Mismatches between Morphology and Syntax in First Language Acquisition Suggest a 'Syntax-First' Model*

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1. Introduction and overview

Do children build (overt) morphology based on initial syntactic knowledge or does the acquisition of (overt) morphology determine, to some degree, the acquisition of syntax? In the present paper we investigate this question with regard to the acquisition of verbal morpho-syntax. Previous studies reflect a yet unresolved debate between two fundamentally contradictory positions:

(i) The acquisition of the functional projection I^0 is triggered by the acquisition of inflectional verbal morphemes (e.g., Schlyter 2003).
(ii) The functional projection I^0 guides the acquisition of inflectional verbal morphemes (e.g., Borer & Rohrbacher 2002; Santelmann, Berk, & Lust, 2000).

We present converging evidence from experimental and natural speech data from L1 acquisition suggesting a 'syntax first' model. Our results cohere with a strong continuity view of acquisition where universal syntactic knowledge, specifically the role of I^0, is continuous and acquisition takes place in language specific domains.

2. Data and methods

In this paper we discuss experimental data from three different production studies conducted at the Cornell Language Acquisition Lab (CLAL). The three studies used the elicited imitation method; two of them tested English-speaking children and the third one tested German-speaking children (see Table 1 below).

We also discuss data from natural speech studies conducted in different languages and by several researchers, both within and outside of CLAL.

2.1. The elicited imitation method

In the elicited imitation method, the subject hears an utterance and is then asked to repeat it back exactly as s/he heard it. Experimental sentences are precisely designed with regard to contrasting factors. The experiment starts with a pre-training session which ensures that the child understands the task. To perform adequately in this task, the child has to analyze the syntactic structure of the model sentences and reconstruct them for production. Results are analyzed quantitatively and qualitatively. (F111or further discussion of this method, see Lust, Flynn & Foley 1996).

2.2. Elicited imitation experiments

The three elicited imitation studies that we discuss investigated different phenomena; nevertheless they produced converging data with regard to the acquisition of inflection.

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- *The inversion study* (Santelmann et al. 2000; Santelmann, Berk, Austin, Somashekar, & Lust 2002). This was a study of yes/no question formation involving English-speaking children. The subjects were asked to imitate declarative structures and yes/no questions with different inflectional elements (main verbs, auxiliaries and modals).
- *The VP ellipsis studies* (Postman, Foley, Pactovis, Rothenstein, Kaye, Lowe, & Lust 1997; Foley, Núñez-del-Prado, Barbier, & Lust 2003; Foley, Lust, & Pactovis submitted). These studies investigated English-speaking children's capacity to imitate coordinate structures with or without VP ellipsis in the second clause.
- *The German word order study* (Boser, 1989, 1992, 1997a, 1997b; Boser, Lust, Santelmann & Whitman 1991). This research studied the acquisition of word order in German with regard to verb position (V2 vs. verb-final).

Table 1 shows information for the subjects that participated in the three experiments.

Table 1: Subjects from experimental studies

Study	N	Age range	Mean age
Inversion	45	1;00-5;01	3;06
VP ellipsis	28	2;07-3;11	3;04
German word order	40	2;08-4;11	3;03

2.2.1. The inversion study

Examples of types of stimuli:

(1) *Copular main verb without modal*
a. Mufasa is a lion king
b. Is Mufasa a lion king?

Lexical main verb without modal
c. Mickey Mouse opens a present.
d. Does Mickey Mouse open a present?

Copular main verb with modal
e. Donald Duck can be a teacher.
f. Can Donald Duck be a teacher?

Lexical main verb with modal
g. Aladdin can draw a picture.
h. Can Aladdin draw a picture?

Auxiliary be
i. Kermit is eating a cookie.
j. Is Kermit eating a cookie?

2.2.2. The VP-ellipsis study

Examples of the two types of stimuli:

(2) *Expanded stimulus*
a. Donald pets the dog and Oscar pets the dog too.

Elided stimulus
b. Ernie touches the ground and Grover does too.

2.2.3. The German word-order study

Example of stimulus:

(3) Dass Stephan einen Bleistift hatte, zeigte Johann dem Daniel.
That Stephan a pencil had, showed Johann the Daniel
'Johann showed Daniel that Stephan had a pencil.'

2.3. Natural speech analyses

The natural speech data presented here come from systematic analyses based on seven monolingual English-speaking subjects ages 1;11 to 3;07 from the Cornell Language Acquisition Lab (CLAL) database, and from data from previously published studies. The analysis of the seven CLAL subjects is a first step in our search for replication data from natural speech. Table 2 presents the CLAL subjects' age, the number of child utterances in each sample, and the number of utterances containing a (lexical or copular) verb.

Table 2: Natural speech subjects from CLAL

	Child ID	Age	# of child utts. in sample	Utts. with verb
1	1MH052394	1:11;14	460	186
2	1HK120692	2;05;03	81	31
3	2MR012793	2:10	202	106
4	1KB040892	2:10;20	166	106
5	1ER1109992	3;00;00	169	96
6	1CV072392	3;04;00	204	91
7	1SH082991	3;07;00	199	111

3. Evidence for I^0

The above mentioned natural speech and experimental data illustrate three types of evidence that suggest that young children are operating on I^0[1] :

- Auxiliary insertion.
- *-s* relocation.
- Inflection errors in VP ellipsis structures.

3.1. Auxiliary insertion

Children insert an auxiliary. This auxiliary may be what meets the minimal requirements of tense. This suggests that I^0 is present in early grammar.

3.1.1. Experimental evidence

a. Inversion study

(4) Model: Mickey Mouse opens a present.
Child: Mickey Mouse is opens a present. (age 3;08; Santelmann et al. 2002)

b. VP-ellipsis study

(5) a. Model: Barney moves his penny and Ernie does too.
Child: Grober does move his penny and and and Ernie does too.
(age 3;04, Foley et al. submitted)

1. The relevant elements in the structures are underlined.

b. Model: Kermit washes his face and Oscar does too.
Child: Kermin does wash his face and Ostar does too.
(age 3;04, Foley et al. submitted)

c. Model: Ernie touches the ground and Grover does too.
Child: Ernie touch the ground and Grover does touch the ground.
(age 3;08, Foley et al. submitted)

c. German word order study

(6) Model: Suzanne warf den Ball als Manfred den Schneeball warf.
Suzanne threw the ball as Manfred the snowball threw
'Suzanne threw the ball as Manfred threw the snowball.'
Child: Suzanne tat den Schneeball werfen. (age 3;05; Boser et al. 1991)
Suzanne did the snowball throw
'Suzanne did throw the snowball.'

3.1.2. Natural speech evidence

(7) a. I do taste dem (age 3;00, Stromswold 1990)
b. Who did take this off? (age 2;11, Hollebrandse & Roeper 1996)
c. Researcher: do you need a tissue?
Child: that a little blow.
Child: I did too get one.
(age 3;07;00; CLAL-NS-Eng-Berk-1SH082991, utt. #247)[2]

Dutch

(8) Ik doe ook verven. (age 3;10, Hollebrandse & Roeper 1996)
I do also paint
'I do also paint.'

3.2. *-S* relocation

One productive commission error demonstrates relocation of the present tense *-s* morpheme in preverbal position, presumably I[03,4].

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2. The notation for the CLAL subjects indicates the following:
- CLAL = Cornell Language Acquisition Lab;
- Task: NS = Natural Speech
- Language = Eng = English
- Researcher who collected the data = Berk
- Session = number preceding subject ID
- Subject ID = SH082991, KB040892, etc.

[3] Related findings appear in Stromswold 1990 and Tesan 2003.

[4] The following are two possibilities for describing the mechanisms underlying the child's *–s* relocation examples:

i) sentences with *–s* relocation contain a null *do* that the *–s* is attached to.

ii) main verbs in sentences with *–s* relocation have a null *–ing* , i.e., children are attempting a present progressive form.

The second possibility seems to may in fact be the case for a couple of our examples ((11b),(11c)), based on the context. However, this possibility seems less plausible with imitation data because the target utterance had a simple present not a present progressive. (Although the progressive is often preferred to the simple present in ordinary discourse, in elicited imitation, children are introduced to a game where they repeat back a "story." The simple present is more natural in this context.). In this paper we are interested more in testing the hypothesis that the child has access to the IP architecture, than in the precise mechanisms by which the child operates on this. However, these issues of mechanism lead us to interesting avenues of future research

3.2.1. Experimental studies

a. Inversion study

(9) a. Model: Bugs Bunny touches a carrot.
Child: Bunny's touch a carrot (age 2;03, Santelmann et al. 2000)
b. Model: Peter Pan can carry a sword.
Child: Peter Pans carry the sword. (age 4;04, Santelmann et al. 2002)

b. VP ellipsis study

(10) a. Model: Count rubs his arm and Ernie rubs his arm too.
Child: Ernies rub his arm. (age 2;11,Foley et al. submitted)
b. Model: Ernie touches the ground and Grover does too.
Child: Ernies touches the ground and and Grover does too.
(age 3;05, Foley et al. submitted)
c. Model: Grover licks his ice-cream and big Bird does too.
Child: Grovers um moves ice cream too and Big Bird did too.
(age 3;03 Foley et al. submitted
d. Model: Count rubs his arm and Ernie rubs his arm too.
Child: Ernie Big Birds rub him arm and Ernie does too.
(age 3;03 Foley et al. submitted)
e. Model: Big Bird drinks his milk and Grover drinks his milk too.
Child: Big Bird drink drin um-um his milk and Grovers drink his milk too.
(age 3;11 Foley et al. submitted)

3.2.2. Natural speech studies

(11) a. It's breaks. (age 3;02, Stromswold 1990)
b. Child: shark.
Researcher: umhmm.
Researcher: what's he doing?
Child: he's try to bite her
(age 2;10;20; CLAL-NS-Eng-Berk-1KB040892, utt. #73)
c. Child: this shark.
Researcher: he's try to get the wermaid. (wermaid = mermaid)
(age 2;10;20; CLAL-NS-Eng-Berk-1KB040892, utt. #242)

d. Child: des he get stuck. (des = then)
Child: dat de wermaid. (dat = that, de=the, wermaid=mermaid)
Child: she's find a fork
(age 2;10;20; CLAL-NS-Eng-Berk-1KB040892, utt. #246)

3.3. Verb inflection errors in VP-ellipsis structures

In this study children overall imitated the elided structure (e.g. (2b) above) correctly more often than the expanded structure (e.g. (2a) above). However, they made significantly more verb inflection changes in the first clause of the structures with VP-ellipsis, e.g. (2b), than in the first clause of structures without ellipsis, e.g. (2a), (see Figure 1).

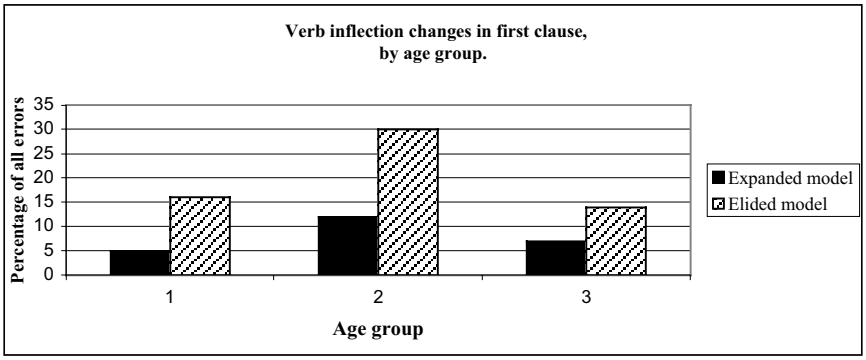

Figure 1: Verb inflection changes in VP ellipsis study

Examples of responses with verb inflection changes in the first clause are given in (12) and (13):

(12) Model: Grover licks his ice-cream and Big Bird does too.
Child: Grover lick his ice-cream and Big Bird too.
(age 2;11, Foley et al. submitted)

(13) Model: Barney smells a cookie and Big Bird does too.
Child: Big Birds does does smell a cookie and…Big Bird does too.
(age 3;04, Foley et al. submitted)

The dissociation of lexical and inflectional features in the verbs of the first clause takes place more often when the construction of a second clause with VP ellipsis requires the VP "residue" of the dissociation; that is, when the child needs to analyze the first verb into root and inflection to be able to expose the root and ultimately represent the inflection on the auxiliary *do* in the second clause. The child's production crucially consults syntax, since the errors in the first-clause verb reflect his/her awareness of the structure necessary in the second clause. Figure 2 shows a simplified representation of the structure prior to Spell Out, with the dissociation of the inflectional features from the verb in the first clause that is necessary to construct the second clause in VP ellipsis structures). Children's capacity to dissociate inflectional features from the verb and to relocate them in the computation of sentence syntax of VP ellipsis provides further evidence of the role of IP in verb inflection. (See Foley et al, submitted for discussion.).[5]

[5] A new study of the acquisition of VP-ellipsis is under way, aimed at replicating our previous findings, using additional controls for phonological and lexical factors.

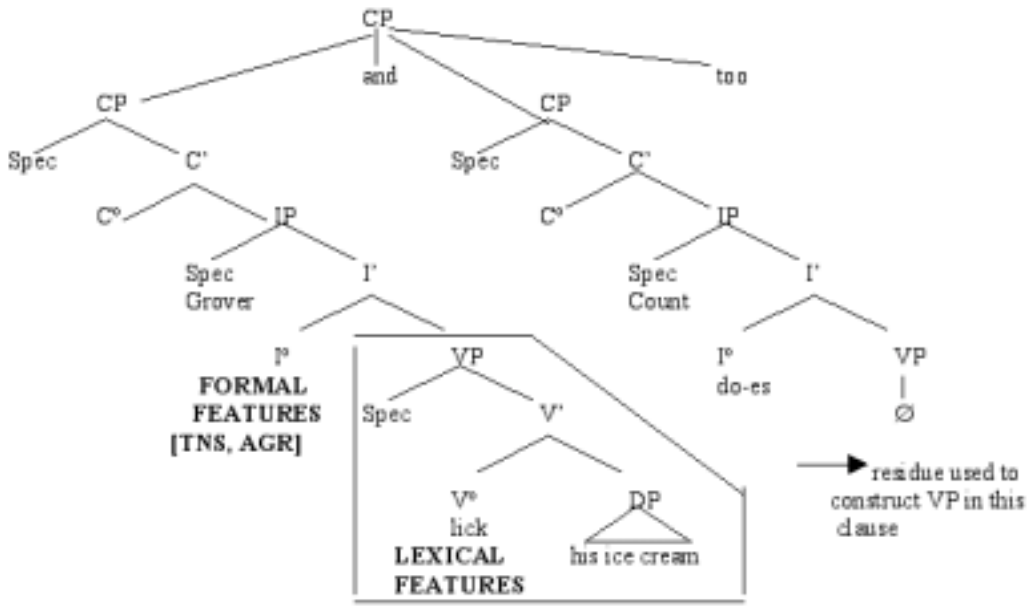

Figure 2: Dissociation of inflectional features from first clause verb

4. Significance of results

The status of I^0 in child language has been much disputed over the past decade. Our results provide evidence of early knowledge of syntax, particularly, of the functional structure involving I^0. These data show that the child is in fact operating on it. Our data support the second view described in section 1, namely the view that the functional projection I^0 precedes and guides the acquisition of inflectional verbal morphemes. The present findings suggest a 'syntax-first' model of first language acquisition.

Second, our results cohere with a strong continuity theory of UG based on evidence that functional categories are actually available initially and function to constrain acquisition. They further seem to suggest that from the beginning of acquisition the human language faculty enables the independent representation of verb stems and formal inflectional features at an abstract level.

Finally, our study raises the question of how the facts from child language map to existing accounts of inflectional morphology (e.g., Halle & Marantz 1993; Chomsky 1993, Lasnik 2000).

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