

CHAPTER FIVE

MULTILINGUAL ACQUISITION OF ENGLISH: DEVELOPMENT OF GRAMMAR THROUGH STUDY OF NULL ANAPHORA

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Introduction

Development of the “Minimalist Program” (MP) (Chomsky 1995) from a “Government and Binding” framework (GB) (Chomsky 1981, 1986) gave rise to numerous debates concerning the validity of long established parameters and parametric variation such as the “pro-drop parameter” in linguistic theory, which is supposed to be on in null-subject languages (NSL) and off in non-null-subject languages (non-NSL). Critically, these debates have consequences for both theories of language and language acquisition. Specifically, studies of language development, be it L1 or Ln, need to reinterpret their results in light of the newly emerging theoretical constructs in order to give an explanatory account of what was traditionally understood as parameter setting.

The main objectives of the present paper are twofold. Firstly, it proposes to account for how multilingual learners acquire binding relations between referentially connected elements in subject-controlled adverbial subordination using a minimalist account of the featural setup of pronominal anaphora. Secondly, the paper attempts to support the viability of a model of acquisition as a computational rather than a maturational process (see Flynn and Lust 2002 for an overview) where “parameter setting” in development is to be understood as a gradual process allowing time for the learner to work out the linguistic implications deriving from the target setting (also in Flynn and O’Neil 1988). This paper provides support for reinterpreting parameter setting as the process in which learners dissociate and integrate linguistic components consistent with the properties of a specific target grammar (Flynn *et al.* 2005).ⁱ

Background

This study focuses on the L3 acquisition of adverbial adjunct control sentences in English by learners of Hungarian L1/German L2. Before we present our research questions for this study, we provide a short description of the most relevant features of these languages.

English

Adverbial subordinate clauses function mainly as adjuncts. Stimulus sentences of this study include adverbial adjunct clauses introduced by *when*. Such clauses do not depend on the verb in the main clause, therefore they may occur in an initial or final position as in (1).

- (1) a. Sarah_i listens to music when she_i reads poetry (Lust 2006:214.1)
b. When she_i listens to music Sarah_i reads poetry (Lust 2006:214.4)

English is a non-NSL language; pronouns in a finite clause are always overtly realized, as can be observed in (1), both sentences contain the pronoun *she* before the verb of the main clause *read*. There is, however, a difference in directionality of this anaphor, a difference which is closely related to but not necessarily dependent on the position of the adverbial subordinate clause. As indicated by indexation, the postposed adverbial adjunct of (1a) contains a forward anaphor because the pronominal anaphor is c-commanded by an antecedent (*Sarah*) which occupies a higher position in the derivation. The anaphor in the proposed adverbial adjunct clause (1b), on the contrary, refers to a NP found behind the position where the anaphor is spelled out, thus *she* in (1b) is a backward anaphor.

English non-finite adverbial clauses, on the other hand, do not require the presence of an explicit pronoun, but contain a null category PRO, as indicated in (2).

- (2) a. John_i saw Mary_j after/before/while PRO_i eating a bagel (Hornstein 2003:30.52)

b. When PRO_i eating a bagel John_i saw Mary_j.

The null category PRO in (2) is an anaphorⁱⁱⁱ which appears in the subject position of its non-finite clause and as the indexation shows its antecedent must be in subject position of the main clause since this is the position which c-commands the null category in adjuncts. Now compare the sentences in (3) where (3a) includes an explicit pronoun whereas (3b) a null PRO category.

- (3) a. The engineer_i greeted the cook_j when he_{i/j} opened the door.
b. The engineer_i greeted the cook_j when PRO_{i/j*} opening the door.

The pronoun anaphor *he* in (3a) may refer to either of the preceding NPs unlike PRO in (3b), as argued above. This shows then that PRO in English non-finite adverbial adjuncts is an obligatorily subject-controlled null anaphor, regardless whether the clause is in initial or final position (2b vs 3b).

German

In German, similar to English, temporal adverbial adjunct clauses introduced by *als* (“when”) may occur in initial or in final position as in (4) with some change in word order in the main clause due to the fact that German is a V2 language.

- (4) a. Sie betrat das Institut, als die Glocke geläutet
She enter-PAST3sg the institute when the bell ring-PAST.participle
hat.
Aux-PERFECT IND
“She entered the institute when the bell rang”.
b. Als die Glocke geläutet hat, betrat sie das Institut.
“When the bell rang, she entered the institute”.

Regarding typological distinction, German is classified as an expletive NSL language because it allows expletive null subjects in certain cases (Roberts and Holmberg 2010:8), but referential null subjects must be spelled out, as in English. Since our study does not include expletives, we treat German here as a non-NSL.

Another important feature for our study is that the German predicate of an adverbial clause of time may contain a non-finite verb, the so called present participle. Although the subject is suppressed, this form of a verb does not agree with the subject of the main clause in person, number or tense, the same as the English gerund (*-ing*). Nonetheless, German non-finite adverbial clauses do not tolerate the presence of a subordinator, as indicated in (5a).

- (5) a. Der Professor_i begrüßte den Chef_j, (*als/*während)
The professor greet.PAST3sg the.ACC cook (*when/*while) PRO_{i/j*} die Schüler beobachtend.
the pupils watch-PRES PARTICIPLE
“The professor greeted the cook while watching the students”.
b. Die Schüler beobachtend begrüßte der Professor den Chef.
“While watching the students the professor greeted the cook”.

As the indexation in (5a) indicates, the null anaphor PRO is subject-controlled, like in English. When positioning the adverbial clause initially, the sentence undergoes a minor word order change, because German requires the verb to be in second position (5b).

Hungarian

Finite adverbial clauses can occupy either initial or final positionsⁱⁱⁱ in Hungarian, introduced by a relative pro-adverb, e.g. *amikor* (“when”), thus sentence in (6a) is a preposed and sentence in (6b) is a postposed subordinate adjunct.

- (6) a. Amikor Anna megérkezett, Péter olvasott (Kenesei *et al.* 1998:48.129a)
When Anna PREF.arrive.PAST3sg Peter read.PAST3sg
“When Anna arrived, Peter was reading”.
b. Péter olvasott, amikor Anna megérkezett (Kenesei *et al.* 1998:48.129c)
Peter read-PAST3sg when Anna PREF.arrive.PAST3sg
“Peter was reading when Anna arrived”-

Hungarian has a morphologically uniform verbal inflectional system, which allows for null subjects in the sense of (Jaeggli and Safir 1989). Moreover, Hungarian not only permits a null pronominal category for referential null subjects but in focus-neutral contexts requires it, as illustrated in (7).

- (7) A mérnök_i köszöntötte a szakácst_j, amikor *pro*_{i,j} (*ô)
 The engineer greet-PAST3sg the cook.ACC when (*pronoun.3sg)
 kinyitotta az ajtót.
 prefix-open-PAST3sg the door.ACC
 “The engineer greeted the cook when he opened the door”.

The finite adverbial adjunct in (7) contains a null pronominal category *pro*,^{iv} both number and person can be recovered from the verbal inflection. Languages like Hungarian are called consistent NSL according to the typology established by (Roberts and Holmberg 2010).^v

In Hungarian non-finite adverbial clauses can be formed by adverbial participials or converbs adding the affix *-va* to the root of the converb (we adopt the abbreviation SCVB to denominate such affix following Kenesei *et al.* (1998:55). Converbs in Hungarian have a unique form, just like in German, they do not inflect. The presence of a converb with a SCVB affix results in the omission of the relative *amikor* altogether (8a), the same that could be observed in the German example (5a). The non-finite clause expresses a simultaneous action with the one in the main clause whereby the subject is suppressed, thus we conclude that the non-finite clause hosts a null anaphor PRO (8a and 8b).

- (8) a. Anna olvasott (*amikor) [PRO a könyvet a kezében Anna read.PAST3sg (*when) the book.ACC the
 in.her.hand
 tartva]. (adapted from Kenesei *et al.* 1998:55.150b)
 hold.SCVB
 “Anna was reading, holding the book in her hands”.
 b. Anna [PRO állva] olvasta a könyvet (adapted from Kenesei *et al.* 1998:55.150a)
 Anna stand-SCVB read.PAST3sg the book.ACC
 “Anna was reading the book standing”.

There is one more observation to make here; it seems that Hungarian does not allow non-finite adverbial clauses in initial position in focus-neutral contexts. Compare the sample sentences in (9).

- (9) a. A tanár_i köszöntötte a szakácst_j [PRO_{i,j}* a diákokat
 The professor greet.PAST3sg the cook.ACC the pupils.ACC
 figyelve].
 watch.SCVB
 “The professor greeted the cook watching the pupils”.
 b. A tanár [a diákokat figyelve] köszöntötte a szakácst.
 c. *[A diákokat figyelve] a tanár köszöntötte a szakácst.

The postposed non-finite adverbial clause results in a correct sentence (9a) but not the preposed one (9c). The sentence in (9b), where the non-finite adverbial clause follows the subject of the main clause but precedes the predicate, is also a possibility in this language. Hungarian PRO, similar to English or German, is subject-controlled, as indicated by the indexation in (9a).

Featural setup of overt pronouns and null anaphora

Elaborating on some of the most relevant features of the pronominal anaphora relevant to the study presented here viz., overt referential pronouns and PRO, (Holmberg 2010:94.a) argues that:

- (10) Pronouns are either DPs, with the structure [_{DP}D[_{φP} φ[_{NP}N]]], or φPs

Holmberg (2010) and Holmberg and Sheehan (2010) provide cross-linguistic evidence that overt referential pronouns are in fact full DPs with the structure given in (10), whereas null subjects in consistent NSLs are φPs. Therefore, pronouns in English and German, non-NSLs, are full DPs, whereas *pro* in Hungarian, a consistent NSL, is a φP without a DP-layer. It is not our objective here to give the technical details how licensing takes place (for detailed analyses see Biberauer *et al.* 2010 and the individual chapters therein), we will simply assume the validity of this recent classification of null subjects and the claim that during the probing/valuing process CP transfers the directionality feature to DP.

The typological distinction made by Holmberg (2010) and Holmberg and Sheehan (2010)^{vi} was further elaborated by Livitz (2011), but here we will focus on her proposal regarding PRO for its relevance to the present study. Livitz proposes that PRO has a φ P structure with unvalued φ -features ($[\text{u}\varphi]$) and is a defective goal in the sense of Roberts (2010) which also explains its silent nature cross-linguistically. Following Landau (2008) Livitz assumes that in an obligatory subject-control structure the referential relationship between PRO and its antecedent T(ense) in the matrix clause is mediated by a DP controller in the matrix clause. Thus the φ -features of both the controller DP and PRO in the subordinate clause are valued by the matrix T when it enters into two parallel AGREE relations in the course of the derivation. PRO-control is illustrated in (11):

$$(11) [T_{\text{u}\varphi} \dots DP_{\text{i}\varphi} [CP [TP PRO_{\text{u}\varphi} T]]] \quad (\text{Livitz 2011:104.20})$$

Hence, we may say that anaphoric relations in adverbial adjunct control structures in non-NSLs can always be traced back to two parallel AGREE relations which involve the presence of a full DP and a PRO element.

Directionality and pronominal anaphora in language acquisition

Previous L1 and L2 studies have indicated that there is a significant effect of directionality in English language acquisition processes. Lust (2006) in her review of the acquisition of syntax by children claims that children can be tested on their linguistic analysis through the study of their knowledge of anaphora:

“We can test whether children’s grammars consult structure dependence through study of anaphora, since anaphora can vary in directionality but at the same time is structurally constrained”(Lust 2006:213)

This claim is supported by findings in developmental psycholinguistic research both for L1 and L2 English which have shown that learners’ interpretation of anaphoric relations between a lexically realized pronoun and an antecedent is affected by directionality, i.e. it is constrained by it. It seems that the forward anaphor (as in 5a) is more productive in English L1 acquisition (Lust *et al.* 1986) and also in English L2 acquisition where directionality in learners’ L1 and L2 coincides (Flynn and Espinal 1985; Flynn 1987a, 1987b; Flynn and Lust 2002). Sentences in (1) are repeated here in (12) for convenience.

- (12) a. Sarah_i listens to music when she_i reads poetry (Lust 2006:214.1)
 b. When she_i listens to music Sarah_i reads poetry(Lust 2006:214.4)

Furthermore, Lust *et al.* (1986) provides evidence that children clearly recognize the existence of a null category in sentences like (3b) repeated here as (13) and they tend to treat the two types of anaphora in the context of adverbial subordination similarly.

- (13) The engineer_i greeted the cook_j when PRO_{i/j*} opening the door.

Learners appear to generalize over PRO applying the directionality constraint which guides the acquisition of anaphoric relations for the lexically realized pronoun. Finally, Lust (2006), based on the series of studies cited above, declares that the directionality effect is structure dependent, i.e. acquisition is influenced by the interaction of the structural setup of L1 and the target language.

Cumulative Enhancement Model (CEM) (Flynn *et al.* 2004)

This study was inspired by the Cumulative Enhancement Model for Language Acquisition (CEM) a tentative proposal for multilingual acquisition to explain how UG maps new input into the target-grammar in language development. If the model is right in rejecting the existence of redundant linguistic representations in the learners’ mind, then learners may benefit from their accumulated linguistic experience in subsequent learning. Assuming the validity of this claim, the L3 acquisition of English may be facilitated for Hungarian L1/German L2 learners in cases where L1 does not coincide with the target values of English but they can draw upon knowledge from a fully developed German L2.

The study

Research questions

The main objective of this paper is to investigate how multilingual learners develop target-specific binding relations for pronominal anaphora. In so doing, we additionally seek to evaluate the efficacy of the Cumulative Enhancement Model (CEM) (Flynn *et al.* 2004) for multiple language acquisition as a model for multilingual acquisition.

As noted above, directionality in adverbial clauses was argued to be critical for the development of anaphoric relations, but directionality is transferred to DP in this type of sentences. It follows then that branching of the adverbial adjunct in non-NSLs is determined by the directionality manifested in their DP, and in this sense English matches German. Hungarian, on the other hand, is a NSL and it was argued that *pro* in such languages is a ϕ P without a DP-layer, therefore, cannot encode directionality in adverbial subordinate clauses. If there are indices in the Hungarian L1/German L2 learners' data that learners possess some subtle awareness of target-like directionality, we assume it to be the sign of a cumulative effect of syntactic knowledge drawn from their fully developed German L2.

As we noted above, neither German nor Hungarian non-finite adverbial adjunct clauses may include the overt subordinator *als* ("when") in German or the pro-adverb *amikor* ("when") in Hungarian, therefore we assume that the featural setup for PRO in English non-finite adverbial adjuncts and the peculiarity of its anaphoric nature in the context of the stimuli must be figured out by the learners in the course of development.

Based on what was mentioned above, this paper investigates the following specific issues:

- (14) How does the acquisition of referential relations for overtly realized pronouns and null anaphora (PRO) develop in English adverbial adjuncts?
- (15) How does *parameter setting* take place in multilingual acquisition, e.g. in the case of Hungarian L1/German L2 learners of English L3?

By asking the question in (14) the study examines above all whether Hungarian L1/German L2 learners of English L3 show a measurable sensibility to the presence of a null category in the input. Then, it looks into how the development of these two types of anaphora relates to or differs from each other. Finally, it tests how development is affected by directionality, that is, the manifestation of this correlation attested in English L1 and L2 acquisition. Finding an answer to the question in (15) advances our understanding of how parameter setting in multilingual acquisition can be understood. In particular, we try to find out what the syntactic knowledge which produces subject controlled non-finite adverbial adjuncts accurately consists of.

Design of study

Of particular importance to this study are the paper of Lust *et al.* (1986), a comparative study of the development of null and pronoun anaphora in English L1 acquisition, and the subsequent paper of Flynn (1987b) (see also Flynn and Lust 2002), a comparative study of the development of pronoun anaphora in English L2 acquisition. We adopted their design and stimulus sentences to investigate how multilingual learners cope with the acquisition of English L3 involving adverbial subordinate clauses.

Subjects' data

As shown in table 5-1, the total number of Hungarian L1/German L2/ English L3 learners was N=32. All learners were young adults, between the ages of 16;00 and 25;00. All of the participants were either preparing to enter the university or already studying at one. All learners were L2 speakers of German. While none of the learners self-reported that they were "native" speakers of German, their exposure to German in school was very intensive. In addition, these learners were also tested on their German proficiency with an independent on-line test prior to their participation in the study. All learners were at least at the C2 level (the "Mastery" level of the European Language Portfolio)^{viii} for German. As indicated in Table 5-1, the L3 learners were at each of three levels of ESL competency as determined by the Michigan Test.

Table 5-1. Learners' data.

Level	Number of learners	Mean ESL score
Low	11	25.0
Mid	10	36.3
High	11	43.4

The participants learned English as a third language (L3) at school and were still enrolled in classes of English as a foreign language at their respective institution.

Stimuli

All participants were administered two batteries of adverbial adjuncts with the subordinator *when*. Stimuli included both finite with a referential, overtly realized pronoun and non-finite sentences with a null anaphor. The subordinate adjunct clause was either preposed or postposed, as illustrated in (16). In a word, stimulus sentences varied in two critical grammatical factors, branching and anaphor type, with all other factors held constant.

- (16) a. ***Preposed adverbial clause, backward anaphor***
When he entered the office, the janitor questioned the man.
b. ***Preposed adverbial clause with null anaphor***
When inspecting the room the worker questioned the janitor.
c. ***Postposed adverbial clause, forward anaphor***
The man answered the boss when he installed the television.
d. ***Postposed adverbial clause with null anaphor***
The professor answered the owner when preparing the lunch.

Learners were tested in their elicited imitation of the stimuli. This experimental research method was chosen because of its power to effectively measure analytic aspects of learners' grammar (Lust *et al.* 1996; see also Mackey and Gass 2005).

Design of statistical analysis

We carried out two different analyses on the imitation data. Firstly, we were interested to know whether branching plays a role in language development studied through the acquisition of complex sentences involving adverbial subordination with a pronoun anaphor. Therefore, the first test (Test 1) looked at data taken from the elicited imitation of pre- and postposed adverbial subordinate clauses with a pronoun anaphor, exemplified in (16a) and (16c). The design was a related-samples non-parametric test.

After examining the data, we proceeded with Test 2 to look at how binding relations of two types of anaphora influenced development. In our analysis, apart from the data from imitation of pre- and postposed subordinate clauses with an overt referential pronoun (stimuli of Test 1), we included pre- and postposed subordinate adjuncts with a null anaphor (PRO) (sentences like 16b and 16d). Test 2 was a repeated-measures analysis of variance (ANOVA) to examine group differences among levels. We employed a three-way mixed between-within ANOVA design taking level (low, mid, high) as a between-groups variable and branching (pre- vs. post-posed) and type of anaphor (pronoun vs. PRO) as within-groups variables. This design allowed us to examine whether there is any interaction between branching and the type of anaphor in these sentences.

Results

Results of Test 1

Test 1 looked at whether learners performed differently on imitating pre- and postposed adjuncts with an overt pronoun anaphor. The examination of the data indicated that variables were not normally distributed and variances were unequal, hence we employed a non-parametric test (related-samples Wilcoxon signed rank test) for this comparison. The null hypothesis that the median of difference was zero could not be rejected, the asymptotic difference was 0.144. Learners did not seem to perform differently on the two types of sentences where the only distinguishing grammatical factor was Branching.

Results of Test 2

First, we examined our data sets to see if they comply with assumptions of normality, homogeneity of variances and sphericity required in an ANOVA. We found no problems with sphericity, but low and mid-levels displayed some non-normality for there were outliers and clear skewness. Transforming the data did not solve the problem. Furthermore, the assumption of homogeneity of variances was violated. Unfortunately, some assumptions of the model could not be satisfied, we proceeded though cautiously knowing that we might lose power.

As noted above, Test 2 was a three-way mixed between-within ANOVA on the four types of sentences exemplified in (16). Apart from Branching, we included another grammatical factor in the design: Anaphor Type. We kept all other factors constant.

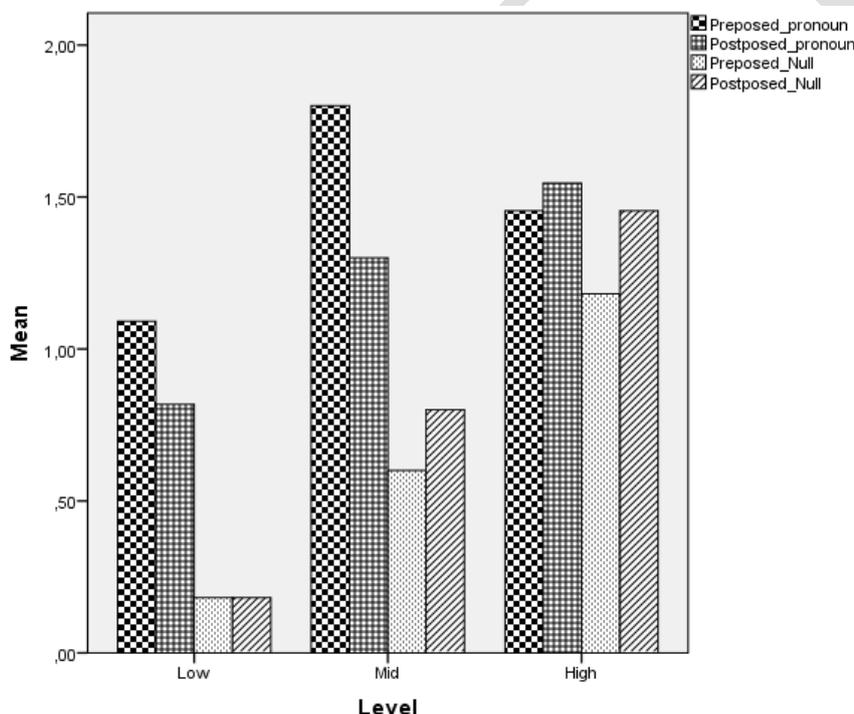
Results of amount correct (0-2) are shown in table 5-2. It also displays the corresponding standard deviation for the four types of stimulus sentences at each of the three levels of English competency.

Table 5-2. Mean number and standard deviation of correct responses according to level.

Level		prepose d_pron	prepose d_Null	postpose d_pron	postpose d_Null
Low (n=11)	Mean	1,0909	,1818	,8182	,1818
	Std. Deviation	,83121	,60302	,98165	,40452
Mid (n=10)	Mean	1,8000	,6000	1,3000	,8000
	Std. Deviation	,42164	,51640	,67495	,91894
High (n=11)	Mean	1,4545	1,1818	1,5455	1,4545
	Std. Deviation	,82020	,87386	,52223	,52223

Even a casual look at the numbers shows that the low and mid-levels manifest a striking difference between correct production of subordinate clauses with an overt referential pronoun and of those with a null anaphor. Figure 5-1 visualizes this difference.

Fig. 5-1 Correct imitation of four sentence types.



We found a statistical effect for Type of Anaphor ($F_{1,29}=35.02$, $p=.000$, $\eta^2=.58$, with very strong power 1.00) but no main effect for Branching, which seems to indicate that learners treat null anaphora the same way as what we saw for overt pronouns in Test 1. The between-subjects variable Level also gave a statistical value ($F_{2,29}=8.03$, $p=.002$, $\eta^2=.35$, with very strong power .93). This figure implies that there is an important developmental change, the overall amount of correct imitations increases considerably as language proficiency of learners develops.

Furthermore, the analysis provided us with statistical interactions which promised to be more interesting as their analysis can provide a better opportunity to reveal correlations. The interaction of Type of Anaphor*Branching gave a statistical result ($F_{1,29}=5.46$, $p=.003$) with large effect size ($\eta^2=.18$), although the power here to detect differences was only .62. Pairwise comparisons revealed that directionality within an anaphor type was not relevant in either of the cases, but the imitation of the stimuli with pronoun anaphora was significantly more successful than with null anaphora both in preposed and postposed adjuncts. This difference seems to disappear as learners' proficiency moves from mid to high level. This last observation comes from the pairwise comparisons of the statistical interaction of Type of Anaphor*Level ($F_{2,29}=4.46$, $p=.02$, $\eta^2=.24$, power=.72). The critical stage in learners' knowledge of anaphoric relations relevant to this study appears to be at intermediate level. While the overall correct imitation of adjunct sentences with overt pronouns increases significantly from

low to intermediate level and grows only slightly from there on, the increase in total amount of correct imitation of sentences with null forms is significant till mid-level and continues to be close to significant ($p=0.08$) after that as well.

Given the data listed above, we may draw our first conclusions based on the statistical analysis of learners' correct imitation of temporal adverbial adjuncts. The type of anaphor included in the stimuli (*pro* vs. PRO) seems to play a significant role in determining how successful Hungarian L1/German L2 learners of English L3 are in imitating them. Another conclusion we could draw from these data was that the acquisition of referential relations for the null category PRO is based on, thus follows the production of referential overtly expressed pronouns.

Error analyses

In the followings, we present our research data of the errors committed by the participants in order to assess the results more exhaustively. We could observe two main types of errors committed by learners when imitating the stimulus sentences. Errors such as one-clause imitations or imitations where the learner changed the type of the subordination were classified as structural errors, exemplified in (17)-(18). These two kinds made up 66% of the overall structural errors.

(17) *One-clause imitations*

Stimulus: When inspecting the room the worker questioned the janitor.

Learner: When inspected the room...

(18) *Conversion of type of subordination*

Stimulus: The mayor questioned the president when he entered the room.

Learner: The mayor questioned the president who entered the room.

The other class of errors included all those that unveiled anaphora-related difficulties. Examples in (19)-(20) list the most typical ones:

(19) *Conversion from non-finite to finite clause*

Stimulus: When inspecting the room the worker questioned the janitor.

Learner: When inspected the room the worker instruct the janitor.

(20) *Subject-drop*

Stimulus: When he delivered the message, the man questioned the lawyer.

Learner: When he delivered the message, greet her the lawyer.

Figure 5-2 represents the developmental change in total amount of anaphora and structural errors in the imitation of the stimulus sentences.

Fig. 5-2. Developmental change in total amount of anaphora and structural errors.

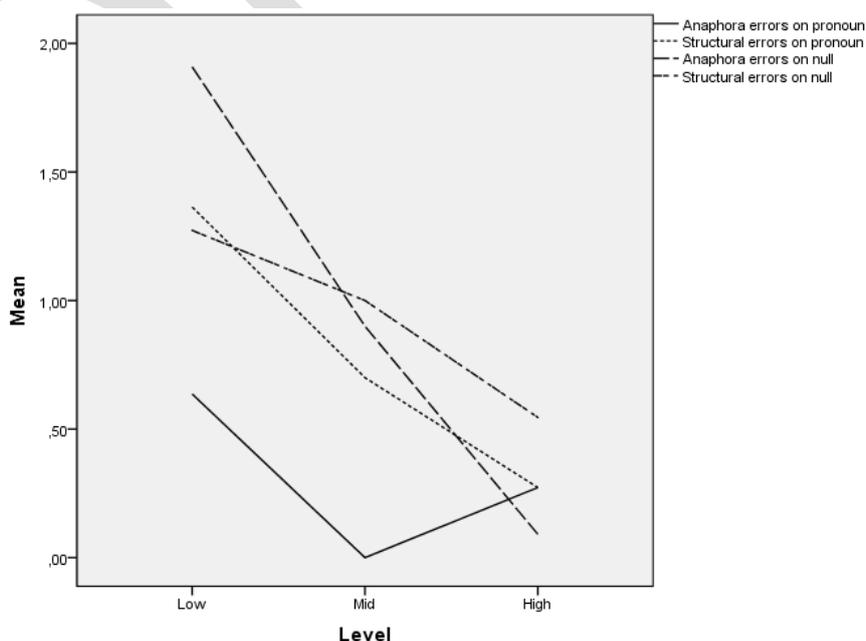
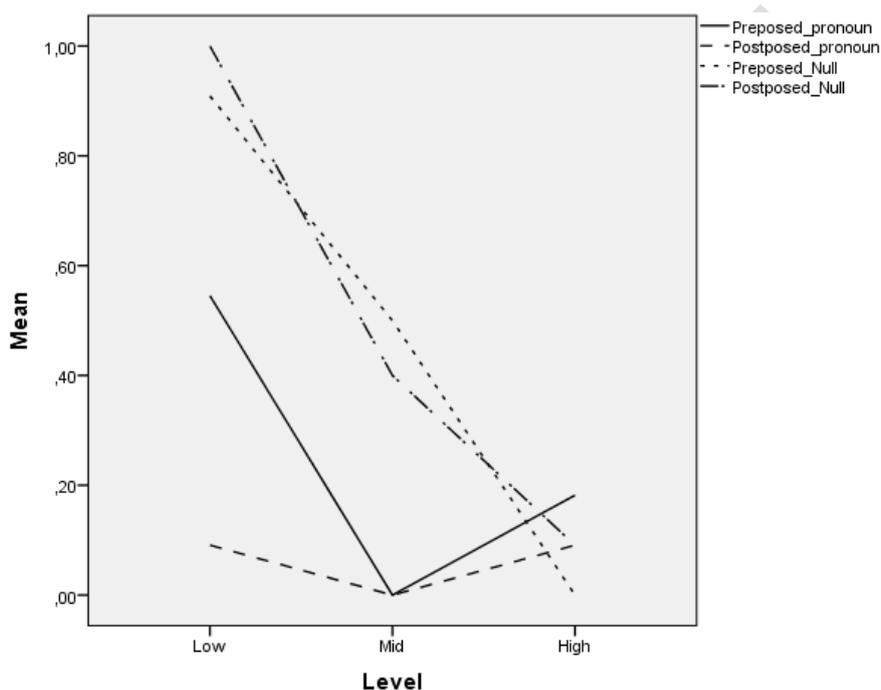


Figure 5-2 shows that the mean number of anaphora errors on null forms accounts for most errors learners made at low level and sharply drops as proficiency improves. This confirms our findings so far that the type of anaphor involved in these sentences determines greatly how successful learners are in imitating them.

To look at anaphora errors in more detail, first we carried out a three-way repeated-measures ANOVA on the anaphora error data taking Level as a between-groups variable and Branching (pre- vs. postposed) and Type of Anaphor (pronoun vs. PRO) as within-groups variables to test for interactions. Figure 5-3 shows that, according to our expectations, there were significantly more anaphora errors on null forms than on sentences involving an overt pronoun for there was a statistical main effect for Type of Anaphor ($F_{1,29}=23.91$, $p=.00$, $\eta^2=.45$, $\text{power}=.99$). Even more important seems to be the statistical interaction Type of Anaphor*Level ($F_{2,29}=10.84$, $p=.00$, $\eta^2=.43$, $\text{power}=.98$), which adds additional support to our claim that the acquisition of referential relations for PRO is developmentally linked and follows the correct interpretation of referential relations for pronoun anaphora.

Fig. 5-3. Development of amount of anaphora errors according to sentence types.



Here we found another telling result. By looking at pairwise comparisons of the interaction branching*type of anaphor in detail, we discovered that there were significantly fewer anaphora errors at low level on the postposed adverbial adjuncts with an overt pronoun than on any of the other types of stimulus sentences. This result strongly suggests that despite of the fact that these multilingual Hungarian L1/German L2 learners of English L3 do not show a statistically measurable preference for postposed adverbial adjuncts in their correct production of such sentences like learners of English L1 or L2 do, they seem to have significantly less difficulties in producing postposed adjuncts measured by the amount of anaphora errors they commit. This suggests after all a similar though not identical developmental pattern to that of English L1/L2 learners previously reported on.

90% of the total anaphora errors on stimulus sentences involving null anaphora were due to learners converting the non-finite clause into a finite one, exemplified in (19). Most of the one-clause repetition errors on stimuli with null anaphora at low level showed this tendency as well, but due to the fact that the imitated sentence contained only one predicate such imitations were counted as one-clause repetitions, i.e. structural errors. We mention this fact only to indicate the frequency of this type of conversion manifest primarily at low level.

When the imitation was a fully articulated adverbial adjunct sentence, converting a non-finite to a finite clause was classified as a type of anaphora error mainly because it indicates that learners seem to perceive the presence of an anaphoric expression and in their production they recur to employing elements available to them at their level, i.e. the finite verb. Since Hungarian is a NSL, it is to be expected that Hungarian learners of English may take longer to acquire the rule of the obligatory presence of an overt pronoun in a tensed clause, or expressed with technical terms, to discern the obligatory DP layer in the derivation. Obviously, their full-fledged German (non-NSL) acquired previously did not induce these learners to add overt pronouns to their imitation, at least not at an initial level. It must also be said here that the omission of an overt pronoun practically disappears by mid-level, even non-finite to a finite clause conversion errors receive an overt pronoun, which demonstrates that the [-pro-drop] feature for English is fully acquired by the time learners' competence in English reaches that level. The considerable amount of converting non-finite stimuli to finite ones at low level leads us to think that learners do

not yet have the correct representation for English binding relations which involves an obligatory DP layer, at least not in the domain of our stimuli.

Discussion

It was claimed that target-language directionality is a subtle syntactic knowledge acquired in the course of language development. We examined here whether this knowledge has an impact on how referential relations for subject-controlled pronominal anaphora in adverbial subordination are established. Although we found no statistically measurable evidence that learners imitate postposed adjuncts with overt pronouns more successfully than preposed ones, error analyses gave support to this claim. Our learners committed significantly more anaphora errors on preposed adjuncts with an overt pronoun than on postposed adjuncts at low level. This fact shows that there is a surprising directionality effect present in the imitation data and which replicates the results found in English L1 acquisition where it was seen that children tended to be more productive on forward pronominalization (Lust *et al.* 1986; and references cited therein). It seems that Hungarian L1/German L2 learners of English L3, like English L1 children, connect directionality of the target-input and referential relations since they are more productive on forward pronominalization. We conclude then, that the directionality principle, as in the case of English L1 children, constrains the development of their representation of the new grammar from the very beginning. Given the fact that Hungarian does not encode directionality in the domain of our stimuli for lacking the knowledge of an obligatory DP layer present in non-NSLs, we assume it is the German L2 that provides this subtle knowledge learners could draw upon. Production data supports that language learning seems to be a cumulative process whereby learners have access to previous syntactic experience to enhance subsequent learning as proposed by the CEM. Language representation is not redundant, syntactic feature settings can be drawn upon to build a new target-specific grammar. Therefore, referring back to our research question in (14), production data of adverbial pre- and postposed adjunct clauses with overt pronouns imply that development of anaphoric relations in these domains is likewise constrained for Hungarian L1/German L2 learners of English L3 as for English L1 children.

Additionally, data revealed that the intermediate level was critical in the development of the target-grammar for our subjects. Learners at this stage seem to acquire a command over correctly set referential relations for pronoun anaphora regardless of clause directionality, as inferred from the fact that there are no significant anaphora errors committed on the stimuli. On the other hand, the large amount of learners' anaphora errors on null forms at low level suggests the overwhelming difficulty they have to categorize PRO as an anaphor requiring an antecedent. By mid-level, however, when the target-specific parameter, i.e. the presence of an obligatory DP-layer has been set, they show a sharp improvement in the correct production of non-finite adjuncts with PRO. The correct establishment of referential relationships for a null category in non-finite adjuncts appears to develop when learners' proficiency moves from mid to advanced level. The branching direction of adjunct clauses does not seem to play a role once learners overcome this stage. The fact that learners detect the anaphoric nature of PRO, i.e. the necessity to value its [_uΦ]-features, results in a significant decrease of anaphora errors in sentences involving null anaphora.

The high amount of anaphora errors in the production of low level English L3 learners gave support to our claim that learners of English are sensitive to the presence of a null category in non-finite clauses from a very early stage. The statistically measurable frequency with which they convert the non-finite verbal forms into finite ones appears to highlight their search for a grammatical solution to interpret the null category and recur to elements available to them at their developmental stage. On the other hand, the fact that they tend to drop overt pronouns in their imitations seems to suggest that the development of the target grammar is not constrained by their German L2, a non-NSL, but rather is a sign that they are not familiar with the featural setup of the English PRO. We may conclude, then, that Hungarian L1/German L2 learners of English L3 are aware of the presence of a null category in the target-language from a very early stage of their development and in order to produce it they replace it with the familiar *pro*.

Conclusions

This study examined how multilingual learners acquire correct referential relations for subject-controlled pronominal anaphora in adverbial subordination. Accepting the claim that directionality as it is set in the target-language fundamentally affects the way learners interpret pronouns, we wanted to know whether referential relations involving pronoun anaphora would reflect our learners' subtle syntactic knowledge of English directionality. Results indicate that the instantiation of the target-specific directionality feature in a previously studied language facilitates the acquisition of relevant binding relations for PRO in English, which is obligatorily subject-controlled in this language. We may, therefore, conclude that learners' acquisition data bears out the assumptions made by the CEM.

With reference to our research question in (15), we may conclude that our Hungarian L1/German L2 learners of English L3 could develop the correct anaphoric relations based on their capacity to dissociate directionality

from CP and integrate it into DP. Simultaneously, success required the recognition of the obligatory presence of a DP-layer in the domain of our stimuli. Therefore, parameter setting seems to involve a process of successive dissociation and integration of syntactic features the way they appear in the target-language.

Notes

ⁱ See also Lardiere (2008) for her version of “feature assembly”.

ⁱⁱ In the following, we will apply the general term anaphor to the null categories of our example sentences in the sense defined by Lust (1986) to connote that they are controlled, i.e. bound by a c-commanding category.

ⁱⁱⁱ There is another nested position for adverbial clauses in Hungarian which is generally non-focussed, as illustrated in (a) (Kenesei *et al.* 1998:48.129b):

Péter, amikor Anna megérkezett, olvasott.

Peter when Anna PREF.arrive.PAST3sg read.PAST3sg

“When Anna arrived, Peter was reading”.

^{iv} Both *pro* and *PRO* are pronominal anaphora in the sense of Chomsky (1981:191) although they differ in phonetic content as *PRO* is silent cross-linguistically.

^v See Dalmi (2013) who argues for Hungarian not fitting into this typological hierarchy and classifies this language as “partially radically NSL” along with other European Uralic languages.

^{vi} According to these authors, apart from the full DP for overt referential pronouns and ϕ P for *pro*, there is a third type, a DP with unvalued [uD], which represents the syntactic setup for a null subject of partial NSL languages.

^{vii} The European Language Portfolio (ELP) was developed by the Language Policy Division of the Council of Europe.

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