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BRIEF RESEARCH REPORT

Knowing more than one can say: The early regular plural*

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ABSTRACT

This paper reports on partial knowledge in two-year-old children's learning of the regular English plural. In Experiments 1 and 2, children were presented with one kind and its label and then were either presented with two of that same kind (A→AA) or the initial picture next to a very different thing (A→AB). The children in A→AA rarely produced the plural. The children in A→AB supplied the singular form of A but children in A→AA did not. Experiment 3 compared the performance of English-speaking and Japanese-speaking children in A→AA with common and novel nouns. The Japanese-speaking children (learning a language without a mandatory plural) supplied the singular form of A but the English-speaking children did not. The findings indicate young children learning English know there is a plural to be learned BEFORE they have fully worked out the rules of production or acquired the necessary singular–plural pairs for broad generalization.

Language learning is often conceptualized as a mapping problem. There are meanings and there are forms and the learner must link the right meaning to the right form (Quine & Van, 1960; Smith & Yu, 2007). Children might show partial knowledge on the way to mature knowledge because the

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meaning categories are not well worked out, leading to overgeneralizations and undergeneralizations (MacNamara, 1982). Alternatively, the meaning categories could be well developed but the child might not yet know the appropriate form (Chapman & Mervis, 1989; Gasser, 1997). This second case has sometimes been referred to as a lexical gap, as the child needs a word to refer to already acquired meaning (Momen & Merriman, 2002; Clark, 1987). This paper reports a new example of a kind of 'gap' – concerning not a lexical category but the English plural. This 'form gap' – that young children know that multiple instances of the same kind require a different form of the noun before they can systematically produce the plural – was suggested by an observation in a previous study (Zapf & Smith, 2007).

The development of the regular plural

Learning the regular plural in English is complicated by the facts of many exceptions (Marcus, Pinker, Ullman, Hollander, Rosen & Xuet, 1992), the use of the plural form for generics as well as for multiple instances of the same kind (Hollander, Gelman & Star, 2002), and the existence of a set of allomorphs and the phonological rules related to them (Anisfeld & Gordon, 1968). Even in the context of all these complexities, children's development of full productivity seems extraordinarily drawn out. Children typically produce their first plural forms (for highly frequent nouns) quite young, at around 1;6 (Cazden, 1968; Zapf & Smith, 2003), but do not produce the plural in all required contexts until as late as four to seven years (Gleason, 1958; Graves & Koziol, 1971; Anisfeld & Tucker, 1967). In a seminal experiment, Gleason (1958) set the standard for the measure of full productivity. She presented four- to seven-year-olds with a single novel thing, named it with a novel noun in the singular form ('This is a wug'), and then presented two unnamed instances of those things, asking the child to supply the form. Gleason found that even early school-age children did not produce the regular plural (e.g. 'wugs') in all required contexts.

A variety of factors might limit performance, including knowledge of various allomorphs and the corresponding phonological rules, as well as the ability to produce the particular combinations of sounds (Graves & Koziol, 1971; Storkel, 2001). Consistent with the potential importance of learning production rules for the plural, studies using preferential looking suggest that certainly most three-year-olds (but not two-year-olds) comprehend the morpheme *-s* on novel word forms as indicating more than one (Kouider, Halberda, Wood & Careyet, 2006).

A form–meaning gap?

In an effort to understand the early generalization of the regular plural to novel forms in production, Zapf & Smith (2007) tracked two-year-old

children's plural productions over a six week period in a modified version of Gleason's task. Children in the experimental sessions heard only singular forms for names of a single (pictured) thing and were asked to supply the appropriate form for pictures containing two instances of the named thing. The experiment examined children's plural productions for both real (and familiar to two-year-olds) English forms and novel (but phonotactically appropriate for English) forms. A production imitation task, performed by a separate group of children, ensured all plural forms (both real and novel) were in the production capabilities of children this age. Children's plural productions increased over the course of the experiment for both the real and novel forms and production of real plural forms were strongly correlated with measures of the frequency of those forms in adult input to children. Children's productions of the novel plural forms were not highly frequent but their occurrence at all is important because these productions are true generalizations, given that children had only ever heard the words in the SINGULAR form. Again, the results suggest a slow course of developmental progress characterized by a long period of partial or incomplete knowledge.

One aspect of the children's performance suggests that although there are limits on the form production side, the children might nonetheless know that a form DIFFERENT from the singular form is required whenever there are multiple instances of the same kind. Specifically, although the two-year-olds in the Zapf & Smith (2007) study often did not supply the required plural form, they virtually NEVER offered the singular form for multiple instances of the same kind. In this task, children are first shown a single thing, told its name and then asked to imitate that name. They are then shown two identical instances of an object type. Since these children had just SAID the singular form, and since that form does appropriately label the kind, if they did not know the plural form, or did not know what else to do, one might have expected them to just repeat the singular form, or perhaps even to say 'wug and wug' or 'another wug'. BUT THEY DID NOT. What children mostly did was say nothing or try to change the subject (e.g. saying such things as 'down' or commenting on other uninteresting things in the room, such as the door). Given that the children in this experiment came to the laboratory every week for six weeks and were typically very talkative, it looked to the experimenters as if the children KNEW THAT THEY DID NOT KNOW the right form for multiple instances of the pictured kind. The purpose of the experiments reported in this paper is to provide experimental evidence for that intuition.

EXPERIMENT 1

There are several reasons why children not producing the plural form may not have offered the singular form when shown two instances of the same kind. These include simple surprise with the change in picture, pragmatic

constraints on repeating oneself and/or a general difficulty in generating (as opposed to imitating) any label on demand. These possibilities are examined in Experiment 1 by comparing children's performance in the same task used by Zapf & Smith (2007) with a slight alteration. In the original task, children were presented with one of a kind, it was named (e.g. 'wug'), then they were presented with two of that same kind and asked for the form; this may be described as an A→AA structured task. In addition, we include an A→AB task. Children are presented with one instance of a novel kind and its name (e.g. 'wug'), then with a repetition of that one picture along with a new and very different kind of thing. If children's lack of response in the original A→AA condition is due to surprise, pragmatic constraints on repeating oneself, or a general difficulty in generating labels, then children in the A→AB version, like those in the original A→AA version, should not produce 'wug' in its singular form when the page is turned. If, however, children's non-productions of the singular form in the original version are due to knowledge that two identical instances require a form different from the singular, then children in the A→AB condition should readily supply the singular form label of A.

METHOD

Participants

Twenty-six children (ten males, sixteen females) between 1;6 and 2;11 (mean age = 2;2) participated. The broad age range is appropriate to the slow and protracted course of the acquisition of the plural, to the individual variability in language development at this early age and because we wanted to capture a broad sample of children likely to have partial knowledge of the plural. All children were from monolingual speaking families drawn from a primarily middle-class town in the Midwestern United States. Half of the children participated in the A→AA condition and the other half participated in the A→AB condition. Children in the two conditions were matched by gender and by age (within one month).

Stimuli and procedure

Fourteen novel consonant-vowel-consonant forms were constructed to meet English phonotactic constraints: Bik, Niz, Stipe, Wug, Zib, Zeet, Gorp, Kib, Gip, Mub, Zug, Lun, Wap and Keeb. Two-year-old children's ability to produce plural versions of these forms in an imitation task was demonstrated in Zapf & Smith (2007).

Four different 4×6 inch picture books were created, two for each condition. The book presented photographs of real things for which the name was unlikely to be known by young children (e.g. corkscrew, old-fashioned

TABLE 1. *Kinds of responses on test trials (AA or AB)*

	Singular form (A)	Plural	No response	Off task response
Experiment 1 – Novel				
A→AA	0·19	0·10	0·58	0·13
A→AB	0·43	0·0	0·34	0·24
Experiment 2 – Real				
A→AA	0·35	0·35	0·26	0·04
A→AB	0·74	0·0	0·07	0·26
Experiment 3 – Novel				
Japanese	0·70	N/A	0·08	0·22
English	0·17	0·03	0·43	0·35
Experiment 3 – Real				
Japanese	0·83	N/A	0·02	0·15
English	0·30	0·20	0·08	0·42

radio). Four pages were used for each trial. In the A→AA condition, the first page had a picture of one object on it and on the opposite (and second) page was the to-be-read script that introduced the name of the novel object, for example, 'Look, a wug. See that wug. Can you touch the wug? Can you say wug?' Children were encouraged to imitate the word. The third page, viewable only after a page turn, presented two identical instances of the category (i.e. two wugs/two old-fashioned radios) and (on the opposite page) the script: 'What's here? Can you tell me what's on this page? What do you see?'

In the A→AB condition the first and second pages (viewable together) were the same as in the A→AA condition. However, on the third and fourth pages the child saw a picture of the object from the first page and a picture of another novel object that was very different from the original instance. This added novel object was not named. The two books in each condition presented the eight trials in different randomly determined orders.

RESULTS

Table 1 provides four possible responses given the two objects AA or AB: (1) the singular form of A which children in both conditions had just imitated in labeling one A object; (2) the plural form of A which is an appropriate response in condition AA; (3) saying nothing at all; and (4) offering some other comment. These were usually subject-changing comments and rarely about the objects being queried. As Zapf & Smith (2007) reported, children this age rarely offered quantitative terms such as 'two' or 'more' in response to the query for a label. The results in the A→AA condition replicate Zapf &

Smith. Children rarely generated the plural form of these novel nouns and they also rarely offered the singular form for two objects. In contrast, children in the A→AB condition did offer the singular form, and did so more than did children in the A→AA condition ($t(24) = 2{\cdot}65$, $p = 0{\cdot}014$). This indicates that the non-productions of the singular form in the A→AA condition are not due to some pragmatic constraint against repeating oneself, nor to the surprise at a changed picture with two objects. Instead, the pattern fits the idea that children's NON-productions of the singular form in the A→AA condition reflect knowledge that this form does not apply in the case of two things of the same kind. Even when these young children cannot yet generate the plural form of a newly learned novel noun, they seem to know the singular does not apply. When children did not produce the plural, they typically said nothing in the A→AA condition. The data also provide a hint that there might be active inhibition of the singular form in the case of two of the same kind. A (2) condition ¥ (2) response type ANOVA comparing No Responses and Irrelevant responses yielded a main effect of response type ($F(1, 24) = 14{\cdot}08$, $p = 0{\cdot}001$, $\eta^2 = 0{\cdot}37$) and a significant interaction between response type and condition ($F(1, 24) = 5{\cdot}81$, $p = 0{\cdot}024$, $\eta^2 = 0{\cdot}20$). The main effect of condition was not reliable ($F(1, 24) = 2{\cdot}28$, $p > 0{\cdot}05$, $\eta^2 = 0{\cdot}09$). Briefly, saying nothing at all occurred more frequently in the A→AA condition whereas saying something – though not providing a label of the set – occurred more frequently in the A→AB condition.

In sum, the pattern of performance suggests that even though children do not produce the needed plural forms they know in some way that the two things of the same kind get a different label than does one thing, and thus they do not produce the singular form.

EXPERIMENT 2

The pattern observed in Experiment 1 could be specific to the production of novel – just heard for the first time – forms. Experiment 2 replicated Experiment 1 using common English nouns and objects likely to be familiar to two-year-olds.

METHOD

Participants

Twenty-six children (ten males, sixteen females) between 1;5 and 2;11 (mean age = 2;1) participated. All children were from monolingual speaking families drawn from a primarily middle-class town in the Midwestern United States. Half of the children participated in the A→AA condition and the other half (matched by gender and within one month by age) participated in the A→AB condition.

Stimuli and procedure

Sixteen nouns typically in the receptive vocabulary of children aged 1;6 learning English (Fenson *et al.*, 1993) and photographs of typical instances were selected: cat, baby, hat, apple, shoe, cup, dog, car, ball, pig, bunny, spoon, bird, truck, bottle, and duck. In the A→AA condition, eight categories were randomly selected for the eight experimental trials. In the A→AB condition, these same eight instances were selected to be the singleton on page one and pictures from the other eight were randomly paired with the initial picture to make the AB combinations. All other aspects of the design and procedure were identical to Experiment 1.

RESULTS

Consistent with Zapf & Smith's (2007) results, children were more likely to offer the plural given two instances of the same category given the common nouns than they were given the novel nouns of Experiment 1. Children in the A→AA condition also did sometimes offer the singular form (A) given two instances of the same kind, but they did so much less often than did children in A→AB condition ($t(24) = 3{\cdot}90$, $p = 0{\cdot}001$). The children in the A→AB condition also sometimes offered the B label in addition to the A label (less than 30% of the trials). These are not included in the counts in Table 1. The pattern of 'off task' responses – saying nothing at all or saying something other than the name of A (or B) – again differed across the two conditions. A (2) condition ¥ (2) response type ANOVA of these two 'off-task' responses yielded a significant interaction ($F(1, 24) = 23{\cdot}16$, $p < 0{\cdot}001$, $\eta^2 = 0{\cdot}49$). Neither main effect approached significance. As in Experiment 1, children in the A→AA condition often said nothing at all when confronted with the two instances, whereas children in the AB condition, when they did not offer the A label, were more likely to say something.

Thus productions of the plural form – and the erroneous production of the singular form two instances of the same kind – do occur given well-known nouns in which the singular and plural forms have been repeatedly heard and sometimes produced by the child in the past. Nonetheless, children are less likely to produce the singular form in the A→AA condition than in the A→AB condition, a result consistent with idea that, even in the case of known nouns that have been commonly applied to these objects, there is some prohibition against the singular form in the context of two instances of the same noun.

EXPERIMENT 3

Experiment 3 provides additional evidence by examining the performance of Japanese-speaking children in the A→AA task. Japanese is a language without a mandatory plural: 'one cup', 'two cups' and 'eight cups', for

example, are all labeled by the same form of the noun. Thus, offering the singular form 'cup' for two cups is correct in Japanese. If it is partial knowledge of THE ENGLISH PLURAL that limits English-speaking children's production of the singular form given two instances of the same kind, then children learning Japanese should show no such reluctance to label multiple instances with the same form just used to label a single instance.

METHOD

Participants

Thirty children (eighteen males, twelve females) between 1;5 and 3;0 (mean age = 2;0) participated. Half of the participants were from monolingual English-speaking families in the Midwestern United States (nine males, six females). Half of the children were from monolingual Japanese-speaking families in Osaka, Japan (eight males, seven females). All children in both countries were from upper-middle-class homes with at least one parent with a college education and all attended nursery school. Children in the two groups were matched (within one month) for age.

Stimuli and procedure

Children were tested in the A→AA condition only with the novel nouns of Experiment 1 and the real nouns of Experiment 2 (combined and presented in two random orders, counterbalanced across children). For the real noun condition, the Japanese labels were chosen as direct translations of the English nouns. The children tested in Japan were tested by a native speaker of Japanese who was first trained and assisted in testing the English-speaking children in the US.

RESULTS

The young English-speaking children, as in Experiments 1 and 2, rarely produced the plural form for the novel and common nouns and also rarely produced the singular form in the context of two instances. As is apparent in Table 1, Japanese-speaking children did not show this pattern. Japanese-speaking children offered the singular form reliably more than English-speaking children when presented with two common objects ($t(28) = 6{\cdot}10$, $p < 0{\cdot}001$) and when presented with two novel objects ($t(28) = 4{\cdot}76$, $p < 0{\cdot}001$). Because the Japanese-speaking children so uniformly offered the A label (the correct response in their language), comparisons of no responses and irrelevant responses are not all that informative; overall English-speaking children offered both of these categories of responses much more than did Japanese-speaking children ($F(1, 28) = 31{\cdot}10$, $p < 0{\cdot}001$,

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$\eta^2 = 0{\cdot}53$). No responses (saying nothing at all) were also more evident for English-speaking children given novel than real things. Overall, the results fit the idea that English-speaking children do not inappropriately offer the singular form when they fail to offer the plural because they know THEIR LANGUAGE precludes this.

GENERAL DISCUSSION

A fundamental problem for all theories of learning is knowing what needs to be learned. This definition of the learning task is crucial for determining the task relevant information and also for evaluating errors. The two main classes of theories of how children learn English morphology both assume that the learner has defined the learning task. One class of theories (so called symbolic or rule-based accounts) posit that children learn rules that transform the singular form of a noun to the plural (Marcus *et al.*, 1992). In their most general form, such a rule might be written as N Ns. The difficulty in learning from this point of view is the allomorphs (/s/, /z/, /z/) and their dependence on the phonological structure of the singular form and also on the wide range of exceptions (e.g. *child children*). The second class of theories, sometimes called similarity-based or instanced-based accounts, propose that children learn specific instances of pairings between singular and plural forms (e.g. *cat–cats*, *dog–dogs*) and that children's production of novel plural forms is the consequence of similarity-based generalizations over these learned pairs (Plunkett & Marchman, 1993). Critically, both accounts implicitly assume that young learners know that there is a singular AND a plural form to be learned. In one case, the learner's task is to find the rule (or rules) that enables transformation from singular to plural form. In the other case, the learner is to store pairs of linked singular and plural forms. But can a child do either of these tasks without already knowing that their language has a plural?

The present findings indicate that young children learning English may know that there is a plural to be learned BEFORE they have fully worked out the rules of production or acquired the necessary singular–plural pairs for broad generalization. It may well be that the long protracted course of acquisition is due to the learner's need to first discover just what needs to be learned, that their language HAS a plural. Partial knowledge of specific individual and highly frequent plural forms or perhaps partial knowledge of many only weakly learned associations may be critical to this definition of the learning task. Alternatively, other cues to the existence of the plural – such as its marking on the verb or via highly frequent pronouns such as *these* and *they* – may play a crucial stepping stone to learning plural forms. With respect to this idea, recent research suggests that young learners are sensitive to the distinction between *is* and *are* (Kouider *et al.*, 2006; see also

Laaha, Ravid, Korecky-Kröll & Laahaet, 2006). Thus other markers of plural may provide a role in children's discovery of the relevant conceptual distinction.

Theories of lexical selection and production in adults and in neuropsychological disorders (Dell, Schwartz, Martin, Saffran & Gagnonet, 1997; Frauenfelder, Scholten & Content, 2001) emphasize the importance of inhibitory processes in the real-time resolution of lexical competitors. Further, the potential importance of lexical competitors in vocabulary development has been suggested by several researchers in the case of productive vocabulary development (Gershkoff-Stowe & Smith, 1997; Gershkoff-Stowe, 2001), the mutual exclusivity phenomenon (Momen & Merriman, 2002; Yoshida and Hanania, 2007) and in a potential competition between plural production and the word *two* (Barner & Snedecker, 2005). The present results and the possibility that partial knowledge of the plural form inhibits production of the singular when there are multiple entities fits this emerging view of the importance of lexical competition in early word learning.

In sum, the results in this paper suggest that two-year-old children may know that the language they are learning has a plural form before they can produce that form in all required contexts. One might have thought that an abstract category 'plural' would emerge late in acquisition. Instead, the present result suggests rudimentary knowledge of the existence of such meaning categories at the front end of acquisition.

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