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Tree growth and morphosyntactic triggers in adult SLA

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Morphosyntactic Triggers in Adult SLA[1]

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1. Introduction

1.1. Triggers in syntax and acquisition

Although the notion of *parameter* forms the basis of acquisition theory within the Principles and Parameters approach to syntax (Chomsky 1981, 1986) and to the acquisition of syntax, there remains a lack of consensus as to the actual set of parameters found in Universal Grammar (UG). What is commonly assumed, however, is that it is desirable to locate all parametric variation in the lexicon, i.e. in that portion of the language that has to be learned (Borer 1984, Chomsky 1991). For the purposes of syntactic variation between grammars, the *closed-class* portion of the lexicon is crucial, including the so-called grammatical or functional elements such as tense marking, agreement paradigms, and articles.

In this paper we consider the question of how syntactic structure is acquired, in particular how *functional projections* develop. Functional projections are that part of syntactic representation which contains the grammatical/functional morphemes, and where most or all syntactic phenomena associated with inflectional morphology is represented. Functional projections form a bridge between inflectional morphology and syntax.

Inextricably tied to the notion of parameters is the idea that specific parameter settings are *triggered* during language acquisition. While we have not cast the developmental stages which we have proposed in several papers (see e.g. Vainikka and Young-Scholten 1994) for the second language acquisition of German as necessarily involving parameter setting, the emergence of each functional projection can be seen as setting one or more parameters relevant for that projection.[2] Our approach to the acquisition of phrase structure entails that the learner posits as few positions and projections as needed to account for the relevant input data at any given stage of development. Various formulations of such an approach have been proposed in the syntactic literature; cf. e.g. Grimshaw (1993) and Speas (1993). The steps in (1) constrain the developing grammar (i.e. they involve X'-Theory; Chomsky 1986, Abney 1987) while implying that the learner is actively scanning the input to which he/she is exposed for evidence on the basis of which to posit syntactic structure.

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[1] An earlier version of this paper was presented at the Generative Approaches to Second Language Acquisition conference in New York (May 1995), where we benefited from the comments of the audience. A written version of the presentation appeared as an IRCS Technical Report 95-20, University of Pennsylvania. This final version has further benefited from the insights and comments of three anonymous reviewers. While preparing the earlier version of this manuscript, the first author's research was supported by NSF Grant to IRCS #SBR-8920230. The research reported here crucially relies on data collected in the *LEXLERN* Project in Duesseldorf (DFG Grant # Cl 97/1-1,1-2). Thanks are due to Harald Clahsen for allowing us to pursue our own ideas while working on the project. The data from (American) English learners of German come from the *VYSA* (= *V*ainikka and *Y*oung-*S*cholten *A*merican second language learners study, initial funding for which was provided by a British Academy Small Personal Research Grant to the second author.

[2] This idea is further developed in Vainikka (1997) where a new notion of a "head parameter" is introduced. Each functional projection in UG corresponds to a parameter with two settings, "ON" or "OFF". The "ON"
setting corresponds to a situation where the projection is realized in a language, whereas the "OFF" setting indicates that the projection is not realized.

(1a) a head, once identified in the input, projects a maximal projection
b) a complement position is posited based on positive evidence
c) a specifier position is posited based on positive evidence

The first step is crucial, and is therefore what we are concerned with. We assume that adult L2 learners' grammars, as well as those of children learning their L1 or L2, are constrained by UG. Given this assumption, once a head is posited, a complement and specifer position are possible as well. Our goal in this paper is to isolate potential triggers in the input for each of the stages that we have proposed in earlier papers, as defined by new syntactic projections. Triggers are elements in the ambient language which result in the learner reorganizing his/her grammar via parameter setting. Specific proposals concerning the nature of triggers for parameter setting have been put forth by Lightfoot (1989), J. Fodor (1992), Clark & Roberts (1993), and Gibson & Wexler (1994). Both Lightfoot (1989) and Gibson & Wexler (1994) consider a model whereby a single sentence type will enable the language learner to uniquely determine a set of parameter settings; we will not pursue this type of trigger. As an alternative, Fodor (1992) formalizes the notion of a *designated trigger*, according to which parameters designate what type of input will cause a particular parameter setting to be chosen by the language learner; it is this type of designated trigger that underlies our conception of trigger. As a general requirement for a posited trigger, it is assumed that triggers must be robust in the input data (cf. Lightfoot 1989 and Clark & Roberts 1993).

As will become clear in the following sections, we are interested in finding triggers for specific functional projections. As a starting point, we will assue that since triggers are robust in the input data, they are likely to be produced very early by the learner. In particular, when the longitudinal production data first reveal evidence of a specific functional projection having been acquired, among such early evidence we expect to find the element or construction that has acted as a designated trigger for that functional projection. Since functional projections typically contain inflectional morphemes, it is natural to consider these as candidates for designated triggers for the functional projections in which they occur. Such triggers would also satisfy the robustness requirement for any functional projection for which the language contains overt morphological evidence. As described above, under this approach, functional projections for which there is no morphosyntactic evidence in the input would not be posited by the language learner.[3]

Before turning to the specific proposals for triggers in second language acquisition, we first review our proposals for the development of syntactic structure.

1.2. Gradual Development of Syntactic Structure

We have proposed in several papers on the untutored acquisition of German by adults (Vainikka & Young-Scholten 1994, 1996a, 1996b, in press, to appear) that second language learners gradually build up syntactic structure. That is, they initially posit only lexical projections (such as the VP), and then in sequence gradually posit the relevant functional projections.

This approach to the second language acquisition of syntactic structure is based on a gradual structure building approach to first language acquisition, as developed in Clahsen, Eisenbeiss & Vainikka (1994) for German and Finnish, in Wijnen (1994) for Dutch, and in Vainikka (1993/4) for English (see also Guilfoyle & Noonan 1992). As in Radford (1990), this approach posits an early stage without functional projections; that is, children's earliest utterances are taken to be best represented by something like a bare VP structure (see also Rizzi 1993/4 for a truncated tree analysis of children's root infinitives). However, unlike Radford's (1990) maturational approach under which all functional projections are available simultaneously, functional projections are assumed to emerge based on triggering by the input data, in interaction with the principles of UG, in particular, X'-Theory (cf. Radford 1994).

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[3] Note that our view of functional projections, as well as that of Grimshaw (1993) and Speas (1993), excludes the possibility of abstract functional projections such as AgrOP for English which are possible under standard approaches to syntax (e.g. Chomsky 1993). In a similar vein, Schwartz & Sprouse (1996) have criticized our approach precisely because it does not allow for such abstract functional projections and therefore there is less distinction between the features located in a functional projection and the corresponding realizations of these features than what is standardly assumed.

The main challenge to the structure building approach to first language acquisition is to show that there is an early stage at which no functional projections are posited. Given early production data from German, it is clear that verb raising to a functional head is productive very early, under age two (Rohrbacher & Vainikka 1994). If it turns out that there is no stage for first language acquisition at which only lexical projections are posited by the child, then it is difficult to maintain that such a stage exists for L2 acquisition, since we claim that the acquisition of phrase structure is similar in child L1 and adult L2 acquisition.

To determine whether a bare VP-stage exists in L1 acquisition, it is imperative that two criteria be met when bringing evidence to bear on the issue. First, the data must come from young enough children, and second, the data should represent a variety of languages. New data from Germanic languages other than German, namely Dutch (Wijnen 1994) and Swedish (Rohrbacher & Vainikka 1994), clearly show an early stage without raised finite verbs, as illustrated in Table 1 for Swedish, and as exemplified in (2). In the earliest files for these children, all main verbs are non-finite; similar data are reported in Wijnen (1994) for Dutch. [4]We expect a comparable stage to be found for German when more data from the relevant age are examined.
In light of these new data, the bare VP stage is plausible even for languages of the German and Dutch type.

Table 1. Finite vs. non-finite main verbs in early Swedish
(data from CHILDES Database; cf. Stroemqvist et.al. 1993). (Rohrbacher & Vainikka 1994)

	files	*finite main verbs*	*non-finite main verbs*
Anton	1-2 (age 1;11-2;0)	0 (0%)	27 (100%)
	3-8 (age 2;0-2;4)	1 (2%)	57 (98%)
Markus	4-6 (age 1;7-1;9)	0 (0%)	17 (100%)
	7-8 (age 1;9-1;10)	3 (7%)	41 (93%)

(2a) Gubbe vara dar. (Swedish, Markus 1;10)
old.man be-INF there (Platzack 1994; gloss ours)
(Gubben ar dar.)
'The old man is there.'

b) Auto hier wahren. (German, Katrin 1;5)
car here drive-INF ('fahren') (Rohrbacher & Vainikka 1994)
(Das Auto faehrt hier.)
'The car drives here.'

Let us now turn to the second language acquisition data. The L2 learners we have studied from Korean, Turkish, Italian, Spanish and English first language backgrounds all initially transfer the headedness of their first language VP at the earliest stages of acquisition, when they posit only the lexical projection VP; examples from the earliest stage are shown in (3). (The Korean VP is head-final and the Italian and English VPs are head-initial.)

[4] Two pieces of evidence are used to determine finiteness in German and Dutch (OV languages), verb position and verb morphology. Even in the early acquisition data, these two factors typically converge. In Swedish, a VO language, verb position is not reliable since both the finite and the non-finite verb precede the object in the adult language, except in sentences with adverbs, which are notoriously rare in early acquisition data. However, verb morphology is distinct between the finite and the non-finite verb forms even in Swedish.

3a) Haar schoen machen. Changsu #124 (L1 Korean)
hair pretty make-INF
(Sie macht die Haare schoen.)
'She's making her hair look pretty.'

b) Ich sprechen die meine Firma. Salvatore 3 (L1 Italian)
I speak-INF the my firm
(Ich spreche mit meiner Firma.)
'I speak to my firm.'

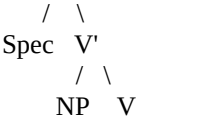
c) Peter lernen die Buch. Paul 1 (L1 English)
Peter learn-INF the book.
(Peter liest das Buch).
'Peter reads the book.'

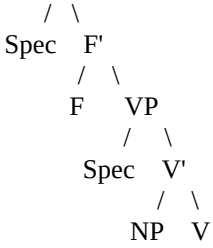
While still at a very early stage, the Italian, Spanish and English speakers switch the headedness of their first language VP to the head-final value of German, as exemplified in (4) for an Italian speaker and an English speaker.

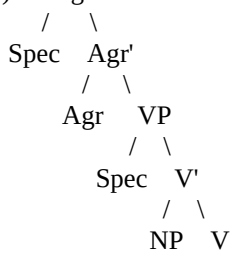
4a) Vielleicht Schule essen. Salvatore 6 (L1 Italian)
maybe school eat-INF
(Vielleicht isst sie in der Schule.)
'Maybe she eats at school.'

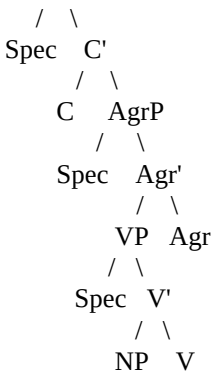
b) Er kann ein Bike, ein Motofahrrad fahren. Paul 3 (L1 English)
He can a bike, a motor-bicycle drive-INF
(Er kann Motorrad fahren.)
'He can ride a motorcycle.'

The gradual building up of syntactic structure for the L2 acquisition of German that we have proposed is illustrated by the trees in (5).

(5a)


(5b)


(5c)


(5d)


After the early VP-stage, all five groups of learners -- and German children (Clahsen 1991) -- posit an underspecified functional projection (FP) which is subsequently specified as an AgrP, as in (5b-c). Following the spirit of Clahsen (1991), we assume that once the language learner (acquiring either a first or a second language) determines that inflectional material occurs on the verbs in the input which cannot be accommodated by the bare VP projection, UG allows for the projection of a 'temporary' projection, FP, directly based on X'-Theory, but not found in adult German. And once the nature of the inflectional material on main as well as auxiliary verbs has been ascertained as an agreement paradigm, an AgrP projection can be posited instead.[5] Finally, a CP-projection is posited, as in (5d). Examples from the FP-stage are given in (6) and from the AgrP-stage in (7).

6a) Jetzt brau Wohnungsamt fragen. Sevinc #111 (L1 Turkish)
now need-0 housing-authority ask-INF
(Jetzt brauch ich das Wohnungsamt zu fragen.)
'Now I need to ask the housing authority.'

b) Un anfang zu regnen. Maria (L1 Spanish)
and begin-0 to rain-INF
(Und es faengt an zu regnen.)
'And it begins to rain.'

c) Ein Men liebe das Kuchen für Frühstück Paul 3 (L1 English)
a man love-1SG the cake for breakfast
(Ein Mann liebt den Kuchen zum Frühstück)
'The man loves cake for breakfast.'

7a) Sie kommt zu Hause. Ensook #131 (L1 Korean)
she come-3SG to home
(Sie kommt nach Hause.)
'She is coming home.'

b) Ich habe auf Italienisch gesagt. Bruno 7 (L1 Italian)
I have-1SG in Italian said
(Ich habe das auf Italienisch gesagt.)
'I have said (it) in Italian.'

Not only is the learners' first verbal functional projection, FP, an underspecified projection non-existent in adult German,[6] but because syntactic projections in Korean and Turkish are held to be head-final (see Choe 1988 on Korean, Comrie 1981:210 on Turkish) the head-initial FP cannot be related to these L2 learners native language. Because the syntactic development of the L2 learners we studied so closely

[5] Alternatively, it may be that instead of an underspecified FP, UG gives rise to a functional projection lower in the tree such as an Aspect Phrase or Tense Phrase (given the Split INFL approach of Pollock 1989), prior to the development of the AgrP. Under this alternative, one would expect to find early production of Aspect or Tense elements, exactly in parallel to what we observe for the AgrP phrase. The (mature) German agreement paradigm is as follows, for main verbs in the present tense:

	singular	*plural*
1st	-e/0	-n
2nd	-s(t)	-t
3rd	-t	-n

[6] Although the CP projection is head-initial in the target language, positing a CP at this early stage would not explain the apparent inaccessibility to CP-related elements such as complementizers at this stage. A further possibility is that (as has been proposed by Travis (1984)) the German IP is in fact head-initial; in this case, our FP could be more naturally taken to derive based on the L2 input.

parallels that of German children, we have proposed that the only point at which L2 learners make use of their L1 syntax is at the earliest stages, when the headedness of the VP is transferred.

Our evidence for the gradual building up of syntactic structure comes from the sequential emergence of the functional morphemes and the emergence of related syntactic phenomena, as summarized in Table 2.

Table 2. Characteristics of stages in L2 acquisition

VP-stage	FP-stage	AgrP-stage
no verb raising	some verb raising (optional)	frequent verb raising
no modals/auxiliaries	some modals/auxiliaries	common modals/auxiliaries.
no agreement paradigm	no agreement paradigm	presence of agreement paradigm
no complementizers	no complementizers	some complementizers
no complex WH-movement	no complex WH-movement	some complex WH-movement

The acquisition sequence we posit for L2 German also fits the results of the cross-sectional and longitudinal ZISA studies, in which 59 Romance adults learning German were studied (see e.g. Clahsen & Muysken 1986).[7] The results discussed by Clahsen & Muysken reveal that -- subsequent to the initial SVO word order -- the L2 learners acquire the 'particle rule', which in our approach reflects the acquisition of a head-final VP, as shown in (5a) above. German V2 is acquired next, whereby the finite verb always occurs in the second position in main clauses; the acquisition of a head-initial functional projection such as FP or AgrP gives rise to such a result. Finally, the last property to be acquired by the Romance L2 learners in the ZISA study is the position of the finite verb in embedded clauses; this cannot be learned, according to our approach, until the CP-projection has been acquired, as in (5d).

Various authors have attempted to argue against our stages by providing evidence for the early presence of functional categories in the L2 data, possibly transferred from the L1. Since we are claiming that there is no L1 transfer at the level of functional projections, but only at the level of lexical projections such as the VP, any evidence showing that functional material is transferred constitutes potential counterevidence to our approach. These potential counterarguments are addressed in detail in Vainikka & Young-Scholten (1996a), where we argue that the purported evidence levelled against our approach tends to support our approach, and at the very least does not invalidate it. One of the most difficult challenges will be summarized here.

Schwartz (in press) points out that our proposal predicts that verb raising is not transferred in second language acquisition, given that -- as is usually assumed -- it involves raising the verb from the VP to a functional projection. This prediction appears at first glance problematic for us, given reports in the literature that verb raising has been transferred, in particular from L1 French to L2 English (White 1991 a/b, 1992). On the other hand, there is recent evidence to suggest that verb raising is not directly transferred from the L1; to the extent that L1 transfer is not responsible for verb raising found in the interlanguage, our approach which allows UG-based verb raising at intermediate stages (such as at the FP-stage in L2 German) can be maintained. Thus, according to Eubank (1996) neither White's data nor other available longitudinal data (Gerbault 1978, Tiphine 1983; n.d.) reveal a stage in the L2 acquisition of English by French speakers at which French-type verb raising occurs. To the extent that the verb raising observed in L2 French and L2 English is different from the learners' L1s, such verb raising would have to be derivable from UG.[8]

[7] Note that our analysis of the data differs from Clahsen and Muysken's and has forced us to conclude that the data provide clear evidence of post-puberty access to UG.

[8] As pointed out by an anonymous reviewer, our conclusion that verb raising in L2 English may be derivable from UG would also predict that such verb raising occurs in L1 English, contrary to fact. Although we do not have a complete solution for this problem, we suspect that verb raising is not fully coded in the functional heads, but also has to do with the lexical items entered into the VP. In L1 English, the information on the verb would never give rise to verb raising, whereas in L2 English the VP-level information is transferred from the L1, and this might include some information about verb raising. The

Further support for this view on verb raising comes from recent work on the L2 acquisition of German by Swedish speakers (Håkansson 1994), who exhibit problems with German verb raising although both German and Swedish have the same kind of verb raising to C. Furthermore, Håkansson & Nettelbladt (1993) show that children acquiring L2 Swedish produce target-deviant word order patterns similar to those produced by children with specific language impairment, suggesting that something other than transfer is responsible for the word order patterns produced by the L2 children. Thus, evidence for transfer of functional projections from the L1 is thin.

A structure building approach provides a way of accounting for the stages of acquisition observed in L1 and L2 development and allows us to closely examine morphological development. It turns out, as we will see, that this is where differences between children learning their first language and adults learning a second language become apparent. We now turn to the crucial question of how the learner is motivated to reorganize his/her grammar throughout development. In other words, what drives the learner to project more structure?

2. Trigers in First and Second Language Acquisition

2.1 Bound vs. Free Morphemes

The issue is whether triggers for first language learners also act as triggers for second language learners. We propose, based on the existing data on L1 and L2 acquisition, that while *bound morphemes* such as inflectional affixes typically function as triggers in L1 acquisition, *free morphemes* do so in L2 acquisition (cf. our preliminary discussion in Vainikka & Young-Scholten 1996a, Section 4.4).[9] That is, bound morphemes have priority as triggers in L1A, but if the target language has no bound morphemes relevant for a particular parameter, then free morphemes will act as triggers (as might be the case with CP-related parameters in English). In adult L2 acquisition, on the other hand, free morphemes have priority as a trigger, and it may be that for most adult L2 learners a bound morpheme can never act as a trigger

If a particular parameter can only be triggered by a bound morpheme, such a parameter may be difficult or impossible to set in L2 acquisition, resulting in a fossilized non-target grammar. Thus, we claim that a change occurs in the language faculty during the critical period that has an effect on the status of triggers.[10]

In their review of the first and second language morpheme order studies carried out in the 1970s on the acquisition of English, Zobl & Liceras (1994) shed some light on the status of free and bound morphemes for child and adult learners.[11] In one of the original studies, Bailey, Madden & Krashen (1974) noted that the order of acquisition for adult L2 learners was similar to that of L2 children, but dissimilar to that of L1 children. If we look at these morpheme orders in terms of order within specific functional projections, as

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combination of such information on the verb and the presence of an intermediate functional head (F) would explain why the French learners of English raise their verbs only 'half-way'.

[9] See Newport (1990) who, based on a study of the native, early (pre-puberty) and late (post-puberty) first language acquisition of ASL, notes an age-based decline in the ability to analyze bound morphemes.

[10] As pointed out by an anonymous reviewer, our proposal appears to conflict with Fodor's notion of a designated trigger, which we wish to maintain in some form. Consider the possibility that UG provides a designated trigger for a parameter that is broad enough to include either bound or free elements. For example, UG might indicate a designated trigger for a TP which includes the information that the trigger is a tense marker, without specifying whether the trigger is a bound element (such as the -ed in English) or a free one (such as the auxiliary 'have' in English).

[11] Zobl & Liceras (1994) adopt a view similar to ours, according to which functional projections are first realized as bound morphemes in L1 acquisition and as free morphemes in L2 acquisition. However, they consider the differences in morpheme order acquisition to be evidence against structure building in L2A; cf. Vainikka & Young-Scholten (1996a, Sect.4.4) where we argue that this conclusion is based on a questionable assumption.

illustrated in Table 3, we see that L1 children tend to first acquire affixes -- i.e. bound morphemes -- related to the specific projections while second language learners initially acquire *free morphemes* and subsequently the corresponding affixes. Thus, in the nominal domain involving the functional projection DP (Determiner Phrase), L1 children acquire the possessive marker 's before or at the same time as the articles *a*/*the*, whereas L2 learners, according to the morpheme order studies, acquire the articles prior to possessive marking. In the sentential domain, L1 learners acquire past tense marking and perhaps even the 3rd sg. -*s* prior to the auxiliaries, whereas the reverse order holds for L2 learners.

Table 3. Relative morpheme order in acquisition
(based on Zobl & Liceras 1994; cf. also Vainikka & Young-Scholten 1996a)

Related Projection	Morpheme in L1A	Morpheme in L2A
DP	1. possessive	1. article
	1./2. article	2. possessive
IP	1. past & 3SG	1. auxiliary
	2. auxiliary	2. past & 3SG

Just because a particular element is acquired earlier than another element does not of course show that the earlier acquired element is involved in triggering syntactic structure. However, we are making the reasonable assumption that it is a necessary condition for a trigger to be acquired earlier than the related elements; recall that we are also assuming that it is grammatical, closed-class elements which are the most likely candidates for triggering syntactic structure. In addition, since triggers are assumed to be salient in the input data, this would further increase the likelihood for them to occur early in the production data.[12] Thus, if the results represented in Table 3 can be maintained, the English possessive affix could not possibly be a trigger for the DP in adult L2 acquisition, any more than the past tense affix could act as a trigger for sentential functional projections; in both cases, there is another grammatical element related to each projection that is acquired earlier.

If our proposal is on the right track, the difference between bound and free morphemes in L1 vs. adult L2 acquisition is presumably derivable from some type of a sensitive period for language development. Under this approach, although both children and adults posit structure using the X'-Theory, it may be that the possibility of using bound affixes as triggers biologically conditioned.

Let us now turn to specific triggers for each of the stages we have proposed for L2 acquisition of German.

2.2. The VP-Stage

The morpheme order studies discussed above further show that there is one functional suffix which is present in the very early production of both L1 and L2 learners of English: *-ing*.[13] This might seem to constitute evidence against our proposal that bound morphemes are not salient triggers in the input for L2 acquisition. However, our proposal is embedded in a theory of structure building from the bottom up, whereby elements associated with the VP -- whether bound or free -- are expected to be acquired before any functional elements. Taking V+*ing* to constitute a non-finite form without the usual functional projections (as is typically assumed in L1 acquisition, cf. e.g. Radford (1990)), acquisition of *-ing* by L2 learners prior to acquisition of other morphemes indicates that the VP projection is available prior to functional projections.[14]

[12] Although it has been shown that in L1 acquisition production data do not always mirror the competence of the child (Gerken, Landau and Redez 1990) given the robustness assumption we take it to be a realistic possibility that elements that act as triggers do occur in the production data, even if some non-triggering elements do not

[13] See for example Haznedar's (1997) account of a Turkish child learning English for whom verbs ended in *-ing* prior to the point at which he switched the headedness of the VP from final to initial. We consider the utterances such as 'Newcastle going' which this young learner produced consistent with our VP Stage.

[14] Alternatively, under the Split-INFL approach (cf. footnote 5), the suffix -ing might occupy the head

How is the headedness of VP triggered? In first language acquisition, Mazuka (1994) notes a paradox whereby in order to set the head-directionality parameter, the child must identify the head (e.g. verb) and its complements (e.g. object NP), but being able to identify them means that the child has already set the parameter. A solution to this paradox which implements prosodic information is proposed in Mazuka (1994) and Nespor (1995). Given Nespor & Vogel's (1986) prosodic hierarchy, the material in the VP maps directly onto a prosodic phrase, and thus it is reasonable to assume that VP is a unit which can be analyzed even prior to full syntactic analysis. Furthermore, the stress pattern associated with the elements inside this phrase is claimed to provide straightforward information about headedness. Indeed, prelinguistic infants have been shown to be sensitive to both stress (Jusczyk, Cutler & Redanz (in press) and constituents of the prosodic hierarchy (Gerken, Jusczyk & Mandel (1994)).

If second language learners possess a similar sensitivity to stress and constituents of the prosodic hierarchy, then the VP will be isolated from the input stream in a similar manner, and its headedness determined. Recall, however, that the L2 learners transfer the headedness of the VP from their mother tongue, as discussed in Section 1.2. This indicates that -- unlike in L1 acquisition -- the VP projection need not in fact be triggered, since it is directly transferred from a previously existing grammar. In effect, the L1 VP is used to bootstrap L2 syntax, a possibility not found in L1 acquisition. On the other hand, although the VP projection itself need not be triggered, L2 learners still have to reorganize the word order of the VP to match that of the target language, and they readily do so.

2.3. The FP-Stage

A clear difference between L1 and L2 acquisition concerns the development of the agreement paradigm (shown in foonote 5). Even at the AgrP-Stage (to be discussed below), where the agreement paradigm has clearly been acquired, our adult second language learners mark agreement much less consistently than children at a comparable stage (Clahsen 1991). It has become very clear in the L1 literature that German verbs occurring to the right of the object appear in the infinitive form, ending with the infinitival suffix *-n*, in children's utterances, whereas verbs to the left of the object typically end with an inflectional suffix (Clahsen 1991; Clahsen & Penke 1992). In other words, utterances with non-finite, sentence-final verbs involve only an VP, whereas utterances with finite verbs preceding their objects must involve a functional projection (a head-initial FP).

While our L2 learners are similar to German children in terms of which verb forms appear exclusively to the right of the object (i.e. non-finite forms ending in *-n*)[15] such non-finite verb forms also frequently appear to the left of the object in the L2 data, as in (8). For example, as reported in Vainikka & Young-Scholten (1994, [Table F]), 57% of the raised main verbs in the data of the five least advanced Korean and Turkish learners of German occur with the infinitival *-n* suffix, regardless of the person/number of the subject NP. In other words, adults -- unlike children -- often raise the non-finite verb at early stages of L2 development. This is very typical at the FP-stage in L2 German, prior to the productive use of the agreement paradigm.

8) Ich kaufen Brot so tuerkische Geschaeft.
I buy-INF bread so Turkish store
'I buy bread at a Turkish store.' Mine #187 (L1 Turkish)

A potential trigger for the FP projection is the German modal *will* 'want', since it is often the first INFL-related element acquired (in our L2 German data). However, there is a possible problem with the

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position of a low functional projection such as Aspect Phrase in both L1 and L2 acquisition. Even under this assumption, -ing is expected to emerge earlier than grammatical elements (whether bound or free -- e.g.
past tense marking) associated with higher projections.

[15] Some variants of the non-finite suffix in the L2 data are discussed in Vainikka & Young-Scholten (1996b).

assumption that modals act as triggers for verb raising, which is clearly a productive option at the FP-stage: in the input data, modals are relatively less frequent in one of the two possible verb positions, namely the VP-internal position. An English-type analysis of German modals (i.e. base-generated in a functional head) would in fact account for the majority of instances of modals. Thus, it appears that while modals cannot function as robust triggers for the raising of verbs in German, they would qualify as robust triggers for a functional head in which *base-generated* elements such as modals and auxiliaries occur without verb raising. Once such a functional head (i.e. the head of FP) has been posited by the learner, the realization that the target language has verb raising becomes possible.

Children at this point in the acquisition process, on the other hand, can be expected to observe that verbs in the raised position have a different inflectional suffix as compared to their non-finite form in the VP. The first finite suffix acquired by German children is the 3SG *-t*; thus, this is an instance of a bound morpheme triggering a functional head for verb raising. If children are using a suffix on the main verb as a trigger for verb raising, this will be a very robust trigger, since the main verb occurs with sufficient frequency in two verbal positions: with agreement suffixes in the raised position, and with non-finite suffixes in the VP.

Thus, a correlation between raised verbs and agreement in L1 acquisition is not surprising, whereas -- based on our proposal concerning free vs. bound morphemes -- adults will fail to consistently analyze the various inflectional affixes on the raised verb. This results in a situation where verbs without a finite suffix are raised to a functional head, exactly what is observed at the early stages of L2 acquisition. While the data from these adult L2 learners demonstrate that they have access to X'-Theory, (i.e. they are able to posit functional projections which exist neither in their L1 nor in the L2), their raising of non-finite verbs suggests that bound morphemes are not the trigger for FP.

Like adult L2 learners, German Down's Syndrome first language learners investigated by Schaner-Wolles (1994) raise the non-finite verb more often than their age-matched counterparts, doing so even at a relatively advanced syntactic level. As Schaner-Wolles points out, this means that the agreement suffixes cannot be the only trigger for verb raising. These findings indicate that the alternative trigger available to adult second language learners for the positing of the functional projection FP is available to such children as well. [16]

2.4. The AgrP-Stage

At the following stage of development, the underspecified FP is specified by the learners as an Agreement Phrase, as evidenced by their mastery of the agreement paradigm. The German target grammar provides a way to acquire the agreement paradigm using free morphemes, namely the copular paradigm shown in Table 4. Indeed in the L2 acquisition data from one of the ZISA (naturalistic) Spanish learners of German, Jose, the copular paradigm is acquired right before Jose acquires agreement on main verbs. This strongly suggests that the forms of the copula act as a trigger for the new AgrP projection.

Table 4. The German copular paradigm *sein*

	singular	*plural*
1st	bin	sind
2nd	bist	seid
3rd	ist	sind

Once the functional projection has been specified as an AgrP, it has characteristics similar to those found in L1 acquisition: it appears to be strongly correlated with verb raising, with agreement morphology, and with

[16] This may also even be the case for bilingual first language acquisition. Recent work by Döpke (1996) on young German/English children suggests that the treatment of bound morphemes differs from what has been observed for monolingual German acquisition.

the requirement that sentences in German have an overt subject.[17] Thus, the resulting AgrP is similar to the child German AgrP; however, it will have been arrived at via a different path, since agreement on main verbs is a more likely trigger in L1 acquisition. Clahsen (1991), for example, argues that the acquisition of the 2nd person singular *-st* suffix on main verbs is connected with the child positing an AgrP projection in his/her grammar.

2.5. An AgrP sub-stage

By the third data collection session from Paul, one of the four English learners of German in the VYSA naturalistic study, evidence of his projecting an FP begins to appear. In the same session there is clear evidence that the copula sein is being acquired (for details see Vainikka and Young-Scholten to appear). Paul's further development provides additional evidence that children and adults treat bound morpehemes differently. By the fourth session, the suffix *-st* has come to function as a default agreement marker on main verbs for Paul, as shown in Table 5 and in the examples in (9). Moreover, the function of this suffix extends to the **-st** forms of the copula and auxiliary, which are used incorrectly most of the time.[18] Paul is not unique in his analysis of *-st*, as there is similar evidence from the other three VYSA learners.

Table 5. Paul's agreement on main verbs (single verb sentences only; copula excluded)

FILE	**MAIN VERBS**	**V-n** ✓	wrong	**V-st** ✓	wrong	**V-e/a** ✓	wrong	**V**-0 ✓	wrong	**V-t** ✓	wrong
3	78	12	37	2	3	7	5	4	1	7	0
4	98	20	19	5	25	11	1	10	3	4	0

None of the instances of agreement were categorized as 'unclear' with respect to the person and number intended..

9a) Vier man hast ein Buch schreiben. Paul 3
four men have-2SG a book written
(Vier Männer haben ein Buch geschrieben.)
'Four men have written a book.'

b) Habst du ein Apfelkuchen machen? Paul 4
have-2SG you an apple cake made
(Hast du einen Apfelkuchen gemacht?)
'Did you make an apple cake?'

[17] Clahsen & Hong (1995) provide evidence from a reaction time experiment that shows that the acquisition of agreement and the obligatory usage of a subject are *not* correlated in L2 acquisition of German, contrary to our claim. However their findings are confounded by the requirement that the sentence-initial Spec (FP) position be filled (either by a subject or by another XP), as we argue in Vainikka & Young-Scholten (1994) for the FP-stage. Thus, their finding that agreement appears to be more difficult to acquire than obligatory subjects supports our approach, since agreement is associated with the later AgrP-stage, while the sentence-initial position is typically filled by a subject at the earlier FP-stage.

[18] One obvious solution is that *-st* simply represents transfer of third person singular *-s* from English - perfectly plausible since this suffix is often pronounced as *-s* in German. However, the data do not support such a conclusion. To begin with, *-s(t)* is used in contexts other than third person singular, the 2nd singular copula *bist* is overgeneralized rather than 3rd singular *ist*, *-s(t)* is used with modals, unlike in English, and the *-s(t)* never involves voicing assimilation, as it would in English. 19 At least English speakers learning German as a second language in a naturalistic setting. Note that if we do not find evidence of such overgeneralization by learners from other native language backgrounds this does not constitute counter-evidence, since our contention is simply that children and adults treat bound and free morphemes differently during the development of phrase structure.

c) Die Frau liebst Schokolade. Paul 4
the woman love-2SG chocolate
(Die Frau liebt Schokolade)
'The woman loves chocolate.'

As noted above, for monolingual German children, the positing of AgrP is held to be triggered by agreement on main verbs. Yet children do not engage in such overgeneralization of -st; once AgrP has been acquired, agreement is correct. For adult L2 learners, the *-st* suffix does not function as a trigger for AgrP. And unlike child first language learners, adult L2 learners, including those who show no evidence of overgeneralizing -st, raise verbs to AgrP prior to their acquisition of the agreement paradigm (see Vainikka and Young-Scholten 1994).[19] The English learners of German use the suffix *-st* as a default agreement suffix prior to their subsequent mastery of the agreement paradigm itself. While this is specific to German, it is of note that the robustness of *-st* in the input coupled with its morphological uniqueness as agreement marker is something recognized not only by children learning German as their first language, but also by adults learning German as their second language.

2.6. The CP-stage

We propose that object clitics act as triggers in L1 acquisition for the CP-stage. The distribution of object clitics in German provides a clear cue that finite verbs and complementizers occupy the same position, since for both sentence types, as illustrated in (10), the clitic form for es, *'s* 'it' adjoins to C.

10a) Ulrike kauft's heute in der Stadt.
Ulrike buy-3SG + it today in the city
'Ulrike is buying it today in the city'

b) Er fragte, ob's Ulrike heute in der Stadt kauft.
he ask-PAST/3SG if + it Ulrike today in the city buy-3SG
'He asked if Ulrike is buying it today in the city'

This cue would not constitute a clear one for second language learners since pronominal enclitics in German have much the same phonological characteristics as the agreement suffixes, both constituting at most a syllable. In other words, clitics behave like bound morphemes. And even advanced L2 learners have been shown to have problems with the distribution of object clitics and other pronominal clitics (see Young-Scholten 1993).

While the CP is triggered by object clitics in the L1 acquisiton of German (object clitics being salient bound morphemes associated with the CP projection), in the L2 acquisition of German, the CP projection is triggered by complementizers, salient free morpheme associated with the CP. Like modals and copulas, complementizers are free morphemes which exhibit similar phonological characteristics. Note, however, that complementizers do not provide information about verb raising to C in German. Thus, we might expect a stage with a CP-projection but with verbs raising to a head-initial AGR and not all the way to C. In fact, evidence for such a stage has been reported in the literature on the ZISA study (cf. e.g. Clahsen and Muysken 1986). In an English-type language where there may be no bound morphemes associated with the CP projection, free morphemes such as WH-elements or complementizers (other than the optional 'that') may act as triggers for the CP in both L1 and L2 acquisition.

[19] At least English speakers learning German as a second language in a naturalistic setting. Note that if we do not find evidence of such overgeneralization by learners from other native language backgrounds this does not constitute counter-evidence, since our contention is simply that children and adults treat bound and free morphemes differently during the development of phrase structure.

3. Discussion

Table 6 summarizes the triggers we have proposed for the various functional projections in the first and second language acquisition of German.

Table 6. Triggers for positing projections [in the acquisition of German]

Projection	Trigger in L1A	Trigger in L2A
VP	stress pattern	L1 bootstrapping
FP	3SG *-t*	modals
AgrP	agreement paradigm	copular paradigm
CP	object clitics	complementizers

The evidence we have discussed clearly indicates that the status of triggers in first and second language acquisition differs. We have also found a second instance - in addition to use of *-n* as default FP suffix - in which adult L2 learners, unlike child L1 learners, make use of a default suffix during the development of phrase structure. To this evidence we can add the observation that a number of the learners in the ZISA studies (both longitudinal and cross-sectional) and in our LEXLERN study appeared to be fossilized. Thus one might conclude that it is the different status of triggers for second language learners -- rather than lack of access to Universal Grammar -- that is connected with lack of native-like attainment. Since much of syntax is encoded in grammatical elements realized as affixes, difficulty in fully analyzing such affixes could seriously hamper language development.

What factors internal to the organism might be responsible for the difference between the treatment of triggers in L1 and L2 acquisition? Newport (1990) suggests that the processing of complex morphology by the learner undergoes a major qualitative shift around the age of puberty (and perhaps also a minor shift well before puberty, sometime after the age of four). Thus, there may be a neurobiological factor relevant for the critical period (which might start to exert some influence even earlier, on child L2 acquisition) which results in bound morphemes being processed differently by second language learning adults, whereby such elements are no longer readily available as triggers for syntactic structure. That cases of specific language impairment in first language acquisition seem to involve morphosyntactic deficiencies rather than purely syntactic ones (cf. e.g. Gopnik 1990) suggests another instance in which exceptional language acquisition results in triggering patterns similar to those found in adult second language acquisition.

We suspect that ultimately the distinction between bound and free morphemes as triggers may be derivable from phonology -- free morphemes in German typically constitute at least a phonological foot, while bound morphemes typically involve units smaller than a foot. It is well known that aspects of the learner's L1 phonology are transferred in L2 acquisition and it is generally agreed that adult L2 learners experience persistent phonological difficulites (not all of which may be directly related to L1 influence; L2 acquisition after the critical period may fail to make some parameters relating to phonological units smaller than a foot available). Thus lack of phonological attainment may in turn result in incomplete analysis of sub-foot constituents in the learner's L.

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