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**COGNITIVE
DEVELOPMENT**

What preschool children do and do not do with ungrammatical word orders

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Abstract

Akhtar [J. Child Lang. 26 (1999) 339.] found that when 4-year-old English-speaking children hear novel verbs in transitive utterances with ungrammatical word orders (e.g., *Elmo the tree meeked*), they correct them to canonical SVO order almost all of the time. However, when 3-year-olds and older 2-year-olds hear these same utterances, they waver between correcting and using the ungrammatical ordering. In the current study, we adapted this task for children at 2;4, using an intransitive construction. The major finding was that children corrected the noncanonical word order less than half as often as Akhtar's 2-year-old subjects who were approximately 4 months older. At the same time, however, children showed in several ways that they had some implicit understanding of canonical SV order; for example, they used the novel verb which they heard used in grammatical word order more often than the novel verb which they heard in ungrammatical word order, and they consistently used pronouns and the progressive *-s* auxiliary in appropriate ways. The current findings thus contribute to a growing body of theory and research suggesting that the ontogenetic emergence of linguistic categories and schemas is a gradual process, as is the emergence of categories in other domains of cognitive development. © 2001 Elsevier Science Inc. All rights reserved.

1. Introduction

When young children hear a novel verb used in one linguistic construction, they tend to continue using it in that, and only that, construction. A number of

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experimental studies have found that the ability to use novel verbs in unmodelled syntactic constructions gradually increases between the ages of 2;0 and 3;0. Indeed, most children still show a greater tendency towards conservative, rather than productive, use up until just before their third birthday (see Tomasello, 2000 for a review).

The main conclusion from these studies is that early in grammatical development, young children are not working with verb-general linguistic categories and schemas, but rather their underlying linguistic representations consist of schemas based on specific lexical items.¹ Another recent study, using a different methodology, has provided additional support for this conclusion in a particularly dramatic way. Akhtar (1999) modelled novel verbs for novel events with young children at 2;8, 3;6, and 4;4 years old. One verb was modelled in canonical English SVO order, as in *Elmo meeked the cow*, whereas two others were either in SOV (*Elmo the cow tammed*) or VSO (*Gopped Elmo the cow*). The latter two orders are noncanonical in English when describing a scene in which an actor (here: *Elmo*) acts on an undergoer (here: *the cow*). Children were then encouraged to use the novel verbs with neutral questions such as *What happened?* The results were striking. When children heard a novel verb in SVO order, that is what they produced, almost exclusively. Conversely, when they heard the familiar verb *push* in a noncanonical word order, they mostly corrected it to canonical SVO order—presumably relying on their extensive knowledge of *push* that they brought to the experiment. In the two key conditions, when children heard a novel verb in one of the noncanonical SOV or VSO frames, they behaved quite differently. Whereas at 4;4, the children corrected the noncanonical adult word patterns to a canonical English SVO pattern an average of 96% of the time, at 2;8 and 3;6 the children only did this a little over 50% of the time. These findings are particularly important because they show that 2-year-olds are not just conservative in that they use novel verbs how they have heard them, they are so conservative that they can be induced to produce a novel verb in bizarre word order/semantic role pairings completely unlike anything they would normally hear.

Interestingly, the fact that many of the younger children in Akhtar's study vacillated between using the odd orders and 'correcting' to canonical SVO order indicates that perhaps they knew enough about canonical English word order patterns to discern that these were strange patterns, but not enough to overcome completely their tendency to use individual verbs in the particular word order in which they hear them used. This suggests that the younger children had some kind of SVO schema, but that this is perhaps not as strong as that of older children. It may be that children develop abstract linguistic schemas only gradually, and that there are periods of time where children are caught between

¹ Although some preferential-looking studies suggest that young 2-year-olds have implicit knowledge of verb-general transitive word order (e.g. Bavin & Growcott, 1999; Bavin & Kidd, 2000; Naigles, 1990), in act-out measures of comprehension, children are almost as conservative as they are in production (Jaakkola & Akhtar, 2000; Akhtar & Tomasello, 1997).

using a newly learned form as they hear it used, and assimilating it to their gradually forming SVO schema. It is also noteworthy that when they used the noncanonical orders, they always used nouns, not pronouns, whereas roughly half of their corrections to SVO order was with pronouns. This suggests that young children's earliest representation of the SVO pattern may partially originate in pronoun-specific schemas such as *He's VERBing* (see Lieven, Pine, & Baldwin, 1997; Pine, Lieven, & Rowland, 1998). One specific hypothesis resulting from this interpretation is that if still younger children were run in this experiment, they would follow the adult models almost exclusively with little vacillation—because they know even less about English SVO ordering than Akhtar's youngest children.

In the current study, therefore, we adapted Akhtar's basic experimental paradigm for children between 2;2 and 2;6 years of age. Since children of this age are more likely to produce two-word than three-word utterances, the main adaptation was to use an intransitive (unergative) construction, with only a single (actor) argument. There were three conditions. In the experimental condition, children heard a novel verb in ungrammatical VERB–SUBJECT (VS) word order. Our expectation was that children this young would not correct this odd word order very often since they do not have a strong knowledge of canonical SV word order. Instead, they would simply use it as they had heard it used. In the first control condition, children heard another novel verb, but this time in grammatical SV word order. Our expectation in this case was that, once again, they would use the verb as they had heard it used, which meant SV order. (This condition thus provides a baseline indication of the degree to which the children were willing to use a novel verb). In the second control condition, children heard a familiar verb (*jump*) in ungrammatical VS word order. Unlike the other two conditions, our expectation in this case was that they would correct this odd word order. This is because 2;4-year-olds have heard this verb in canonical order many times in the past, and so they know that its verb-specific canonical word order is SV. (This condition thus controls for the possibility that young children are generally too shy to correct adults.) We also had a control actor construal test to make sure that the children construed all the adult models—including those with 'VERB–NOUN' word order—as unergative intransitives.

2. Method

2.1. Participants

The participants were sixteen 2-year-old children (mean = 2;4, range = 2;2–2;6) and sixteen 3-year-old children (mean = 3;9, range = 3;6–4;0)—all monolingual speakers of British English. Both groups contained nine girls and seven boys. In addition, 15 children participated in both testing sessions, but were not included in the study—10 of these because they did not meet the

criteria of using one of the novel verbs nonimitatively in a multiword utterance at least once (nine 2- and one 3-year-old), 3 because of experimenter error, and 2 because they turned out to be bilingual. A further nine children did not complete both testing sessions due to fussiness or missed appointments.

2.2. *Materials and design*

The main apparatus was a puppet theatre, whose front was approximately 1.25 m wide and 1.3 m high. The stage of the theatre had a curtain backdrop, from behind which toy animals could emerge and perform actions. Each child participated in three games, each centred on a single toy animal performing a single, self-initiated, self-perpetuated action as one emerged from the puppet theatre. (1) In the ‘meeking/mooping’ game, the toy animal flew out of the puppet theatre holding the end of an elastic string between its paws and swung around a pole several times. (2) In the ‘baffing/tamming’ game, the toy animal emerged slowly from the puppet theatre down a ramp in a wobbling motion. (3) In the ‘jumping’ game, the toy animal jumped repeatedly inside the puppet theatre and then jumped out.² The order in which the games were played was counter-balanced across children in each age group. To ensure that the children interpreted all three games as actions involving one actor (the toy), the children did not find out that there was a puppeteer in the theatre until after the experimental sessions were over.

There were three experimental conditions defined by the language models the child experienced. Each child played one game in each condition. (1) In the Novel VS condition, the child heard a novel verb used in an utterance with the ordering VS (e.g., after a duck had swung out of the theatre and around the pole ‘Meeked the duck’). (2) In the Novel SV condition, the child heard a novel verb used in an utterance with the ordering SV (e.g., after a cow had emerged from the theatre in a wobbling motion ‘The cow baffed’). (3) In the Familiar VS condition, the child heard a familiar verb used in an utterance with the ordering VS (e.g., after a horse had emerged and jumped up and down on the theatre stage ‘Jumped the horse’). The two novel verb conditions were counterbalanced with the ‘meeking/mooping’ and ‘baffing/tamming’ games across children for each age. The Familiar VS condition was always used with the ‘jumping’ game.

2.3. *Procedure*

Each child participated in two sessions that lasted between 20 and 40 min each, mostly on consecutive days. The main experimenter (E) was an adult

² It should be noted that all three verbs share an essential semantic similarity, in that they all encode manner of motion and change of location of a single, self-propelled participant. This was done to ensure that any differences in word order usage among the three verb conditions could not be claimed to result from the children analysing one of the verbs as being underlying ‘unaccusative’.

female, as was the secondary experimenter who sat inside the puppet theatre and manipulated the toys. A caregiver was also in the room, and she/he and her/his child sat approximately 1 m in front of puppet theatre. The first session began with a warm-up game in which the child heard an action referred to with a familiar verb in a grammatical word order and was later asked, on another enactment of the event, “What’s happening?” and/or “What happened?”. The experimental session then began. The child played each experimental game seven times (blocked) with various toy animals. Before each game, the child was asked to name the toy animals, and prior to each enactment of a game, the child was told “Look what the X can do” or “Do you think the X can do it, too?”. In five enactments of the game, children heard an appropriate linguistic model multiple times for each enactment. For each linguistic model in each condition, E used the noun with the definite article (e.g., *the cat*), unless a particular child gave it a name (e.g., *Winnie*), in which case E adopted her usage. E also used a tag question (e.g., *meeked the X, didn’t it?*) at least once per enactment, and frequently added the adverbial phrases *quickly*, *slowly*, *again*, or *now* to the linguistic models. For two enactments of the game, E and/or the parent covered their eyes and the child was asked elicitation questions: “What’s happening?” and/or “What happened?” as the toy animal performed its action (always new toy animals). If the child did not answer, E asked “What animal is it?” and if the child named the animal, she was then asked “and what’s happening/ed with the X?”. On Day 2, the procedure was the same, except that only four enactments were accompanied by linguistic models and the other three were accompanied by the elicitation questions.

The ordering on Day 1 for a given verb was:

- four enactments with linguistic models;
- one enactment with elicitation questions;
- the next enactment with linguistic models; and
- the last enactment with elicitation questions.

The ordering on Day 2 was:

- two enactments with linguistic models; and
- alternation between enactments with linguistic models and those with elicitation questions.

To keep the interaction around the games natural, E used as many linguistic models around a single enactment of a game as seemed natural, given the child’s attentional state. For the two conditions with novel verbs (Novel VS and Novel SV), both age groups heard an average of 47 linguistic models, roughly half of which was in the progressive minus the auxiliary (e.g., *the cat meeking*) and half in the past tense (e.g., *the cat meeked*). For the Familiar VS condition, the 3-year-olds heard an average of 51 and the 2-year-olds an average of 50 linguistic models,

again roughly half of which was in the progressive and half in the past. However, the number of trials (hence the number of opportunities for the children to produce the verbs themselves) was identical for all the children. As a way of making sure that children learned and used the experimental verbs, several times during the enactments of each game, the child was asked to repeat the name of the target verb (e.g., “Can you say ‘jumping?’”). If the child used a nontarget verb to refer to the target verb, she was told the name of the game (e.g., “We call that ‘jumping’.”).³

It was important to the current research question that children viewed the toy animals’ actions as self-initiated and so appropriately described with an intransitive verb; otherwise, it would be inappropriate for us to expect the child to treat the single participant as subject. On Day 2 following the experimental session with each verb, therefore, we also sought to determine if any child had in fact realised that there was an adult hidden inside the puppet theatre, and, moreover, if they had consequently interpreted the ‘VERB–NOUN’ models, such as *Meeked the dog* as ‘(omitted subject)–VERB–OBJECT’. The procedure for this Actor Construal Test was as follows. For each verb (random order), the child was first reminded of the name of the game by seeing one enactment of the game accompanied by linguistic models. Then, the puppet theatre curtain was opened to reveal the second experimenter. The child was then asked to greet this new person (“Say hello to Kerry!”), was given a new toy, and was asked to name it and give it to the second experimenter. Then the parent and/or E covered her/his eyes and the child observed the second experimenter initiating the target game with the toy animal and was asked “Who *VERB*ed?” (e.g., “Who meeked?”).

2.4. Scoring

All child utterances (both elicited and spontaneous) containing one of the three experimental verbs were transcribed separately by two individuals, and any utterance on which the transcribers did not agree was checked by a third (blind) transcriber, who mostly agreed with one of the two others. If the third transcriber did not agree with either of the previous two, the utterance was discarded from the sample. All nonimitative, semantically appropriate utterances containing a noun/pronoun and experimental verb were then coded by E for whether they matched or mismatched the modelled word order. Imitations were defined as any utterance containing a noun that the child had heard E use together with the same target verb at any point during the experiment (recall that the enactments with elicitation questions had no linguistic models from E and always used new toys). Eight utterances (all from 3-year-olds) that were clearly intended as imperatives were also excluded (imperatives were defined as utterances made before the

³ For two 3-year-olds, E inadvertently used the Familiar VS verb by saying *that’s jumping, isn’t it*, which was intended as a naming utterance but which could be construed as an SV utterance with the *that* as a demonstrative pronoun. However, as these children displayed the same pattern of linguistic behaviour as the majority of the other 3-year-olds, they were included in the study.

enactment occurred using the verb without either of the modelled endings, *-ing* or *-ed*). Two utterances (both by the same 2-year-old using *jump*) in which there was a significant pause and intonation break between the noun and verb were also excluded (e.g., “frog! . . . jumping on a stick”), as were a few utterances in which the syntactic relation of the noun to the verb was ambiguous (e.g., “Look at the frog jumping.”). Although instructed not to, a couple of parents did use the target verbs during the session. If this occurred before the child had produced any nonimitative multiword utterances with that verb, the child was dropped from the study. If it occurred afterwards, the child was included, but all utterances following the parental intrusion were excluded unless they were identical to the child’s prior productive utterances.

For the actor construal test, if the child unambiguously indicated the toy animal either verbally or by pointing, this was coded as an ‘animal’ response. If the child pointed at the puppeteer (second experimenter), puppet theatre, or other puppeteering equipment, this was coded as ‘person.’

3. Results

Children could either follow the word order in E’s linguistic models with a given experimental verb, which was called Matching, or they could use the other possible order, which was called Mismatching. These two response types are analysed separately in the main analyses. It should be noted that some of the children did not use the target verb at all in one or two of the three conditions. In addition, since we included spontaneous productive usage of the target verbs, there was in principle no limit on the number of times a given child could use a particular verb. For these reasons, the matches and mismatches are not mirror images of each other.

3.1. Main analyses

Table 1 shows the mean frequency of matches and mismatches as a function of age and of the three experimental conditions. Mismatches of the Familiar VS and Novel VS verbs almost all consisted of straight corrections to SV. (The exceptions all involved use of SVO word order. There were two such exemplars from the 2-, and 20 from the 3-year-olds; these still clearly have SV ordering and so were classed as mismatches in these conditions.) The very few mismatches of the Novel SV verb all involved switches to VS word order (in every case, this was the order modelled for the preceding verb). The frequency of mismatches was analysed using a 2 (Age) \times 3 (Experimental Condition) mixed factorial analysis of variance (ANOVA). There were main effects for both Condition [$F(2, 60) = 18.78, P < .001$] and Age [$F(1, 30) = 29.13, P < .001$]. However, these must be interpreted in the context of a significant Condition \times Age interaction [$F(2, 60) = 4.12, P < .05$].

Tables 1

The mean frequency of matches and mismatches as a function of age and condition

		Familiar VS	Novel VS	Novel SV
2;4-year-olds	Matches	0.88	0.94	4.50
	Mismatches	2.25	0.25	0.13
	<i>Overall use</i>	3.13	1.19	4.63
3;9-year-olds	Matches	1.38	1.56	4.38
	Mismatches	6.50	3.06	0.56
	<i>Overall use</i>	7.88	4.62	4.94

Since we had hypothesised, firstly, that the 2-year-olds would mismatch the Familiar VS more frequently than the Novel VS, and, secondly, that the 3-year-olds would mismatch the Novel VS more frequently than Novel SV, whereas the 2-year-olds would not, this interaction was further investigated by carrying out three within-subjects planned contrasts (with a Bonferroni correction for three comparisons). The 2-year-olds mismatched (corrected) the word order in the Familiar VS condition significantly more often than in the Novel VS condition [$t(15)=2.56$, $P<.017$, one-tailed]. There was no significant difference for the 2-year-olds between the Novel VS and Novel SV mismatches. However, for the 3-year-olds, the frequency of mismatches in the Novel VS condition was significantly higher than in the Novel SV condition [$t(15)=2.51$, $P<.017$, one-tailed]. The findings for mismatches thus support our hypotheses.

The children's Matching utterances were analysed in the same basic way as Mismatches. A 2×3 ANOVA indicated a main effect for condition [$F(2, 60)=7.22$, $P<.01$], but no main effect for age and no interaction. Since our hypotheses for the matches were the mirror images of those for the mismatches, we carried out the same basic planned contrasts (again with a Bonferroni correction for three comparisons). For the 2-year-olds, contrary to our hypothesis, there was no significant difference between the Familiar VS and the Novel VS condition. The difference between the Novel VS (mean=0.94) and Novel SV matches (4.50) was also not significant for the 2-year-olds. The difference between these two conditions was significant, however, for the 3-year-olds [$t(15)=2.78$, $P<.01$, one-tailed]. Thus, the findings for matches in the two Novel Verb conditions are in line with our hypotheses.⁴

Overall, the results for the 3-year-olds are clear. They mismatched (corrected) both of the VS verbs (Novel and Familiar) to canonical SV order more than they mismatched the Novel SV verb, and they matched adult word order more often for the Novel SV verb than for either of the VS verbs. Clearly, they know a lot about canonical English word order and they prefer to produce SV utterances no matter what they have heard. The 2-year-olds, however, are a different story. Although their Matches showed some signs that they were sensitive to canonical

⁴ A similar pattern of results was found for both matches and mismatches when they were analysed in terms of mean proportions. In addition, when we used nonparametric procedures, we again found the same pattern of results for both frequency and mean proportions.

English word order—they matched the Novel SV verb four times more often than the Novel VS verb—in their mismatches, they showed no signs of such sensitivity. They almost never mismatched either the Novel SV or the Novel VS verb; with the novel verbs, they produced only the order they heard on almost every occasion. Also, the 2-year-olds were more likely to correct the Familiar VS verb than the Novel VS verb to canonical word order, which indicates that they knew the appropriate word order for *jump*—presumably because they have heard the appropriate word order with this particular verb many times in the past. Because this point is so crucial to our experimental hypothesis, we performed one statistical analysis across matches and mismatches. We asked whether the 2-year-olds were more likely to match than to mismatch the ungrammatical word order used with the Novel VS verb. The answer is that they were; they mismatched (corrected), on average, only 0.25 times per child, whereas they followed the noncanonical word order over three times as often, almost once per child (0.94) [$t(15)=1.9$, $P<.05$, one-tailed].

In terms of individual child performance with the Novel VS verb, five of the 2-year-olds matched the modelled order exactly with all of their utterances, whereas only two invariably corrected it (the 3-year-olds showed the opposite pattern, with only two matching consistently and seven mismatching consistently). However, the 2-year-olds also showed a tendency to avoid using the novel verbs altogether, with seven never using the Novel VS and four never using the Novel SV productively.

Finally, in order to ensure that the children's matches of VS word order were not merely due to a growing tendency over the sessions to comply with the adult (i.e., coming to see additional adult models as requests to conform to adult word order), we examined whether the children were more likely to match the two VS verbs in Session 2 than in Session 1. It was found that the frequency of matches and mismatches was the same across the 2 days in all cases except for the 3-year-olds with the Novel VS verb, which was higher for *both* matches and mismatches on Day 2 [$t(15)=2.22$, $P<.05$ and $t(15)=2.56$, $P<.05$, respectively]. There is thus no evidence for a growing conformity effect.

3.2. Actor construal test

In the actor construal test, virtually no child indicated that she/he thought that the toy animals' actions had someone or something else as actor. Thus, even when they had heard a verb in VS word order (as in 'Meeking the rabbit'), they hardly ever indicated the puppeteer, puppeteering equipment, or theatre in response to the "Who *VERB*-ed?" questions. Of 74 responses given by the 32 children for the three verbs combined (out of a possible 96, there were 22 nonresponses), there were only three in which a child indicated something other than the toy animal. Indeed, of the 3-year-olds, almost 100% indicated the toy animal in each of the three conditions. For the 2-year-olds, overall responding was less high; the number of their responses in which they indicated the animal as agent were 9, 6,

and 11 for the Familiar VS, Novel VS, and Novel SV conditions, respectively (out of a possible total of 16 responses for each condition). We conclude that even when they heard ‘VERB+NOUN’ models, the children understood that the experimenter was intending this to mean ‘VERB+ACTOR’ rather than ‘VERB+UNDERGOER’. The fact that the 2-year-olds did not show a tendency to correct this to ‘ACTOR+VERB’ order within the novel VS thus suggests that they do not have strong verb–general representations of SV word order.

3.3. Nominal choice, verbal morphology, and nonmodelled constructions

Children of both ages showed signs of knowing something about the kinds of nominal items that are normally used in pre- and postverbal position in English transitive and intransitive utterances (subjects, in child-directed speech, are pronouns about 80% of the time, whereas objects are nouns approximately 55% of the time; Cameron-Faulkner, Lieven, & Tomasello, submitted). As can be seen in Table 2a and b, when children matched the noncanonical order, they virtually never used a pronoun (a total of 3 of 76 utterances), which means that they did not like using a pronoun for an actor/subject coming after the verb. This replicates Akhtar’s (1999) findings.

Conversely, when they corrected the Familiar VS verb and/or the Novel VS verb to canonical order, they used pronouns much more often than nouns (2-year-olds almost five times as often, 3-year-olds more than twice as often). That this does not simply reflect a mere preference for pronoun subjects can be seen from the findings from the Novel SV condition; here, both age groups used nouns and pronouns roughly 40% of the time when using SV word order. Therefore, when the children heard ‘Noun verb’ with a specific verb, they were willing to use ‘noun verb’ utterances with it more than 40% of the time. However, in the VS conditions, they of course did not hear this. Their reliance on subject pronouns when correcting the Novel VS thus indicates that English 2- and 3-year-olds have much stronger ‘pronoun verb’ than ‘noun verb’ intransitive schemas. For the 2-year-olds, this is the case even for the familiar verb, indicating that they have learned that certain

Tables 2

Mean proportions of nouns and pronouns in utterances involving different orderings of subject and verb in the VS conditions (denominator is number of children who gave at least one response in the condition concerned)

	SV order with pronouns	SV order with nouns	VS order with pronouns	VS order with nouns
<i>(a) Novel verb VS</i>				
2-year-olds ($n=9$)	0.20	0.11	0.03	0.65
3-year-olds ($n=14$)	0.49	0.13	0.00	0.38
<i>(b) Familiar verb VS</i>				
2-year-olds ($n=11$)	0.52	0.15	0.00	0.33
3-year-olds ($n=16$)	0.54	0.33	0.01	0.12

pronouns such as ‘he’ precede rather than follow ‘jump,’ but have yet to acquire the equivalent knowledge for nouns.

Another interesting finding was that when using VS word order, none of the children ever added an auxiliary, no matter the form of the verb (progressive, past, or bare). On the other hand, when using SV word order with the progressive, the 2-year-olds added the auxiliary 70% of the time with pronoun subjects and 26% of the time with nouns. The 3-year-olds added the auxiliary 88% of the time with pronoun subjects and 73% of the time with nouns. Again, this pattern may indicate that children of this age are learning the construction *X’s VERBing* as a whole by learning to associate the auxiliary *–s* with the bound morpheme *–ing* and with specific lexical items, especially pronouns.

Finally, it should be mentioned that four of the more linguistically advanced 2-year-olds did use a novel verb creatively in a nonmodelled construction at least once during the experiment. For three of the four children, these creative uses were limited to modal constructions (e.g., *He can VERB*). This indicates support for previous findings that some young 2-year-olds have lexically specific patterns based on particular modal verbs (see, e.g., Pine, Lieven, & Rowland).

4. Discussion

Using a slightly modified paradigm, the current results replicate those of Akhtar’s (1999) for 3-year-olds and provide further information about the behaviour of younger 2-year-olds in this task. Focusing on the crucial condition, our children at 3;9 corrected the Novel VS verb to canonical English word order in an average of 66% of their productions; this accords generally with Akhtar’s finding that children at 3;6 corrected to SVO 59% of the time. The new finding in the current study is that children at 2;4 corrected the Novel VS verb to SV only 21% of the time. Given that Akhtar’s children at 4;4 corrected to SVO order 96% of the time, we get a very consistent picture of gradual development from 2;4 to 4;4.

This is not to say that young 2-year-olds know nothing about canonical English word order in the transitive and intransitive constructions. In the current study, they corrected the familiar verb to canonical order 72% of the time, which means that they know the ordering of this and no doubt many other individual verbs. In addition, examination of the children’s use of pronouns and the *–s* auxiliary also showed that they are forming more general schemas around these items. Perhaps most telling, they also matched the ordering of the Novel SV verb four times more often than they matched the ordering of the Novel VS verb; this indicates the influence of at least implicit verb–general knowledge on their performance in this task as they seemingly avoided to some degree reproducing the noncanonical order. The point is just that for about four of five children, their knowledge of SV ordering in English is not strong enough to overcome their general tendency to use newly learned verbs only in the constructions in which

they have heard them used and not in others. Thus, sensitivity to differences in word order (as seen in some preferential-looking studies, and also in the avoidance patterns in the current study) is not the same thing as the knowledge of how to productively use general word order to express semantic relationships. Moreover, it is unlikely that all 2;4-year-olds have general word order ‘competence’ but are prevented from actively demonstrating this by some kind of ‘performance’ problem. If this were the case, one would need to account for the willingness of roughly 50% of these children to productively use ungrammatical word orders.⁵

These findings fit in well with the view that children’s verb–general syntactic schemas develop gradually out of their early lexically based schemas, which in turn develop out of memory traces of actual utterances. This interpretation is consistent with both usage-based theorists in Cognitive Linguistics (Bybee, 1995; Goldberg, 1999; Langacker, 2000) and connectionist theorists concerned with issues of schema strength and critical mass (e.g., Elman, 1998; Morris, Cottrell, & Elman, 2000). In this view, a child’s early lexically specific schemas, such as *X hit Y* and *X kick Y*, cluster into groups based on their similarities to one another in terms of semantics and form, the latter including both word order and phonological consistencies—such as the pronoun *he*—in English. The strength of the schema, which arises out of these clusters (in this case perhaps *ACTOR action UNDERGOER*), is largely determined by the number of items already in the cluster and by the semantic similarity between the cluster and a particular novel verb. Therefore, children should be able to assimilate a novel verb to such a schema if the verb cluster is already sufficiently large, and/or if the novel verb is sufficiently similar in meaning and form. In addition, there are other processes which simultaneously help to form more abstract constructions. In particular, items which are consistently substituted for one another in input patterns—such as the pronoun *he* and preverbal nouns in English—may become connected in some way, enabling pronoun islands, such as *He’s VERBing it*, to gradually extend to include nouns, eventually resulting in more abstract schemas such as the transitive.

Further support for this view comes from a recent study in which children at age 2;6 were given training with verbs in transitive schemas. It was found that when trained with consistent schemas, such as *He’s VERBing it*, used with a range of different verbs, approximately 85% of the children then went on to produce novel verbs in unmodelled transitive constructions—about 4.5 times the percentage found in studies with no training (Childers & Tomasello, in press).

⁵ An utterance with VERB + NOUN order such as *Buffed the frog* is ungrammatical when used—as in the current study—to describe a scene in which a frog carries out an action independently (recall that the children did not discover the puppeteer until after the experimental sessions were over, and that even in the postexperiment actor construal test, they virtually never indicated that they interpreted such utterances as ACTION + UNDERGOER). We therefore argue that when the children produced utterances such as *Meeked the duck*, they intended this to mean ‘ACTION + DOER-OF-PARTICULAR-ACTION,’ which is ungrammatical in English.

If we examine the range of recent empirical findings, then, the following developmental trajectory emerges. Below the age of 2, word order production and comprehension are, for the vast majority of children, lexically specific (Roberts, 1983; Tomasello, Akhtar, Dodson, & Rekau, 1997). From around the age of 2 English-speaking children show that they are sensitive to the transitive–causative pattern in comprehension, as measured by the preferential-looking paradigm (e.g., Bavin & Growcott; Naigles). By around 2;4, children know enough about this ordering that they tend to refrain from using a novel verb heard in a strange-sounding word order (in the current study, they matched the noncanonical order less often than the canonical), but they nevertheless rely almost exclusively on lexically specific (both verb- and pronoun-based) word order schemas when they produce creative utterances. By age 2;8, children are able to correct noncanonical word orders with novel verbs to SVO roughly 50% of the time (Akhtar) and to use novel verbs in constructions they have never before heard them in at about this same frequency (Tomasello, 2000). By ages 4 and 5, children show that they can generate creative utterances from verb general schemas (e.g., Pinker, Lebeaux, & Frost, 1987).

The current findings thus contribute to a growing body of theory and research suggesting that the ontogenetic emergence of linguistic categories and schemas is a gradual process in which notions of relative entrenchment and abstraction play an important role—as they do in concept formation in other areas of cognitive development (see, e.g., Bauer & Fivush, 1992; Mandler, 2000). More reliance on models from Cognitive Psychology and Cognitive Linguistics—and more empirical research on the actual process of category and schema formation in the ontogeny of language—is therefore sorely needed.

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