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# Learning word-order constraints under conditions of object ellipsis\*

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## *Abstract*

*It is generally assumed that the nature of the input children hear, when combined with innate capacities for (language) learning, is sufficiently rich for language acquisition to succeed despite the presence of ungrammatical utterances. Little attention, however, has been given to how children learn grammatical constructions that are rare in the input, where both overt positive evidence and implicit negative evidence are limited. Such cases provide a unique window of opportunity for exploring the various language-learning strategies children use, whether these exhibit certain "innate" semantic or syntactic predispositions, or whether more general learning mechanisms, such as statistical inference, are involved. This paper examines children's acquisition of double-object applicative constructions in the Bantu language Sesotho, where evidence for the order of postverbal objects is absent from the input, due in part to the high instance of "unspecified object deletion," or object ellipsis. It finds that although three- to four-year-olds perform above chance on forced-choice elicited-production tasks, eight-year-olds are still not adult-like in their use of the syntactic restrictions that govern these constructions. The paper raises questions regarding the types of learning strategies children use under conditions of ellipsis, and the implications this has for theories of language acquisition.*

## **1. Introduction**

From the early days of generative linguistics it was assumed that everyday speech was full of ungrammatical sentences (or "performance errors") that would render problematic the task of learning language from overt positive evidence. Given this presumed "ungrammatical" nature of the input (also known as "the poverty of the stimulus") and the problems it poses for language learners, it was proposed that young children must

bring to the language-learning task some sort of innate predisposition for learning language, and that this built-in mechanism would help guide the child to successful acquisition of language (e.g. Chomsky 1965). Further support for this claim came from observations regarding the rapid time course of language acquisition, where much has been acquired by the age of three or four, but where some highly frequent aspects of language, such as grammatical morphemes, appear to be acquired independently of frequency of occurrence in the input (e.g. Brown 1973).

More recently, however, researchers have begun to recognize that statistical properties of the input may influence both the rate and type of language learning that takes place, and that this may occur in a number of different linguistic domains: early research on infant speech perception shows that one-year-old infants prefer listening to novel words with stress patterns that most closely resemble the high-frequency stress patterns in the language they are learning (e.g. Jusczyk et al. 1993; Morgan 1996), and children's first two-word utterances already exhibit the word-order relations most frequently found in the language to which they are exposed (Mazuka 1996). This early sensitivity to both phonological and syntactic properties of the ambient language helps explain otherwise confounding cross-linguistic differences in the appearance of certain grammatical constructions. For example, although English-speaking preschoolers use few verbal passives in their spontaneous speech, children learning Sesotho — a Bantu language where verbal passives are frequently used in adult and child-directed speech — use these constructions frequently by the age of three (Demuth 1989, 1990). Thus, it appears that children continue to be sensitive to the statistical properties of the input they hear, and that theories of language learning cannot discount the importance of these frequency effects.

It is therefore interesting to consider how children learn aspects of syntactic systems where overt positive evidence for certain constructions is sparse. Is it the case, as Chomsky and others have suggested, that children are innately guided in learning these aspects of language? Or do children simply await sufficient overt positive evidence (or implicit negative evidence) before such constructions are learned (Baker 1979)? Pinker (1984, 1989) proposed that children come to the language-learning task equipped with certain "semantic predispositions" that would help them "bootstrap" their way into learning the syntax of language. This view is especially appealing given the presence of argument ellipsis, where the syntax of certain constructions may be "underspecified" in the input but the semantics may be robust. Alternatively, proponents of "construction grammar" would maintain that children learn the syntax verbs quite late, using nonproductive verb–argument "constructions" as unanalyzed units

early on (e.g. Tomasello 1992). Such a proposal would predict a lack of early productive errors.

In this paper we focus on an interesting case of ellipsis — that of "object drop" in Sesotho ditransitive applicative constructions (also known as "benefactive" or double-object" constructions). Although the applicative morpheme adds an additional argument to the verbs, sometimes that argument (usually a benefactive) or more frequently the other argument (usually a theme) is omitted from the clause, with no incorporated object pronoun remaining on the verb (as is normally the case). This is part of a more general discourse phenomenon in Bantu languages called "unspecified object deletion," where the lexical object of a verb is occasionally omitted from the discourse (e.g. *I'm writing [a letter] to John, I'm cooking [some food] for you*). The existence of such constructions raises questions regarding how and when children learn the syntactic ordering restrictions on postverbal NPs in Bantu double-object applicative constructions. It also raises the more general issue of how children learn the syntactic frames of such verbs if one or both objects are missing.

The paper is organized as follows: in section 2 we briefly outline the syntax of double-object applicatives in Sesotho. In section 3 we review results of a previous study that found object ellipsis in the spontaneous use of these constructions by both young children and adults in child-directed speech. In section 4 we then present findings from a forced-choice elicited-production experiment designed to test three- to eight-year-old children's knowledge of the syntactic restrictions on Sesotho double-object applicatives. In section 5 we discuss possible interpretations of children's task-noncompliant errors. We conclude in section 6 with a discussion of the theoretical implications of the findings, both for the learning of syntactic structure in particular and for theories of language learning more generally.

## 2. The syntax of Sesotho double-object applicatives<sup>1</sup>

The applicative morpheme in Bantu languages is generally infixes toward the end of the verb stem, adding another (usually benefactive) argument to the verb.<sup>2</sup> In the case of a normal transitive verb, adding the applicative morpheme renders the verb ditransitive (hence the name "double-object" constructions). Consider the examples below, where (1a) is the transitive form of the verb *pheha* 'cook', and (1b) is the applicative *phehela* 'cook for someone'.<sup>3</sup>

- (1) a. Bana ba-pheh-a nama  
children AGR-cook-FV meat  
'The children are cooking meat'
- b. Bana ba-pheh-el-a mme nama  
children AGR-cook-APL-FV mother meat  
'The children are cooking meat for my mother'

Bresnan and Moshi (1990) show that Bantu languages exhibit "object asymmetries" with respect to double-object applicative constructions: languages like Kinyarwanda and some dialects of Chichewa show "symmetrical" object properties (both objects showing true "object" properties), whereas languages like Kiswahili and other dialects of Chichewa show "asymmetrical" object properties (with only the applied object showing true "object" properties). Both sets of languages are similar, however, in placing the benefactive argument immediately after the verb, so that the order of postverbal objects is benefactive, theme, as in (1b) above. The chart below shows where various Bantu languages fall with respect to object properties, with Sesotho being classified as "mixed."

- (2) Symmetrical vs. asymmetrical object "parameter"

<i>Symmetrical</i>	<i>Asymmetrical</i>	<i>"Mixed"</i>
Kinyarwanda	Kiswahili	Sesotho
Kihaya	Chimwini	Chishona
Kimeru	Hibena	
Mashi	Chichewa-A	
Luya		
Chichewa-B		

Morolong and Hyman (1977) and Machobane (1989) show that Sesotho is basically a symmetrical language, both objects undergoing pronominalization, and both able to become the subject of a passive. However, Sesotho differs from other Bantu languages in placing the animate object next to the verb, regardless of thematic role. When the objects are equally animate or inanimate, either order is possible, resulting in the potentially ambiguous meanings listed below, regardless of the word order.

- (3) a. Sello o-shap-el-a Dineo bashanyana  
Sello AGR-beat-APL-FV Dineo boys  
i. 'Sello beats the boys for Dineo'  
ii. 'Sello beats Dineo for the boys'
- b. Sello o-shap-el-a bashanyana Dineo  
Sello AGR-beat-APL-FV boys Dineo  
i. 'Sello beats Dineo for the boys'  
ii. 'Sello beats the boys for Dineo'

When the objects differ in animacy, however, THE ANIMATE OBJECT MUST PRECEDE THE INANIMATE OBJECT. Thus, only (4a) is grammatical where the animacy of the two objects differs.

- (4) a. Banana ba-pheh-el-a mme nama  
girls AGR-cook-APL-FV mother meat  
'The girls are cooking meat for my mother'
- b. \*Banana ba-pheh-el-a nama mme  
girls AGR-cook-APL-FV meat mother

Similar grammatical judgments hold when the animate argument is a theme rather than a benefactive. That is, the animate theme must appear immediately adjacent to the verb, (5a).

- (5) a. Thabo o-rat-el-a Neo bohale  
Thabo AGR-like-APL-FV Neo temper  
'Thabo likes Neo for her temper'
- b. \*Thabo o-rat-el-a bohale Neo  
Thabo AGR-like-APL-FV temper Neo

As long as animacy is equal or the benefactive is animate, both benefactive and theme objects show the same object properties with respect to triggering object agreement, (6), and becoming the subject of a passive, (7).

- (6) a. Banana ba-mo-pheh-el-a nama  
girls AGR-OBJ-cook-APL-FV meat  
'The girls are cooking meat for her'
- b. Banana ba-e-pheh-el-a mme  
girls AGR-OBJ-cook-APL-FV mother  
'The girls are cooking it for my mother'
- (7) b. Mme o-pheh-ets-w-e nama  
mother AGR-cook-APL/PRF-PASS-FV meat  
'My mother has been cooked the meat'
- b. Nama o-pheh-ets-w-e mme  
meat AGR-cook-APL/PRF-PASS-FV mother  
'The meat has been cooked for my mother'

However, Morolong and Hyman (1977) show that if the benefactive is inanimate and the theme animate, (8a), the benefactive cannot pronominalize, (8b), nor can it become the subject of a passive, (8c). That is, the benefactive is no longer considered a good object.

- (8) a. Ke-bits-ed-its-e bana mokete  
 AGR-call-APL-PRF-FV children feast  
 'I called the children for the feast'  
 b. \*Ke-o-bits-ed-its-e bana  
 AGR-OBJ-call-APL-PRF-FV children  
 c. \*Mokete o-bits-ed-its-w-e bana  
 feast AGR-call-APL-PRF-PASS-FV children

Learners of Bantu languages must therefore determine whether they are learning a symmetrical or an asymmetrical object language. In the case of Sesotho, they must also learn that postverbal word order, pronominalization, and passivization all interact with the animacy of the object NPs. Of particular interest here is that, if animacy of the objects is equal, either NP is acceptable immediately adjacent to the verb. However, if only one object is animate, it must immediately follow the verb regardless of its thematic role. Thus, Sesotho-speaking children must learn that animacy interacts with the otherwise symmetrical nature of Sesotho.

If double-object applicative constructions are frequent in everyday discourse, or at least in child-directed speech, we would expect such constructions to be learned easily and early. On the other hand, if these are rare in the speech that children hear, we might expect that learning would be protracted, and that children might initially adopt innately driven learning strategies for determining which word orders are correct. As will be shown below, double-object applicatives are extremely rare in both adult spontaneous speech directed to Sesotho-speaking two- to three-year-olds and in these children's speech as well. This is largely due to a discourse process called "unspecified object deletion," where an object of the verb (usually the theme) is elided, leaving no pronominal trace (cf. Bresnan and Moshi 1990).

### 3. Children's and adults' spontaneous use of double-object applicatives

In order to gain some insight into Sesotho-speaking children's use of double-object applicatives, Demuth (1998) examined a sample of spontaneous speech drawn from the Sesotho Corpus — a set of 98 hours of children's spontaneous speech productions collected during interactions with parents, siblings, and other family members in rural Lesotho (Demuth 1984). The data examined included three three- to four-hour speech samples from two children (a boy [H] and a girl [L]) at 2;1, 2;6, and 3/3;2 years, and adult speech to children in the same samples.

The study found that the two children were using applicative constructions productively by 2;6 years, with few errors of either commission or

omission. Out of a total of 2785 utterances containing verbs, the two children used applicative constructions 105 times, that is, in 3.7% of their utterances, one of the children using the applicative with 32 different verbs (cf. Demuth 1992). Applicatives used with transitive verbs, thereby rendering them ditransitive, made up approximately 70% of both children's applicative verbs, and in the large majority of these (63 = 85%) the applicative argument was a benefactive. However, out of these 63 exemplars, there were NO EXAMPLES OF DOUBLE-OBJECT APPLICATIVES. Rather, the theme often underwent unspecified object deletion and/or the benefactive argument was realized as an incorporated object pronoun. Both processes are shown in the example for child L below, where the foregoing conversation revolved around *dieta* 'shoes', but neither lexical nor pronominal reference to this argument appears in the subsequent utterance.

- (9) (L 2;6 yrs.)  
 A-mo-rek-el-a  
 AGR-OBJ-buy-APL-FV  
 'She should buy (shoes) for him.'

Interestingly, ADULTS ALSO SHOWED NO CASES OF DOUBLE-OBJECT APPLICATIVES, even though their use of applicatives was slightly more frequent (4.5% of the 2916 verbal utterances examined). Child and adult use of ditransitive applicatives and their arguments is shown in Table 1.

Table 1 shows that the theme has been elided in the majority of the children's applicatives (46 = 73%), and that the benefactive most frequently surfaces as an object pronominal prefixed to the verb (44 = 70%). Both of these occur together in 36 of the cases — over half (57%) of all the ditransitive applicatives these children used: rarely does either argument occur as a lexical NP after the verb (three times [5%] for benefactives and twelve times [19%] for themes). Adults show a similar pattern of use, though they drop themes less frequently than do children when the benefactive is pronominalized (17 = 32%). Nonetheless, in spontaneous

Table 1. *The syntactic frames (number and percent) of objects in ditransitive applicative constructions in the spontaneous speech of two children (sampled at 2;1 years, 2;6 years, and 3/3;2 years) and in adult child-directed speech (Ben-V TH = preverbal pronominal benefactive and postverbal lexical theme NP, etc.)*

	Ben-V TH	Ben-V	V BEN	Th-V	V TH	V	Total
Children	8 (13)	36 (57)	3 (5)	5 (8)	4 (6)	7 (11)	63
Adults	14 (26)	17 (32)	6 (11)	6 (11)	2 (4)	8 (15)	53

speech directed toward these children, adults elided the theme in 31 (59%) and the benefactive in 16 (30%) of their utterances, leaving only 14 (26%) of their ditransitive applicatives with two surface objects! That is, approximately one-quarter of all ditransitive applicatives in the child-directed Sesotho examined here actually surface with two objects, and NONE OF THESE HAD TWO POSTVERBAL NPs.

One might wonder if the animacy characteristics of ditransitive applicatives used in child-directed speech could contain clues to the syntactic constraints on double-object constructions. However, we found that all but one of the benefactives that surfaced in the adult sample were animate, and all of the themes that surfaced were inanimate. That is, there seems to be robust evidence in the input children hear for the benefactive object being animate, even if evidence for the syntactic ordering of animate objects in double-object constructions is sparse.

Thus, two- to three-year-old children rarely hear constructions of the type needed to determine that animacy plays a role in determining word-order restrictions in Sesotho double-object applicatives. This would appear to present a serious learnability problem of exactly the type discussed by Chomsky and colleagues in the early days of theoretical linguistics. One of the objects of this study was therefore to investigate when and how this syntactic restriction is learned, and if in doing so children exhibit innate semantic predispositions or attention to subtle properties of the input, or both.

#### 4. Children's developing awareness of the syntax of double-object applicatives

The purpose of this study was to determine when young children acquire knowledge about the syntactic restrictions on Sesotho double-object applicatives. In particular, we wanted to investigate when children begin to realize that animacy plays a role in the ordering restrictions found with postverbal NPs of double-object applicatives. This is particularly interesting since the input children hear contains few such constructions, one of the objects generally being pronominalized and the other frequently undergoing object ellipsis. We might therefore expect children to freely order postverbal objects in double-object applicatives, taking a long time to learn about animacy effects. On the other hand, even a very small amount of overt positive evidence (i.e. even one exemplar per week) might be sufficient for children to realize that animate objects must be ordered before inanimate objects. Alternatively, children might exhibit other more semantically (innately?) driven learning strategies, such as

ordering the benefactive first, regardless of animacy considerations, as is found in other Bantu languages. The fact that these constructions rarely occur in spontaneous speech and are probably acquired late provides a unique opportunity for exploring the various learning strategies that children may use in this syntactic domain. Note that the acquisition of this syntactic restriction lies at the interface between syntax and semantics but is not lexical, as in the case of dative shift in English (cf. Oehrle 1976; Goldsmith 1980; Stowell 1981; Randall 1992).

In order to test children's knowledge of the syntactic constraints on Sesotho double-object applicatives we designed a forced-choice elicited-production task where children and adults were asked to produce sentences using these constructions. The objects in each of four conditions differed in their animacy characteristics, half having equal animacy and half having split animacy. The three hypotheses we wished to test were the following:

- Hypothesis 1: Children and adults will perform identically (randomly) on the equal-animacy condition.
- Hypothesis 2: Children will differ from adults on the split-animacy condition.
- Hypothesis 3: Children will exhibit age-grade effects on the split-animacy condition, older children performing better than younger children.

On the equal-animacy condition either order of objects is permitted, and the sentences are ambiguous as to which is the benefactive. We therefore expected all subjects to perform randomly on this condition. In contrast, on the split-animate condition, we predicted that children would differ significantly from adults in their use of these constructions, and that their performance would improve with age. The subjects, stimuli, and procedure used in this experiment are described below.

#### Subjects

A total of 80 subjects successfully participated in the experiment, including 20 three- to four-year-olds, 20 five- to six-year-olds, 20 eight-year-olds, and 20 adults (see Table 2). The younger subjects were drawn from children in several preschools in the Lesotho lowlands in Maseru (the capital city) and Roma (near the National University of Lesotho). The eight-year-olds were drawn from standard 2 and 3 pupils at Roma Primary School. The adults were drawn from a similar pool, mostly students and employees at the university, most of whom came from

Table 2. Subjects

Number of subjects	Mean age	Age range
20	3;7	(3;0-4;4)
20	5;7	(5;2-6;6)
20	8;4	(8;0-8;10)
20	adults	(21-58)

the areas of Roma and Maseru, including some who were parents of participating children.

### Stimuli

The stimuli consisted of four sets of five sentence pairs, for a total of 20 sentence pairs. Each of these sentence pairs was composed of a high-frequency Sesotho transitive verb used with the applicative morpheme, resulting in two ditransitive constructions per verb differing only in the order of postverbal objects (see Appendix). Care was taken to construct stimuli sentences that were as short as possible to facilitate ease of processing by the younger children. The sentence stimuli used in this study were therefore composed of null-subject sentences with between eight and eleven syllables, where the verb was only inflected for the applicative (i.e. no other verbal extensions such as perfect aspect, passive, causative, or reciprocal were used).<sup>4</sup>

Each of the four sets of sentence pairs differed in the animacy characteristics of the objects. In the equal-animacy condition both objects had the same animacy, both were either animate (A: animate objects) or inanimate (B: inanimate objects). In both cases either order of objects is grammatical (BEN TH or TH BEN) with a resulting ambiguity in semantic interpretation. In the split-animacy condition, however, only one of the objects was animate, and this object must be ordered immediately after the verb. In the first case (C: animate benefactive) the benefactive was animate, and in the second case (D: animate theme) the theme was animate. In the D sentences the second object has the thematic role of reason, sentences with an animate theme and inanimate benefactive being extremely rare. These stimuli characteristics are summarized in Table 3.

All twenty sentence pairs were randomized, both for order of within-pair sentences and across sentence pairs. The stimuli were then recorded by the second author onto a Sony WM-D6C analogue audio tape recorder

Table 3. Word orders permitted in unfocused Sesotho double-object applicative constructions

	Orders of postverbal objects	
Equal-animacy condition		
A. animate objects	BEN TH ~	TH BEN
B. inanimate objects	BEN TH ~	TH BEN
Split-animacy condition		
C. animate benefactive	BEN TH	*TH BEN
D. animate theme	TH REASON	*REASON TH

with a Sony ECM-MS907 electret condenser stereo microphone. These stimuli were then played to subjects through speakers during the experimental procedure, as outlined below.

We expected adults to perform randomly on the equal-animacy condition where both sentences are grammatical, but 100% correct for the split-animacy condition where only one of the sentences is grammatical. We expected children also to perform randomly on the equal-animacy condition. The split-animacy condition was then the test condition, designed to determine children's knowledge of the syntactic constraints on Sesotho double-object applicatives.

### Procedure

The experiments took place in a quiet room on the school premises for the children, and at the university for the adults. The prerecorded stimuli were played for the subjects out of speakers placed in front of them on a table. Subjects were familiarized with two hand puppets (a sheep and a panda bear), and were explained the rules of the "game." They were told that both puppets came from another country (e.g. Switzerland) and were learning Sesotho. Sometimes they spoke good Sesotho and sometimes not. The subjects were asked to listen carefully as each puppet said a sentence (each puppet being animated in turn by one of the experimenters — usually the third author) and were then asked to indicate which puppet spoke the best Sesotho (the grammaticality-judgment task). The experimenter then asked the subjects *O-itseng?* 'What did he say?', and each subject's response was audio recorded (the elicited-production task). After five practice trials, the test sentences were presented. Any child who could not carry out the task after a repeat of the five practice trials was discarded from the study. This consisted of four three- to four-year-

olds, most of whom appeared to be tired or hungry and were therefore not attending to the task.

The children obviously enjoyed the grammaticality-judgment task, even though many of them would fixate on one of the puppets, saying that it was always right. For the two younger groups of children the grammaticality judgments were random, whereas for the eight-year-olds and adults, grammaticality judgments were almost always identical with the sentence produced. Grammaticality judgments are generally difficult to elicit from young children (McDaniel and Cairns 1996), and their use in this experiment was no exception. However, the grammaticality-judgment task served an extremely useful purpose in distracting the younger subjects momentarily such that during the elicited-production task they did not merely repeat the last sentence heard. We therefore included the grammaticality-judgment task in our procedure but focus on results from the elicited-production task below.

The elicited-production task was challenging, obviously taxing the younger children's sentence-processing abilities. However, it was also clear that these children were parsing the sentences and understood their meaning, even though they had to concentrate both on comprehension and on their own productions. This procedure was specifically designed to tap children's knowledge of the grammatical constraints on double-object applicative constructions, and the results suggest strongly that this was successful. This is consistent with previous uses of this procedure for the investigation of children's syntactic awareness of other word-order phenomena (e.g. Loust and Wakayama 1981).

### Results

For each of the two test conditions (equal-animacy condition and split-animacy condition) there were ten items per subject and twenty subjects, yielding a total of 200 items per condition per age group. If subjects did not successfully repeat one of the sentences, these items were not counted in the total, resulting in fewer than the target 200 tokens per condition. The results are presented in Table 4.

As predicted in Hypothesis 1, all subjects performed at chance on the equal-animacy condition, randomly producing the first sentence heard. Hypothesis 2 is also confirmed: each of the child age groups differed significantly from adults on their performance on split-animacy conditions. Paired t-tests show that this was significant at the level of  $p < 0.0001$  for both the three- to four-year-olds and the five- to six-year-olds, and at the level of  $p = 0.0001$  for the eight-year-olds. That is, children under

Table 4. Number and percent correct on double-object applicative constructions

Age group	Equal-animacy condition	Split-animacy condition
3-4-year-olds	94/194 (48)	133/199 (67)
5-6-year-olds	89/198 (45)	136/200 (68)
8-year-olds	100/199 (50)	167/200 (84)
Adults	99/200 (50)	190/200 (95)

the age of eight are still not performing at the level of adults on observing the syntactic constraint on animacy restrictions in Sesotho double-object applicatives, though eight-year-olds perform significantly better than their five- to six-year-old counterparts at  $p = 0.0006$ .

Hypothesis 3, that each group would show an improvement with age, is only partly supported by the results of this study: there was no difference between the youngest two groups of children. The youngest group performed above chance on the split-animacy condition ( $p < 0.0001$ ), but there seems to be little progress made during the period between three and six years. However, by eight years this picture is significantly improved. Thus, although three- to six-year-olds show some knowledge of Sesotho animacy effects, it appears that more adult-like behavior may require a higher total frequency of input before learners fully learn the syntactic restrictions on Sesotho double-object applicatives. We do not yet know if the type of input needed is cumulative, or if perhaps double-object applicatives occur more frequently during adult-directed speech and/or in school reading materials, the older children receiving a richer form of input that might facilitate the acquisition of these constructions. In either case, it is apparent that, even with impoverished input, the younger two groups of children perform above chance on ordering the animate object immediately after the verb. What is not clear is how to interpret these findings. That is, what does "partial" awareness of syntactic restrictions mean?

In the next section we examine some of the noncompliant (i.e. task-inappropriate) errors made by the younger children, errors that shed some light on these children's underlying grammatical system at this point in time.

### Analysis of task-noncompliant errors

As described above, the purpose of this study was to examine the word-order choices children would make when presented with animate-

inanimate and inanimate-animate word orders in the split-animate condition. The equal-animacy condition, where either order of objects was acceptable, was included as a “control” to ensure that subjects were actually carrying out the task. This was a challenging task for the youngest age group, requiring careful attention to the two exemplars given. We therefore expected a higher attrition rate among younger children. If children changed some of the objects to other nouns that differed in animacy from the two target stimuli, it was assumed that the children were not attending to the task, and these tokens were omitted from the overall analysis. If children changed the animacy of more than three of the objects, they were dropped from the study. Two four-year-olds were classified as “noncompliant” children and did not complete the study. Additional children were then recruited to ensure a total of 20 participants in each age group.

In retrospect, the noncompliant errors actually reveal important aspects of children’s underlying knowledge of applicative constructions. As can be inferred from Table 4, almost all of the noncompliant responses of children included in the study occurred on the equal-animacy condition (nine errors total) and were incurred primarily by the younger children at one error each (six by three- to four-year-olds, two by five- to six-year-olds, and one by an eight-year-old). In contrast, there was only one noncompliant error in the split-animacy condition — also by a child in the three- to four-year-old group.

In most cases these errors were made on the A (animate objects) stimuli, where both objects of the applicative were animate. In the responses that were omitted from the analysis, the children changed one of the animate objects into an inanimate object, resulting in animate-inanimate order of objects after the verb. For example, a sentence such as *Re tlisetša nate rakhadi* ‘We’re bringing our aunt for father’ would be changed into something like *Re tlisetša nate tafole* ‘We’re bringing the table for father’. In all cases, these noncompliant errors were “grammatically correct” in terms of placing the animate object immediately after the verb. That is, although the children did not perform according to what was asked for in the task, they nonetheless produced grammatical sentences. However, rather than complying with the task requirements, they were actually performing “repairs.”

Thus, it appears that, for some children, the optimal form of the double-object applicative has an animate benefactive followed by an inanimate theme. This corresponds to the animacy attributes of child-directed speech, where all but one of the ditransitive applicative benefactives in the input corpus analysis were found to be animate, and all themes inanimate. That is, some of the younger children appear to be highly sensitive to robust semantic properties of the input and seem to require that their double-object applicatives adhere to the semantic (animacy) characteristics found

in the ambient language. The remaining question, then, is whether the children showing task-noncompliant behavior require only that benefactives be animate, or that animate objects must be ordered immediately after the verb as well. That is, it is not clear if these children’s grammars have a semantic requirement, a syntactic requirement, or both.

If these children know about the syntactic restrictions on Sesotho double-object applicatives, we would expect them to perform at 100% correct on the C (animate benefactive) stimuli, where the benefactive is animate and the theme inanimate. However, despite the fact that these children showed a tendency to prefer double-object applicatives with one animate and one inanimate object, their performance on the C (animate benefactive) stimuli was the same as others in their age group — only 70%. It thus appears that having the benefactive argument be animate is more important than placing it next to the verb. In other words, at least some children seem to prefer that the benefactive have certain semantic properties but appear to be less concerned with the syntactic requirements this implies. This semantic tendency tends to be strongest for the three- to four-year-old age group: the five- to six-year-olds seem to have relaxed this semantic bias, while not yet having learned the syntactic constraints. The three- to four-year-olds seem to be very sensitive to the high-frequency aspects of the input (i.e. that benefactives are animate) and probably find such constructions both easier to process and easier to produce. This would account for the fewer errors on the split-animate conditions, as well as the noncompliant errors made on the equal-animacy condition.

To summarize, when noncompliant errors were made by children in the group analysis, the animate object was always placed immediately after the verb, despite the fact that these children performed only around 70% correct on the split-animacy condition. How can the discrepancy between these two phenomena be reconciled? We discuss various possibilities below.

## 5. Discussion

One possible interpretation of the task-noncompliant errors might be that children have some innate predisposition for placing the benefactive or animate argument immediately after the verb. Perhaps placing the benefactive next to the verb is less marked cross-linguistically, and learners start with this assumption until given evidence to the contrary. It certainly seems to be the “unmarked” case among Bantu languages (cf. Bresnan and Moshi 1990). Furthermore, at least in Sesotho, the recipient in nonapplicative double-object constructions must occur immediately after the verb. A survey of the Sesotho Corpus indicates that the recipient

is almost always animate, that these constructions are much more frequent in the input than double-object applicatives, and that children are using these constructions by the age of two (Demuth et al. 2000).

- (10) L (2;1 yrs.)  
 a fa mme tamati  
 (ke-f-a mme tamati)  
 AGR-give-FV mother tomato  
 'I'm giving mother the tomato'

However, a consideration of word-order constraints in English dative-shift constructions shows that these constraints tend to be lexical semantic rather than across the board, with "recipient-like" objects freely reordering, (11), but mere benefactives not, (12) (cf. Oehrle 1976; Goldsmith 1980; Stowell 1981).

- (11) a. Joe is painting a portrait for Sally.  
 b. Joe is painting Sally a portrait.  
 (12) a. Hillary is parking the car for Bill.  
 b. \*Hillary is parking Bill the car.

Learning the restrictions on English dative-shift constructions requires learning of these lexical semantic relations and tends to be acquired rather late (cf. Mazurkewich and White 1984; Randall 1992). This contrasts with the situation in Sesotho, where the generalization is across the board and might be expected to be learned earlier. It is therefore not clear that one can appeal to language "universals" or "innate predispositions" to explain the tendency by the younger children to place the benefactive adjacent to the verb.

The second possibility is that young Sesotho-speakers are sensitive to subtle, low-frequency aspects of the input (including indirect evidence from passivization and pronominalization), and that this is sufficient for young learners to develop a TENDENCY toward placing the animate/benefactive object immediately after the verb. Obviously, this must be the case. If it were not, adults would not show the categorical behavior that they do. Alternatively, it could be that children know little about the syntactic restrictions involving animacy and word order in double-object applicatives but are only mirroring the recipient-theme (or animate-inanimate) word order found in the much more frequent nonapplicative double-object constructions like that shown in (10) above. That is, the younger children may not yet have differentiated recipient and benefactive thematic roles and may treat them as similar constructions for some time. Or, they may know about different thematic roles but

"bootstrap" the ordering of objects from those constructions that occur more frequently in the input.

Given the fact that the syntactic properties of the Sesotho double-object applicative are difficult to discern due to the high frequency of object pronominalization and ellipsis, it is not surprising that these constructions might take time to learn. The situation with the animacy of the benefactive argument is quite different: most of the ditransitive applicatives used in daily discourse have an animate benefactive, and this argument generally surfaces somewhere in the sentence (either as a full NP or as an incorporated pronominal), even when the theme is elided. Thus, there is more positive evidence in the input for the animacy of benefactives than there is evidence for the syntactic ordering restrictions on two postverbal NPs. It therefore appears that children's behavior in these tasks exhibits knowledge of some of the high-frequency input that they hear, mapping animacy onto benefactive thematic roles, and perhaps drawing on other types of double-object construction for information about postverbal word order.

In sum, even the youngest children in this study performed significantly above chance in placing animate objects after the verb. This indicates that children of this age have some knowledge of the interactions between animacy and syntactic constraints on Sesotho double-object applicatives. However, these children also differ significantly in their performance from both eight-year-olds and adults, indicating that the syntactic restrictions on these constructions have not yet been mastered.

## 6. Conclusions

This paper has investigated the acquisition of word-order constraints in Sesotho double-object applicatives, a construction that rarely occurs in child-directed speech due to the high instance of discourse effects such as pronominalization and "unspecified object deletion," or *object ellipsis* — both of which occur in about three-quarters of child-directed ditransitive applicatives (e.g. [13]).

- (13) Ausi Mahlobohang o-tla-le-ngwath-el-a  
 Sister MH. AGR-FUT-OBJ-feed-APL-FV  
 'Sister MH. will come serve (it) for you (pl).'

The study of how double-object applicatives are acquired under cases of such argument ellipsis offers a unique opportunity for exploring the various language-learning strategies children use, providing much-needed evidence for refining our theories of language acquisition. In particular,

such studies may shed light on the nature/nurture debate, or how much of language learning is specific to language, and how much can be attributed to more general learning mechanisms.

The results of this study found that, though three- to six-year-old Sesotho speakers perform at 67–68% on correctly placing animate objects immediately after the verb, they do not yet perform at the level of either eight-year-olds (84%) or adults (95%). Furthermore, their task-noncompliant errors entailed changing stimuli sentences containing two equal animate arguments to sentences with split animacy, specifically an animate benefactive followed by an inanimate theme. This accords strongly with the animacy properties of these thematic roles in the input children hear. Thus, children appear to be more in tune with the statistically prominent SEMANTIC CHARACTERISTICS of these thematic roles than with the SYNTACTIC RESTRICTIONS that operate on them. This is not surprising, given the low frequency of double-object applicatives in the input, due in part to object ellipsis.

It is less clear what would account for the fact that the animate benefactives were always placed immediately after the verb in children's noncompliant errors, given that these children did not consistently do this in the split-animacy conditions, nor is this word order universal (e.g. \**I parked Martin the car*). It is possible that children are working on analogy with more frequent nonapplicative double-object constructions like *fa* 'give', where the recipient argument, which is generally animate, must be ordered immediately after the verb. These types of double-object construction are much more frequent in the input than double-object applicatives, and children are using them during the beginning of the third year (Demuth et al. 2000).

It is possible, then, that children may start with this as a conservative working assumption in Sesotho, somewhat in line with the subset principle proposed by Berwick and Weinberg (1984), and only modify it as overt positive evidence or implicit negative evidence becomes available with more input. Given that this evidence is infrequent, it may take a long time to hear. Alternatively, it could be that, given a larger sample of child-directed speech, we would find a few examples of double-object applicatives, and that even this small amount of overt positive evidence and concomitant implicit negative evidence would be sufficient for children to begin developing a syntactic bias in the appropriate direction. Further research on a larger corpus of adult child-directed speech will be needed to determine the frequency of these constructions, and the discourse contexts in which they occur.

In sum, we find robust evidence that children have an early awareness of some of the semantic properties of the objects that typically occur in

double-object applicatives in Sesotho. However, this information is also statistically prominent in the input. There is therefore no need to appeal to semantic biases in order to account for this behavior. On the other hand, the presence of inanimate–animate word-order errors on the split-animate conditions indicates that children are not merely producing the high-frequency input they hear. This poses problems for “construction grammar” approaches to learning the syntax of verbs.

More interesting is children's gradual acquisition of the syntactic constraints on these constructions given the high frequency of object ellipsis. It would appear that some form of “discourse bootstrapping” may actually be required for learning the argument structure of Sesotho verbs, as Rispoli (1995) has proposed for languages like Japanese. Note also that the high instance of object ellipsis poses problems for syntactic bootstrapping approaches to learning the meanings of verbs (cf. Gleitman 1990; Fisher et al. 1991). Again, some form of discourse bootstrapping would seem to be required.

The study of syntactic constructions that entail ellipsis in the input, where the nature of syntactic structure is partially obscured, thus provides a critically important source of evidence for our understanding of the language-learning strategies young children employ. At least in the case of constructions like Sesotho double-object applicatives, language learners must use not only semantic and syntactic information but also processes of “discourse bootstrapping” to recover the arguments and meaning of verbs. However, fully acquiring the syntactic restrictions on these arguments appears to take some time and may ultimately be based on probabilistic negative evidence (cf. Randall 1987). The results of this study indicate that by three to four years of age Sesotho-speaking children already know something about animacy effects, even if they are not yet performing like adults. This indicates that partial learning of these constructions has taken place. Such a proposal would be consistent with findings elsewhere in the literature, where it has also been reported that children initially show partial knowledge of syntactic and semantic constructions such as causatives and relative clauses (Bowerman 1974, 1990; Hamburger and Crain 1982). Further research will need to explore more fully how and when individual children begin to show more adult-like performance on placing animate objects immediately after the Sesotho applicative verb. Such findings should shed further light on how language learning proceeds in the face of impoverished input.

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**Appendix. Stimuli***Equal-animacy conditions*

## A. Animate objects

1. Ba khethela ngaka tichere  
'They're selecting the teacher for the doctor'  
or  
Ba khethela tichere ngaka  
'They're selecting the doctor for the teacher'
  2. Re shebela ausi Pule  
'We're looking for Pule on behalf of our sister'  
or  
Re shebela Pule ausi  
'We're looking for our sister on behalf of Pule'
  3. Ba patela Sello bana  
'They're hiding the children for Sello'  
or  
Ba patela bana Sello  
'They're hiding Sello for the children'
  4. Ke batlela ngwana abuti  
'I'm looking for my brother on behalf of the child'  
or  
Ke batlela abuti ngwana  
'I'm looking for the child on behalf of my brother'
  5. Re tisetisa ntate rakhadi  
'We're bringing our aunt for our father'  
or  
Re tisetisa rakhadi ntate  
'We're bringing our father for our aunt'
- B. Inanimate objects
1. Re hlakolela setulo tafole  
'We're wiping the table for the chair'  
or  
Re hlakolela tafole setulo  
'We're wiping the chair for the table'
  2. Ke khella moroho eiye  
'I'm picking onions to go with the leafy greens'  
or  
Ke khella eiye moroho  
'I'm picking leafy greens to go with the onions'
  3. Ba phehela papa nama  
'They're cooking meat to go with the corn meal'  
or

- Ba phehela nama papa  
'They're cooking corn meal to go with the meat'
4. Re rokela hempe mose  
'We're sewing the skirt to go with the blouse'  
or  
Re rokela mose hempe  
'We're sewing the blouse to go with the skirt'
  5. Ba rekela baki katiba  
'They're buying the hat to go with the jacket'  
or  
Ba rekela katiba baki  
'They're buying the jacket to go with the hat'

*Split-animacy conditions*

## C. Animate benefactive

1. Ba robela moruti thupa  
'They're breaking the stick for the priest'  
\*Ba robela thupa moruti
2. Re tsella motho lebese  
'We're pouring the milk for the person'  
\*Re tsella lebese motho
3. Re bapalla mokhotsi bolo  
'We're playing ball for our friend'  
\*Re bapalla bolo mokhotsi
4. Ke ngolla mosali lengolo  
'I'm writing a letter for the woman'  
\*Ke ngolla lengolo mosali
5. Ba kwahella ntate nama  
'They're covering the meat for our father'  
\*Ba kwahella nama ntate

## D. Animate theme

1. Ke shapela bana ditlhapa  
'I'm lashing the children because of the insults'  
\*Ke shapela ditlhapa bana
2. Ba otlela Mosa papadi  
'They're hitting Mosa because of the games'  
\*Ba otlela papadi Mosa
3. Re ratela banana botle  
'We like the girls because of their beauty'  
\*Re ratela botle banana
4. Ba tsabela Neo bohale  
'They fear Neo because of her temper'  
\*Ba tsabela bohale Neo

5. Ke bitsetsa rangwane dijo  
 'I'm calling my uncle because of the food'  
 \*Ke bitsetsa dijo rangwane

## Notes

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1. See Doke and Mofokeng (1957), Morolong and Hyman (1977), and Machobane (1989) for a more detailed discussion of Sesotho applicative constructions.
  2. The applicative adds a locative argument to some intransitive (unaccusative) and transitive Sesotho verbs (cf. Machobane 1989). In this paper we focus on benefactive applicative arguments. See Alsina and Mchombo (1990), Baker (1988), Bresnan and Moshi (1990), Duranti and Byarushengo (1977), Hawkinson and Hyman (1974), Harford (1993), Hyman and Duranti (1982), and Marantz (1984) for discussion of applicative constructions in other Bantu languages.
  3. A modified (more phonetically transparent) version of Lesotho orthography has been used. Glosses are as follows:  
 AGR = subject-verb agreement  
 APL = applicative  
 FV = final vowel (mood)  
 OBJ = pronominal object  
 PASS = passive  
 PRF = perfect
  4. Previous work on the acquisition of Bantu languages has found that three-year-olds' early verb stems are generally simplified, surfacing with only one verbal extension even when two or more are intended (Demuth 1998; Idiata 1998).

## References

Alsina, Alex; and Mchombo, Sam (1990). The syntax of applicatives in Chichewa: problems for a theta theoretic asymmetry. *Natural Language and Linguistic Theory* 8, 493–506.

- Baker, C. L. (1979). Syntactic theory and the projection problem. *Linguistic Inquiry* 10, 533–581.
- Baker, Mark (1988). Theta theory and the syntax of applicatives in Chichewa. *Natural Language and Linguistic Theory* 6(3), 353–389.
- Berwick, Robert; and Weinberg, Amy (1984). *The Grammatical Basis of Linguistic Performance*. Cambridge, MA: MIT Press.
- Bowerman, Melissa (1974). Learning the structure of causative verbs: a study in the relationship of cognitive, semantic and syntactic development. *Papers and Reports on Child Language Development* 8, 142–178.
- (1990). Mapping thematic roles onto syntactic functions: are children helped by innate linking rules? *Linguistic Theory* 28, 1253–1289.
- Bresnan, Joan; and Moshi, Lioba (1990). Object asymmetries in comparative Bantu syntax. *Linguistic Inquiry* 21(2), 147–185.
- Brown, Roger (1973). *A First Language*. Cambridge, MA: Harvard University Press.
- Chomsky, Noam (1965). *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Demuth, Katherine (1984). *Aspects of Sesotho Language Acquisition*. Bloomington: Indiana University Linguistics Club.
- (1989). Maturation and the acquisition of Sesotho passive. *Language* 65(1), 56–80.
- (1990). Subject, topic and the Sesotho passive. *Journal of Child Language* 17(1), 67–84.
- (1992). Acquisition of Sesotho. In *The Cross-Linguistic Study of Language Acquisition*, vol. 3, D. Slobin (ed.), 557–638. Hillsdale, NJ: Erlbaum.
- (1998). Argument structure and the acquisition of Sesotho applicatives. *Linguistics* 36(4), 781–806.
- ; Bulkowski, Julia; and Holla, Alaka (2000). Object drop in Bantu languages: implications for learning the syntax and semantics of double object applicatives. Paper presented at the 31st ACAL, American Conference on African Linguistics, Boston University.
- Doke, C. M.; and Mofokeng, S. M. (1957). *Textbook of Southern Sotho Grammar*. Cape Town: Longman.
- Duranti, Alessandro; and Byarushengo, Ernest (1977). On the notion “direct object.” In *Haya Grammatical Structure*, Ernest Byarushengo, Alessandro Duranti, and Larry Hyman (eds.), 45–71. Southern California Occasional Papers in Linguistics 6. Los Angeles: University of Southern California.
- Fisher, Cindy; Gleitman, Henry; and Gleitman, Lila (1991). On the semantic content of subcategorization frames. *Cognitive Psychology* 23, 331–392.
- Gleitman, Lila (1990). The structural sources of verb meanings. *Language Acquisition* 1(1), 1–55.
- Goldsmith, John (1980). Meaning and the mechanism in grammar. In *Harvard Studies in Syntax and Semantics III*, S. Kuno (ed.). Cambridge, MA: Harvard University.
- Hamburger, Henry; and Crain, Steven (1982). Relative acquisition. In *Language Development: Syntax and Semantics*, Stan Kuczaj (ed.). Hillsdale, NJ: Erlbaum.
- Harford, Carolyn (1993). The applicative in Chishona and lexical mapping theory. In *Theoretical Aspects of Bantu Grammar 1*, Sam Mchobo (ed.), 93–111. Stanford, CA: Center for the Study of Language and Information.
- Hawkinson, Anne; and Hyman, Larry (1974). Hierarchies of natural topic in Shona. *Studies in African Linguistics* 5, 147–170.
- Hyman, Larry; and Duranti, Alessandro (1982). On the object relation in Bantu. In *Studies in Transitivity*, Paul Hopper and Sandra Thompson (eds.), 217–239. Syntax and Semantics 15. New York: Academic Press.
- Idiata, Daniel Franck (1998). Quelques aspects de l'acquisition de la langue isangu par les enfants. Unpublished Ph.D dissertation, Université Lumière Lyon 2.

- Jusczyk, Peter; Cutler, Anne; and Redanz, N. (1993). Preference for the predominant stress patterns of English words. *Child Development* 64, 675–687.
- Lust, Barbara; and Wakayama, T. K. (1981). Word order in Japanese first language acquisition. In *Child Language: An International Perspective*, P. Dale and D. Ingram (eds.). Baltimore, MD: University Park Press.
- Machobane, 'Malillo (1989). Some restrictions of transitivity morphemes in Sesotho. Unpublished Ph.D. dissertation, McGill University.
- Marantz, Alec (1984). *On the Nature of Grammatical Relations*. Cambridge, MA: MIT Press.
- Mazuka, Reiko (1996). Can a grammatical parameter be set before the first word? Prosodic contributions to early setting of a grammatical parameter. In *Signal to Syntax: Bootstrapping from Speech to Grammar in Early Acquisition*, J. Morgan and K. Demuth (eds.), 313–330. Mahwah, NJ: Erlbaum.
- Mazurkewich, Irene; and White, Lydia (1984). The acquisition of the dative alternations: unlearning overgeneralizations. *Cognition* 16(3), 261–283.
- McDaniel, Dana; and Cairns, Helen Smith (1996). Eliciting judgments of grammaticality and reference. In *Methods for Assessing Children's Syntax*, D. McDaniel, C. McKee, and H. S. Cairns (eds.), 233–254. Cambridge, MA: MIT Press.
- Morgan, James (1996). A rhythmic bias in preverbal speech segmentation. *Journal of Memory and Language* 35, 666–688.
- Morolong, 'Malillo; and Hyman, Larry (1977). Animacy, objects and clitics in Sesotho. *Studies in African Linguistics* 8(3), 199–218.
- Oehrle, Richard (1976). The grammatical status of the English dative alternation. Unpublished Ph.D. dissertation, MIT.
- Pinker, Steven (1984). *Language Learnability and Language Development*. Cambridge, MA: Harvard University Press.
- (1989). *Learnability and Cognition: The Acquisition of Argument Structure*. Cambridge, MA: MIT Press.
- Randall, Janet (1987). *Indirect Positive Evidence: Overturning Generalizations in Language Acquisition*. Bloomington: Indiana University Linguistics Club.
- (1992). The catapult hypothesis: an approach to unlearning. In *Theoretical Issues in Language Acquisition*, J. Weissenborn, H. Goodluck, and T. Roeper (eds.), 93–138. Hillsdale, NJ: Erlbaum.
- Rispoli, Matthew (1995). Missing arguments and the acquisition of predicate meanings. In *Beyond Names for Things*, M. Tomasello and W. Merriman (eds.), 331–351. Hillsdale, NJ: Erlbaum.
- Stowell, Timothy (1981). Origins of phrase-structure. Unpublished Ph.D. dissertation, MIT.
- Tomasello, Michael (1992). *First Verbs: A Case Study of Early Grammatical Development*. Cambridge: Cambridge University Press.