

Further Evidence in Support of the Cumulative-Enhancement Model: CP Structure Development

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Abstract

The *Cumulative Enhancement Model* proposed by Flynn et al. (2004) seeks to provide an explanatory model for multiple language acquisition. Results reported in this paper present further evidence in support of this model. Results of an elicited imitation task comparing the production of relative clauses by learners of GermanL1 and HungarianL1/GermanL2 acquiring L2 and L3 English respectively at three levels of proficiency indicate, on the one hand, an increased facilitation in subsequent acquisition with each new language learned and, on the other hand, development of syntactic knowledge in L3 acquisition that cannot be explained in terms of an astructural *transfer* from the last language learned.

1. Introduction

Consistent with the research agenda represented in this volume, our purpose in this chapter is to provide insights into the development and representation of language-specific grammars with the help of studying third-language (L3) acquisition. L3 results may render answers in this field that the study of second-language (L2) acquisition alone cannot, for L3 research has the power to investigate the properties of the initial state which constrain the development of language-specific grammars in order to shed light on the availability of Universal Grammar (UG) and, thus, to separate what is universal from what is language-specific, i.e. L3 research offers the possibility of assessing the extent to which language-specific properties of either the L1 or the L2 determine subsequent language development.

Transfer from the L1 to the L2 has been widely debated in second language research.¹ L3 research picks up the thread and seeks to investigate the manner in which the specific languages known to the learner affect subsequent language learning. The L2 Status Factor (see Bardel and Falk 2007 and Falk and Bardel 2010), as its name suggests, proposes that the last learned language is the determining factor in language transfer. The model focuses on the obvious differences between L1 and the subsequently learned languages and predicts a general tendency to activate and transfer linguistic experience and/or elements of the last learned language into subsequent language acquisition. Bardel and Falk (2007) propose, furthermore, that the L2 Status Factor guides syntactic transfer as well; that is, they posit that

¹ See e.g. Bley-Vroman (1989), Clahsen and Muysken (1986), Johnson (1988), Johnson and Newport (1989), Schwartz and Sprouse (1996), Hawkins and Chan (1997), Flynn (1983 and subsequent work), etc.

syntactic development in subsequent acquisition is also affected by the specific syntactic features of the last learned language.

Transfer at the L3 initial state comprises the main interest of the Typological Primacy Model (TPM) as well (see Rothman 2010; Rothman and Cabrelli Amaro 2010). It seeks to predict which set of language properties a multilingual language learner is likely to transfer when learning a new language L_n . The TPM does not reject the validity of the L2 Status Factor *a priori*, but rather posits the existence of an internal parser to the learner who, with its help, assesses the typological similarities and/or differences between the languages known to him/her and the new one to be learnt. Based on the theory of the (psycho)typologically-motivated transfer (Kellerman 1983), the TPM suggests that the learner may choose the typologically more similar system for multilingual transfer to facilitate the acquisition of L_n .

Another recently-emerged effort to explain multiple language acquisition is the Cumulative Enhancement Model (CEM) (see Flynn, Foley, & Vinnitskaya 2004). Its primary concern is to reveal the structural development in the acquisition of a specific L_n language, i.e. it focuses on how a multilingual learner constructs the grammar of the target language. The fundamental prediction the model makes is that language learning is cumulative, and it excludes redundancy in linguistic representation. One of the logical corollaries of such a hypothesis is that the accumulated linguistic knowledge necessarily enhances subsequent language learning.

The present chapter focuses on L3 development. More specifically, it proposes to provide further evidence concerning the validity of the CEM for language acquisition. In addition, the research reported in this chapter examines the role of the last learned language in subsequent language development.

2. Background studies and the CEM

This paper builds upon a series of language development studies focusing on the acquisition of relative clauses in English. These studies seek to elucidate language development by contemplating the development of the language-specific Complementizer Phrase (CP). According to the theoretical claim made by Chomsky (2000), there is linguistic development in the process of constructing language-specific grammars by learners.

It seems that the head-complement relationship, i.e. head-directionality, within a clause (constituent word order within a clause), and the CP-related head-complement structure (branching²) are determined by some specific features of the CP and generated by the UG. Experience shows us that head-directionality may overlap in certain languages, like in English or Spanish, which are strictly head-initial languages in the sense of embedding their relative clause after the relativized NP and exhibiting an SVO constituent word order within the subordinate clause; by contrast, Japanese is a left-branching (head-final) language

² An anonymous reviewer suggested the use of head-directionality instead of right- vs. left-branching languages as being the more common usage, which allows categorizing the languages into head-initial and head-final. We have to note, however, that speaking about relative clauses, branching direction seems to visualize better the fact that in the case of e.g. left-branching (=head-final) languages, like Japanese, relative clauses appear to the left of their heads, but this head is not necessarily in the final position.

with an SOV constituent word order in the relative clause. The schematic representation of the constituent word order within the relative clause in the three languages is indicated in (1) and (2):

- (1) Subject-gap relative clauses:
- a. *English: SVO*
 $NP_{\text{subject/object}} \quad [rel. \text{ pronoun} \quad e_{\text{subject}} \quad V \quad NP_{\text{object}}]$
 - b. *Japanese: SOV*
 $[e_{\text{subject}} \quad NP_{\text{object}} \quad V] \quad NP_{\text{subject/object}}$
 - c. *Spanish: SVO*
 $NP_{\text{subject/object}} \quad [rel. \text{ pronoun} \quad e_{\text{subject}} \quad V \quad NP_{\text{object}}]$
- (2) Object-gap relative clauses:
- a. *English: SVO*
 $NP_{\text{subject/object}} \quad [rel. \text{ pronoun} \quad NP_{\text{subject}} \quad V \quad e_{\text{object}}]$
 - b. *Japanese: SOV*
 $[NP_{\text{subject}} \quad e_{\text{subject}} \quad V] \quad NP_{\text{subject/object}}$
 - c. *Spanish: SVO*
 $NP_{\text{subject/object}} \quad [rel. \text{ pronoun} \quad NP_{\text{subject}} \quad V \quad e_{\text{object}}]$

Of particular importance to this paper are Flynn's (1983, 1987) studies of adult L2 and Flynn et al.'s (2004) study of L3 acquisition of English. The L2 studies investigated adult Japanese and Spanish and the L3 study investigated KazakhL1/RussianL2 speakers learning L3 English. All of these studies used the same test sentences, an adoption of the original study of Flynn and Lust (1981) of monolingual children acquiring English, and employed the same procedure.

Results of these studies revealed that in order to examine how the CP develops, it is necessary to test learners on their handling of free relatives, because free relatives appeared to be developmental precursors to headed relatives in the process of building a full-fledged, language-specific CP architecture (Flynn et al. 2004; Flynn et al. 2008). Consequently, the homogeneous groups were tested on lexically-headed and headless relatives, and the lexically-headed relatives were further divided into relative clauses with specified vs. unspecified heads (i.e. a lexical NP head vs *person*). The inclusion of relative sentences with unspecified heads, where the head has no semantic content (as in the case of free relatives), allows researchers to tease apart the syntax and the semantics.³ Table 1 provides a simplified summary of the results of the above-mentioned studies.

@@ Insert Table 1 here

Results of these studies indicated that the L1 Japanese learners of L2 English (study #2 in Table 1), like the English monolingual children (study #1 in Table 1), scored

³ If learners' production on unspecified headed and free relatives patterned alike, it would show that there is a semantic effect, whereas if headed relatives patterned against free relatives, it would suggest a syntactic effect.

significantly higher on free relatives than on any of the lexically-headed relative types, whereas the Spanish L1 group (study #3 in Table 1) did not do significantly better on any of the three types of relatives in their L2 acquisition of English, despite having been equated at all levels of English competence. It seems that the Spanish L1 learners could somehow draw upon their knowledge of CP structure, for Spanish and English match in terms of both CP properties (contrary to the Japanese L1 learners of L2 English), and use it in subsequent learning. This observation led the authors to conclude that the free relative clause structure appears to be a developmental precursor to the lexically-headed form.

The primacy of free relatives in CP development of the target language was further tested by the mentioned L3 study, which investigated an adult group of KazL1/RuL2 learners of L3 English (study #4 in Table 1). Kazakh is a head-final language with an SOV constituent word order within the relative clause, like Japanese (3.b) and (4.b), the difference being that these learners learned Russian as L2 first and subsequently English as L3, which is a head-initial language with primary SVO order in relative clauses, so it matches the English configuration represented in (3.a) and (4.a). Results of this study indicated that the development of the CP structures in the target language of these learners patterned with that of the SpaL1/EnL2 rather than the JaL1/EnL2 group; in other words, the Kazakh L1 adult learners, with the help of their experience in acquiring L2 Russian, had developed a target-like CP structure upon which they could draw. Flynn et al. (2004) concluded on the one hand that the universal knowledge underlying the free relative seems to be fully available for the learner and, thus, acts as a developmental precursor in the acquisition of English, as was to be observed in the case of the JaL1/EnL2 group; on the other hand, prior CP development appears to influence the development of target-specific CP structure, as in the case of the KazL1/RuL2/EnL3 group or the Spanish L1 learners of English, who had already instantiated the CP setup for English through the acquisition of their own L1.

The L3 study of Flynn et al. (2004) concluded with the postulation of the *Cumulative Enhancement Model* (CEM) for language acquisition. This model hypothesizes that all previous languages known are available to the learner to constructively enhance subsequent language learning. The results support the validity of the following claims of the CEM:

- (3)
 - a. Development of the CP structures in a prior language or languages determines the course of future language-specific development.
 - b. Having integrated language-specific CP features with universal knowledge of CP in earlier language acquisition, the learner can draw upon that developmental process or template created by this earlier developmental experience in later acquisition.

More informally stated, the model predicts that the architecture of previously-developed CP structures may be available to the learners in terms of enhancing subsequent language development. Consequently, it appears that with respect to the CP, the mind does not redundantly represent CP clausal structure.

3. Motivation for our study and research focus

Consistent with the current view of language proposed within the generative framework of linguistics, language acquisition necessarily involves the correct selection and development of formal features on functional heads, which then guide the mapping of language-specific constituents and/or the clausal architecture. It is assumed that the interpretable vs. non-interpretable features of the CP are responsible for the directionality of embedding (head-directionality) and also for constituent word order within the subordinate clause (SVO vs. SOV) (see Flynn and Foley 2004; Lust 2006).

In this chapter, we build upon the results of the series of studies investigating the development of a language-specific CP structure (see Table 1) and seek to refine further the claims supporting the CEM by testing groups with another combination of languages on the same properties and using the same test design.

Firstly, we refer to the Flynn et al. (2004) study, which strongly suggests that the L1 does not have a privileged role in L3 development on the level of complex sentence construction. KazL1/RuL2 learners of English L3 manifested a clearly distinct developmental pattern in their acquisition of English from that of the Japanese L1 speakers, even though the CP properties of Kazakh and Japanese match, i.e. they are both head-final languages with SOV constituent word order within the relative clause.

Secondly, we are interested in teasing apart the influence of the two constitutional features of the CP, head-directionality and constituent word order relevant to the CP, on the development of target grammar syntax. Choosing learners of English with German L1 fulfills this requirement, given that German manifests the same head-directionality as English (head-initial), but differs with regard to constituent word order within subordinate clauses by exhibiting a standard SOV order.

Finally, comparing the aforementioned L2 study with the production data of a group of Hungarian L1/German L2 learners of English L3, where L1 and L3 match one another completely but not L2, provides a singular opportunity to investigate the role of the last learned language on the acquisition of language-specific syntactic knowledge. A careful analysis of the produced developmental patterns by the two groups learning English, where the L3 group had previously acquired German (the L1 of the other group), promises to shed light on the nature of the acquisition process involving complex structures. In addition, the comparison between the L2 and L3 studies offers the chance to control the effect of enhancement on development due to multiple language acquisition experience.

4. German and Hungarian: Syntactic background

As we mentioned earlier, German is a head-initial (right-branching) language, like English (and Hungarian), but with regard to CP relevant word order, it exhibits a general SOV word order, as do most of the head-final (left-branching) languages, like Japanese; therefore, in this aspect, it matches neither English nor Hungarian. A relative sentence contains a relative pronoun, which introduces the relative clause and which is marked for case, gender, and person, as we can observe in the example in (4), where the relative pronoun *der* refers to a singular masculine subject:

- (4) Der Anwalt, *der* den Arbeiter kritisierte, rief den Polizisten.
 The lawyer *rel.pr.* the-Ac worker criticized called the-Ac policeman
 ‘The lawyer who criticized the worker called the policeman’

Hungarian is a Uralic language belonging to the Ugric group; it is agglutinative with a complex conjugation system. As mentioned before, in Hungarian, relative clauses appear to the right of the relativized head; hence, it is a head-initial (right-branching) language with a primary SVO word order, although Hungarian is considered to be organized around the concept of topic and focus rather than the concept of subject (Li 1976). The stimulus sentences we are concerned about in our experiment include objects modified by an article, in which case the SVO word order is regarded to be the default (MacWhinney and Pléh 1988; see also É. Kiss 1981), like English and in contrast to German. The Hungarian relative pronoun is marked for case and person, so the sentence in (4) translates as (5) into this language.

- (5) Az ügyvéd, *aki* kritizálta a munkást, hívta a rendőrt.
 The lawyer *rel.pr.* criticized the worker-Ac called the policeman-Ac

In order to facilitate further reference to the feature arrangement relevant to the CP in the languages involved in this series of experiments (see Table 1), Table 2 offers a simplified overview and includes German and Hungarian as well.

@@ Insert Table 2 here

5. Predictions

Our main concern in the present chapter is the development of language-specific CP features, i.e. refining the nature and impact of those factors that are involved in the acquisition process of complex structures in a given language. Consequently, for our research, we have chosen language combinations which help to tease apart the influence of the two features responsible for the CP-related, head-complement directionality. The research has two independent components. The first is the L2 study, which focuses on the acquisition of English as an L2 by L1 speakers of German. The second, the L3 study, centers on the acquisition of English as an L3 by Hungarian L1 speakers whose L2 is German. English, like Hungarian, is a head-initial (right-branching) language triggering an SVO word order within restrictive relative clauses. As we described above, Hungarian matches English in terms of its CP-related properties but differs from German with respect to one of these features, namely, its constituent word order within the relative clause. Taking this into account, we have generated the following set of predictions:

5.1. L2 Study: German L1/English L2 acquisition

1. If the feature on the CP responsible for constituent word order within relative clauses plays a role in the development of the CP independently from the feature which determines CP-related head-directionality (branching), then we would expect this to be reflected by the production data of the GeL1/EnL2 group, i. e. data would provide evidence that learners resort to the help of free relatives to construct the language-specific CP structure. Accordingly, language development patterns would differ from the ones exhibited by the SpaL1/EnL2 group (study #3 in Table 1) and would probably match the ones provided by the JaL1/EnL2 group (study #2 in Table 1).
2. On the contrary, if CP-related head-directionality (branching) alone determines CP development, i.e. the constituent word order in the relative clause plays no role, we would expect that patterns of L2 English language development of learners of L1 German would be comparable to those isolated for the SpaL1/EnL2 group. This would follow from the fact that German matches English with respect to the branching direction instantiated in the CP; thus, the CP architecture represented in English would be available to enhance the L2 learning of English. These resulting patterns would serve as a contrast to those isolated for the JaL1/EnL2 group, due to Japanese being a left-branching (head-final) language.

5.2. L3 Study: Hungarian L1/German L2/English L3 acquisition

The study represents a language combination where the CP properties of L1 and L3 match one another but not the L2, with respect to constituent word order within the relative clause.

1. Applying the CEM, we predict that the acquisition of L3 English by HuL1/GeL2 learners will be facilitated *vis-à-vis* CP (Flynn S. 2009), i. e. this group has the same facility to develop CP features for English as the KazL1/RuL2/EnL3 learners do (study #4 in Table 1).
2. Regarding the role of previously-learned languages in subsequent language development, the study offers the possibility of investigating whether the last learned L2 German has any syntactically demonstrable effect on L3 CP development. Similar developmental patterns between the L2 and the L3 studies would argue for such influence and for the validity of the L2 Status Factor;⁴ mismatching patterns or error types would provide evidence to the contrary.

6. Design, method, and subjects

The design of our L2 and our L3 studies matched the ones reported in Flynn and Lust (1981); Flynn (1983, 1987, 1989); and Flynn et al. (2004) and are summarized in Table 1. The design varied along three factors, as seen in Table 3. The stimulus sentences involved the relativization of a noun phrase object or subject; within the subordinate clause, the gap was either in subject or in object position. These variations were extended to three types of relative clause structures that were varied in terms of the semantic and syntactic status of the relativized head NP.

⁴ Thanks to an anonymous reviewer who has pointed this out to us.

@@ Insert Table 3 here

Using an elicited imitation task, we tested two groups of adults on their production of the sentences in Table 3. Forty-two German-speaking learners of L2 English and 36 Hungarian learners (with L2 German) of L3 English took part in the experiment. The German L2 group consisted of university students of engineering who had received 2 to 10 years of formal instruction in English and were still participating in regular ESL classes at the time of testing. Members of the Hungarian L3 group were mainly high school students (25) preparing to enter into university, and the remaining 11 were attending university at the time of testing. These learners had also received 2 to 10 years of formal instruction in English. They were all residents of Hungary who had been exposed to German for at least 10 years. All of the subjects declared themselves nonnative speakers of German, although their exposure to German in school was very intensive; apart from their regular German as SL classes every day, they studied several subjects in German at school (history, biology, and geography, and for some, physics, mathematics, and chemistry). As a result, these students exhibited an advanced competency in this language, which was also tested independently with the help of an online test (www.testpodium.com). Those who did not score high enough to be on a C2 level (the “Mastery” level of the European Language Portfolio, the highest level of language competence in a certain language, according to common criteria accepted throughout Europe⁵) were excluded from the study prior to the experiment, because our aim was to see to what extent fully-constructed language-specific CP structures influence the development of subsequent learning.

A proficiency test was administered to the participants prior to the experiment in order to allocate them into three proficiency levels in English (low, mid, and high), as established by the Michigan Test. Subject information is summarized in Table 4. The mean ESL scores of each level show that learners of the two groups were at close to equivalent levels of proficiency in English, both overall and at each developmental stage, since there are only modest differences between the two figures in each case.

@@ Insert Table 4 here

Additionally, we carried out an ANCOVA statistical analysis on the data, a 3-way mixed design 2*3*3, with study (L2 and L3 study) and level (low, mid, high) as between-subjects factors and sentence type (specified headed, unspecified headed, free) as within-subjects factor, using proficiency as a covariate to statistically equate the two groups on proficiency. The non-significant value for the 2-way study*level interaction ($p=.410$) suggests that the proficiency effect was statistically equivalent for the two language groups. Moreover, the 3-way study*level*type of relative interaction ($p=.088$) gave a non-significant value, which suggests that the effect of proficiency is not significantly different across levels of the two studies and sentence type.

⁵ http://www.coe.int/t/DG4/Portfolio/?L=E&M=/main_pages/introduction.html

Regarding the method of our proceedings, participants in the experiment were to imitate two sets of 21 sentences; each battery contained 12 test sentences and 9 fillers in random order. Half of each group was given battery 1, and the other half battery 2, first. Each learner was taught and tested on his/her knowledge of the lexical items used in the stimulus sentences prior to testing. This was done to ensure that the obtained results were not due to a lack of lexical knowledge, but rather due to syntactic factors involved in the development of the language-specific grammar. Responses were scored as correct if they matched the stimulus sentence. Minor changes, such as pronunciation errors or in-class lexical substitutions, were not counted as errors (for example, using *ask* instead of *question* or *workman* instead of *worker*).

7. Results

7.1. L2 Study: German L1 / English L2 Group

Participants were tested on three types of relative clauses (lexically-headed and specified, lexically-headed and unspecified, and free relatives); each type varied according to the grammatical function of the relativized head and its gap in the relative clause (SS, SO, OS, OO). The mean number of correct responses for the three types of relatives is presented in Table 5 (two measures were taken from all 3*4 sentences; max. value is 8).

@@ Insert Table 5 here

A three-way analysis of variance was carried out on the data with level as a between-subjects factor (low, mid, and high), and within-subjects repeated measures on type of relative clause (specified headed, unspecified headed, and free relatives). Type of relative proved to be a significant main effect ($F_{2,78}=11.467$, $p<.001$). Figure 1 shows the production data broken down into the three levels of English competency.

@@ Insert Figure 1 here

Pairwise comparisons, however, revealed that the significant within-subjects effect is mainly due to low production data on unspecified headed relative clauses. Therefore, data were further tested by comparing the total correct responses for lexically-headed relatives against that of free relatives using a paired-samples t-test, after having made sure that the assumptions of this type of test were met. Table 6 provides the overall results of the test and the results broken down into the three levels of proficiency.

@@ Insert Table 6 here

The statistical analysis of correlations revealed a highly significant overall difference between headed and free relatives ($t=-3.454$, $p=.001$); furthermore, subsequent statistical tests applied by proficiency level have shown that the mean number of correct imitation of free

relatives was significantly higher up until the mid level (low level: $p=.044$; mid level: $p=.002$).

7.2. L3 Study: HungarianL1/GermanL2/EnglishL3

Table 7 presents the mean number of correct responses for the three types of relatives produced by the L3 group.

@@ Insert Table 7 here

Even a casual look at Table 7 shows that there is only a very modest difference among the three relative types. Nevertheless, as in the case of the L2 group, we carried out a three-way analysis of variance on the data with level as a between-subjects factor (low, mid, and high), and within-subjects repeated measures on type of relative clause (specified headed, unspecified headed, and free relatives). We did not find a significant effect on sentence type ($F_{2,66}=0.653$, $p=.524$), nor did pairwise comparisons among types of relative clauses give significant p values. Figure 2 shows the production data broken down into the three levels of English competency.

@@ Insert Figure 2 here

8. Discussion

The statistical analysis of the results of the L2 study group revealed significant differences between correct production of lexically-headed and free relatives at the low and mid levels of their acquisition of English L2. The developmental patterns at the early and intermediate stages of acquisition seem to resemble those isolated for the L2 acquisition of English by Japanese speakers and for the L1 acquisition of English by children, rather than the one reported for the SpaL1/EnL2 and the KazL1/RuL2/EnL3 studies. This result suggests that free relatives act as developmental precursors to the lexically-headed forms for the L1 German learners of L2 English as well, for the data reveals a free relative primacy at low and intermediate levels of English proficiency. Therefore, we may conclude that we have found evidence to support our prediction in 5.1.1: the feature responsible to constituent word order within subordinate clauses seems to play a role in the process by which the learner constructs subsequent language-specific grammars.⁶

The statistical analysis of the results of the L3 study group suggests, on the contrary, that HuL1/GeL2 learners of L3 English do not need to fall back on the primary use of free relatives in order to build up a target-like CP, since this group shows no evidence that they

⁶ An anonymous reviewer pointed out the relevance to our results of conducting a similar study with L1 Chinese learners of English whose L1 has an opposite case to German in the sense that its word order within the subordinate clause (SVO) is consistent with English and Hungarian, but it differs in head-complement directionality (left-branching). This we find a valuable suggestion that would help to further tease apart the aspects we are considering here.

find the imitation of free relatives easier than that of the headed ones. These results match those produced by the KazL1/RuL2/EnL3 group (Flynn et al. 2004) and therefore satisfy the prediction in (5.2.1) in support of the CEM. The CEM was grounded on a study where specific CP features were similar in L2 and L3 but differed from L1. The present study, where CP features match in L1 and L3 but not in L2, has produced similar results; therefore, this study provides further evidence for the validity of this model.

These findings appear to be relevant to our research question in 5.2.2, which focuses on the role of the last learned language in subsequent language acquisition. The different developmental patterns exhibited by the L2 and the L3 studies provide one of the strongest pieces of evidence for rejecting an astructural transfer of the last learned language into subsequent acquisition. If the syntactic setup of the last learned L2 German was what L1 Hungarian learners transfer into their L3 English, we would have expected to find almost identical resulting patterns.

This conclusion is corroborated by the occurrence of a type of error where learners replace the relative pronoun *who* with either *what*, *whatever*, or *whoever*. Although this type of mistake did not prove to be significant, there is a striking difference in the data produced by the two language groups. Hungarian speakers rarely, if ever, converted the lexically-headed relative clause to a free relative in their imitations, and if they did they replaced *who* with *whoever*, as in (6):

- (6) *Stimulus:* The woman instructed the lawyer *who* the policeman called. (Specified OO)
 Learner: The woman instructed the lawyer *whoever* the policeman called.

There are nine such instances at the low level, no such case was found at the mid level and only two at the high level, so we can conclude that this group hardly ever converted headed relatives to free relatives in their errors. Interesting enough, the GeL1/EnL2 group produced practically no case of replacing *who* with *whoever*; instead, they substituted *who* with *what* or *whatever*, as in (7), in almost all cases they converted lexically-headed relatives to free relatives in their errors. Five such instances were found at the low level, and even mid-level learners made this type of mistakes eight times, and only one instance was counted at the high level.

- (7) *Stimulus:* The woman instructed the lawyer *who* the policeman called. (Specified OO)
 Learner: The woman instructed the policeman *what* the lawyer greet.

As we noted before, this error type was not significant in either of the language groups, but the fact that German speakers, even at the mid level employ *what* or *whatever*, which are vocabulary items not given in the stimulus sentences, indicates an important difference between the two language groups. We refer here to Flynn and Lust (1981) and Diessel and Tomasello (2005), who also reported such a conversion; they argue that this substitution suggests that learners are attempting to cope with the more complex subordinate constructions by starting out from the simpler headless relatives, where *what* or *whatever* are commonly used (cf. Hamburger 1980). We conclude then that this error analysis provides

further support to the claim that German speakers rely on free relatives as a basis for developing a full-fledged subordinate construction.

Of particular interest here is another type of conversion error where learners changed the grammatical relations of the stimulus in the imitation. Learners, in their responses to stimuli, as in (8), converted the role of the gap position from O to S within the relative clause.

(8) *Stimulus*: The janitor questioned the person who the student greeted. (Unspecified OO)

Learner: The janitor asked the person who greeted the janitor. (Unspecified OS)

Table 8 presents the distribution of S/O conversion errors by study and level (N=number of occurrence; %=percentage of total responses).

@@ Insert Table 8 here

Gair et al. (1997) reports that the error of changing the grammatical function relation of the relativized item within the relative clause was committed in greater proportion by L1 Japanese than by L1 Spanish learners of English, exactly by those who cannot draw upon their knowledge of L1 in developing the target grammar.⁷ It is evident that while learners of both groups commit S/O conversion errors presented in (8) to a certain extent, there is a sharp difference between the performance of the two groups. Firstly, in the case of the L2 study, this type of error has proved to be remarkably constant across levels, whereas learners of the L3 study seem to stop making this type of conversion about the time when their language competency shifts from intermediate to advanced.

This striking difference suggested that in carrying out a six-way analysis of variance on the data with level and group as between-subjects variables and within-subjects repeated measures on the six types of stimuli, such mistakes could possibly occur (Specified SO and OO, Unspecified SO and OO, Free SO and OO). Figure 3 illustrates the overall results of the analysis, as it compares the means of S/O conversion errors by the two language groups.

@@ Insert Figure 3 here

Among the main effects of the statistical analysis, the factor “study” gave $F_{1,72}=3.407$, $p=.069$, a value which is very close to being statistically significant;⁸ this also implies that the knowledge of L1 Hungarian in the case of the L3 English group has a role in target-like CP development. Figures 4 to 6 represent the means of S/O conversion errors by groups, broken down into levels of proficiency.

⁷ Gair et al. (1997) explain the high rate of the JaL1/EnL2 learners committing this type of error by reasoning that “they do not so much as change the grammatical function of the gap within the object relative clause, but rather fail to recognize its existence” (Gair et al. 1997:107).

⁸ The main effect type of relative gave a highly significant value ($F_{1,72}=7.495$, $p<.001$), but to analyze why learners commit this type of mistake mainly in the case of the lexically-headed and unspecified SO type relatives goes beyond the scope of this paper.

@@ Insert Figure 4, 5, 6 here

A casual glance at the markedly distinct S/O conversion error patterns in Figures 4 to 6 implies that we are to reject the claim for a plain and direct syntactic transfer from L2 to L3. HuL1/GeL2 learners of L3 English do not seem to follow the same developmental path, a claim primarily drawn from the evident difference we found in terms of developmental patterns regarding the three types of relative clauses.

We may conclude then that our prediction for L3 acquisition of English by HuL1/GeL2 learners in 5.2.1 is supported. We have shown that free relatives are not a developmental precursor in the development of grammatical construction mapping for these learners. Their patterns match the KazL1/RuL2/EnL3 and the SpaL1/EnL2 groups. These learners seem to draw upon their experience from previous language acquisition as predicted by the CEM.

The L3 group's exceptionally good performance was also attested by the fact that their production at the high level was significantly better than the comparable results of the GeL1/EnL2 ($p=0.0013$). More specifically, when we compare the correct production data at the high level, participants in the L3 group do significantly better in their imitation of free relatives ($p=0.016$) and of lexically-headed relatives with an unspecified NP as head ($p=0.0041$). Figure 7 presents a graph comparing the correct production of the two groups.

@@ Insert Figure 7 here

In contrast, results show that GeL1/EnL2 learners perform significantly better on free relatives at least in the low and intermediate stages of their language development; essentially they exhibit the same pattern as the JaL1/EnL2 learners (see our prediction in 5.1.1). This result provides support that free relatives are developmentally primary to the lexically-headed relative clauses for these learners, which may suggest that due to CP related word order differences they have to figure out the new values for the CP, which is not as immediately evident as it is for the HuL1/GeL2/EnL3 learners.

The detailed error analysis provides further evidence concerning the role of linguistic experience in subsequent acquisition (see our prediction in 5.2.2). The considerably lower amount of S/O conversion errors made by the HuL1/GeL2/EnL3 group and the striking difference in the resulting patterns when compared to the GeL1/EnL2 group argue against a structural transfer from L2 to L3. This may support the conclusion made by Flynn et al. (2004) that the last learned language has no negative impact on language development, i.e. in the development of underlying grammatical structures. In sum, we conclude that the CEM provides an explanatory model to account for the development of language-specific knowledge, at least at the structural level relevant to CP.

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Table 1: General summary of results of relative clause studies for L1, L2 and L3 English

Target language	Group	Pattern
1. English as L1	Children	Free relative precedes lexically headed relative clause
2. English as L2	Adults, L1 Japanese (head-final)	Free relative precedes lexically headed relative clause
3. English as L2	Adults, L1 Spanish (head-initial)	Free relative does NOT precede lexically headed relative clause
4. English as L3	Adults, L1 Kazakh (head-final) and L2 Russian (head-initial)	Free relative does NOT precede lexically headed relative clause

*Sources: Flynn and Lust (1981); Flynn (1983, 1987, 1989); Flynn (2009).

Table 2: CP directionality and word order in subordinate clauses in tested languages

Relevant study	Language involved	Head-initial (RB)	Head-final (LB)	SVO	SOV
#1 English L1	English	√		√	
#2 JaL1/EnL2	Japanese		√		√
#3 SpaL1/EnL2	Spanish	√		√	
#4 KazL1/RusL2/EnL3	Kazakh Russian	√	√	√	√
#5 GeL1/EnL2	German	√			√
#6 HuL1/GeL2/EnL3	Hungarian	√		√	

Table 3: Stimulus sentences used in study

Relative Type	Head position: Subject		Head position: Object	
	Gap position: Subject	Gap position: Object	Gap position: Subject	Gap position: Object
Lexically-headed, specified	The lawyer who criticized the worker called the policeman.	The student who the professor introduced answered the man.	The boss introduced the gentleman who questioned the lawyer.	The woman instructed the lawyer who the policeman called.
Lexically-headed, unspecified	The person who criticized the engineer greeted the man.	The person who the engineer answered criticized the man.	The boss introduced the person who instructed the lawyer.	The janitor questioned the person who the student greeted.
Free	Whoever entered the office introduced the professor.	Whoever the policeman greeted questioned the gentleman.	The professor introduced whoever greeted the lawyer.	The doctor answered whoever the policeman criticized.

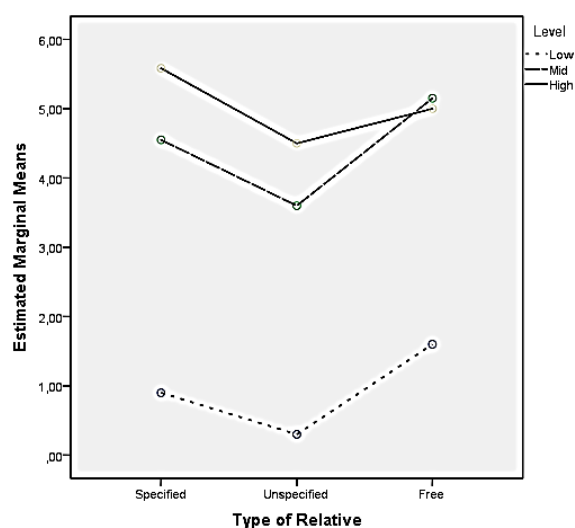
*Source: Flynn, Foley, & Vinnitskaya (2004)

Table 4: Subject information

Level	L2 Study: GeL1/EnL2		L3 Study: HuL1/GeL2/EnL3	
	Number of learners	Mean ESL score	Number of learners	Mean ESL score
Low	10	19.4	9	19.8
Mid	20	33.1	13	32.0
High	12	42.5	14	42.4
Total	42	32.5	36	30.5

Table 5: GeL1/EnL2 - Mean number of correct responses on three types of relatives by level (max. value=8)

Level	Specified	Unspecified	Free
Low	,9000	,3000	1,6000
Mid	4,5500	3,6000	5,1500
High	5,5833	4,5000	5,0000
Total	3,9762	3,0714	4,2619

Figure 1: GeL1/EnL2 Group: Mean of correct production according to level and relative type**Table 6:** GermanL1/English L2: Paired Samples Data (total and by level)

		Mean	t	df	Sig. (2-tailed)
Total	Lexically Headed-Free	-.738	-3.454	41	.001
Low	Lexically Headed-Free	-1.00	-2.335	9	.044
Mid	Lexically Headed-Free	-1.07	-3.587	19	.002
High	Lexically Headed-Free	0.04	.114	11	.912

Table 7: HuL1/GeL2/EnL3: Mean number of correct responses on three types of relatives by level (max. value=8)

Level	Specified	Unspecified	Free
Low	1,3333	,7778	1,3333
Mid	4,2308	3,9231	4,0000
High	5,6429	5,9286	6,2143
Total	4,0556	3,9167	4,1944

Figure 2: HuL1/GeL2/EnL3 Group: Mean of correct production according to level and relative type

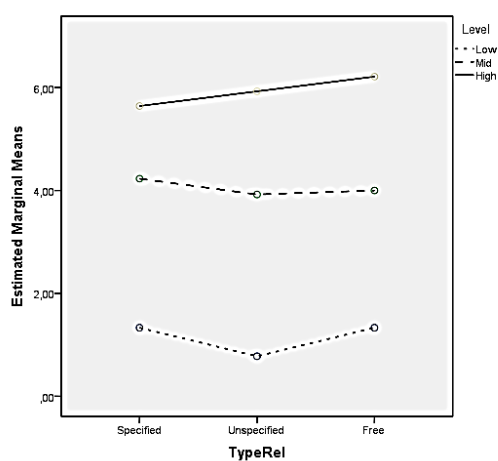


Table 8: S/O conversion errors

	<i>L2 study: GeL1/EnL2</i>		<i>L3 study: HuL1/GeL2/EnL3</i>	
Level	N	%	N	%
Low	15	6.3	12	5.6
Mid	31	6.5	15	4.8
High	17	5.9	-	-
Total	63	6.3	27	3.1

Figure 3: Means of S/O conversion errors by groups

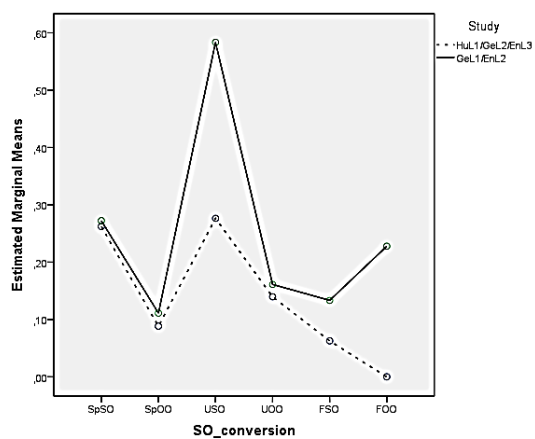


Figure 4: S/O conversion by groups at low level

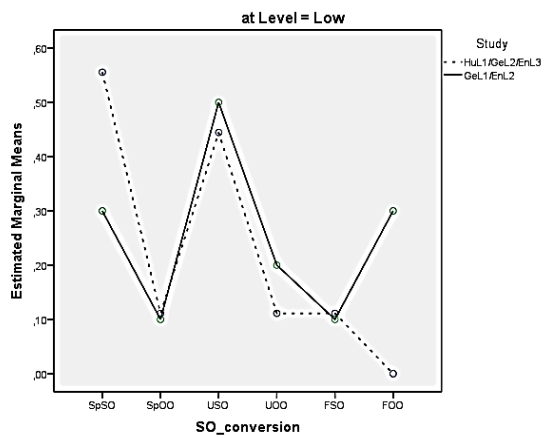


Figure 5: S/O conversion by groups at mid level

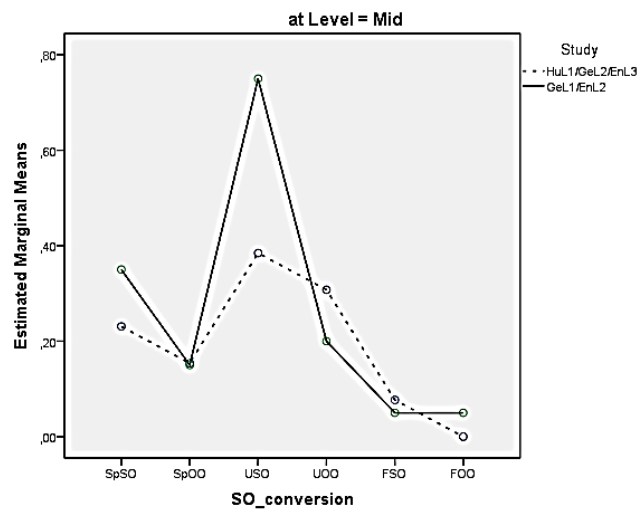


Figure 6: S/O conversion by groups at high level

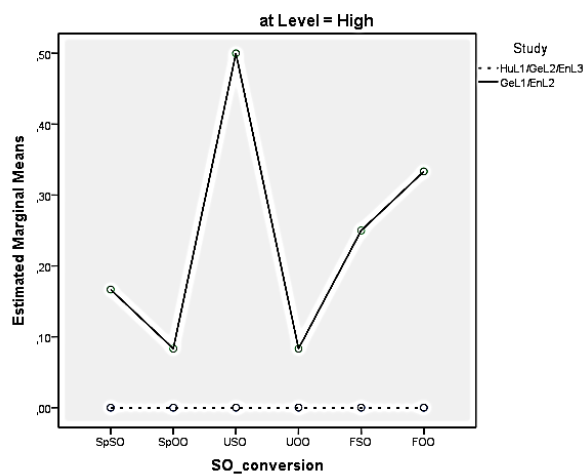
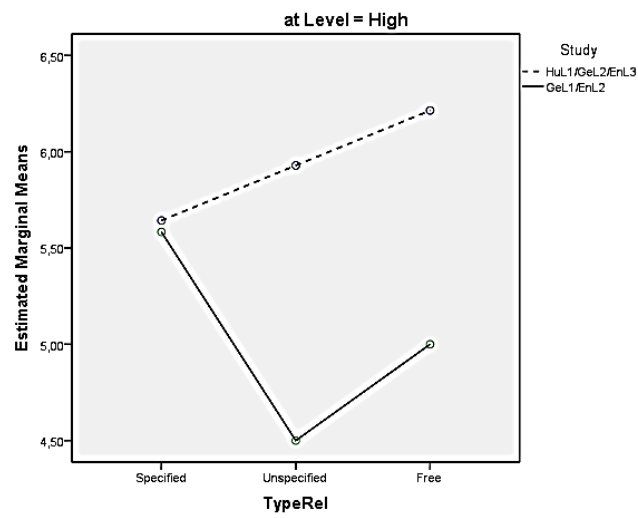


Figure 7: Comparison of correct production on types of relative between the L3 (HuL1/GeL2/EnL3) and the L2



(GeL1/EnL2) studies