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Tree Growth and Morphosyntactic Triggers in Adult SLA

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In this paper, we examine the role of triggers in second language acquisition. Specifically, we ask given that in second language, as in first language acquisition, syntactic projections gradually emerge, and given the notion that something becomes available in the input to trigger the reorganization of the L2 grammar, exactly what triggers second language development?

We first describe the gradual building up of syntactic structures - or tree growth - in each of the stages of L2 acquisition (as described in Vainikka (1993/4)). We then consider what might constitute the relevant triggers of each of the stages of both L1 and L2 acquisitions (seen below).

We find that the status of triggers in first and second language acquisition differs. We also observe that a number of learners in the **ZISA** studies (Clahsen & Muysken 1986) and in our **LEXLEARN** project in Dusseldorf appears to be fossilized. One might conclude that it is the different status of triggers for second language learners - rather than lack of access to Universal Grammar - that results in the lack of ultimate attainment of native competence. Since much of syntax is encoded in grammatical elements realized as affxes, difficulty in 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 there may be a neurobiological factor relevant for the critical period which results in bound morphemes being processed by second language learners. We suspect, however, that ultimately the distinction between bound and free morphemes as triggers may be derived from phonology - free morphemes typically constituate at least a phonological foot, while bound morphemes typically involve units smaller than a foot.

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May 1995 (draft)

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1 Introduction

1.1 Gradual emergence of structure in L2 acquisition

We have proposed in several papers on the acquisition of German (Vainikka & Young-Scholten 1994; in press *a*; in press *b*; to appear) that, like first language learners,[1] second language learners gradually build up syntactic structure. That is, they posit only lexical projections at first, and then in sequence gradually posit the relevant functional projections.

The second language learners we have studied from Korean, Turkish, Italian and Spanish first language backgrounds all initially transfer the headedness of their L1 VPs at the earliest stages of acquisition, where learners posit only VP; examples from the earliest stage are shown in (1). (The Korean VP is head-final and the Italian VP is head-initial.)

1a) Haar schoen machen.
hair pretty make-INF
'She's making her hair look pretty' Changsu #124 (L1 Korean)

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

While still at a very early stage, the Italian and Spanish learners switch the headedness of their L1 VPs to the head-final value of German, as exemplified in (2) for an Italian speaker.

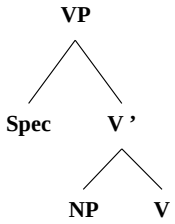
2) Vielleicht Schule essen.
maybe school eat-INF
'Maybe he/she eats at school' Salvatore/6 (L1 Italian)

The gradual building up of syntactic structure for L2 acquisition of German that we have proposed is illustrated by the trees in (3).

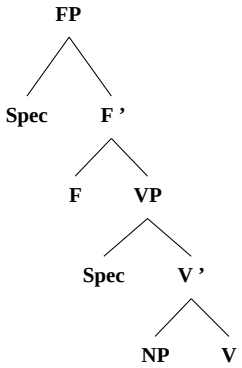
[1] See Vainikka (1993/4) for discussion of this somewhat controversial approach to first language acquisition.

Figure 3

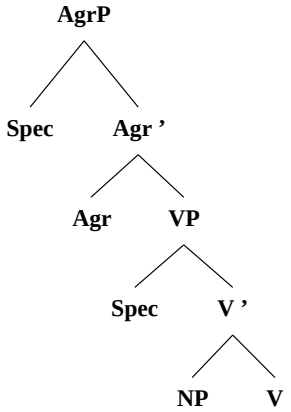
(3a.)



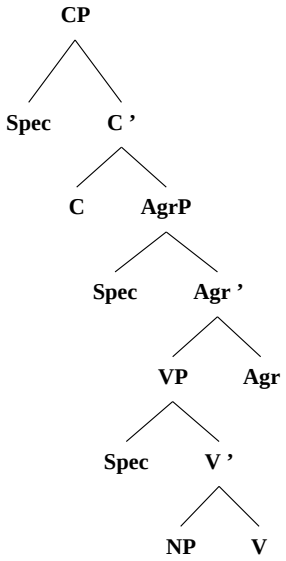
(3b.)



(3c.)



(3d.)



After the early VP-stage, all four groups of learners - and German children - posit an underspecified functional projection (FP) which is subsequently specified as an AgrP, as in (3b-c). Finally, a CP-projection is posited, as in (3d). Examples from the FP-stage are given in (4) and from the AgrP-stage in (5).

4a) Jetzt brau Wohnungsamt fragen.
now need-0 housing-authority ask-INF

'Now I need to ask the housing authority' Sevinc #111 (L1 Turkish)

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

5a) Sie kommt zu Hause.
she come-3SG to home
'She is coming home' Ensook #131 (L1 Korean)

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

The learners' first verbal functional projection, FP, is a head-initial projection which does not exist in adult German. Moreover, syntactic projections in Korean and Turkish are typically head-final, and thus head-initial projections cannot be taken to be L1-related. Because the syntactic development of the L2 learners we studied so closely 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, at which the headedness of the VP is transferred.

The acquisition sequence posited in (3) for L2 German also fits the results of the cross-sectional and longitudinal ZISA studies, in which 59 Romance adults learning German were studied (Clahsen & Muysken 1986). 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 (3a). 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 (3d).

Our evidence for the gradual building up of syntactic structure, or 'tree growth', is the sequential emergence of the functional elements, as shown in Table 1.

Table 1. Characteristics of stages in L2 acquisition.

VP-stage	FP-stage	AgrP-stage
no verb raising	optional verb raising	verb raising frequent
no modals/auxiliaries	some modals/auxiliaries	modals/aux. common
no agreement paradigm	no agreement paradigm	agreement paradigm acquired
no complementizers	no complementizers	some complementizers
no complex WH-movement	no complex WH-movement	some complex WH-questions

There is no a priori reason the child or second language learning adult should produce utterances with only uninflected main verbs and only later produce inflected main verbs or auxiliaries. Certainly the latter are more frequent in the input. Nor does the lack of phonological prominence of some functional elements provide a full explanation either for their late acquisition, since, for example, in German *das* [das] as a demonstrative pronoun appears quite early, while *dass* [das] as a complementizer appears much later. Thus prosodic explanations along the lines of those proposed by e.g. Demuth (to appear) fail as a monolithic account for the order of appearance of functional elements.

1.2 Current state of challenges

Although early work on L1 acquisition provided evidence for an early stage without functional projections (Radford 1990), more recent research points to problems with this approach since young German children frequently produce raised finite verbs (cf. e.g. Clahsen & Penke 1992).

If it turns out that there is no stage for first language acquisition at which only lexical projections are posited, then it is difficult to claim that such a stage exists for L2 acquisition, especially if we are claiming that the acquisition of phrase structure is similar in child L1 and adult L2 acquisition. Moreover, if the existence of such an early VP-stage is in doubt, then it becomes difficult to maintain a view under which only lexical projections are transferred.

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 2 for Swedish. In the earliest files for these children, all main verbs are non-finite. We expect a comparable stage to be found for German when more data from the relevant age are examined.

Table 2. Finite vs. non-finite main verbs in early Swedish
(data from CHILDES Database; cf. Stroemqvist et.al. 1993).
(Rohrbacher & Vainikka 1994)

	files	*finite main Vs*	*non-finite main Vs*
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%)

A straightforward analysis of the early root infinitives in various languages is that they reflect a bare VP tree, without any functional projections available for verb raising or for inflectional morphology.

Turning now to L2 acquisition, one might ask whether there is really no evidence of transfer of functional projections. The most serious challenge to our position in this regard is the status of verb raising. Schwartz (to appear) 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. Yet it appears that French learners of English do indeed transfer verb raising from their L1. However, according to Eubank (1994) neither White's data (1991a/b;, 1992) 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. Further support for this view comes from recent work on L2 acquisition of German by Swedish speakers (Hakansson 1994), who exhibit problems with German verb raising although both German and Swedish have the same kind of verb raising to C. Furthermore, Hakansson & Nettelbladt (1993) show that L2 children acquiring 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. 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 Triggers of tree growth

Before we consider various means by which second language learners make use of elements in the input as triggers to spur tree growth, let us first examine how children might do so.

2.1 Triggers in L1 acquisition

Specific proposals concerning the nature of triggers for parameter setting in L1 acquisition have been put forth by e.g. Gibson & Wexler (1994), J.Fodor (1992) and Clark & Roberts (1993). Gibson & Wexler consider a model whereby a single sentence type will enable the language learner to uniquely determine a set of parameter settings. Fodor, on the other hand, develops 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. In general, it is assumed that triggers must be robust in the input data; for example, Clark & Roberts' model of mathematical learnability suggests that triggers cannot be rare in the input data.

Although triggers are usually thought of as triggering certain parameter settings, we adopt a more general notion of a trigger, namely any element which causes the grammar to be reorganized. Given that functional elements are often assumed be the locus of parametric variation and they are located in

the functional projections the development of which we are considering, it makes sense to consider the possibility that functional elements act as triggers for development.

2.2 Triggers in L2 acquisition

A clear difference between L1 and L2 acquisition concerns the development of the agreement paradigm.[2]

While one can indeed conclude that our learners have acquired agreement at the AgrP-stage, unlike children at a comparable stage (Clahsen 1991) our adult second language learners mark agreement much less consistently. From the point at which verbs start to appear to the left of the direct object, our learners – unlike the German children discussed in the literature – do not always attach agreement suffixes to these verbs. Clahsen (and much subsequent work) notes a clear asymmetry whereby verbs to the right of the object are in the infinitive form, ending with *-n*. On the other hand, verbs to the left of the object typically end with an inflectional suffix. While our 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*),[3] such non-finite verb forms also frequently appear to the left of the object in the L2 data, as in (6). 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 L2 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.

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

The question which we can now pose is the following: given that in second language acquisition, as in first language acquisition, syntactic projections gradually emerge, and given the notion that something 'becomes available' in the input to trigger the reorganization of the L2 grammar, exactly what triggers second language development?

To begin with, the issue is whether triggers for first language learners also act as triggers for second language learners. What the existing data on L2 acquisition suggest in general is that while *bound morphemes* such as inflectional affixes function as triggers in L1 acquisition *free morphemes* do so in L2

[2]The German agreement paradigm is as follows, for main verbs in the present tense:

	singular	plural
1st	-e/0	-n
2nd	-st	-t
3rd	-t	-n

[3]Some variants of the non-finite suffix in the L2 data are discussed in Vainikka & Young-Scholten (in press *a*).

acquisition.[4] For example, Zobl & Liceras (1994) review the first and second language morpheme order studies carried out in the 1970s on the acquisition of English to address L1 - L2 differences. 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 illustrated in Table 3, we see that children first acquire those affixes – i.e. bound morphemes – related to DP and IP, while second language learners initially acquire *free morphemes* related to DP and IP and subsequently the affixes.

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

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

In their analysis of the morpheme order studies, 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 argue that the morpheme order studies reveal a further difference between L1 and L2 acquisition, namely that nominal functional projections tend to be acquired earlier than verbal ones in L1 acquisition, while such a generalization is not discernable in the L2 acquisition orders. They take this distinction to show that functional projections gradually emerge in first language acquisition, but are transferred from the learner's native language in second language acquisition. This is based on the assumption that a DP has to be posited before an IP under structure building. However, no such restriction is implied by syntactic theory, where the 'nominal track' and the 'verbal track' are distinct in terms of functional projections. Thus, the structure building approach can be maintained for L2 acquisition, as well.

The morpheme order studies further show that there is one morpheme which is acquired very early by both L1 and L2 learners of English: *-ing*. 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, (as is typically assumed in L1 acquisition, cf. e.g. Radford (1990)) which is in V rather than in I, acquisition of *-ing* by L2 learners prior to acquisition of other morphemes indicates that the VP projection is available prior to functional projections.

[4]See also Newport (1993) who draws a distinction between bound and free morphemes with respect to the acquisition of ASL at different ages.

3 Triggers for each stage

Let us now turn to a consideration of what might constitute the relevant triggers for each of the stages that we have posited.

3.1 The VP-Stage

In first language acquisition, Mazuka (1994) notes a paradox whereby in order to set the head-directionality parameter, the child must identify the head and its complements, but being able to identify 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 could be isolated from the input stream in a similar manner, and its headedness determined. However, given the possibility that L2 learner's initial state with respect to stress is likely to be filtered through their L1 stress system, it may be the case that this information is not sufficiently usable (cf. e.g. Archibald 1992). If this situation obtains, the transferred VP could then used to bootstrap L2 syntax, a possibility not found in L1 acquisition. The order of VP-constituents with similar meaning would be compared between the L1 and the L2, resulting in eventual reorganization within the VP, if need be.

3.2 The FP-Stage

At the FP-stage, verb raising is optional and occurs about half of the time in matrix clauses. As mentioned already, there is a difference in verb raising of the infinitival form, whereby adults often raise the non-finite verb form, and children rarely do. When not raised, the verb typically occurs in a non-finite form for both groups.

A potential trigger for an FP projection is the modal *will* 'want' since it is often the first INFL-related element acquired (in our L2 data). A potential problem exists with modals being a trigger for verb raising: 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 account for the majority of instances of modals. Thus, it appears that modals cannot function as robust triggers for verb raising in German.

On the other hand, modals would suffice as robust triggers for a functional head in which base-generated elements such as modals occur, without verb raising. Once such a functional head 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 affix as compared to the 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 affix are raised to a functional head, exactly the situation observed at the early stages of L2 acquisition. Thus, while the data from these adults 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 different treatment of triggers is revealed in the process of raising non-finite verbs.

Like 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, even at a relatively advanced syntactic level. As Schaner-Wolles points out, this suggests that the agreement suffixes are not the only trigger for verb raising. We would assume that the Down's Syndrome children and second language learners make use of a similar alternative trigger.

3.3 The AgrP-Stage

Once the underspecified functional projection has been posited, this seems to provide a way for the L2 learner to acquire the agreement paradigm, thereby resulting in a projection the head of which contains specified grammatical features, as in the target grammar. In particular, the target grammar provides a way to acquire the agreement paradigm using free morphemes, namely the copular paradigm shown in Table 4. Indeed in Jose's L2 acquisition data (ZISA Corpus), he acquires the copular paradigm right before he acquires agreement on main verbs.

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 the requirement that sentences in German have an overt subject. Thus, the resulting AgrP is similar to the Child German AgrP; however, it will have been arrived at via a different path.

3.4 The CP-stage

For the CP-stage we propose that object clitics act as triggers in L1 acquisition. 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 (7), the clitic *'s* 'it' adjoins to C.

7a) 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 clitics in German have the same phonological characteristics as the agreement suffixes. Both constitute at most a syllable. In other words, clitics behave like bound morphemes. Even advanced L2 learners have problems with the distribution of object clitics and other pronominal clitics (as shown in Young-Scholten 1993). We propose that, rather than object clitics, complementizers can act as triggers for the CP-projection in L2 acquisition. Complementizers are free morphemes and share the phonological characteristics of modals and copulas. 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 AGR and not all the way to C. Evidence for such a stage has been reported in the literature on the ZISA study.

4 Conclusion

Table 5 summarizes the triggers we have tentatively proposed for the various functional projections in first and second language acquisition.

Table 5. Triggers for positing functional projections.

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 indicates that the status of triggers in first and second language acquisition differs. 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 results in lack of ultimate attainment of native competence. Since much of syntax is encoded in grammatical elements realized as affixes, difficulty in 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, based on her findings on native, early and late ASL first language acquisition that the processing of complex morphology 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 results in bound morphemes being processed differently by second language learners. Furthermore, typical language disorders in first language acquisition seem to involve morphosyntactic deficiencies rather than purely syntactic ones (cf. e.g. Gopnik 1990).

We suspect that ultimately the distinction between bound and free morphemes as triggers may be derivable from phonology – free morphemes 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 exert a negative influence on the analysis of sub-foot constituents in the L2.

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