

Daxing with a Dax: Evidence of Productive Lexical Structures in Children

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Abstract

In English, many words can be used flexibly to label artifacts, as nouns, or functional uses of those artifacts, as verbs: We can *shovel* snow with a *shovel* and *comb* our hair with a *comb*. Here, we examine whether young children form generalizations about flexibility from early in life and use such generalizations to predict new word meanings. When children learn a new word for an artifact, do they also expect it to label its functional use, and vice versa? In Experiment 1, we show that when four- and five-year-olds are taught a first novel word to label a familiar action—e.g., that *bucking* means shoveling—they exclude the artifact involved in this action—i.e., the shovel—as the meaning of a second novel word (e.g., *gork*). This suggests that children spontaneously expected the first novel word—which referred to the action—to also refer to the artifact. In Experiment 2, we show that this pattern extends to words that label novel actions involving novel artifacts, suggesting that children expect any word for an action to label the artifact that helps carry out that action. Experiment 3 traces how such generalizations may arise in development. In particular, we show that while four- and five-year-olds each expect words to label artifacts and their functional uses, three-year-olds may not.

Keywords: Language acquisition; polysemy; mutual exclusivity; class-extension rules

Introduction

Language gifts us with the resources to innovate in order to express our ideas. One such resource is the potential to flexibly extend words to new meanings (Copestake & Briscoe, 1995; Pustejovsky, 1995). For example, many verbs in English have been formed from nouns (see Clark & Clark, 1979): when we *shovel* the snow, *bike* to school, or *comb* our hair, we describe our actions in terms of the artifacts that help us carry out those actions. Similarly, there are many instances of nouns in English that have been derived from verbs: when we take a long *walk*, use an *eraser*, or cheer for a *wrestler*, we use nouns defined by their corresponding actions. Adult speakers have productive knowledge of these patterns, and can use them in a systematic way to meet communicative demands—e.g., She will *Wikipedia* the answer. But when and how does this generative talent arise?

The present study explores whether productive knowledge of flexibility emerges early in life, and might allow children to predict new word meanings, thereby supporting lexical development. When flexible words, like *shovel*, *bike*, and *comb*,

follow patterns, children could form generalizations about these patterns and spontaneously apply them to novel words. This would promote word learning, because children would only need to learn one phonological form to express multiple meanings. For instance, if children learned the pattern that labels of artifacts can also describe the uses of those artifacts, they could infer that a new artifact name would also apply to the artifact's functional use. Children could form such generalizations early in life, thus facilitating early word learning. This would be especially plausible if patterns of flexibility marked conceptual relations that children find salient, like the relationship between an artifact and its function (Caslet & Kelemen, 2007).

An alternative possibility—borrowing from usage-based theories of language development (e.g., Tomasello, 2003)—is that children only gradually form generalizations about flexibility, instance by instance. By this account, children might initially treat the noun and verb meanings of words like *shovel* and *hammer* as homophones. After this, they would separately represent the relationships between shovel/shovel and hammer/hammer as “islands of flexibility”, prior to uniting them under the same abstract linguistic principle. Critically, on this account, children only form productive generalizations after exposure to many pairs of flexible words, limiting the potential of such generalizations to constrain children's hypotheses about word meaning.

One approach to distinguish between these two possibilities is to explore whether young children spontaneously expect words to be used flexibly: e.g., for words that label tools to also label their functional uses, and vice versa. Although studies have provided evidence that young children comprehend the relationship between flexible nouns and verbs (Berman, 1999; Bushnell & Maratsos, 1984; Lippeveld & Oshima-Takane, 2010), and even produce new ones—e.g., “Don't *broom* my mess” (example from Clark, 1982), they do not provide unequivocal evidence that children *expect* verbs to be formed from nouns.

For example, in one study (Lippeveld & Oshima-Takane, 2010), two- and three-year-old children watched a video in which a bottle opener was used to open a bottle, while a novel noun *vop* was used to refer to the bottle opener—e.g., “This

is a *vop*! Look at what it can do to the bottle!” Later, children were tested on their interpretation of the innovative verb formed from this noun—e.g., children were asked to “find the one that is *voping*.” The three-year-olds (but not the two-year-olds) responded in a way suggesting that they understood the new verb—they looked longer at an action that depicted bottle-opening than a different action. However, it is possible that although children seemed to identify the bottle-opening action as the likely referent of the verb “*voping*,” they may not have *expected* the bottle-opening event to be referred to as *voping*—they may only have formed a verb from *vop* when asked to “find *voping*.” Further, children could have succeeded even without forming a verb from a noun. When children were taught what a *vop* was, they could have initially linked *vop* not just to the bottle-opener but also to the bottle-opening event that it participated in, looking then at that event due to the phonological overlap between *vop* and *voping*.

The present studies address the limitations of previous work by adapting a mutual exclusivity method to probe children’s expectations of how words can be used. In one form of a mutual exclusivity task (e.g., Diesendruck & Markson, 2001), children are presented with two items for which children do not know labels, and are taught that a novel word labels one of those items (e.g., *blicket*). They are then asked to choose the referent of a second novel word (e.g., Give me the *wug*). Children tend to choose the item that has not yet been labeled, excluding the item that already has a label on the grounds that it should not have a second.

Here, we adapt this method to explore whether children expect that a novel verb—e.g., *daxing*—that is taught to refer to an action will also refer, as a noun, to the artifact that helps carry out that action. If so, children should expect that a second novel word—e.g., *blicket*—cannot refer to the artifact, because the first novel word already does. This would be predicted if children have formed productive lexical structures to support flexible uses of verbs as nouns. If, on the other hand, children treat words for actions and words for artifacts as separate lexical items, they should not exclude artifacts as the meanings of the second novel words. Critically, this method probes children’s own expectations about the extension of the novel verb—children are given no evidence that this word can be shifted, as in previous studies.

Using this method, we explore the productivity of the lexical structures three-, four-, and five-year-old children have formed to support corresponding noun and verb pairs. In Experiment 1, we assess whether children treat nominal and verbal uses of familiar words as separate lexical items by examining whether children expect a *novel* word that refers to a *familiar* action—e.g., shoveling—to also refer to the artifact that carries out that action—e.g., a shovel. In Experiment 2, we explore whether this tendency also extends to novel actions performed by novel artifacts. In Experiment 3, we investigate how knowledge of and expectations about flexible words change throughout early development.

Experiment 1

Here, we examine whether children have formed lexical structures to allow familiar words like *shovel* to be extended between their different uses. Using *familiar* words allowed us to test whether children treat existing corresponding noun/verb pairs as *unrelated* lexical items, like homophones such as *bat/bat*. Such a lack of distinction between these two varieties of phonological overlap would be expected according to a usage-based account in the period prior to having formed “islands of flexibility.” Previous studies using a similar method to the one used here have shown that when children learn that a novel word labels one homophone (e.g., that *dax* labels a baseball bat), they do not expect the novel word to also label the other homophone (e.g., an animal bat; Srinivasan & Snedeker, 2011). Thus, we reasoned that if children treat familiar noun and verb meanings as unrelated homophones, they should not expect a novel label for a verb meaning (e.g., *dax* to label hammering) to also label the corresponding noun meaning (e.g., *dax* to label a hammer). In contrast, if familiar noun and verb meanings arise from a common, generative structure, children *should* expect a novel label for the verb meaning to also label the noun meaning.

Methods

Participants The participants were 20 children (7 girls) between the ages of 4;1 and 5;11 ($M = 59$ months). Four additional children participated but were excluded due to missing the initial trials that gauged their understanding of the task (1), for failing to identify any critical noun-verb pairs during the warm-up (1), or because they didn’t want to continue (2). All children were either brought into the lab or recruited from daycares in the San Diego area. All children received a small gift for participating.

Materials and Procedure We used a mutual exclusivity task to examine whether children spontaneously extend novel labels between the noun and verb uses of words like *shovel*. We familiarized the children to the task by first introducing them to a character named Monkey (by showing them a picture of Monkey). We told the children that one special thing about Monkey is that, because he is a Muppet, he speaks a special Muppet language. We told the children that in the game, they would learn some Muppet words.

Each of the trials included a *training phase* and a *judgment phase*. We initiated the training phase of each critical trial by asking the children if they knew the meaning of a novel Muppet verb—e.g., “Sometimes, Monkey likes to *buck* stuff from one place to another. Do you know what *bucking* is?” Having established that the novel verb was an unfamiliar word from Muppet language, we showed them a video in which the novel verb was used to refer to a familiar action. For example, children were shown a video in which Monkey was shoveling sand from a plate into a bowl, while hearing the verb *buck* used to describe the action in a number of ways. Children heard the verb used in the infinitive to refer to what Monkey was going to do (“He’s going to use it to *buck* something into

the bowl”), in the progressive to refer to the action as it was ongoing (“Wow, Monkey’s *bucking* it into the bowl”), and in the past tense to refer the completed action (“Monkey *bucked* some stuff into the bowl”). The video also described how the affordances of the artifact facilitate the action (“What Monkey has is pretty long and it can carry the stuff well”). Critically, children did not receive any evidence that the novel word could refer to the artifact itself (e.g., the shovel).

Immediately following the video, the experimenter initiated the judgment phase of the trial: e.g., “So that’s what *bucking* is. Now we know what *bucking* is. But now, I want the *gork*. Show me the *gork*!” The child was then presented with a slide containing two pictures. The pictures included an instance of (1) the artifact used in the video (e.g., a shovel of a different color) and (2) the patient object/substance that had been acted upon (e.g., a second exemplar of sand). This was to ensure that children were using the novel words to refer to categories, rather than individual tokens. The child’s choice—which they indicated by pointing—was then recorded. We reasoned that if children expect a word for an action to also refer to the artifact that carries out that action, they should exclude the artifact as the referent of the *second* novel word and instead choose the patient. Critically, the English names of artifact and the patient were not provided during the training phase, such that they could each serve as candidate referents of the second novel word (e.g., we referred to the shovel as a “thing” or “what Monkey has,” and referred to the sand as “stuff” or “something”).

Children only received a particular critical item if they had been able to accurately produce the English noun and verb uses related to that particular item in an earlier pre-test (e.g., use *shovel* as both a noun and verb). In the pre-test, we tested children’s knowledge of the critical nouns by showing them pictures of the artifacts and asking them to name them. After testing the critical noun uses, we tested children on the critical verb uses, by showing them pictures of people using those artifacts and asking them to describe what the people were doing. If children did not immediately name these actions, we prompted them—e.g., for the shoveling item: “What is she doing to the sand?” We only accepted responses that used the target artifact verb—e.g., “She’s picking up the sand with a shovel” wasn’t accepted. Children were tested on the noun and verb forms of *comb*, *shovel*, *tape*, *bicycle*, *button*, *brush*, *hammer*, and *lock*.

Before receiving any critical trials, the children received three mutual exclusivity warm-up items to measure children’s ability to make mutual exclusivity judgments when doing so only required shifting a noun between two exemplars of the same type. For example, in one trial, children were taught that *blicket* referred to a book, and then had to choose whether *tima* referred to another book (same-type) or to a CD (different-type). We expected that children would reliably choose the foil item (e.g., the CD) on these trials if they understood the task. Children that did not do so on the first

item were given feedback, but all children had to get two out of three of these items correct without feedback to proceed.

Children also received one foil warm-up trial that required them to choose between two items that were different from the one they were trained on. For example, in one trial, children were taught that *spado* referred to a knife and then had to decide whether a table or chair was the referent of *parma*. These items were included to prevent children from expecting that the first novel word could always be extended to one of the two pictures presented in the judgment phase.

Table 1: Experiment 1 Critical Items.

Training Phase Event	Judgment Phase
<i>Moop</i> (bike) to school	<i>Tima</i> = bike or school
<i>Dax</i> (hammer) nail into wood	<i>Kiv</i> = hammer or nail
<i>Buck</i> (shovel) sand into bowl	<i>Gork</i> = shovel or sand
<i>Tig</i> (brush) hair on head	<i>Lum</i> = brush or hair
<i>Wug</i> (tape) picture to box	<i>Koon</i> = tape or picture
<i>Kraz</i> (lock) box	<i>Bip</i> = lock or box
<i>Lorp</i> (button) sweater	<i>Zot</i> = button or sweater
<i>Jop</i> (comb) hair on head	<i>Raj</i> = comb or hair

After the warm-up items, the children were shown between one and four critical items, depending on how many noun-verb pairs they had produced in the pre-test. These items were administered in a fixed order; see Table 1 for a description of the training and judgment phases of the critical items. On average, children received 3.8 critical items, with 6 tested on *biking*, 19 tested on *hammering*, 9 tested on *shoveling*, 14 tested on *brushing*, 12 tested on *taping*, 2 tested on *locking*, 10 tested on *buttoning*, and 4 tested on *combing*. Because the three mutual exclusivity warm-up trials provided a ceiling measure of children’s ability to make mutual exclusivity judgments, we report children’s performance on these trials below. Finally, we constructed two versions of the task that varied with respect to whether the pictures in the judgment phases of the trials were presented to the left or right of the child.

Results and Discussion

Because of our small number of items and the categorical nature of our data, we present only non-parametric analyses.¹ On the warm-up trials, children reliably chose the different-type foils, $M = .80$, $SE = .08$, Wilcoxon $T = 174.5$, $N = 20$, $p < .005$. This indicates that the children were readily able to make mutual exclusivity judgments when doing so simply required shifting a noun between two exemplars of the same type— e.g., between two books.

Would children also make mutual exclusivity judgments on the critical trials, when doing so would require shifting between a verb and noun? Our dependent measure on the criti-

¹Preliminary analyses for Experiments 1 and 2 did not find significant effects of gender, age, or side of presentation. We have thus excluded these factors from the analyses reported here.

cal trials was the proportion of times children excluded the artifact and chose the patient of the event—the object/substance the artifact was used to act upon. Children chose the patient reliably more than chance (.5), $M = .73$, $SE = .07$, Wilcoxon $T = 148.5$, $N = 20$, $p < .005$. This suggests that children expected the first novel word—which had referred, as a verb, to the action (e.g., *shoveling*)—to also refer, as a noun, to the artifact that helped carry out the action (e.g., to the shovel). Due to this expectation, children may have excluded the artifact as the meaning of the second novel word, believing that the first novel word already referred to it. This finding suggests that children do not represent the nominal and verbal uses of familiar words like shovel as separate lexical items. Rather, children have formed lexical structures to support the flexible extension of these words across their noun and verb meanings.

Critically, children could not have succeeded on the critical trials simply by mapping the first novel word to the entire event they watched in the training video. Although such a mapping would allow the first novel word to apply to the artifact of the event, it would also allow it to apply to the patient of the event. Thus, the fact that children preferentially extended the first novel word to the artifact and *not* the patient suggests that children expect a verb for a familiar event (e.g., *shoveling*) to refer to a *specific* constituent of that event—its artifact (e.g., the shovel) but not its patient (e.g., the sand).

Experiment 2

Here, we examine whether the structures that encode the relations between the nominal and verbal uses of familiar words are productive. If they are, children should expect *any* word for an action to also refer to the artifact that helps carry out that action. To test this possibility, we taught children novel words for actions involving novel artifacts that acted on novel patients. Would children expect the novel words for the actions to also refer to the artifacts? If so, they should exclude the artifacts and choose the patients when asked to determine the referents of the second novel words.

Methods

Participants The participants were 20 children (8 girls) between the ages of 4;0 and 5;10 ($M = 58$ months). Four additional children participated but were excluded for failing the initial trials that gauged their understanding of the task.

Materials and Procedure All aspects of the materials and the procedure were the same except that different critical items were used. Rather than depicting actions involving familiar artifacts (e.g., shovels) acting upon familiar patients (e.g., sand), the critical items depicted novel artifacts that acted upon novel patients. Because the critical items did not involve familiar artifacts, we did not pre-test children on their knowledge of the nominal and verbal uses of familiar artifact words. Thus, the critical trials that children received were not restricted by their performance on an earlier pre-test—all children in Experiment 2 received the same four critical trials.

Figure 1: Experiment 2 Critical Items (The pictures shown were displayed during the judgment phases of the trials).

Event	Instrument	Patient
<i>Dax</i> = Instrument flattens out patient		
<i>Moop</i> = Instrument stirs patient		
<i>Tig</i> = Instrument picks up patient		
<i>Wug</i> = Instruments cuts patient into shape		

Each of the critical artifacts and patients appeared unique in shape and color, and also possessed novel functions (see Figure 1). Children learned of the functions of the novel artifacts when the novel verbs were modeled in the videos. As before, children heard the novel verb used in the infinitive to refer what Monkey was going to do (“He’s going to use it to *wug* this stuff to make a shape out of it”), in the progressive to refer to the action as it was ongoing (“Monkey’s *wugging* the stuff”), and in the past tense to refer the completed action (“Monkey *wugged* the stuff and made a shape out of it”). The video also described how the affordances of the artifact facilitate the action: e.g., “What monkey has is sharp on the bottom and it has a handle that Monkey can hold onto.”² Immediately after the training phase, we initiated the judgment phase of the trial: e.g., “So that’s what *wugging* is. Now we know what *wugging* is. But *now* I want the *lum*. Show me the *lum*!” The pictures of the artifact and patient were then presented and the child’s choice was recorded. To see how robust these extensions are, the pictures depicted *different* tokens of artifacts and patients of the same category as those used in the videos. For example, the artifact in the *wugging* item had different colored blocks attached to it, and the patient in the *daxing* item was composed of a different-colored clay (see Figure 1).

Results and Discussion

As in Experiment 1, children were readily able to make mutual exclusivity judgments when doing so required shifting a noun between exemplars from the same type. On the trials where there was a same-type option, children reliably chose the different-type foils over the same-type matches, $M = .94$, $SE = .03$, Wilcoxon $T = 136$, $n = 17$, $p < .001$. Our dependent measure on the critical trials was the proportion of

²A control condition was run to rule out the possibility that the active artifact was more salient, leading the child to associate it with the novel word and succeed at test even without attending to the syntax of the narration. In this condition, the same videos were presented with alternate narrations in which the patient was labeled with the novel word. When asked to identify the referent of the second novel label at test, children reliably chose the artifact (Wilcoxon $T = 37$, $n = 16$, $p = .06$).

times children excluded the novel artifact and chose the novel patient of the event. Children chose the patient reliably more than chance (.5), $M = .78$, $SE = .06$, Wilcoxon $T = 126$, $n = 17$, $p < .005$. Children may have excluded the novel artifacts because they expected the first novel words to instead refer to them. This suggests that children expect a word that labels a novel action to also label a particular constituent of that action—the novel artifact that helps carry it out. This finding strengthens the conclusions of Experiment 1, by suggesting that the structures that support familiar flexible pairs are productive and generalize to novel cases. Such productivity could facilitate children’s initial acquisition of corresponding noun/verb pairs, and could help explain why lexical innovations—like to *Wikipedia*—are often created.

Experiment 3

In Experiment 2, we established that four- and five-year-olds are able to extend a novel word that labels a novel action to the artifact performing that action, suggesting that the structures that encode the relationships between the nominal and verbal uses of familiar words are productive. Here, we examine the developmental trajectory of this generative ability and explore whether it may be linked to prior experience with flexible noun/verb pairs, like *hammer* and *shovel*.

Methods

Participants The participants were 84 monolingual children (42 girls) between the ages of 3;0 and 5;11 ($M = 53.8$ months, $SD = 10.2$), including 29 three-year-olds ($M = 42.6$ months, $SD = 3.9$), 29 four-year-olds ($M = 53.8$ months, $SD = 3.2$), and 26 five-year-olds ($M = 66.4$ months, $SD = 3.8$). Fourteen participants were excluded due to experimenter or technical error (10), interference resulting from a distracting testing environment (3), or because they had witnessed another child participate previously (1).

Materials and Procedure The procedure for this experiment was identical to Experiment 2, with the following alterations. An additional mutual exclusivity warm-up trial was added. These four *warm-up* trials were instead used as *control* trials, serving as a predictor of children’s understanding of the task in our analyses. Consequently, unlike in Experiments 1 and 2, children did not receive feedback on any of their choices in these trials, and children were not excluded on the basis of their performance. A final distinction in the procedure for Experiment 3 is that the majority of the parents of participants filled out a vocabulary survey, which consisted of 33 flexible noun/verb pairs (derived in part from Clark & Clark, 1979). The survey probed parental report of production and comprehension separately (e.g., for the noun/verb pair *bike*, parents were asked to report whether their child understood the noun form *bike*, the verb form *to bike*, and whether they produced each of these forms). The addition of this survey was motivated by the finding in Lippeveld and Oshima-Takane (2010) that extension between verb and artifact labels could be correlated with frequency of flexible

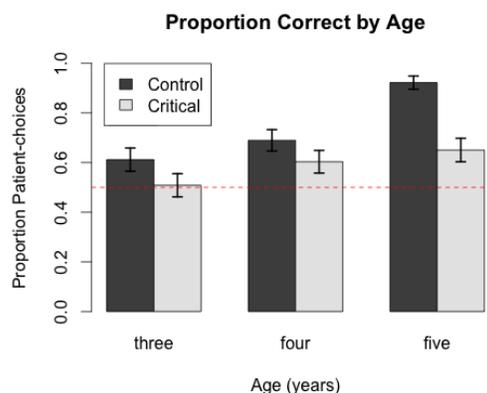
noun/verb pairs in parental input.

Results and Discussion

The data were entered into a mixed effects logistic regression with Age and Vocabulary (parent-reported familiarity with instrument noun/verb pairs) as between-subjects variables, and Trial Type (Control or Critical) as a within-subjects variable. Age ($\chi^2(1, N=74) = 10.10$, $p < 0.01$) and Trial Type ($\chi^2(1, N=74) = 9.61$, $p < 0.01$) emerged as significant on this analysis, indicating that children’s performance on the task improved as they got older, and differed on Critical and Control trials. Given the number of children for whom we did not have a vocabulary measure (10), and its lack of influence, we removed this variable, enabling us to analyze all the children tested in Experiment 3 ($n=84$). This new model found significant effects of Age ($\chi^2(1, N=84) = 17.2$, $p < 0.001$) and Trial Type ($\chi^2(1, N=84) = 17.40$, $p < 0.001$), as well as an interaction between the two ($\chi^2(1, N=84) = 4.28$, $p < 0.05$). The interaction captures the difference in rate of improvement across this age range for the two trial types. While performance on control trials dramatically improved from three to five years, critical trial performance did so much more slowly. A one-way ANOVA revealed that though the vocabulary measures were not predictive of trial performance, they did improve significantly with age $F(1, 74) = 2.54$, $p < 0.001$.

Non-parametric tests confirm the success of later ages on the task. While four- and five-year-olds reliably chose the patient of the verb, rather than the artifact (four-year-olds: Wilcoxon $W = 16240$, $n = 29$, $p < 0.001$; five-year-olds: $W = 13802$, $n = 26$, $p < 0.001$), three-year-olds performed at chance on the critical trials (0.5). That three-year-olds performed above chance for the controls (Wilcoxon $W = 16472$, $n = 29$, $p < .01$) suggests either that our task was not sensitive enough to reflect their knowledge of this productive relationship, or that the expectation of this predictable lexical extension might emerge sometime in the third year of development.

Figure 2: Proportion of patient and different-type choices on critical and control trials, respectively, by age.



General Discussion

English includes many examples of words that label artifacts, as nouns, and functional uses of those artifacts, as verbs. The present studies indicate that these examples are not etymological relics, but instead reveal a productive linguistic structure.

In Experiment 1, we showed that four- and five-year-old children do not represent the nominal and verbal uses of familiar words as separate, unrelated words, but instead derive them from common lexical structures. Specifically, after learning that a novel verb referred to a familiar action, children excluded the artifact involved in that action when determining the referent of a second novel word. Children instead chose the patient of the action, suggesting that they expect the word labeling an event to also refer to a specific constituent of that event—its artifact. In Experiment 2, we showed that the structures four- and five-year-olds deploy to capture the flexibility of familiar verbs are productive: after learning that a novel verb referred to a novel action, children in Experiment 2 excluded the novel artifact of that action as the meaning of a second novel word. This suggests that four- and five-year-olds spontaneously expect *any* word for an action to also refer to the artifact that helps carry out that action. Finally, in Experiment 3, we found that while four- and five-year-olds seem to have this productive expectation, three-year-olds do not. However, given that we observed a significant relationship between age and performance on the control trials, it is possible that three-year-olds, and even younger age groups are able to generalize between noun and verb meanings, but that our experimental measures were not sensitive enough to detect this. One reason to believe that three-year-olds may be capable of forming such generalizations is that children of this age often create new verb from nouns (and nouns from verbs) in their spontaneous speech (e.g., Clark, 1982).

At stake in the question of *when* children begin to form generalizations about flexible word use is whether such generalizations could play a role in facilitating lexical development. As noted in the Introduction, if children recognize the special relationship between shared labels for actions and artifacts early on, this could be quite powerful for language acquisition because children would need to learn only one word to express multiple meanings. If, on the other hand, such inferences arise only later in life—and are constructed only gradually after exposure to several instances of such flexible word pair patterns—they will not play as large of a role in lexical development.

In future research, we intend to explore how children come to form generalizations about flexible word use, by using a more sensitive dependent measure, such as preferential looking. For example, we could teach children a novel word to label a novel action (as in Experiments 2 and 3), and then instruct them to look at the referent of a second novel word. If children are able to spontaneously generalize that the first novel word can refer to both the action and the artifact performing that action, then we would expect them to gaze at the acted-upon item (not the artifact) when told to look at the

referent of the second novel word. If we find that younger children do not perform these spontaneous generalizations, we could then examine whether children understand the relationship between the different meanings of familiar flexible verb/noun pairs or whether they treat these words as unrelated homophones (as we did in Experiment 1). In doing so, we will investigate whether children initially form usage-based “islands of flexibility” or whether these productive lexical structures are present to support word-learning.

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