Role of Linguistic Input in Third Person Singular –s Use in the Speech of Young Children

RESEARCH NOTE

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Purpose: To examine the role of linguistic input in how young, typically developing children use the 3rd person singular –s (3S) inflection.

Method: Novel verbs were presented to 16 young children in either 3S contexts (e.g., “The tiger heens”) or nonfinite (NF) contexts (e.g., “Will the tiger heen?”). The input was further manipulated for length such that half of the presentations in each context had adjectives modifying the subject. Children were then prompted to use the novel verbs in contexts requiring 3S and in contexts requiring an infinitive form. The children’s use of 3S with familiar verbs was also examined.

Results: Novel verbs heard only in 3S contexts were more likely to be produced with 3S in obligatory contexts and were more likely to be inappropriately applied to infinitive contexts than novel verbs heard only in NF contexts. Degree of 3S use in obligatory contexts was lower for familiar verbs than for novel verbs heard only in 3S contexts but higher than for novel verbs heard only in NF contexts. Length was not a significant factor.

Conclusion: Linguistic input appears to have a strong effect on how young children use the 3S inflection in newly encountered verbs.

KEY WORDS: normal language development, morphology, toddlers

It is well documented that young English-speaking children go through a stage in which they show inconsistent use of grammatical morphemes that mark verb tense and subject–verb agreement. For example, young children may say “The girl jumps” in one instance and “The boy run” in another, often in the same spontaneous speech sample.

Theakston, Lieven, and Tomasello (2003) offered one explanation for this inconsistency in young children’s use of one such tense-agreement morpheme, the third person singular –s (3S) inflection. Their study was based on *usage-based theory* (Tomasello, 2003), which posits that young children’s early use of inflections such as 3S reflects the acquisition of the inflection on a verb-by-verb basis. Only gradually do these narrow patterns of use form a broader, more abstract pattern. During the transition phase, children will show inconsistency because they will have heard instances of the verb with the inflection (as in “The girl runs”) and without the inflection (as in “Will the boy run?”). It is assumed that in the latter cases, children do not fully grasp the structure of the entire input sentence and consequently regard “The boy run” as comparable to “The girl runs.”

To test this proposal, Theakston et al. (2003) presented young children aged 30 to 36 months with one novel verb in marked form in a 3S context (e.g., “It tams”) and one novel verb in a nonfinite (NF) context

(e.g., “Will it keef?”). A third novel verb was presented to the children in both a 3S and an NF context (e.g., “It mibs,” “Will it mib?”). The children were then asked to produce the three novel verbs in a 3S context (e.g., “What does it do? It ...”; targets: *tams*, *keefs*, *mibs*). The results indicated that novel verbs presented to the children only in the 3S context were significantly more likely to be produced by the children with the 3S inflection than were novel words presented in both the 3S and NF contexts and novel verbs presented only in the NF context. Familiar verbs presented in the same three contexts did not show the same input effects; the children showed approximately the same degree of inconsistency regardless of presentation condition. The familiar verbs were less likely to be inflected with 3S than the novel words presented in the 3S-only condition but were more likely to be inflected with 3S than the novel words presented in the NF-only condition. Such findings were expected because the familiar verbs were likely to have been heard by the children in their daily lives in both the inflected and uninflected forms.

With a separate group of children, Theakston et al. (2003) presented novel verbs in either the 3S-only, mixed (3S, NF), or NF-only contexts but then tested the children’s use of the novel verbs in contexts that required an infinitive form (e.g., “What’s it gonna do? It is gonna ...”; targets: *tam*, *keef*, *mib*). Theakston et al. expected considerable use of 3S in infinitive contexts for novel verbs that had been heard in 3S contexts only (e.g., “It is gonna ... tams”) because, they reasoned, children in this period of development were still greatly influenced by the specific form in which a new verb is heard. Not until later do children recognize the broader context in which a verb is used, permitting them to produce the verb with alternative inflections (or no inflection) depending on the sentence frame in which it is to be used.

Theakston et al.’s (2003) findings were in line with expectations. When tested in infinitive contexts, the novel verbs that had been heard in 3S contexts only were produced with the 3S inflection in 55% of the items (e.g., “It is gonna ... tams”). In contrast, novel verbs that had been heard in NF contexts only were not produced with 3S by the children in these infinitive contexts.

The finding that children will use a novel form in a context in which it would not ordinarily appear (as in “It is gonna ... tams”) has a precedent in previous studies of children’s choice of word order. Akhtar (1999) introduced novel verbs to 2-, 3-, and 4-year-old English-speaking children by using each novel verb in either conventional English subject–verb–object (SVO) order or in one of the non-English orders, SOV or VSO. The children were then tested for their use of the novel verbs in sentences involving different agents and patients. Both the 2- and 3-year-olds often used the novel verb in SOV or VSO order if the

novel verb had been heard with that word order; however, if the novel verb had been heard in English SVO order, the children almost never deviated from SVO order. The 4-year-olds, in contrast, usually produced novel verbs in SVO order even if they had heard the novel verbs in SOV or VSO order. Together, the findings of Theakston et al. (2003) and Akhtar (1999) suggest that 2- and 3-year-olds are significantly influenced by the input and will even use novel verbs in ways that do not fit customary usage if they have not yet had experience with the verb in a variety of contexts.

Theakston et al.’s (2003) study has important implications for the discussion of children’s inconsistency in using inflections such as 3S; specifically, their findings suggest that children do not initially interpret new verb forms as part of a broader, more abstract pattern. Instead, much of their inconsistency (e.g., “The girl runs”; “The boy run”) could be cases in which the children are producing each alternative form in a way that reflects their experience with the form (e.g., hearing “Every day the girl runs” and “Will the boy run?”)

This interpretation of early inconsistency is a departure from researchers’ usual notion of inconsistency. For example, Miller and Deevy (2003) found that young children who showed inconsistency with 3S often produced the same verb both with and without 3S in contexts that obligated use of this inflection. They interpreted this finding as suggesting that 3S was a productive inflection in the children’s grammar but that the children had not yet reached a point in maturation when this inflection was used at adultlike levels. However, it is certainly possible that the forms of the same verb with and without 3S may have had different sources in the child’s input (as in the examples “Every day the girl runs” and “Will the boy run?”). Miller and Deevy also reported that some verbs produced by the children in two or more 3S contexts were either never inflected or always inflected. This observation is also compatible with an assumption of strong input effects: The verbs used in only one way may have been encountered in only one type of grammatical context.

Given this interpretation of inconsistency, it is important to replicate and extend Theakston et al.’s (2003) study. The study described in this Research Note was designed to serve this purpose.

In Theakston et al.’s (2003) study, only a limited amount of data were collected in each input condition. For each condition, children’s performance was based on a maximum of three responses using only one novel verb. The authors reported that nonresponses resulted in empty cells in some of the children’s data sets, and so these children’s data were excluded from certain analyses. Given that Theakston et al.’s findings suggest an alternative interpretation to our notion of inconsistency,

there is a need to replicate their research with a larger number of novel verbs to assess the generalizability of the findings. The use of a larger number of novel verbs in exploring 3S inconsistency represents one of the goals of this study.

Extending the work of Theakston et al. (2003) could also shed light on the nature of children's transition from narrow patterns of use that are strongly influenced by the input to broader abstract patterns that extend beyond the input. In Theakston et al.'s study, children produced the 3S inflection in 36% of obligatory contexts with novel verbs that had been heard in NF contexts only (e.g., "Will it tam?"). This finding suggests that the children were beginning to recognize that the presence of *will* in "Will it tam?" may render the bare stem *tam* inadequate when used without an accompanying auxiliary.

However, the nature of this apparent recognition is unclear. It is possible that the children had acquired a more general ability to understand auxiliary-fronted questions, but it also is possible that this ability was quite early in its development, enabling the children to relate *will* to the novel verb in short questions such as "Will it tam?" but not in longer questions. Accordingly, an additional goal of this study was to determine whether children's use of the 3S inflection in obligatory contexts would differ depending on whether NF novel verbs had been heard with the auxiliary in relatively close proximity to the novel verb (e.g., "Will the bear mib?") or at a greater distance from the novel verb (e.g., "Will the big brown bear mib?"). If children had acquired a more general ability to understand auxiliary-fronted questions, these two types of questions would not result in a difference in the degree to which the children would use 3S with the novel verb in contexts requiring this inflection. No difference would be expected because the syntactic operations are assumed to be the same in the two types of questions. However, if the children's ability to understand the ties between the auxiliary and the novel verb were only just emerging, children might be more likely to detect these ties when the auxiliary and novel verb were in relatively close proximity. In this case, novel verbs heard only in NF form in shorter questions might be more likely to be treated as inadequate for use in nonauxiliary utterances, resulting in greater use of 3S in contexts that require this inflection.

On the basis of Theakston et al.'s (2003) study, we made the following five predictions: (a) children would show greater use of 3S in obligatory contexts with novel verbs that had been heard with 3S only than with novel verbs that had been heard in NF form only; (b) children would show less use of 3S in obligatory contexts with familiar verbs than with novel verbs that had been heard with 3S only; (c) children would show greater use of 3S in obligatory contexts with familiar verbs than with novel

verbs that had been heard in NF only; (d) children would show greater (inappropriate) use of 3S in infinitive contexts with novel verbs that had been heard with 3S only than with novel verbs that had been heard in NF form only; and (e) if children occasionally used 3S in obligatory contexts with novel verbs that had been heard in NF contexts only, this use would be greater for novel verbs that had been heard in short questions than for novel verbs that had been heard in longer questions.

Method

Participants

Sixteen children ranging in age from 30 to 36 months ($M = 33$, $SD = 2$) served as the participants. All children were monolingual, native speakers of English. According to the children's parents and preschool teachers, the children appeared to be developing language normally. All children scored above 85 ($M = 103$, $SD = 6$) on the Peabody Picture Vocabulary Test, Third Edition (Dunn & Dunn, 1997). In addition (see *Procedure* section), the children showed age-appropriate production of the plural *-s* inflection. All children also passed a pure-tone hearing screening at 25 dB (HL) for each ear at 500, 1000, 2000, and 4000 Hz.

To ensure that the children possessed the phonological skills to use /s/ and /z/ as a word-final inflection, we administered a 30-item noun plural task. The singular referents (e.g., "a cat") contained the same word-final consonants (e.g., /t/) used as stem-final consonants in the novel verbs. For each item, the examiner named the pictured object (e.g., "Here is one cat") and then prompted the child to name the pictured object presented in a pair (e.g., "Here are two ..."; target: *cats*). All children scored at least 90% correct in their noun plural use ($M = 99$, $SD = 3$).

Procedure

Selection of the novel verbs. In Theakston et al.'s (2003) study, children were presented with a total of three verbs. In this study, children were presented with 16 novel verbs to ensure a greater likelihood of having data from all children across all conditions and to assess the generalizability of the findings. The 16 novel verbs selected for this study had a monosyllabic CVC construction. We controlled the difficulty of production for these verbs by selecting novel verbs with consonants that were likely to be in the children's repertoire. Eight of the 16 novel verbs selected (e.g., [pIm]) required the /z/ allomorph when inflected with 3S (e.g., [pImz]); the remaining eight novel verbs (e.g., [dep]) required the /s/ allomorph

(e.g., [deps]). The novel verbs were pseudorandomized such that the children were exposed to verbs with each allomorph type at all stages of the task.

All 16 novel verbs were designed to have high phonotactic probability; specifically, we first considered those CVC nonwords from the larger list designated as having high phonotactic probability by Jusczyk, Luce, and Charles-Luce (1994). Of these high-phonotactic probability nonwords, we then selected 16 on the basis of phonological neighborhood density. We calculated neighborhood densities using the Neighborhood Search function in the online Washington University in St. Louis Speech and Hearing Lab Neighborhood Database (Sommers, 2002). The 16 nonwords were selected to limit the range of density values ($M = 20.88$, $SD = 3.59$, range: 14–28) while minimizing phonological similarities among the nonwords. The nonwords were *kabe*, *mek*, *dape*, *bap*, *gan*, *tem*, *deek*, *pab*, *tet*, *heen*, *seb*, *mip*, *mub*, *dit*, *pim*, and *fek*. We then pseudorandomized the 16 nonwords, with the qualification that no two immediately adjacent nonwords were phonetically similar.

Once we had established the order of nonwords, we created a second nonword order by inverting the original order. As a result, the nonwords were presented in one of two orders: Half the children were presented with the novel verbs in one order, and the other half were presented with the novel verbs in the reverse order. For each child participating in the study, only one agent and one action were associated with each novel verb, to maximize the frequency with which children used the 3S inflection in 3S contexts and to minimize potential confusion between the target and other novel verbs.

Novel verb presentation conditions and testing. As in Theakston et al.'s (2003) study, we selected the syntactic constructions of the stimuli such that half the novel verbs were presented in a context requiring 3S (e.g., "The fish meks"), and the other half were presented in an NF context (e.g., "Will the tiger heen?"). We then subdivided the 3S and NF contexts to create a total of four presentation conditions. In one presentation condition (hereafter, the *short 3S* condition), four of the novel verbs were presented with 3S in short utterances, as in "The fish meks." In another presentation condition (hereafter, the *short NF* condition), four other novel verbs were presented in NF form in short utterances, as in "Will the tiger heen?" These two conditions resembled those used by Theakston et al. except that we used article + noun subjects rather than *it* as the subject. In yet another presentation condition (the *long 3S* condition), four other novel verbs were presented with 3S in longer utterances, as in "The happy green frog sebs." Finally, in another presentation condition (the *long NF* condition), the remaining four novel verbs were presented in NF form in longer utterances, as in "Will the big brown bear mip?"

From these examples, one can see that the long NF condition involves a larger separation in number of words between the tense-bearing element (*will*) and the novel lexical verb than is the case for the short NF condition. If degree of separation plays a role in children's ability to recognize that the use of an NF novel verb form depends on the presence of an auxiliary elsewhere in the utterance, then a larger percentage of children's NF productions (e.g., "bear mip") should be seen for novel verbs presented in the long NF condition than in the short NF condition. It is also evident that this factor plays no role in the short versus long 3S conditions because no auxiliary is involved, and in both the short and long 3S conditions, the subject noun (e.g., *fish*, *frog*) immediately precedes the inflected novel verb (e.g., "The fish meks," "The happy green frog sebs"). Thus, the long 3S condition served as a control for overall length; we did not expect that length would influence the children's tendency to use 3S relative to the short 3S condition.

Theakston et al. (2003) presented all conditions in one testing session. In this study, we tested each of the four input conditions (short 3S, long 3S, short NF, and long NF) on a separate day to minimize any potential crossover effects between the input conditions. We also pseudorandomized the condition presentation order across the 4 days into four condition orders to avoid any effects of presentation order on performance. Four of the 16 children were assigned to each of the four condition presentation orders.

For each condition, we used the following procedure. The examiner told the child that they were going to help a puppet called "Shy Turtle" learn some new words. Practice items were then administered using real verbs to be sure that the children understood the prompt (e.g., "What does [e.g., 'the horse'] do?" "The horse ..."). In these practice items, the examiner modeled the correct response (e.g., "swims"). The examiner then performed a novel action using a toy animal while producing the target verb three times in either 3S form (e.g., "The fish meks") or NF form (e.g., "Will the tiger heen?"), depending on the condition. All input utterances were directed at both Shy Turtle and the child. In the case of the input utterances in the short NF and long NF conditions—which took the form of questions (e.g., "Will the tiger heen?")—Shy Turtle often responded to the question (e.g., by nodding) to render the utterance more natural. Immediately following the three presentations of the novel verb in its respective condition, the examiner then asked the child, for example, "What does the fish do? Tell Shy Turtle, the fish ...". This procedure was used for all four presentation conditions (short 3S, long 3S, short NF, and long NF); that is, each novel verb was presented in its respective condition three times and then immediately tested in a context obligating use of the 3S inflection. The next novel verb from the same condition was then presented and

tested, and so on, until all four novel verbs in the condition had been presented and tested. A separate session/day was devoted to each condition. The examiner recorded the child's responses phonetically. Responses for 25% of the participants were phonetically transcribed from the audio recordings by an independent scorer with an interrater reliability of 91%.

Use of the 3S inflection in familiar verbs. To assess the children's use of the 3S inflection with familiar verbs, we tested the children midway through the novel verb sessions: between the second and third conditions described earlier. The familiar verbs were always tested after the second novel verb condition was completed, to minimize any potential carryover from the familiar verb task to the novel verb task administered that day. The third novel verb condition was then completed in the next session. Fifteen items were used in testing. Each item used one of 15 monosyllabic verbs selected from the MacArthur Communicative Development Inventory Words and Sentences vocabulary checklist (Fenson et al., 1993). To control for phonetic context, we selected only those verbs that required either the /s/ allomorph (five items; e.g., *jumps*), or the /z/ allomorph (10 items; e.g., *runs*). These 15 verbs were *clap, hide, draw, run, moo, bite, sit, read, play, sleep, cry, hug, blow, climb, and jump*. The items were arranged in two orders of presentation, with half the children receiving each order.

The examiner instructed the children that they were to tell Shy Turtle what the people and animals do. The examiner then performed an action using a doll or toy animal (e.g., a boy hiding) while verbally presenting the target verb three times in unmarked form (e.g., "I like to hide"; "Every day I hide"; "Watch me hide"). The examiner then provided a prompt that obligated use of the 3S inflection (e.g., "What does the boy do? The boy ..."; target: *hides*). It should be noted that this procedure deviated from the procedure used by Theakston et al. (2003) in that we introduced the familiar verbs with first-person subjects; therefore, the children did not hear the examiner use 3S with the familiar verbs before being required to produce the verbs with this inflection. Responses were recorded orthographically and on audiotape. The recordings were later reviewed, and the responses were transcribed phonetically. Responses for 25% of the participants were phonetically transcribed from the audio recordings by an independent scorer with an interrater reliability of 96%.

Novel verb use in infinitive contexts. Following the presentation and testing of all 16 novel verbs and the familiar verbs in 3S contexts, the children were once again presented with all 16 novel verbs in their original presentation condition and presentation order. However, in this case, all 16 novel verbs were presented in a single session, either during the fourth session after completing

the last of the four novel verb (3S or NF) presentation conditions, or during a fifth session on a different day. The child heard the first novel verb in its respective presentation condition (e.g., "The fish meks") three times, with each presentation accompanied by its associated action. The child was then immediately asked to produce the novel verb in a context that obligated an infinitive form, as in "What does the fish like to do? Tell Shy Turtle. The fish likes to ..." (target: *mek*). The next novel verb was then presented in its original condition and was tested in an infinitive context, and so on, until all 16 novel verbs had been presented and tested. This procedure differed from that of Theakston et al. (2003), who tested children's use of novel verbs in either a 3S context or an infinitive context but not in both. The children's responses were transcribed phonetically as well as audio recorded for later transcription. Responses for 29% of the participants were phonetically transcribed from the audio recordings by an independent scorer, and interrater reliability was 96%.

Data analysis. For all analyses, the dependent measure was the degree to which the children used the 3S inflection. For the novel verb infinitive task, use of the 3S inflection conflicted with the adult grammar; for the remaining tasks, higher degrees of use of 3S reflected closer approximations to adultlike usage. We used the percentage of use of the 3S inflection instead of raw frequency because some children did not recall a particular novel verb and, thus, the numbers were unequal across children. Percentages were also needed for comparison between the children's use of 3S in familiar words and their use of this inflection in novel verbs because the number of items in these two tasks was not identical. The percentages were then arcsine transformed. For all analyses, effect sizes (ESs) were calculated (with G*Power Version 3.0.3; Faul, Erdfelder, Lang, & Buchner, 2007) for significant differences (*f, d*; Cohen, 1988).

Results

Use of 3S With Novel Verbs as a Function of Presentation Condition

Preliminary analyses revealed no presentation order effects; thus, presentation order was not treated as a variable in the main analysis. We conducted a repeated measures analysis of variance (ANOVA) with syntax (3S, NF) and length (short, long) as the within-subject variables. The ANOVA revealed a significant main effect of syntax, $F(1, 15) = 66.14, p < .001, f = 2.10$ (large ES), whereby the percentage of 3S inflection use was significantly higher in response to 3S presentations ($M = 94\%$, $SD = 11$, 95% confidence interval [CI] [87, 100]) than NF presentations ($M = 34\%$, $SD = 38$, 95% CI [7, 62]). There was no effect of length, $F(1, 15) = 0.31, p = .59$, and the

Syntax $\times$ Length interaction was not significant, $F(1, 15) = 1.52$, $p = .24$ (see Table 1). The important comparison within the (nonsignificant) interaction was the comparison between short NF and long NF conditions. The highly similar results for these two conditions (over 98% overlap in scores; Cohen, 1988) indicate that our failure to observe a difference was not likely due to inadequate power. All productions that did not include the 3S inflection were productions of the bare stem form (e.g., *heen*).

Use of 3S With Novel Verbs Relative to 3S Use With Familiar Verbs

The familiar verb 3S task differed somewhat from the novel verb tasks in that the examiner used the familiar verbs with first-person subjects. Percentage of use scores on the familiar verb 3S task ranged from 0% to 100% ($M = 55\%$, $SD = 41$). All productions that did not include the 3S inflection were bare stem productions (e.g., *run*). We compared the transformed data from the familiar verb 3S task and novel verb 3S task using an ANOVA with verb type (novel verb–3S presentations, novel verb–NF presentations, familiar verb) as the within-subject variable. Because there were no length effects, we combined data from the short and long 3S conditions and the data from the short and long NF conditions. There was a significant main effect of verb type, $F(2, 30) = 27.66$, $p < .001$, $f = 1.36$ (large ES). A Tukey's honestly significant

difference posttest revealed that children used the 3S inflection with significantly greater frequency with the novel verbs in the 3S condition ($M = 94\%$, $SD = 9$) than with the familiar verbs ($M = 55\%$, $SD = 41$, 95% CI [33, 76]), $p < .001$, $d = 0.92$ (large ES), or the novel verbs in the NF condition ($M = 35\%$, $SD = 37$), $p < .001$, $d = 1.97$ (large ES). Furthermore, the children used the 3S inflection with significantly greater frequency with the familiar verbs than with the novel verbs in the NF condition, $p = .03$, $d = 0.93$ (large ES).

Inappropriate Use of 3S With Novel Verbs in Infinitive Contexts

Of the 16 children who had completed the novel verb 3S task, two were excluded from the analysis for the novel verb infinitive task. As noted earlier, this task was administered after all other tasks, and one child discontinued participation prior to the administration of this task. The second child was inadvertently administered incorrect prompts. As a result, there were 14 children included in this analysis. We analyzed the data with a repeated measures ANOVA with syntax (3S, NF) and length (short, long) as the within-subject variables. There was a main effect of syntax, $F(1, 13) = 39.90$, $p < .001$, $f = 1.75$ (large ES), whereby the percentage of 3S inflection use was significantly higher in response to 3S presentations ($M = 74\%$, $SD = 34$, 95% CI [55, 92]) than NF presentations ($M = 20\%$, $SD = 28$, 95% CI [0, 41]). There was no effect of length, $F(1, 13) = 0.27$, $p = .62$, and the Syntax $\times$ Length interaction was not significant, $F(1, 13) = 0.15$, $p = .71$ (see Table 1). All productions that did not include the 3S inflection were productions of the bare stem (e.g., *mip*), which for this task constituted a correct (adultlike) response. Thus, for this infinitive task, use of 3S represents application of a form that is not appropriate for the context.

Although the children were less likely to use the 3S inflection in infinitive contexts if the novel verb had been heard only in NF form (20% use of 3S) than if it had been heard only in 3S form (74% use of 3S), Theakston et al. (2003) found no use of the 3S inflection in infinitive contexts if the novel verb had never been heard with a 3S inflection. Indeed, the use of 3S in infinitive contexts is not a characteristic of children's spontaneous speech, and when such productions occur, they seem to be the result of speech planning errors (e.g., "He wanna plays"; Jaeger, 2005, p. 403). Given this unexpected finding, we examined our data further, suspecting that the nature of our infinitive task may have contributed to our finding. Recall that our infinitive task was administered in a single, final session. In the final session, the children were reintroduced to each novel verb (hearing the novel verb three times in its original presentation condition) and were then immediately tested for their use of the novel

Table 1. Mean percentage use of the third person singular (3S) /-s/ inflection with novel verbs in contexts obligating 3S /-s/, with familiar verbs in contexts obligating 3S /-s/, and with novel verbs obligating the infinitive form.

Verb type	M	SD	95% CI
Novel, 3S /-s/ context			
Short 3S	96	6	[93, 100]
Long 3S	92	14	[85, 99]
Short NF	34	37	[14, 54]
Long NF	35	40	[13, 56]
Familiar, 3S /-s/ context ^a	55	41	[33, 76]
Novel, infinitive context			
Short 3S	73	35	[52, 93]
Long 3S	74	32	[55, 93]
Short NF	16	27	[0, 40]
Long NF	24	28	[7, 40]

Note. All table values are percentages. CI = confidence interval; Short = novel verbs heard in shorter sentences; Long = novel verbs heard in longer sentences; 3S = novel verbs heard only with third person singular /-s/; NF = novel verbs heard only in bare stem (nonfinite) form.

^aFamiliar verbs were presented by the examiner with first person subjects before the child was required to use the familiar verbs in third person singular /-s/ contexts.

verb in an infinitive context. The next novel verb was then reintroduced and tested. This procedure continued for all 16 novel verbs. Presenting all 16 novel verbs in succession in a single session might have led to some priming effects such that the form of a novel verb in a preceding item might have influenced the form of the novel verb in the subsequent item (e.g., Leonard et al., 2000).

We inspected our data for this possibility. Given that the novel verbs were reintroduced to the children in the same order as in their original presentation, the children were reintroduced to four consecutive novel verbs from one condition (e.g., short 3S), followed by four novel verbs from another condition (e.g., short NF), and so on. Priming for 3S should be strongest for the first novel verb from an NF condition that was reintroduced following four consecutive novel verbs from a 3S condition. Priming effects for 3S should be weaker for the subsequent three novel verbs from the NF condition because these were preceded by a novel verb from the same NF condition. The data were consistent with these expectations. The first novel verb from an NF condition that followed novel verbs from a 3S condition was produced with 3S on the infinitive task on 46% of occasions. In contrast, the second, third, and fourth novel verbs from an NF condition were produced with 3S on the infinitive tasks in only 15% of instances (second = 15%, third = 15%, fourth = 15%). Further supportive data come from an inspection of the children's use of 3S on the infinitive task with the first novel verb from an NF condition (e.g., short NF) that was preceded by four consecutive novel verbs from a (different) NF condition (e.g., long NF). This first novel verb was produced with 3S in only 13% of instances. The second (13%), third (0%), and fourth (0%) novel verbs from the NF condition were likewise produced with 3S in only a limited number of instances.

Discussion

Before discussing the findings of this study, we must acknowledge the differences between our procedures and those used by Theakston et al. (2003). Along with the increase in number of novel verbs used and the manipulation of length, we deviated from Theakston et al.'s study in our treatment of familiar verbs. Theakston et al. presented familiar verbs in the same contexts (3S, NF) as the novel verbs and tested the children's use of the familiar verbs in contexts obligating 3S and (with a different sample of children) in contexts obligating infinitives. In Theakston et al.'s study, presentation context did not influence the children's use of 3S with familiar verbs, and the children appropriately used the bare stem in infinitive contexts. For these reasons, we limited our assessment of familiar verbs to a task that required the

children to use 3S with 15 familiar verbs. The children heard each verb three times with a first-person subject (rather than in a 3S or infinitive context) and then completed a sentence that obligated the 3S inflection. The children, therefore, did not hear the examiner use 3S with the familiar verbs, yet the 3S inflection was required in their response. Although the resulting data were in line with predictions, interpretation would have been more straightforward if we had used Theakston et al.'s procedure for familiar verbs. Indeed, given the children's occasional use of 3S with a novel verb in an infinitive context (which we discuss later in this section), it would have been especially helpful if we had likewise assessed the children's use of familiar verbs in infinitive contexts.

Our procedure for assessing the children's use of novel verbs in infinitive contexts differed from that of Theakston et al. (2003) in one potentially important respect: After all novel verbs had been presented in 3S or NF contexts and tested in 3S contexts, we re-presented the novel verbs in their original contexts and tested their use in infinitive contexts in a single session. This arrangement resulted in the re-presentation of some novel verbs in one context (3S or NF) after the child had just heard four novel verbs re-presented in the other context. Although the results were generally consistent with predictions, we suspect that some of the children's responses in infinitive contexts may have been influenced by immediately preceding novel verbs, as we discuss later in this section.

On the basis of Theakston et al.'s (2003) research, we predicted several specific findings for our study. The first is that children would show greater use of 3S in obligatory contexts with novel verbs that had been heard with 3S only than with novel verbs that had been heard in NF form only. This prediction was confirmed, and the difference reflected a very large ES. These findings corroborated those reported by Theakston et al. It is important to note that in this study, we used 16 rather than three novel verbs, and presentations occurred over four sessions rather than a single session. Thus, the earlier findings do not seem to be attributable to factors unique to the specific design used by Theakston et al.

Two other predictions were that children would (a) show less use of 3S in obligatory contexts with familiar verbs than with novel verbs that had been heard with 3S only but (b) show greater use of 3S in obligatory contexts with familiar verbs than with novel verbs that had been heard in NF form only. The reasoning behind these predictions is that familiar verbs would probably have been heard by the children in their daily circumstances in a variety of grammatical contexts, and thus the children would be less limited in the manner in which these verbs could be used, in contrast to newly encountered verbs that were associated with only a single context.

The results are compatible with both predictions. Given that our method for assessing 3S with familiar verbs differed from Theakston et al.'s (2003) procedure, some caution should be exercised in interpreting the data. Nevertheless, despite the procedural differences, our results were quite similar to those of Theakston et al. Our participants averaged 55% use of 3S of obligatory contexts during testing of familiar verbs; in Theakston et al.'s study, the average was 68%. (As we noted earlier, the use of 3S with familiar verbs by the children in Theakston et al.'s study was not influenced by presentation condition.) In both studies, the children's use of 3S with familiar verbs was lower than their 3S use with novel verbs heard exclusively in 3S contexts and was higher than their 3S use with novel verbs heard only in NF contexts. Given the comparable findings in the two studies, we suspect that Theakston et al.'s findings are generalizable with regard to the degree of use of 3S in familiar verbs versus in novel verbs heard exclusively in either 3S or NF form.

A fourth prediction was that children would show greater (inappropriate) use of 3S in infinitive contexts with novel verbs that had been heard in 3S form only than with novel verbs that had been heard in NF form only. This prediction was based on the assumption that if children who still show inconsistent use of 3S hear a new verb only in 3S contexts, the form of that verb will be relatively fixed until alternative forms of the verb (uninflected forms and/or forms with inflections other than 3S) are heard. This fourth prediction was borne out by the data: The children were significantly more likely to use the 3S form of the novel verb in infinitive contexts if the novel verb had been heard in 3S form only than if the novel verb had been heard in NF only. The ES was large. As in Theakston et al.'s (2003) study, the children in our study were more likely to use the 3S inflection in an infinitive context than to use the NF form if the novel verb had been heard only in 3S contexts.

Although input clearly played a major role in this inappropriate application of the 3S form of novel verbs, the children were not indiscriminately producing the form of the novel verb that they had heard. In this study, novel verbs heard only in 3S form were produced with the 3S inflection in 74% of obligatory contexts requiring the infinitive form but in 94% of contexts that required the 3S form. Likewise, in Theakston et al.'s (2003) study, novel verbs heard only in 3S form were produced with the 3S inflection in 55% of contexts requiring the infinitive form but in 100% of contexts requiring the 3S form. Thus, it appears that the children may have been in the early stages of distinguishing the contexts ordinarily associated with 3S versus NF forms. However, with limited experience with the novel verbs, they more often than not simply applied the only form of the novel verb that they had heard.

In one respect, our data differed from those of Theakston et al. (2003). We found that novel verbs heard only in NF contexts were produced with the 3S inflection to some degree ($M = 20\%$) in infinitive contexts. Productions of this type are quite infrequent in studies of children's spontaneous speech. In Theakston et al.'s study, novel verbs of this type were never inflected with 3S when tested in infinitive contexts. It should be noted, however, that only three novel verbs were presented in the Theakston et al. study, as compared with 16 novel verbs in this study. It is possible that, if Theakston et al. had administered a greater number of novel verbs, they may have also encountered some use of the 3S inflection with novel verbs presented in NF contexts.

We believe that this unexpected use of 3S forms in our study can be attributed to the manner in which we administered the novel verb infinitive task, with each of the 16 novel verbs reintroduced in its original presentation condition and then tested in an infinitive context. Priming effects seemed to be operating. As reported earlier, we found that the great majority of productions of 3S with novel verbs heard only in NF form occurred when the novel verb was immediately preceded by several novel verbs that had been heard only in 3S form. The likelihood of 3S use dropped dramatically with the very next novel verb from an NF condition.

Even with these unintended priming effects, it should be noted that the percentage of 3S use in infinitive contexts was lower for novel verbs from an NF condition (20%) than for any other context or condition used in this study. For example, novel verbs heard only in NF contexts and then tested in 3S contexts were produced with the 3S inflection in 34% of obligatory contexts. Familiar verbs (that presumably had been heard with and without 3S by the children in their daily experience) were produced with the 3S inflection in 55% of obligatory contexts. As noted earlier, if the novel verb had been heard in 3S form only, the degree of 3S use during testing was much higher (94% in obligatory contexts for 3S and 74% in obligatory contexts for an infinitive). The rank order based on degree of 3S use with novel verbs across these conditions and testing contexts was identical to that reported by Theakston et al. (2003). Nevertheless, it would have been preferable to adhere in every detail to those authors' procedures for assessing the children's use of novel verbs and to have included an assessment of the children's use of familiar verbs in infinitive contexts for comparison purposes.

A final goal of this study was to determine the possible basis for children's occasional use of the 3S inflection with novel verbs heard only in NF form. It seemed that this type of use occurred because the children were beginning to recognize that the presence of an auxiliary such as *will* rendered the bare stem form of the novel verb inappropriate when used without an accompanying

auxiliary. In this study, we examined this issue further by asking whether this awareness might be attributable to a more general ability to understand auxiliary-fronted questions or, instead, to an emerging recognition of the relationship between an auxiliary and the lexical verb that is initially achieved only when the auxiliary is in close proximity to the lexical verb. We used the length manipulation for this purpose. If children had acquired a more general ability to understand auxiliary-fronted questions, we would expect no differences in 3S inflection use for novel verbs heard in the short and long NF conditions. On the other hand, if the children's ability to understand the ties between the auxiliary and the novel verb was only just emerging, children might be more likely to detect these ties when the auxiliary and novel verb were in relatively close proximity. In this case, we would expect a difference in 3S inflection use for novel verbs heard in the long and short NF conditions.

The findings revealed no effect of length and, it is important to note, no Syntax $\times$ Length interaction. There are at least two possible reasons for these findings. The first is that many of the children had not acquired an understanding of the structural details of auxiliary-fronted questions and, thus, were unaware that the auxiliary marks tense in the utterance, allowing the novel verb to appear in NF form. For these children, the NF form of the novel verb heard in the input was not linked to an interrogative structure, and as a result, the children simply applied this NF form during testing, even though the testing context obligated a 3S form. Evidence consistent with this possibility is the fact that six of the children showed 0% use of the 3S inflection with novel verbs that had been heard only in short questions. For these children, larger separations between the auxiliary and the novel verb could not have led to lower use of the 3S inflection because of floor effects.

A second possible reason for the absence of a Syntax $\times$ Length interaction is that, for many children in the study, any separation between the tense-marking auxiliary and the novel verb—whether in an interrogative structure or in any other construction—might have invited the tendency to disregard tense and simply extract the subject–lexical verb sequence (e.g., “The tiger mib”) for production as a stand-alone utterance. These two possibilities might be evaluated in a future study in which the effects of input in the form of a noninterrogative with a separation between the subject and novel verb (e.g., “The tiger will always mib”) could be compared with the effects of input in the form of an interrogative (e.g., “Will the silly tiger mib?”).

The findings of this study, together with those of Theakston et al. (2003), have implications for attempts to explain the transition from inconsistent use with relatively low levels of accuracy (e.g., 35%) to inconsistent use with relatively high levels of accuracy. (e.g., 75%).

Regardless of the maturational or learning factors assumed in accounts of grammatical development, it is well established that children do not show an abrupt change from inconsistent use to adultlike use; instead, the change is gradual. For example, for the age span of 3;0 (months; years) to 3;6, Rice, Wexler, and Hershberger (1998) reported increases in children's percentages of 3S use from approximately 42% to 62% in response to experimental probes and from approximately 65% to 75% in spontaneous speech. The details in the children's grammars that change during this small but reliable shift toward adultlike use are not well understood. An important part of this shift might be the children's increasing experience with verbs in the input, allowing a child to register each verb in different grammatical contexts (e.g., 3S, NF contexts) and, in turn, use these verbs in a more flexible manner. This greater flexibility would result in greater overlap among verbs in the grammatical contexts in which they are used, which could lead to broader, more abstract patterns of use.

This study corroborates earlier findings of strong input effects on young children's tendency to use the 3S inflection, and it does so with design features that differ from the earlier work of Theakston et al. (2003), increasing our confidence that these findings are generalizable. Additional research is needed to understand how children's early reliance on forms as they are heard in the input can change to more flexible and productive use of these forms by the children. A profitable next step in this line of research might be the use of a longitudinal design in which children participate in experiments with novel verbs at several points in time and, on each occasion, are tested on their ability to extend the novel forms to new contexts. Work of this type might allow researchers to determine the precise nature of the changes in children's grammars that are responsible for the gradual increases in accuracy that occur within the broader period of inconsistency.

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