Of these, most were produced by 5-year-olds (10 of 15, 67%). Finally, the correlation between age in months and choosing the generic shape match was significant, r(66) = 0.417, p = 0.000. This relationship, along with 5-year-olds tendency to choose it multiple times, suggests that children's preference for the generic shape match increased with age.

3.2 | Do generic objects elicit a greater variety of novel potential substitutions than specific objects?

At the end of the procedure, children were given one of the four objects and asked to spontaneously generate a list potential substitutes for which that object could serve. Some children were given a generic object (N = 34), and the others were given a specific object (N = 32). Overall, the average number of substitutions generated by children in the generic group (M = 2.12) did not differ from the number generated by those in the specific group (M = 1.66), p > 0.05. In fact, a majority of children (36 in total) did not offer any potential substitutions. However, among those who listed at least one novel substitution (N = 26), there was emerging evidence that generic objects may be more likely to lead children to generate multiple substitutions, χ^2 (1, N = 26) = 4.01, p = 0.053 (see Table 3).

4 | DISCUSSION

The purpose of this study was to examine the role of shape and specificity in children's selection of object substitutions. As hypothesized, children preferred substituting with matching shapes that were generic—plain with no markings, such as a plain circle block—over matching shapes with specificity—details of clear markings or identifiers, such as a block painted to look like a clock. Children chose the generic shape at rates that far exceeded chance; they chose the generic shape matches more often than any other object, and they were more likely to select the generic shape match as a substitute for multiple objects. However, children did not generate a longer list of possible substitutes when shown a generic object as compared with a specific one. Overall, the findings suggest that decreased object specificity may extend the possibilities of potential substitutions children consider for an object.

In object substitution, children use one thing as a symbol for another. Previous studies have documented the power of shape in this process. Shape is a key consideration when deciding whether one object might serve as a

TABLE 3 Number of potential object substitutions generated based on the specificity of the object

	Number of substitutions	
Specificity of object	One	Two or more
Generic object	5	9
Specific object	9	3

suitable substitute for another (Diesendruck & Bloom, 2003; McLoyd, 1980; Smith & Jones, 2011). The current study is the first to show that specificity is also a key consideration. In particular, objects shaped similarly to a target and low in specificity are by far the most likely to be chosen as a substitute. When choosing between two identically shaped objects, one with low specificity and one with high specificity, children were nearly twice as likely to select low-specificity (i.e., generic) object, suggesting that the importance of shape in object substitution can be substantially elevated with the addition of specificity. Perhaps, as Smith and Jones (2011) might argue, a generic shape is viewed as more symbol-like thus allowing children the ability to generalize it more broadly. In support, there is some evidence that abstraction, or simplification through the use of generic shapes, increases children's generalization of categories (Son et al., 2008). In terms of our findings, abstraction (i.e., simplification in details) may result in more generalizing or preferred use of the generic objects in the object substitution tasks.

It could be argued that rather than preferring the generic object, children are instead avoiding the specific object. When choosing what to use for a button, children seem to zero in on two choices: a generic, undefined round object and a round object specified to look like a clock. Facing this choice, it is plausible that children might reject the clock because it clearly contradicts the story item—it is obviously not a button. This reasoning would leave the generic object as the only viable choice. If so, children would not be actively preferring the generic object so much as defaulting to it after the alternative was rejected. However, we believe this argument is incorrect. We examined whether children might select the generic shape match as a substitute for multiple objects (e.g., selecting the generic circle for both the button and the tyre). If children are indeed avoiding the specific object, then we might expect their preference for the generic shape match to be weaker in the second shape trial than the first. By the second trial, both objects have identities; the clock is still a clock and the generic circle is now, say, a button. This should neutralize the appeal of the generic object by essentially prompting children to reject both objects. If, however, children truly prefer the generic object because it is inherently undefined, then we might expect their preference for the generic shape match to be unchanged across multiple substitutions. Findings support the latter; the children selected the generic shape matches across multiple trials, and they were just as similarly likely to select it on the first and second same-shape trials.

With age, young children develop more of an ability to be flexible in letting one thing represent another (Fein, 1981; Howe & Bruno, 2010). In the current study, we did see that the 5-year-olds were most likely to allow the generic shaped objects to be a substitute across all four trials, whereas 3- and 4-year olds did this less. Furthermore, we found that 3-year-olds were more likely to rely solely on shape for determining object substitutions, as they picked both generic and specific shape matches equally. Cognitive changes happen between the ages of 3 and 5 that are related to the present findings. For example, 3-year-olds have difficulty in misleading appearances and viewing multiple perspectives (Abelev & Markman, 2006; Flavell, Green, & Flavell, 1986). However, by the age of 5, children are more likely to have overcome these difficulties and have developed the understanding that a situation or an object can be viewed in different ways (Abelev & Markman, 2006). The ability to view an object in more than one way may also develop over time, as our findings might support.

In the final part of the study, children were given one of the four objects and asked to generate a list of possible substitutions for that object. We expected a generic object would lead to a longer list of possible substitutions than a specific one. Generic objects are unbounded, unmarked, and undefined, and this might give them some flexibility when being used as a substitute for something else. However, no increase was found in average number of substitutions generated for generic compared with specific objects. That said, when considering only those children who listed at least one new substitution idea, generic objects were marginally more likely than specific ones to yield multiple ideas. This provides at least some additional evidence that generic objects may lead children towards a greater variety of substitutions than their specific counterparts. It also suggests that children do think that some objects, particularly those that are generic, are more flexible than others when it comes to substitution.

Still, this was not the robust substitution pattern we expected to observe. One explanation might be that children simply do not believe that some objects are more flexible than the others when it comes to substitution. After all, in any substitution, the child must bridge the differences between the target and the substitute with their own

imagination. Perhaps this process is no less effortful when those differences are small than when they are large. If so, then a plain circle (which is not a button) and a clock circle (which is also not a button) require the same effort to substitute. Another possible explanation, one we believe to be more viable, is that our design restricted children's substitution. In this study, most children (more than half) failed to generate any substitutions. This is not typical as studies show that 3- to 5-year-olds capably substitute one object for another (Elder & Pederson, 1978; Jackowitz & Watson, 1980). When children were given an object, regardless of whether it was generic or specific, they always heard it labelled in the same way (e.g., for circular objects, it was "this is a clock"). Labelling the objects in the same way ensured that similarly shaped objects had the same lexical starting point. However, for some children, this may have inadvertently restricted the kinds of things they subsequently considered when generating their list of possible substitutes. It could be that labelling the object put the same definition back on the object that its simplicity was supposed to take away.

4.1 | Limitations and implications

There are a few limitations to note. The majority of our participants where White and middle class. A more diverse sample would allow for greater generalization of our findings. Also, children's familiarity with the items in the story and those provided as possible substitutes were not known. Though the authors selected items that are very common, some children may not have been familiar with all of the items (e.g., a juice box) impacting their object substitution decision. In addition, there were size differences between the needed object and available choices, and for young children, such discrepancies might have an impact on object substitution (Lillard, 2015). Additionally, the study task required receptive language skills and attention. Children's abilities in such skills were not assessed or controlled for in the current study. As previously noted, the design of the final portion of the study needs further consideration. Future studies should continue to examine children's use of object during object substitution and assess their reasoning for the selection of objects. For example, a future study could ask children to explain their reasoning for selecting objects for substitutions.

The findings from this study have implications for parents, early childhood educators, and other adults working with young children. The importance of the adult in creating an environment that promotes play and creativity is well known (Eckhoff & Urbach, 2008; Howe et al., 2014). Our findings suggest that shapes with decreased specificity (i.e., generic shapes) increase the possible substitutions children consider for objects. Therefore, parents and early childhood educators should consider the benefits of providing unstructured items, like plain shaped blocks, to young children. Often, structured items, such as tea sets, phones, or pots and pans—things that have a specific, clearly defined purpose—populate the pages of toy catalogues, or the shelves at toy stores, and ultimately, children's classrooms, bedrooms, or other play spaces. Our findings suggest the importance of including plenty of unstructured, generic objects in these spaces too.

Object substitution is a skill often needed in pretend play, and such skills are important for a children's development. Children's ability to transform one object into another demonstrates cognitive skills, such as problem solving, creativity, and divergent thinking (Russ, 2003). Object substitution also promotes social skills by helping children manipulate a play scene to support further play (Howe et al., 2014). For example, a child who wants a friend to continue to play may help that friend transform a block into a needed tool in their play through object substitution. Children with pretend play skills, such as object substitution, have better peer interactions and display fewer negative social behaviours, like disrupting others play, because of their ability to manipulate a scene using such play tools (Uren & Stagnitti, 2009). Our findings have implications for pretend play and the adults facilitating it. The use of generic objects may help children extend their play because they are able to generalize those shapes to a wider variety of things. Also, for those facilitating pretend play, it is important to remember that specific items, those designed to resemble something particular, may limit a child from seeing the object as more than what it is designed to look like, whereas the use of items with less specificity may help scaffold children's play.

5 | CONCLUSION

In conclusion, during object substitution, children substitute one object for something else. Our findings further support the notion that children attend to shape when making object substitutions. New was our finding that children also looked to specificity during object substitution and that objects with low specificity led to greater substitution. In other words, increased object specificity appears to negatively affect children in the sense that the more an object resembles something else, the more children pass over it when making object substitutions. This was evident in several ways, perhaps most plainly in children's overwhelming preference to choose substitutes that were generic and that matched the shape of a needed object and in their willingness to choose this generic shape match for multiple substitutions. These findings were especially robust in 5-year-olds. Considering these findings, it appears that children's play spaces would benefit from the inclusion of generic objects with few details, such as blocks, sticks, pebbles, and toilet paper rolls, as tools to promote object substitution.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

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APPENDIX A

STORY SCRIPT

Tommy is a little boy around your age. He is at his house playing with his toys. After a while, he has played with all of his toys at his house and now needs something new and fun to play. Tommy wants to call his friend to see if he can play. He looks for a phone to call his friend, but he cannot seem to find one. Let's try to help Tommy find a phone. Which one of these could be a phone?

Tommy is going to go outside, but it is cold so he has to put on a jacket. Tommy puts his jacket on and sees that one of his buttons is missing. He has to find a button to help him stay warm. Let's help Tommy find a button. Which one of these could be a button?

Tommy wants to ride his tricycle next. When he goes to get onto the tricycle, he notices that it needs a new tyre. He searches and searches for a tyre, but cannot find one. Let's help Tommy find a tyre. Which one of these could be a tyre?

Tommy is thirsty after playing so hard, and he wants to drink a juice box. He searches and searches his house to find a drink box but cannot find one. Let's help him find a juice box. Which one of these could be a juice box? Tommy drinks his juice box and then goes to his friend's house and has a great time.