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CHILD DEVELOPMENT

EMPIRICAL ARTICLE

Preschoolers and adults metonymically extend proper names to owned objects

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Abstract

Three preregistered experiments, conducted in 2021, investigated whether English-speaking American preschoolers ($N=120$; 4–6 years; 54 females, predominantly White) and adults ($N=80$; 18–52 years; 59 females, predominantly Asian) metonymically extend owners' names to owned objects—an extension not typically found in English. In Experiment 1, 5- and 6-year-olds and adults extended names to owned objects over duplicates ($d=0.34$ in children; $d=1.13$ in adults). In Experiment 2, 5- and 6-year-olds and adults extended names to owned over borrowed objects ($d=1.37$ in children; $d=4.34$ in adults). Experiment 3 replicated this finding with 4-year-olds ($d=0.43$). Thus, English-speaking preschoolers can acquire semantic generalizations, even those not present in their language.

In many natural languages, moderate-to-high-frequency words carry multiple related but distinct meanings (Apresjan, 1974; Copestake & Briscoe, 1995; Nerlich et al., 2003). These kinds of flexible word uses can take different forms, such as morphological conversions (e.g., noun–verb conversions; "I bought a *hammer*"; "I can *hammer* the nail"; Srinivasan et al., 2017), metaphors (e.g., space–time metaphors; "This is a *long* road"; "He took a *long* time"; Starr & Srinivasan, 2018, 2021), and metonyms (e.g., producer–product metonyms; "Raymond *Carver* wrote a poem"; "I'm reading *Carver*"; Littlemore, 2015). These kinds of semantic generalizations not only explain the multiple senses of existing words, but can also facilitate the creation of new word meanings in a lexicon (Srinivasan et al., 2019). For example, English speakers create new verbs from nouns, following an instrument–activity generalization (e.g., "*Google* is a search engine"; "I *googled* the answer").

Children acquire semantic generalizations during their preschool years: 4-year-olds understand that producers' names can refer to their products (e.g., "*Monet* lived in France"; "The gallery owns a *Monet*"; Zhu, 2021), that instrument names can refer to activities conducted with the instruments (e.g., "I held a *shovel*"; "I can *shovel* snow"; Srinivasan et al., 2017), that animal names can refer to meats from the animals (e.g., "A *turkey* struts around"; "This *turkey* is well-seasoned"; Srinivasan & Snedeker, 2014), that material names can refer to objects made from those materials (e.g., "*Glass* shattered everywhere"; "Give me a *glass* of water"; Srinivasan et al., 2019), and that container names can refer to container's contents (e.g., "The *CD* was bulky"; "Let's listen to the *CD*"; Rabagliati et al., 2010). Four-year-olds also understand flexible word uses that do not follow generalizable rules (e.g., "She is wearing a baseball *cap*"; "Where is the bottle *cap*?"; Floyd & Goldberg, 2020). Moreover, children can learn from these semantic generalizations: for example, when introduced to a novel artifact that is used for "daxing," 4-year-olds infer that the artifact is called a "dax" (Srinivasan et al., 2017). These results show that preschoolers who learn one word meaning (e.g., "dax" as an activity) can then use an abstract semantic generalization (e.g., instrument–activity) to spontaneously infer another complementary word meaning (e.g., "dax" as an instrument). Thus, abstract semantic generalizations facilitate further word learning.

While previous research establishes that children acquire many semantic generalizations early in development, it is unclear what mechanisms underlie the acquisition of these semantic generalizations. For example, researchers have posited that children might only learn various kinds of abstract linguistic generalizations through extensive linguistic experience (e.g., Lieven et al., 2003; Tomasello, 2000, 2003). Specifically, children

may learn abstract semantic generalizations only after hearing multiple individual words that follow the generalization. Preschoolers may infer that a novel object with the function of "daxing" is called a "dax" because they have heard similar usages for other words like "shovel" and "hammer." The acquisition of semantic generalizations may be a gradual learning process, since each kind of semantic generalization (e.g., instrument–activity, producer–product, animal–meat) must be acquired separately and through repeated experience. Moreover, some semantic generalizations may emerge late in development, depending on when children acquire enough linguistic experience. For example, producer–product semantic generalizations (e.g., "*Woolf* was a brilliant writer"; "*Woolf* was on her bookshelf") often involve specific proper names, which children may not hear until quite late in development. Moreover, if children can only acquire semantic generalizations through protracted linguistic experience with specific words, then semantic generalizations may not be useful for learning in early childhood.

In contrast, it is possible that children can acquire semantic generalizations without extensive linguistic experience with specific inputs. Rather, children might leverage their preexisting conceptual knowledge—either in the form of higher-level conceptual theories or lower-level associations—to produce semantic generalizations. For example, many theories argue that semantic generalizations often reflect privileged connections in abstract conceptual structure (Chang & Fitz, 2014; Pustejovsky, 1995; Srinivasan, 2016). Children possess early-emerging conceptual knowledge—rich, theory-based understandings of animals, objects, and people—which could arise from domain-specific innate mechanisms, early life experience, or both (Carey, 2009; Gelman, 2003; Gopnik & Meltzoff, 1997). This conceptual knowledge might guide their acquisition of semantic generalizations in language.

For example, a higher-level conceptual account might posit that preschoolers possess sophisticated abstract knowledge pertaining to various kinds of concepts, and can use this knowledge to draw additional inferences in both conceptual and linguistic domains. By 4 years of age, children distinguish between conceptually relevant properties of artifacts (e.g., functional features, like watches telling time) from arbitrary but frequent properties of artifacts (e.g., perceptual features, like watches having round faces), by judging artifacts missing conceptually relevant features differently from artifacts missing arbitrary but frequent features (e.g., by deeming a watch that does not tell time as broken, but a watch that has a square face as perfectly fine) (Haward et al., 2018). Thus, a high-level conceptual account might argue that children infer that an object used for "daxing" is called a "dax" due to the privileged conceptual link between artifacts and their functions (Keleman, 1999; Keleman et al., 2012; Kemler Nelson et al., 2000), rather than due to extensive linguistic experience with other words that follow the instrument–activity pattern. Similarly, other semantic generalizations might also be based on privileged conceptual properties. For example, the producer–product generalization may be licensed by the causal relation between the producer and the product, such that the producer causes the existence of the product (Lakoff, 1980; Pustejovsky, 1991; Zhu, 2021), and children's early sensitivity to causal reasoning (e.g., Gopnik & Sobel, 2000) and the causal-historical features of individual objects (Gelman et al., 2012, 2016; Gelman & Davidson, 2016) may guide their acquisition of the producer–product generalization. Since the same semantic generalizations tend to emerge across multiple disparate languages, these semantic generalizations may be guided by universal conceptual structures in thought, rather than particular experiences within a given language (Srinivasan & Rabagliati, 2015).

Additionally, a lower-level conceptual account might posit that children can acquire semantic generalizations through lower-level associative structures in thought: for example, owners and their owned objects are frequently associated with each other, independent of sophisticated abstract theories of ownership. These lower-level cognitive associations might also facilitate the acquisition of semantic generalizations, independent of linguistic input. Unlike a higher-level conceptual account that suggests that children leverage sophisticated, abstract theories of world to make additional linguistic inferences, a lower-level conceptual account simply posits that some kind of basic, previous conceptual knowledge (i.e., the frequency of associations between concepts) guides the acquisition of semantic generalizations. Indeed, children sometimes *overextend* semantic generalizations relative to adults, suggesting that children do not solely rely on extensive linguistic experience to generate regular linguistic patterns (Rabagliati et al., 2010).

All this suggests that children may be able to acquire semantic generalizations not through extensive linguistic experience, but rather by leveraging their existing conceptual knowledge. If extensive linguistic experience is *not* necessary for the acquisition of semantic generalizations, then semantic generalizations may emerge relatively early in development, as children can produce these generalizations in language as soon as they acquire the relevant high-level conceptual structures or low-level conceptual associations. Consequently, semantic generalizations may also be a useful early word learning mechanism—children may quickly learn the semantic scope of a new word from just a few examples.

Some empirical research has begun to investigate whether extensive linguistic experience with specific exemplars is necessary for the acquisition of semantic generalizations. For example, previous research showed that 4-year-olds acquire producer–product metonymy (e.g., "There is a writer called *Hemingway*"; "Wow, a *Hemingway*!") despite little experience with proper

names like "Picasso" or "Hemingway" (Zhu, 2021). This research tentatively suggested that children's acquisition of producer–product metonymy does not require linguistic experience with individual words that follow the producer–product generalization. However, it is impossible to conclusively demonstrate that preschoolers do not have *any* linguistic experience with producer–product metonyms, given that English-speaking adults still regularly produce producer–product metonyms. While previous corpus data, parental reports, and experimental data provide converging evidence that preschoolers possess little, experience with producer–product metonyms (Zhu, 2021), it is difficult to exhaustively provide negative evidence showing that preschoolers have never heard these metonyms.

Consequently, the present research attempts to provide new positive evidence that extensive linguistic experience with specific exemplars is *not* necessary for the acquisition of semantic generalizations. Specifically, the present research investigates whether children and adults can generate novel metonymic extensions that are not typically expressed in English at all. While speakers of English and at least 14 other languages (e.g., Farsi, Hungarian, Italian, Japanese; see Srinivasan & Rabagliati, 2015 for full list) metonymically extend a person's name to objects *created* by that person (e.g., saying, "There's a *Van Gogh* on the wall" to refer to a painting created by Vincent Van Gogh), the present research asks whether English-speaking children and adults will also metonymically extend a person's name to objects *owned* by that person (e.g., saying, "There's a *Winfrey* on the wall" to refer to a painting owned by Oprah Winfrey). Since owner–owned object metonymy is not a semantic generalization that is conventionally expressed in English, neither children nor adults should possess meaningful previous linguistic experience extending proper names to owned objects. However, while there is no existing semantic generalization in English that highlights the relation between owner and owned object, a wealth of previous research demonstrates that children and adults are sensitive to the causal history of objects (e.g., DeJesus et al., 2022; Frazier et al., 2009; Judge et al., 2020; Levene et al., 2015; Newman & Bloom, 2012; Rozin et al., 1986) and to ownership information in particular (e.g., Gelman & Davidson, 2016; Kangiesser & Hood, 2014; Lee & Gelman, 2022; Pesowski & Friedman, 2015, 2016, 2018, 2019; Pesowski et al., 2022). Indeed, the extended-self hypothesis (Belk, 1988) suggests that humans may reason about certain owned objects as extensions of the owners; consequently, the owners and the owned objects are part of the same conceptual space. Moreover, even in the absence of sophisticated theories of ownership, owners and owned objects are frequently associated with each other. Thus, evidence that children and adults metonymically extend proper names to owned objects might suggest that some kind of preexisting conceptual information (e.g., higher-level conceptual knowledge or lower-level associations) guides their acquisition of semantic generalizations.

Moreover, while previous research suggests that children struggle to understand non-literal language (e.g., Winner et al., 1976, 1980), more recent work shows that preschoolers can already produce and understand various kinds of non-literal language, such as metaphors and metonyms (Falkum et al., 2017; Pouscoulous & Tomasello, 2020; Zhu, 2021). The current research contributes to this growing body of literature on children's early-emerging capacity to use non-literal language, by showing that children understand novel metonyms that are not conventionally expressed in their everyday language.

In the current paper, we present three preregistered experiments demonstrating that children and adults metonymically extend proper names to owned objects, and thus provide evidence that English-speaking children and adults can readily generate regular linguistic patterns that are not found in their everyday language. In Experiment 1, we demonstrated that 5- and 6-year-olds and adults metonymically extend proper names to owned objects over duplicates. In Experiment 2, we conceptually replicated the results of Experiment 1 by demonstrating that 5- and 6-year-olds and adults metonymically extend proper names to owned objects over borrowed objects. In Experiment 3, we showed that 4-year-olds also metonymically extend proper names to owned objects over borrowed objects. Overall, these data show that children and adults can acquire new semantic generalizations, even in the absence of prior linguistic experience.

EXPERIMENT 1

In Experiment 1, we created an online version of Hood and Bloom's (2008) "copying machine", which presented participants with an original object belonging to a person and a perceptually identical duplicate of the object. Hood and Bloom (2008) introduced 6-year-olds to a scenario involving personal possessions of Queen Elizabeth II (e.g., a cup) and perceptually identical copies of those objects. They found that school-age children judged an original object belonging to Queen Elizabeth as more valuable than a duplicate. Similarly, previous research shows that adults value authentic, original objects (Frazier et al., 2009; Newman & Bloom, 2012). Thus, in the current experiment, we investigate whether children and adults are also more likely to metonymically extend a royal person's name to the owned object than the duplicate.

While previous research suggests that children acquire semantic generalizations, such as producer–product metonymy, at 4 years (e.g., Zhu, 2021), Hood and Bloom's (2008) research on children's sensitivity to the causal-historical origins of objects was conducted with 6-year-olds. Consequently, we chose to test an older age

range (i.e., 5- and 6-year-olds) in the current experiment's child sample. Like Hood and Bloom's (2008) paradigm, our paradigm also used scenarios with famous royals, albeit using novel names (e.g., *Inglepim*) rather than familiar names (e.g., *Elizabeth*). By using novel names, we ensured that children and adults did not have previous linguistic experience with the proper names involved in the experiment.

Methods

Participants

We tested 40 5- to 6-year-olds (M = 6.22 years; SD = 0.56 years; range = 5.09–6.97 years; 19 females) and 40 adults (M = 22.31 years; SD = 4.79 years; range = 18.20–41.37 years; 32 females). Since this series of experiments investigated whether participants could acquire a semantic generalization (i.e., owner–owned object metonymy) not found in their everyday language (i.e., English), all experiments involved only participants who spoke and heard predominantly English (i.e., more than 50% of the time). Researchers tested an additional child, whose data were excluded due to technical difficulties. In all experiments, children were recruited from a participant database and adults were recruited from a university campus, and reflected local convenience samples drawn from the San Francisco Bay Area. Child participants were White (50%), Asian (25%), mixed White-Asian (15%), Latina (5%), mixed Black-Asian (2.5%), or Black (2.5%). Adult participants were Asian (47.5%), White (27.5%), Latina (17.5%), or mixed White–Asian (7.5%). Children were tested from January through March 2021, and adults were tested from July to September 2021.

In all experiments, we adhered to a preregistered stopping rule of 40 participants per condition. This sample size gave us approximately 80% power to detect a moderate effect size ($d = 0.5$), and is larger than the sample sizes used in previous experiments on children's acquisition of semantic generalizations (i.e., Srinivasan et al., 2017, 2019; Zhu, 2021). Preregistration for all experiments can be found on the Open Science Framework (https://osf.io/yj9ht/). All experiments reported in this paper were approved by the university's Committee for the Protection of Human Subjects. All adult participants and parents of child participants provided informed consent.

Stimuli and procedure

In all experiments, participants were tested over Zoom using either a tablet or computer. We presented participants with short vignettes involving a "copying machine" that created duplicates of objects (Hood & Bloom, 2008). An experimenter introduced the task by saying, "In this game, I'm going to tell you a story about my friend Pamee. This is Pamee! One day, Pamee sees a very cool purple copying machine. Look what the purple machine can do!" Pamee remained on-screen throughout the experiment (i.e., during the warm-up and test trials). The copying machine was a purple conveyor belt.

Warm-up trials

The experimenter presented two warm-up trials to demonstrate how the copying machine worked. In one of the warm-up trials, a lightbulb appeared on the left side of the conveyor belt as the experimenter said, "Look, a lightbulb!" An opaque purple box from the top of the conveyor machine came down and covered the lightbulb. Then, leaving the original lightbulb in its place, the opaque purple box moved to the right side of the conveyor belt. When the opaque purple box went up again, it revealed a duplicate of the lightbulb on the right side of the conveyor belt. The experimenter said, "Wow! The purple copying machine copied the lightbulb!" In another warm-up trial, a donut appeared on the right side of the conveyor belt. The donut was copied in a similar fashion, except the original object was on the right side of the conveyor belt and the duplicate was on the left side of the conveyor belt. The order of presentation for the two trials was counterbalanced across subjects.

Test trials

The experimenter introduced the test trials by saying, "Now that you know how the purple copying machine works, let's watch it copy some more things owned by famous royals. I'm going to ask you some questions too!" On each trial, the experimenter introduced an object owned by a famous royal (e.g., "Look, a teapot! A very famous queen, called Queen Inglepim, owns this teapot."), located on one side of the conveyor belt. The participants then saw the conveyor belt create a duplicate of the original object, located on the other side of the conveyor belt. The experimenter noted the creation of the duplicate (e.g., "Wow! The purple copying machine made a copy of Queen Inglepim's teapot!"). Finally, the experimenter introduced the novel metonym (e.g., "Pamee says, "Wow, an Inglepim!" Which teapot is an Inglepim? Is it the old one or the new one?"). There were four trials total, involving royals with novel names and different objects (i.e., Queen Inglepim's teapot, King Zazapa's clock, Prince Queshkovo's pen, and Princess Klenubar's cup). Across the trials, we counterbalanced whether the original object initially appeared on the left or the right side of the conveyor belt. See Figure 1 for a test trial example.

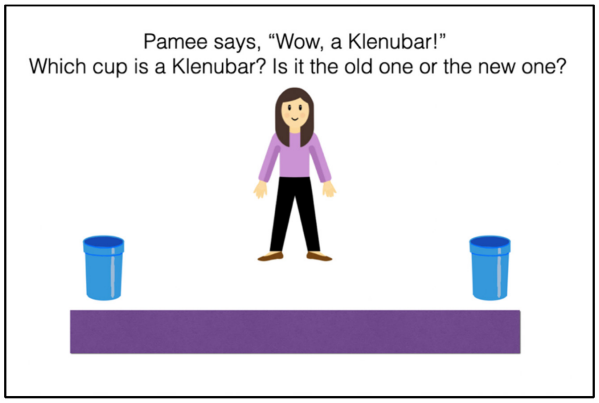

FIGURE 1 Example of the test trial from Experiment 1. Pamee sees Princess Klenubar's original cup ("the old one") and a duplicate of the cup made by the copying machine ("the new one") and makes a metonymic utterance ("Wow, a Klenubar!").

Explanation

On the final trial, the experimenter asked participants for an explanation (e.g., if the participant selected the old teapot, the experimenter asked, "Why did you think the old teapot was an Inglepim?").

Results and discussion

Test trials

In the following analyses, the dependent variable was the proportion of original object—as opposed to duplicate—choices. First, we conducted two preregistered analyses to investigate whether children and adults were more likely to metonymically extend the royal person's name (e.g., *Inglepim*) to the original owned object (e.g., Queen Inglepim's teapot) over the duplicate (e.g., a perceptually identical teapot). We found that 5- and 6-year-olds were significantly more likely to metonymically extend the proper name to the original object over the duplicate, $M = 60.00\%$, $SE = 4.63\%$, $t(39) = 2.16$, $d = 0.34$, $p = .04$ (both corrected and uncorrected). Similarly, adults were also significantly more likely to metonymically extend the proper name to the original object over the duplicate, $M = 81.88\%$, $SE = 4.47\%$, $t(39) = 7.12$, $d = 1.13$, $p < .001$ (both corrected and uncorrected). Both children and adults' performance remained statistically significant after correcting for multiple comparisons (Benjamini et al., 2009; Benjamini & Hochberg, 1995).

In further exploratory analyses, we found that adults' responses were significantly different from children's responses, such that adults were significantly more likely to metonymically extend the proper name to the original object, $t(78) = 3.40$, $p = .001$. Within the child sample of 5- and 6-year-olds, there was no relation between age (measured as a continuous variable) and task performance, $\beta = -.01$, $SE = 0.08$, $p = .90$.

Explanations

In additional exploratory analyses, we examined participants' explanations. Each participant provided a single explanation on the final trial, leading to a total of 80 explanations (i.e., 40 adult explanations and 40 child explanations). Explanations were coded blind to participants' performance on the test trials. Explanations were sorted into two categories: Causal-Historical and Non-Causal-Historical. Causal-Historical explanations appealed to (1) ownership information, (2) the originality of the old object, or (3) the non-originality of the new object. Non-Causal-Historical explanations appealed to (1) irrelevant features, such as perceptual properties of the object, (2) the oldness or newness of objects, but without any mention of causal-historical information, or (3) random guessing.

Adults and children provided a variety of Causal-Historical and Non-Causal-Historical explanations. For example, 33 of 40 adults (82.5%) provided Causal-Historical explanations (e.g., "Because that's the original one, the other one is just a copy"; "Because it belonged to the royal person named so it would be named after them"; "In making a copy of a pen to another pen, it's simply a pen, but what makes the original one a Queshkovo is the attributes of ownership … because only the physical copy is recreated, not the connotation that people put on to the object") and 7 of 40 adults (17.5%) provided Non-Causal-Historical explanations (e.g., "I was looking at the direction of how the purple box moved"; "I'm honestly just guessing"). Thirteen of 40 children (32.5%) provided Causal-Historical explanations (e.g., "Because it belongs to the princess"; "The old one is sort of like the original one"; "The new one is fake"; "Because the new one was made by something else") and 27 of 40 children (67.5%) provided Non-Causal-Historical explanations (e.g., "They're both the same so I can choose either one"; "If it's old I think it will work well"; "There's tea inside"; "I don't get it"). Intercoder reliability was 87.5%, converging on the same category for 70 of 80 explanations. The categorization of the remaining 10 explanations was resolved through discussion.

The adults who provided Causal-Historical explanations metonymically extended the proper names to the original objects over the duplicates at significantly above chance levels,$M = 89\%$, $SE = 3.93\%$, $t(32) = 10.03$, $p < .001$ (both corrected and uncorrected). In contrast, the adults who provided Non-Causal-Historical explanations performed at chance levels, $M = 46\%$, $SE = 10.10\%$, $t(6) = 0.35$, $p = .74$ (both corrected and uncorrected). Adults who provided Causal-Historical explanations were more significantly more likely to metonymically extend the proper names to the owned objects than adults who provided Non-Causal-Historical explanations, $t(38) = 4.44$, $p < .001$ (both corrected and uncorrected). Similarly, the children who provided Causal-Historical explanations

metonymically extended the proper names to the original objects over the duplicates at significantly above chance levels, M = 73%, SE = 9.16%, $t(12) = 2.52$, $p = .03$ uncorrected ($p = .05$ corrected), whereas the children who provided Non-Causal-Historical explanations performed at chance levels, M = 53%, SE = 6.23%, $t(26) = 0.75$, $p = .46$ uncorrected ($p = .55$ corrected). Children who provided Causal-Historical explanations were more significantly more likely to metonymically extend the proper names to the owned objects than children who provided Non-Causal-Historical explanations, $t(38) = 2.04$, $p = .05$ uncorrected ($p = .07$ corrected). After correcting for multiple comparisons (Benjamini et al., 2009; Benjamini & Hochberg, 1995), the results from adult participants, but not from the results from the child participants, remained statistically significant.

In summary, Experiment 1 demonstrates that adults and children metonymically extend proper names to original owned objects over perceptually identical duplicates. Moreover, most adults and some children provide explanations appealing to the causal-historical features of the objects when justifying their responses. Thus, Experiment 1 provides initial evidence that prior linguistic experience is not necessary for the acquisition and use of semantic generalizations.

EXPERIMENT 2

Experiment 1 showed that English-speaking adults and 5- and 6-year-olds metonymically extend a proper name to an owned object over an identical duplicate, despite the fact that owner–owned object metonymy is not a semantic generalization found in their everyday language. However, while participants in Experiment 1 metonymically extended the proper name to the owned object above chance levels, both adults and children were not at ceiling. Adults chose the owned object over the duplicate on 82% of trials, while children chose the owned object over the duplicate on 60% of trials. Moreover, while most adults in Experiment 1 appealed to the object's causal-historical features in their explanations by referencing ownership or originality information, children's explanations were more mixed. These statistically significant but below-ceiling responses may be attributed to subtlety or ambiguity in Experiment 1's paradigm. Hood and Bloom's (2008) original experiment found a sensitivity to owned objects versus perceptually identically duplicates in 6-year-olds, though other research with different—and perhaps less subtle—paradigms show a sensitivity to causal-historical information emerging years earlier (Gelman et al., 2012, 2016; Gelman & Davidson, 2016). Moreover, under theories involving the transmission of essences from people to objects (e.g., Gelman et al., 2015; Newman & Bloom, 2014), Experiment 1's paradigm may have presented some ambiguity: while the owner's essence clearly extended to the owned object, it may have been ambiguous as to whether the owner's essence was also transferred to the duplicate.

Thus, in Experiment 2, we use a new paradigm that conveys ownership information more directly: we explicitly tell participants which object belongs to the person (i.e., an owned object) and which object belongs to someone else (i.e., a borrowed object). Thus, the owner's essence clearly extends to the owned object but not to the borrowed object. In Experiment 2, the relevant ownership information is repeated multiple times throughout the trial, in contrast to Experiment 1, in which the relevant ownership information is stated only once at the beginning of the trial. We investigate whether, in this more direct paradigm, adults and children still use causal-historical information to guide their metonymic extensions (i.e., by extending proper names to owned objects).

Moreover, in Experiment 1, it is possible that children and adults succeed using an alternative strategy orthogonal to ownership information. Specifically, children and adults might succeed on the task by simply selecting the objects that are mentioned first, or more frequently, in the vignettes. Experiment 2 rules out this alternative strategy by counterbalancing whether the owned objects or borrowed objects are presented first, and mentioning the owned and borrowed objects equally frequently.

Methods

Participants

We tested 40 5- to 6-year-olds (M = 5.83 years; SD = 0.60 years; range = 5.01–6.95 years; 18 females) and 40 adults (M = 23.89 years; SD = 8.49 years; range = 19.06–52.81 years; 27 females) over Zoom. All participants spoke and heard predominantly English (i.e., more than 50% of the time), except for one 6-year-old who was trilingual (35% English, 35% Chinese, and 30% Russian). Researchers tested two additional children, whose data were excluded due to technical difficulties (one child) and experimenter error (one child). Child participants were White (65%), mixed White–Asian (12.5%), Asian (10%), Latina (10%), or mixed Black–Asian (2.5%). Adult participants were Asian (42.5%), White (32.5%), Latina (17.5%), mixed White–Asian (5%), or mixed White–Black (2.5%). Children were tested from March to July 2021, and adults were tested from June to July 2021.

Stimuli and procedure

Over Zoom, we presented participants with four short vignettes, using the same novel names as in Experiment 1 (i.e., *Zazapa*, *Klenubar*, *Inglepim*, and *Queshkovo*). The experimenter introduced the task by saying,

"In this game, I'm going to tell you a story about my friend Pamee. This is Pamee!"

Test trials

On each trial, Pamee met a new person who played with their own toys and their friends' toys. The experimenter introduced the character (e.g., "One day, Pamee meets someone called Zazapa. This is Zazapa!"). Then, the experimenter introduced toys of a particular color, belonging to the person (e.g., "Sometimes Zazapa plays with his *own* toys. See these red toys? These red toys belong to Zazapa!"), and other toys of a different color, belonging to the friend (e.g., "Sometimes Zazapa plays with his *friend's* toys. See these blue toys? These blue toys belong to Zazapa's friend!").

At the end of each trial, Pamee saw two toys that were identical on all dimensions except color, which marked the toy as either belonging to the person (e.g., a red toy belonging to Zazapa) or their friend (e.g., a blue toy belonging to Zazapa's friend). The experimenter prompted participants with a metonym (e.g., Pamee sees the toys and says, "Wow, a Zazapa! Which toy is a Zazapa? Is it the red toy or the blue toy?") and participants provided a verbal response (e.g., saying, "the red one"). The experimenter did not provide feedback. See Figure 2 for a test trial example.

Within participants, we counterbalanced the order in which the person's own toys and the friend's toys were mentioned, across the four trials. Thus, for each participant, the person's own toys were mentioned first on half of the trials, and the friend's toys were mentioned first on the other half of the trials. Additionally, within participants, we counterbalanced whether the person's own toy appeared on the left or the right side of the screen. Across participants, we also counterbalanced the color of the toys (e.g., such that half the participants heard that the person's toy was red and the friend's toy as blue, and the other half of the participants heard that the person's toy was blue and the friend's toy was red).

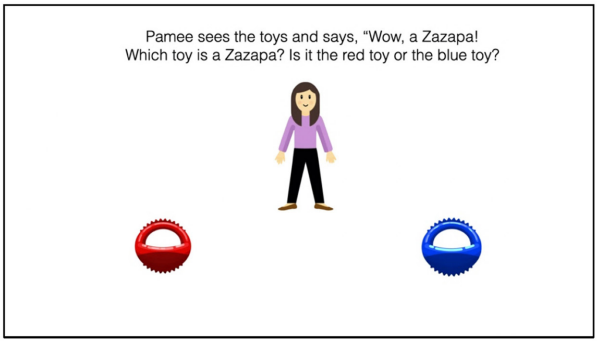

FIGURE 2 Example of the test trial from Experiment 2. Pamee sees Zazapa's toy and Zazapa's friend's toy and makes a metonymic utterance ("Wow, a Zazapa!").

Attention check

On the final trial, the experimenter asked participants which toy belonged to the person in question (e.g., "Can you remind me which toy belonged to Zazapa? Was it the red toy or the blue toy?") and which toy belonged to the friend (e.g., "Can you remind me which toy belonged to Zazapa's friend? Was it the red toy or the blue toy?").

Explanation

After the attention checks, the experimenter asked participants for an explanation to justify their response on the final trial (e.g., if the participant selected the red toy as a Zazapa, the experimenter asked, "Why did you think the red toy was a Zazapa?").

Results and discussion

Attention checks

One hundred percent of adult participants passed both attention checks, by successfully identifying which toy belonged to the person in the story (e.g., Zazapa) and which toy belonged to the friend (e.g., Zazapa's friend). Eighty percent of 5- and 6-year-olds (32 of 40 children) also passed both attention checks. Of the children who failed the attention checks, 12.5% (5 of 40 children) failed to correctly identify both the person's toy and the friend's toy, 5% (2 of 40 children) failed to correctly identify the friend's toy, and 2.5% (1 of 40 children) failed to identify the person's toy. We conduct analyses with the entire sample of 5- and 6-year-olds ($n=40$), as well as the subset of 5- and 6-year-olds who passed both attention checks ($n=32$). The analyses with the entire child sample was preregistered, whereas the analyses with only the subset of children who passed the attention checks was exploratory.

Test trials

In the following analyses, the dependent variable was the proportion of metonymic extensions to the person's own toy, as opposed to the friend's toy. First, we conducted two preregistered analyses to investigate whether children and adults were more likely to metonymically extend the person's name (e.g., *Zazapa*) to the person's own possession (e.g., Zazapa's toy) over the friend's possession (e.g., Zazapa's friend's toy). Adults were significantly more likely to metonymically extend the person's name to the person's own toy over the friend's toy, $M=96.25\%$, $SE=1.69\%$, $t(39)=27.42$, $d=4.34$, $p<.001$ (both corrected and uncorrected). As an entire sample, children were significantly more likely to metonymically extend the

person's name to the person's own toy over the friend's toy, M = 84.38%, SE = 3.97%, $t(39) = 8.65$, $d = 1.37$, $p < .001$ (both corrected and uncorrected). Additionally, in an exploratory analysis, the subset of children who passed both attention checks were significantly more likely to metonymically extend the person's name to the person's own toy over the friend's toy, M = 86.72%, SE = 3.55%, $t(31) = 10.35$, $d = 1.83$, $p < .001$ (both corrected and uncorrected). Children's and adults' responses remained significant after correcting for multiple comparisons (Benjamini et al., 2009; Benjamini & Hochberg, 1995).

In further exploratory analyses, we investigated whether participants' responses differed between Experiment 1 (i.e., a paradigm that conveys ownership information in a relatively subtle manner) and Experiment 2 (i.e., a paradigm that conveys ownership information directly and repeatedly). Adults were significantly more likely to metonymically extend the proper name to the owned object in Experiment 2, $t(78) = 3.01$, $p = .004$. There were also significant differences in performance between Experiment 1 and Experiment 2 in the entire child sample, $t(78) = 3.99$, $p < .001$, and in the subset of children who passed the attention checks, $t(70) = 4.40$, $p < .001$, such that performance on the task was stronger in Experiment 2 than in Experiment 1.

In additional exploratory analyses, we found that adults' responses were significantly different from the entire sample of children's responses, such that adults were significantly more likely to metonymically extend the proper name to the owned object, $t(78) = 2.75$, $p = .007$. Similarly, adults were significantly more likely to metonymically extend the proper name to the owned object, when compared to only children who passed the attention check, $t(70) = 2.59$, $p = .01$. Within the entire child sample of 5- and 6-year-olds, there was no relation between age (measured as a continuous variable) and task performance, $\beta = -.03$, SE = 0.07, $p = .67$. Similarly, there was no evidence of a relation between age and task performance in the subset of 5- and 6-year-olds who passed the attention checks, $\beta = .03$, SE = 0.06, $p = .64$.

Explanations

In exploratory analyses, we examined participants' explanations. Each participant provided a single explanation on the final trial, leading to a total of 80 explanations total (i.e., 40 adult explanations and 40 child explanations). Explanations were coded blind to participants' performance on the test trials. Explanations were sorted into two categories: Causal-Historical and Non-Causal-Historical. Causal-Historical explanations appealed directly to ownership information, whereas Non-Causal-Historical explanations appealed to irrelevant features of the object (e.g., the color of the toys) or the person (e.g., an individual preference), or random guessing.

Adults and children provided a variety of Causal-Historical and Non-Causal-Historical explanations. Thirty-six of 40 adults (90%) provided Causal-Historical explanations (e.g., "I assume that people name their toys after themselves"; "It's a toy that belongs to Inglepim so Pamee calls it an Inglepim"), while only 4 of 40 adults (10%) provided Non-Causal-Historical explanations (e.g., "Because you said so"; "Because the slide said so"). In the entire child sample, 10 of 40 children (25%) provided Causal-Historical explanations (e.g., "Because the girl that it belongs to is named Inglepim"; "Because it was his toy and his mom and dad gave it to him") and 30 of 40 children (75%) provided Non-Causal-Historical explanations (e.g., "Because he wanted it"; "Because I remember"; "Because Klenubar likes green"). In the subset of children who passed both attention checks, 10 of 32 children (31.25%) provided Causal-Historical explanations and 22 of 32 children (68.75%) provided Non-Causal-Historical explanations. Intercoder reliability was 97.5%, converging on the same category for 78 of 80 explanations. The categorization of the remaining two explanations was resolved through discussion.

The adults who provided Causal-Historical explanations metonymically extended the proper names to the owned object over the borrowed object at significantly above chance levels, M = 97%, SE = 1.33%, $t(35) = 35.56$, $p < .001$ (both corrected and uncorrected). In contrast, the adults who provided Non-Causal-Historical explanations performed at chance levels, M = 87.5%, SE = 12.5%, $t(3) = 3.00$, $p = .06$ uncorrected ($p = .09$ corrected), though this non-significant result may be due largely to the small sample size of Non-Causal-Historical adult explainers ($n = 4$). However, the difference between these two groups was not significant, $t(38) = 1.78$, $p = .08$ uncorrected ($p = .11$ corrected). In the entire sample of child participants, the children who provided Causal-Historical explanations metonymically extended the proper names to the owned objects over borrowed objects at significantly above chance levels, M = 90%, SE = 4.08%, $t(9) = 9.80$, $p < .001$ (both corrected and uncorrected). The children who provided Non-Causal-Historical explanations also metonymically extended the proper names to the owned objects over borrowed objects at significantly above chance levels, M = 82.5%, SE = 5.11%, $t(29) = 6.36$, $p < .001$ (both corrected and uncorrected). There was no difference in performance between the children who provided Causal-Historical explanations and the children who provided Non-Causal-Historical explanations, $t(38) = 0.81$, $p = .42$ uncorrected ($p = .47$ corrected). These results remained identical when analyzing the responses of only children who passed the attention checks: the children who provided Causal-Historical explanations metonymically extended the proper names to the owned objects over borrowed objects at significantly above chance levels, M = 90%, SE = 4.08%, $t(9) = 9.80$, $p < .001$ (both corrected and uncorrected), and the children who provided Non-Causal-Historical explanations also metonymically extended the proper names to

the owned objects over borrowed objects at significantly above chance levels, M = 85%, SE = 4.84%, $t(21) = 0.7.28$, $p < .001$ (both corrected and uncorrected). Examining only the subset of children who passed the attention check, there was once again no difference in performance between the children who provided Causal-Historical explanations and the children who provided Non-Causal-Historical explanations, $t(30) = 0.62$, $p = .54$ (both corrected and uncorrected). All significant results remained significant after correcting for multiple comparisons (Benjamini et al., 2009; Benjamini & Hochberg, 1995).

In summary, Experiment 2's results conceptually replicated Experiment 1's results by demonstrating that adults and children metonymically extend proper names to owned objects. This tendency to metonymically extend proper names to objects based on ownership information increased in Experiment 2 relative to Experiment 1, possibly because Experiment 2 used a more direct experimental paradigm that mentioned ownership information repeatedly. Additionally, some children (i.e., approximately a quarter of all children, and a third of the subset of children who passed the attention checks) justified their responses by explicitly appealing to causal-historical ownership information (e.g., "It belonged to Zazapa").

EXPERIMENT 3

Experiments 1 and 2 show that adults and 5- and 6-year-olds metonymically extend proper names to owned objects. We chose the conduct the initial studies with 5- and 6-year-olds to match the age of child participants in Hood and Bloom's (2008) original copying machine experiment. However, previous research has demonstrated that children acquire regular semantic generalizations around 4 years, though not earlier (Srinivasan et al., 2017, 2019). Moreover, 4-year-olds have a clear understanding of basic causal relations (Schulz & Gopnik, 2004; Sobel & Kirkham, 2006) and ownership information (Gelman et al., 2012). Preschoolers can also use information about the causal-historical path of an object to make additional inferences, for example that objects with famous histories belong in museums (Frazier & Gelman, 2009). Thus, given that 4-year-olds are sensitive to semantic generalizations and ownership information, Experiment 3 investigates whether 4-year-olds will also metonymically extend people's names to owned objects over borrowed objects.

Methods

Participants

We tested 40 4-year-olds (M = 4.61 years; SD = 0.25 years; range = 4.04–4.99 years; 17 females) over Zoom. All participants spoke and heard predominantly English (i.e., more than 50% of the time). Participants were White (47.5%), mixed White–Asian (17.5%), Asian (15%), Latina (12.5%), mixed Black–Latina (5%), or mixed White–Middle Eastern (2.5%). Children were tested from July to October 2021.

Stimuli and procedure

The experimental procedure of Experiment 3 was identical to the experimental procedure of Experiment 2.

Results and discussion

Attention checks

Sixty-five percent of 4-year-olds (26 of 40 children) passed both attention checks. Of the 4-year-olds who failed the attention checks, 22.5% (9 of 40 children) failed to correctly identify both the person's toy and the friend's toy, 5% (2 of 40 children) failed to correctly identify the friend's toy, and 7.5% (3 of 40 children) failed to identify the person's toy. We conduct analyses with the entire sample of 4-year-olds ($n = 40$), as well as the subset of 4-year-olds who passed both attention checks ($n = 26$). The analyses with the entire sample was preregistered, whereas the analyses with only the subset of children who passed the attention checks was exploratory.

Test trials

Similar to the analyses in Experiment 2, the dependent variable in Experiment 3 was the proportion of metonymic extensions to the person's own toy over the friend's toy. First, we conducted a preregistered analysis to investigate whether 4-year-olds were more likely to metonymically extend the person's name (e.g., *Zazapa*) to the person's own possession (e.g., Zazapa's toy) over the friend's possession (e.g., Zazapa's friend's toy). We find that, as an entire sample, 4-year-olds were significantly more likely to metonymically extend the person's name to the person's own toy over the friend's toy, M = 63.75%, SE = 5.06%, $t(39) = 2.72$, $d = 0.43$, $p = .01$ (both corrected and uncorrected). Additionally, the subset of children who passed both attention checks were also significantly more likely to metonymically extend the person's name to the person's own toy over the friend's toy, M = 75.96%, SE = 5.09%, $t(25) = 5.10$, $d = 1.00$, $p < .001$ (both corrected and uncorrected). These analyses remained statistically significant after correcting for multiple comparisons (Benjamini et al., 2009; Benjamini & Hochberg, 1995).

In exploratory analyses, we also investigated whether performance on the task changed with age (measured as a continuous variable). Within the entire sample of

4-year-olds, there was no relation between age and task performance, $\beta = .024$, SE = 0.20, $p = .24$. Similarly, there was no evidence of a relation between age and task performance in the subset of 4-year-olds who passed the attention checks, $\beta = .22$, SE = 0.20, $p = .28$. Aggregating the entire sample of 5- and 6-year-olds from Experiment 2 and the entire sample of 4-year-olds from Experiment 3, there was a significant relation between age and task performance, $\beta = .13$, SE = 0.04, $p = .003$. However, this relation between age and task performance did not remain significant in the subset of 4-, 5-, and 6-year-olds who passed the attention checks, $\beta = .07$, SE = 0.04, $p = .06$.

Explanations

In exploratory analyses, we examined 4-year-olds' explanations. Using the same coding scheme as Experiment 2, we found that 4-year-olds mostly provided Non-Causal-Historical explanations, though some 4-year-olds also provided Causal-Historical explanations. In the entire sample, 7 of 40 children (17.5%) provided Causal-Historical explanations (e.g., "Because I remembered that it was Queshkovo's"; "Because it was hers") and 33 of 40 children (82.5%) provided Non-Causal-Historical explanations (e.g., "Because it was a triangle"; "Because she likes orange"; "I don't remember"). In the subset of 4-year-olds who passed both attention checks, 5 of 26 children (19.23%) provided Causal-Historical explanations and 21 of 26 children (80.77%) provided Non-Causal-Historical explanations. Intercoder reliability was 100%, converging on the same category for 40 of 40 explanations.

In the entire sample, 4-year-olds who provided Causal-Historical explanations selected between owned objects and borrowed objects at chance levels, M = 50%, SE = 15.43%, $t(6) = 0$, $p = 1.00$ (both corrected and uncorrected). The children who provided Non-Causal-Historical explanations metonymically extended the proper names to the owned objects over borrowed objects at significantly above chance levels, M = 67%, SE = 5.18%, $t(32) = 3.22$, $p = .003$ uncorrected ($p = .009$ corrected). However, there was no difference in performance between the children who provided Causal-Historical explanations and the children who provided Non-Causal-Historical explanations, $t(38) = 0.1.26$, $p = .22$ uncorrected ($p = .43$ corrected). These results remained consistent when analyzing only the responses of the subset of children who passed both attention checks: the children who provided Causal-Historical explanations selected between owned objects and borrowed objects at chance levels, M = 65%, SE = 16.96%, $t(4) = 0.88$, $p = .43$ uncorrected ($p = .52$ corrected), while the children who provided Non-Causal-Historical explanations metonymically extended the proper names to the owned objects over borrowed objects at significantly above chance levels, M = 78.57%, SE = 4.97%, $t(20) = 5.75$, $p < .001$ (both corrected and uncorrected). Within the subset of 4-year-olds who passed both attention checks, there was once again no difference in performance between the children who provided Causal-Historical explanations and the children who provided Non-Causal-Historical explanations, $t(24) = 1.05$, $p = .30$ uncorrected ($p = .45$ corrected). All significant results remained significant after correcting for multiple comparisons (Benjamini et al., 2009; Benjamini & Hochberg, 1995).

Thus, Experiment 3 shows that 4-year-olds can also metonymically extend proper names to owned objects. Consequently, Experiment 3's findings are consistent with previous results showing that sensitivity to regular semantic generalizations occurs around 4 years (Srinivasan et al., 2017; Srinivasan et al., 2019). Moreover, Experiment 3 shows that 4-year-olds also have default interpretations of novel metonyms (i.e., extending a proper name to an owned object over a borrowed object). Experiment 3's results suggest that English-speaking children are young as 4 years of age can generate semantic generalizations that are not found in their everyday language.

GENERAL DISCUSSION

The present experiments provide positive evidence for a conceptual account of the acquisition of semantic generalizations. In multiple preregistered experiments, we demonstrated that English-speaking children and adults metonymically extended proper names to owned objects over duplicates (Experiment 1) and borrowed objects (Experiments 2 and 3), despite the fact that owner-–owned object metonymy is not conventionally expressed in their everyday language. These findings suggest that children and adults can reliably understand novel metonymic extensions without prior experience. Consequently, sophisticated conceptual structures, in this case the privileged causal-historical relation between an owner and an owned object (Kangiesser & Hood, 2014; Lee & Gelman, 2022), or even lower-level conceptual associations, may guide the acquisition of regular metonymic patterns. Moreover, linguistic experience with specific exemplars may *not* be necessary for the acquisition of other kinds of semantic generalizations either.

In addition to metonymically extending owners' names to owned objects, most adults appealed to causal-historical information in their explanations. An adult participant in Experiment 1 explained, "If you make a copy of something you're getting farther away from the essence of the thing, so what is more essentially *Inglepim* is the original". Similarly, an adult participant in Experiment 2 explained that they "thought that the blue toy was representative of him because it was his toy". These kinds of explanations are consistent with previous work on folk theories of artifacts, specifically

with the intuition that objects are part of an "extended self" (Belk, 1988). Indeed, people may transmit an "individual essence" into specific artifacts (e.g., Newman et al., 2014). Adults' explanations suggested that a conceptual sensitivity to the causal-historical features of objects guided their metonymic extensions in the current experiment.

Preschoolers sometimes have difficulty providing responses to open-ended questions, and thus preschoolers' explanations were more mixed than adults' explanations. Our preregistrations noted the exploratory nature of any explanation analyses, given that preschoolers sometimes struggle to generate sensible explanations. It is impressive that in all experiments, at least some children generated explanations that appealed to the causal-historical features of objects. This is consistent with previous research showing that preschoolers can provide ownership explanations in some experimental paradigms, from age 4 onwards (Nancekivell & Friedman, 2014, 2017). However, preschoolers' mixed explanations suggest that they might be using various kinds of information (e.g., higher-level ownership theories or lower-level associations) to generate their metonymic extensions. While the present research establishes that preschoolers *can* acquire semantic generalizations not found in their everyday language, future research might further investigate the exact mechanisms (e.g., ownership theories, associations, or both) that underlie this acquisition.

It is worth noting that adults were significantly more likely to extend the owners' names to the owned objects, relative to children. Adults' superior performance to children in the present tasks might be attributed to developmental changes in executive function and domain-general cognitive abilities (Carriedo et al., 2016; Menashe et al., 2020), rather than to developmental changes in the acquisition of semantic generalizations. Additionally, differences in task performance between children and adults may also be related to adults' more advanced understanding of ownership. While children's capacity to understand ownership emerges early in development, a full-fledged, adult-like capacity of ownership develops over the course of many years. For example, while 2-year-olds appreciate their own ownership rights (Kangiesser & Hood, 2014; Ross, 2013), and may even show some unwillingness to take others' resources (Pesowski et al., 2019), it is not until 3 years of age that children protest when others' ownership rights are violated (Rossano et al., 2011). Moreover, the kinds of ownership inferences that children can make also continues to develop in early childhood. For example, 5-year-olds, but not younger children, can infer that someone who knows less accessible information about an object is more likely to be owner of the object than someone who knows more accessible information about the object (Nancekivell et al., 2020). Indeed, while adults provided sophisticated ownership explanations to justify their metonymic extensions, children's explanations were more mixed and might suggest that children relied on both theories of ownership and more basic associations to generate their metonymic extensions. Thus, it is worth noting that adults' more accurate responses may be due to better domain-general cognitive abilities, a more sophisticated understanding of ownership, or both. Overall, it is impressive that children's ability to metonymically extend owners' names to owned objects is already present by at least 4 years of age, and may continue to develop across ontogenesis.

Additionally, one might wonder why owner–owned object metonymy does not already exist as a regular pattern in English, given that children and adults are sensitive to ownership information. One possibility is that there is limit to the number of regular semantic generalizations allowable in a given natural language, because too many overlapping semantic generalizations may become difficult to understand. For example, in English, proper names only regularly metonymically refer to created products (i.e., producer–product metonymy). If English allowed for other kinds of regular semantic generalizations involving proper names and causal relations (e.g., owner–owned object) in addition to producer–product metonymy, metonymic utterances may become challenging to interpret (e.g., "I'm reading *Hemingway*" could refer to either a book owned or written by Ernest Hemingway). Indeed, Srinivasan and Rabagliati (2015) have proposed a "conventions constrained by concepts" model of semantic generalizations: arbitrary linguistic conventions can be learned (i.e., a given language may select only one of many conceptually similar semantic generalizations to adopt), but conceptual structures make some semantic generalizations substantially easier to grasp (i.e., semantic generalizations with underlying privileged conceptual structure are easier to learn and understand than semantic generalizations without underlying privileged conceptual structure). These conceptually relevant and easily grasped semantic generalizations may guide early learning.

Given that the current work relies on US convenience samples, there are limits to the generalizability of our findings. The current experiments suggest that upper-middle-class, English-speaking children can metonymically extend proper names to owned objects. However, future research should investigate whether these findings are consistent across more diverse child populations in the United States and beyond. Given previous research demonstrating that the same semantic generalizations tend to emerge across multiple disparate languages in adult speech (Srinivasan & Rabagliati, 2015), theories that focus on cognitive structures like conceptual knowledge or associations may predict that children who speak primary languages other than English would still show the same tendency to metonymically extend proper names to owned objects. Thus, data from more global contexts may provide additional support for accounts

of the acquisition of semantic generalizations that do not rely on extensive linguistic experience with specific exemplars.

Overall, the current findings contribute to growing bodies of literature in language acquisition and cognitive development. First, these findings provide more empirical insight into the mechanisms that may facilitate children's acquisition of semantic generalizations. Specifically, children can generate regular metonyms that do not follow patterns that they have ever heard in the input. Under this account, cognitive structures such as children's early-emerging conceptual knowledge, or even lower-level associations, may guide their acquisition of semantic generalizations in language. Thus, children can acquire semantic generalizations in language as soon as they acquire the relevant concepts or associations in thought—that is to say, relatively early in development. Moreover, these semantic generalizations may be a useful word learning mechanism from the preschool years onwards. Second, while previous research may have suggested that children have difficulty with non-literal language, the current work supports new research showing that children possess an early-emerging competence with various kinds of non-literal language (Falkum et al., 2017; Zhu, 2021; Zhu et al., 2020, in press; Zhu & Gopnik, 2023). Indeed, children could reliably understand a novel kind of metonymic extension that is not found in their everyday language. Thus, the current findings provide further evidence that children can understand non-literal language early in development.

Overall, this research contributes to a growing body of literature demonstrating preschoolers' competence with various kinds of semantic generalizations, and provides positive evidence that extensive prior linguistic experience is not necessary for the acquisition of semantic generalizations. Given the early-emerging nature of semantic generalizations, it is possible that these semantic generalizations also facilitate further word learning. The present research also provides more empirical evidence that preschoolers can understand non-literal language.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

ETHICS STATEMENT

All study protocols were approved by the University of California, Berkeley's Committee for Protection of Human Subjects.

DATA AVAILABILITY STATEMENT

The materials necessary to attempt to replicate the findings presented here are not publicly accessible, but are available upon request. The preregistrations, data, and analytic code necessary to reproduce the analyses presented here are publicly accessible at https://osf.io/yj9ht/.

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