Acquisition of Object Clitics in Child Polish: Evidence for D-Linking

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1 Introduction

Following Wexler, Gavarró & Torrens (2003), two patterns of object clitic acquisition in child language have been identified, based on the presence of clitic-past participle agreement in a given language. Languages with object clitic-past participle agreement (Catalan, French, Italian) involve a clitic omission stage (Schaeffer 2000, Wexler, Gavarró, & Torrens 2003), while languages without clitic-past participle agreement (Spanish, Greek) are characterized by early object clitics in child grammar (Wexler, Gavarró & Torrens 2003, Tsakali & Wexler 2003). Due to the observed split, Wexler et al. (2003) hypothesized that clitic production in child grammar is regulated by the Unique Checking Constraint (UCC), which prevents the D-feature on the DP from being checked twice.

The UCC, initially proposed to account for Root Infinitives (i.e. non-finite forms used as main verbs) in child language, works as follows. First, based on the Minimalist Program (Chomsky 1995), syntactic operations such as argument DP movement are motivated by feature checking. Upward movement of a DP can be triggered by the need to check features which are associated with certain functional projections. One such feature is the D(eterminer)-feature associated with both the DP and functional projections. In particular, if the D-feature is [-Interpretable], it is checked once and subsequently deleted, while a [+Interpretable] D-feature does not get checked and remains in the derivation until LF. A [-Interpretable] feature cannot remain unchecked, as this would cause the derivation to crash, which explains why in adult syntax the uninterpretable features in all functional projections must be checked.

Second, the UCC stipulates that, in child syntax, the D-feature of a DP can only check against one functional category (hence unique checking). Thus, if a derivation contains more than one functional projection with a [-Interpretable] D-feature, for example tense (TNS) and subject agreement (AGRS), in adult grammar the subject DP must raise to check off against the D-features of both TNS and AGRS. This operation requires two instances of checking, which are problematic for a child, as stipulated by the UCC. In order to prevent the derivation from crashing (i.e. no unchecked uninterpretable features in the derivation), a particular functional projection (either TNS or AGR) is deleted from the representation.

Thus, child grammar checks the D-feature against either TNS or AGRS, projecting only one of these INFL functional layers. As a result, either tense or agreement is omitted.

Third, the fact that children produce finite utterances alongside non-finite ones (Root Infinitives, or RI) follows from a constraint on LF called Minimize Violations: choose a numeration whose derivation violates as few grammatical properties as possible. If two numerations are both minimal violators, choose either one. (Wexler 1998:64). Since the projection of both TNS and ARG violates the UCC (one violation), while the projection of only one of those functional categories violates well-formedness (one violation), Minimize Violations gives the child a choice between these two numerations, which accounts for optionality with respect to the production of both finite and non-finite verb forms in early syntax.

Finally, the interpretability of the D-feature in functional projections is parameterized, which accounts for the fact that DP raising occurs in some languages in order to check the [-Interpretable] D-feature but does not occur in others where that feature is [+Interpretable]. In order for the derivation to converge and the verbs to be marked for tense and agreement, both uninterpretable D-features under T and AGRS have to be checked. In order to account for the different RI rates in pro-drop and non pro-drop languages, Wexler assumes that in INFL-licensed pro-drop languages AGRS is pronominal, and either contains a [+Interpretable] D-feature which does not need to be checked or contains no D-feature. In such cases, the subject does not raise to check off the D-feature of AGR, but only raises to TNS. Thus, only one instance of checking is required for the numeration to converge, so that the UCC is said to apply vacuously. The output is the same as the adult representation: there are no unchecked D-features and the derivation does not crash.

The UCC was later extended to account for cross-linguistic patterns of clitic acquisition. To account for the syntax of clitics, Wexler (2003) follows Sportiche (1996) in assuming base-generated pronominal clitics as heads of their own functional projection ClP. The clitic associate is a *pro* which is base-generated in the canonical object position as a V complement. It undergoes overt movement to [spec,ClP] licensing the object clitic in Cl^0, as seen in (1):

(1)
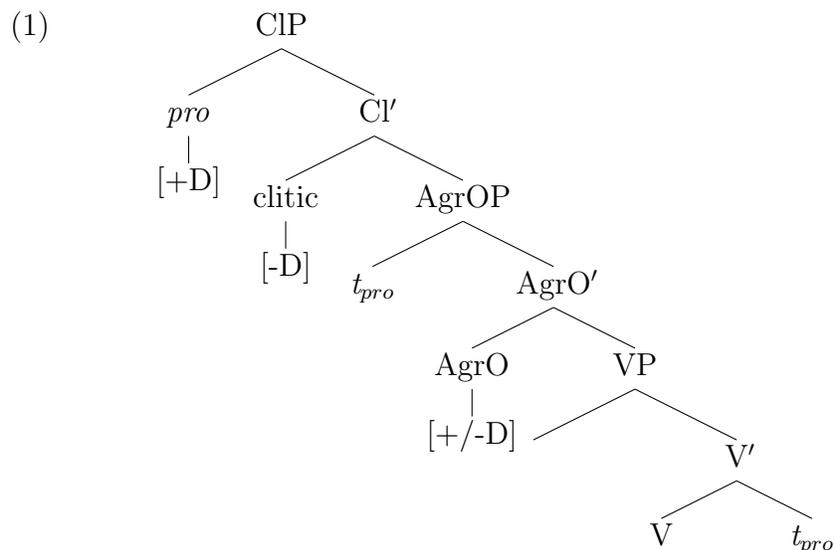
In Wexlers extension of Sportiche's analysis, clitic licensing takes place by checking the inherently uninterpretable D-feature in ClP in a specifier-head configuration. In languages such as French, Italian and Catalan, the past participle agrees with the object clitic in ϕ-features, so that there is D-checking in AgrO. Contrary to Kayne (1989), Wexler argues that all languages project AgrO, not only those with clitic-past participle agreement. Crucially, AgrO is not only responsible for realizing participial agreement through the movement of the clitic associate via spec,AgrO, but also for checking case and ϕ-features on clitics. Thus, on its way to spec,ClP the clitic associate *pro* obligatorily moves via spec, AgrO, where it receives its Accusative case and ϕ-features, which are subsequently transferred to the clitic in a spec-head configuration in ClP.

The acquisition facts are explained as follows. In languages with clitic-past participle agreement such as Italian, French, Catalan or Romanian, the D-feature in AgrO is [-Interpretable] and needs to be checked by the [+Interpretable] D-feature of the *pro* clitic associate, which requires two instances of D-checking (in AgrO and in ClP). The UCC however, prevents double D-checking from occurring, thus forcing the children to drop the clitic, which accounts for the high rate of clitic omission. In contrast, languages without clitic-participle agreement, such as Spanish and Greek, have a [+Interpretable] D-feature in AgrO, and therefore require only one instance of D-checking in ClP. As a result, clitic omission does not occur, as confirmed by early Spanish clitic production data (Wexler, Gavarró & Torrens 2003).

Ivanov (2008) proposes an extension of Wexler's theory, necessitated by his finding of an unpredicted clitic omission stage in child Bulgarian. Following Belletti (2000), who introduces a functional projection APPP (past participle agreement phrase) above AgrOP to account for clitic-participle agreement, Ivanov argues that APPP is only projected in languages with clitic-participle agreement and only in participial constructions, while AgrOP is always projected but its D-feature value is parameterized. Thus, Bulgarian does not project APPP and has a [-Interpretable] D-feature in AgrOP, which results in a double-checking requirement (in ClP and AgrOP). Given the UCC, which prevents double D-checking from taking place, clitic omission occurs in child Bulgarian. In contrast, in languages such as Spanish and Greek, the D-feature in AgrOP is [+interpretable], and clitic omission does not occur (only one instance of D-checking is required in ClP). Although Ivanov (2008) successfully accounts for Bulgarian data and 'saves' the UCC, his conclusion that Bulgarian AgrO must have an uninterpretable D-feature is purely stipulative, as he provides no independent syntactic evidence, apart from indirect acquisition data, that D in AgrO is indeed uninterpretable in Bulgarian.

2 The Present Study

2.1 Goals

Polish is a clitic-rich language where object clitics do not agree with the past participle (Witkoś 1998). However, the acquisition facts of Polish clitics have not been researched so

far. Also, all acquisition experiments thus far have focused on the production data, largely ignoring clitic comprehension facts. Thus, the present study has three goals. The main goal of the study is to test the predictions following from Wexler's Unique Checking Constraint for child Polish. The second goal is to test Polish acquisition data against the extended UCC approach following Ivanov (2008). Finally, the aim of the comprehension experiment is to test whether clitics are correctly interpreted in child syntax without consistently being produced. The comparison between the comprehension and production of clitics is intended to shed light on the validity of UCC as a mechanism regulating early child grammar. As Polish is a language without clitic-past participle agreement, the D-feature in AgrO is interpretable, and the UCC is obeyed due to the single instance of D checking in ClP. Thus, children acquiring Polish are not expected to omit object clitics as the UCC predicts adult-like production from the beginning.

Another goal of the elicited production experiment is to test the predictions following from Ivanov's extension of Wexler's UCC approach, according to the value of the D-feature in AgrO. A [-Interpretable] D-feature in AgrOP necessitates double-checking in ClP and AgrOP, disallowed under the UCC, triggering clitic omission (e.g. child Bulgarian). On the other hand, when the D-feature in AgrOP is [+Interpretable], clitic omission does not occur (e.g. child Spanish and Greek) as only one instance of D-checking in ClP is required. If Polish is like Bulgarian, i.e. has a [-Interpretable] feature in AgrO, clitic omission is expected. If it is like Spanish or Greek, i.e. has a [+Interpretable] D feature in AgrO, children should exhibit early clitic production.

2.2   Elicited Clitic Production Experiment

2.2.1   Method

The subjects were 53 monolingual Polish children (recruited in daycare and preschool facilities in Czestochowa, Poland), aged 2;4 to 5;10 (24 males, 29 females), and divided into three age groups: group 1 (2;4-3;6), group 2 (3;6-4;6) and group 3 (4;7 - 5;10). All subjects were prescreened by their caretakers for language ability; only those children who were familiar with the verbs involved in the experiment were tested. (Initially 62 children qualified, but 9 subject had to be excluded from the analysis due to low response rate).

The data were collected in individual, 35-45 minute sessions with all experiments (production experiment followed by comprehension tasks) administered in succession. The experimenter was assisted by a teacher aid, who played the puppet. Each session was audio recorded on a digital recorder with a highly sensitive stereo microphone. Each recording was stored in a separate file and coded with a letter and a number (e.g. A1, B3). The same number appears on the IRB-approved consent form signed by the parent/guardian.

The elicited production instrument is modeled on previous studies on clitic production and involves prompting childrens answers to the question "What did X do to Y" The experimenter sets up the lead puppet (Doggie) and three toys (Pony, Bear and Barbie) on the table in front of the child and acts out a story depicting a transitive event such as combing, kicking, pushing, hitting, pinching and kissing (all target verbs are obligatorily monotran-

sitive). After one toy performs an action affecting another toy, e.g. Pony kicks Bear, the lead puppet (played by an assistant) asks the child: "What did Pony do to Bear?" The task involves 6 trials in a randomized order, each eliciting a different verb.

2.2.2 Results

In the elicited production task, two hypotheses were tested: (1) Polish children produce clitics from the beginning, and (2) non adult-like clitic production is due to a syntactic rather than a pragmatic deficiency. In other words, children who do not produce clitics are more likely to omit them rather than substitute them with a full DP. As seen in Table 1, the response rate in the production task was exceptionally high (80-100%), as evidenced by the low percentage of random and blank responses. In terms of target responses, the percentage is low in Group 1 (less than a fifth) and increases successively by 20% and then 30% in the older groups (over 40% and over 70% respectively).

Table 1: Summary of responses in the clitic production experiment

	Target	Substitution	Omission	Random	Total
Group 1	0.1739	0.0217	0.6087	0.1956	1.0000
Group 2	0.4167	0.0741	0.3241	0.1852	1.0000
Group 3	0.7083	0.0694	0.2222	0.0000	1.0000

At the same time, DP substitution is low across all age groups (2-7%), while omission rate is initially high (60%), decreasing to less than a quarter of the responses in the oldest group. It appears that children who produce clitics in an adult-like manner consistently use correct person and gender agreement and place the clitic post-verbally. As the results in Table 2 below indicate, clitic production significantly increases with age.

Table 2: Age effect in production

Effect	Num DF	Den DF	F Value	Pr > F
Group	2	49	33.59	<.0001

Thus, while young speakers of Polish are more likely to omit clitics, the older ones (4;6 and above) produce clitics consistently.

2.2.3 Discussion

As illustrated by the results above, children acquiring Polish do not produce object clitics from the beginning and are more likely to omit rather than to substitute clitics. The fact

that Polish children omit clitics goes against the predictions following from the UCC. At the same time, in order to maintain the analysis based on Unique Checking it seems necessary to adopt Ivanov's extension of Wexler's theory and conclude that Polish, like Bulgarian, has an uninterpretable D-feature in AgrO, which necessitates double checking of the D-feature on the *pro* clitic associate in AgrO and in ClP, thus violating the UCC and triggering clitic omission. However, such a conclusion is unsupported by independent syntactic evidence for the uninterpretability of the D-feature in AgrO in Polish. Until such evidence can be found, conclusions based on Ivanov's extension of Wexler's theory remain highly stipulative.

2.3   Clitic Comprehension Experiment

2.3.1   Goals

This experiment tests whether young monolingual learners of Polish can comprehend object clitics in a pre-verbal position higher than the clitic phrase and following the first constituent (i.e. a topicalized DP). Moreover, by comparing clitic production to clitic comprehension results, the experiment attempts to show that syntactic mechanisms involved in clitics placement are available to children early on, and that there may be other constraints, of pragmatic nature, which come into play when clitic production is delayed with respect to clitic comprehension. Clitic comprehension is expected to precede clitic production, or, in other words, clitic production is predicted not to occur before there is evidence of clitic comprehension.

2.3.2   Method

The test instrument is a Truth Value Judgment Task modeled on Crain & Thornton (2000) involving alternating monotransitive-reflexive verbs such as dry, cover, comb, hide, dress, and pick up. Test items depict a situation in which three characters perform an activity as a result of which an action must be taken. For example, Bear, Pony and Barbie go swimming but the water is too cold so they get out and look for towels. Pony has a towel but Bear does not, Bear wants to borrow Ponys towel, Pony refuses and Barbie offers Bear one of her towels and dries him. The lead puppet then comments on the story, "I know what happened. Pony dried him." At this point, knowledge of Principle B should correctly rule out the puppets' interpretation of the story and the child's response should be 'No'. The following is an example of the puppets comment, the truth value of which the child is asked to evaluate.

(2)   *Konik   go   wytarł.*
         pony   him.CL   dried
         'Pony dried him.'

As seen in (2), the syntax of the utterance involves the excorporation of the clitic out of the clitic phrase and placement in a higher position in the clause following a topicalized DP Pony. The topicalized subject DP is placed in spec,CP and marked [+cl]. Thus, the clitic must raise out of ClP (i.e. excorporate from the V-cl cluster) in order to check the [+cl] feature in C.

Test items are randomized and interspersed with fillers which require a positive answer to avoid negative bias. The test is preceded by a brief training session to ensure that children are comfortable contradicting the puppet.

2.3.3 Results

Children acquiring Polish demonstrate high comprehension of object clitics early on, based on their knowledge of Principle B. In other words, they are able to exclude the reflexive interpretation of the object clitic. The following table presents the summary of the results.

Table 3: Summary of the results in clitic comprehension experiment

	Target	Nontarget	Random	Total
Group 1	0.4130	0.4203	0.1627	1.0000
Group 2	0.7593	0.1574	0.0833	1.0000
Group 3	0.9444	0.0556	0.0000	1.0000

With respect to clitic comprehension, the youngest group seems to be at chance level (41%), while the older children display a high comprehension rate of 75% to 94%. Based on this finding, it seems reasonable to interpret the results in terms of clitic comprehension without potential interference from lack of knowledge of Principle B.

Table 4: Statistical tests for clitic comprehension – The SAS System: The mixed procedure solution for fixed effects

Effect	Age Group	Estimate	St. Error	DF	t Value	Pr > t
Intercept						
Group	1	0.9444	0.04989	49	18.93	<.0001
Group	2	-0.5126	0.06202	49	-8.27	<.0001
Group	3	-0.1852	0.06440	49	-2.88	0.0060

As the results above indicate, Groups 1 and 2 are significantly different from Group 3, while Group 3 is significantly different from zero. The table below shows a significant effect of age in the comprehension experiment.

As seen in Table 5, age is a significant factor in clitic comprehension (F=38.39, p< .0001), which implies that as the children get older, their comprehension of clitics is enhanced.

Table 5: Age effect in comprehension experiment

Effect	Num DF	Den DF	F Value	Pr > F
Group	2	49	38.39	<.0001

2.4 Comparison between Comprehension and Production Results

2.4.1 Group findings

In order to test whether age is a factor in clitic production as compared to comprehension, the average scores from Production and Comprehension Experiments are compared against the age factor and type of task. The response variable is the target response versus non-target response, while the explanatory variables are child age and task type (comprehension versus production). In Table 6 below, the base level is results of Comprehension Experiment in Age Group 3. At this level, the estimated proportion of target response is 0.9658. The proportion of target responses in Comprehension Experiment is significantly different from Production Experiment. Age groups 1 and 2 are significantly different from age group 3.

Table 6: Production versus comprehension across age groups

Effect	Age Group	Estimate	St. Error	DF	t Value	Pr > t
Intercept						
Task	1	0.9658	0.04003	49	24.13	<.0001
Task	2	-0.2788	0.03467	51	-8.04	<.0001
Group	1					
Group	2	-0.5196	0.04486	49	-11.56	<.0001
Group	3	-0.2384	0.04659	49	-5.12	<.0001

As seen in Table 7 below, both age group and task type (comprehension and production) are significant terms (p<.0001).

Table 7: Age and task type in production versus comprehension

Effect	Num DF	Den DF	F Value	Pr > F
Task	1	51	64.69	<.0001
Group	2	49	70.67	<.0001

In order to better illustrate the rate of production in comparison to comprehension, the average group scores were plotted on a line graph (Figure 1 below). An interaction term between task and age group is not significant. This indicates that the effect of age group does not differ much by task, which can be seen in the graph below as well.

Figure 1: Production versus comprehension across age groups
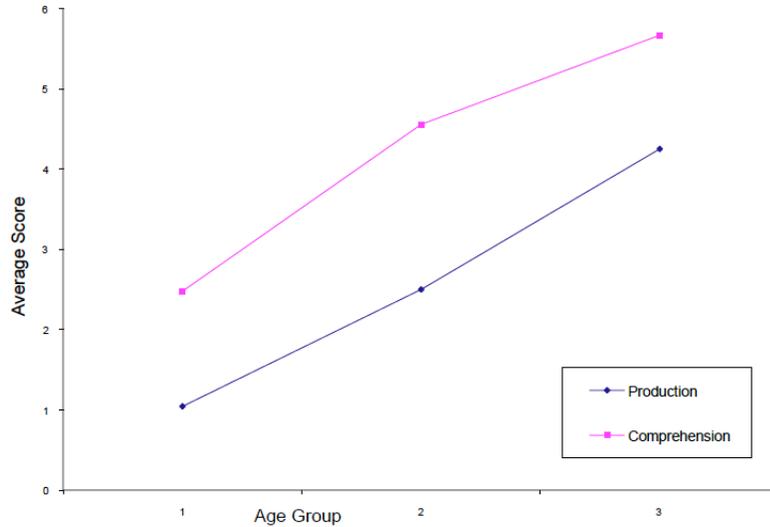
Thus, from the results above it appears that there is no interaction between the task and the age group. In other words, comprehension appears to be dissociated from production although they both depend on age. At the same time, comprehension score is a significant predictor of the results in the production experiment. Thus, in addition to age as an explanatory variable, performance on the comprehension task is also an important indicator of target-like clitic production (cf. Table 8 below).

Table 8: Comprehension and age as predictors of clitic production

Effect	Num DF	Den DF	F Value	Pr > F
Task	1	48	8.22	<.0001
Group	2	48	8.86	<.0001

As Table 8 shows, both predictors of production are significant in this case: task 2 ($p<$ .0061) and Age Group ($p<$ .0005), which suggests that clitic production depends both on children's age and performance on the comprehension task.

2.4.2 Individual results

In order to further explore the relationship between comprehension and production, individual results are plotted on a graph (Figure 2).

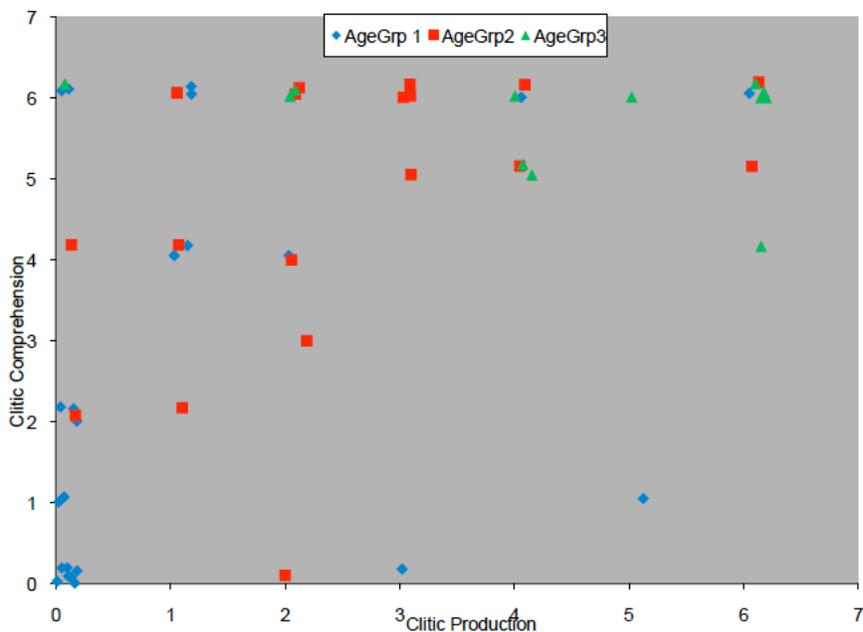Figure 2: A comparison between clitic comprehension and production: individual results

Figure 2 presents the comparison of raw scores from the comprehension and the production experiments. The X axis represents production and the Y axis represents comprehension (out of 6 trials each).

As Figure 2 shows, almost without exception, the children who score low on comprehension (4 trials or less) exhibit low clitic production (4 trials or less), which confirms the earlier group findings. Also, the combined results seem to pattern into three stages of acquisition: stage 1 with low clitic comprehension and production, stage 2 with high clitic comprehension/low production and stage 3 with high comprehension and production. More importantly, children do not seem to exhibit (with one exception) clitic production without comprehension, as shown by lack of intersecting points in the lower right quarter of the graph.

2.5 Discussion

The group results of the Comprehension Experiment, with the youngest group significantly different in comprehension from the older groups, indicate that clitic comprehension is a function of age, but also that adult-like clitic comprehension is achieved by the age of 4

(min. 75% accuracy). Given that Polish children show early knowledge of Principle B and that object clitic comprehension occurs even in the youngest age group (40%), it appears that children are able to calculate clitic referentiality early on. One explanation, in line with Borer & Rohrbacher's (2002) Maturation Hypothesis, involves D-linking as a dominating interpretive mechanism in child language. As Borer & Rohrbacher (2002) argue, D-linking assigns range to functional heads without the use of grammatical formatives or head features, eliminating the need for their phonological realization or movement of lexical heads. Consequently, such formatives as determiners and complementizers are omitted in child language, while verbs (i.e. lexical heads) lack head features and resist movement.

One of the central claims of the Maturation Hypothesis is that properties of grammar are biologically programmed and emerge gradually after a certain period of development, so that until a particular grammatical formative is acquired (e.g. clitic phrase), it remains underspecified for features in the syntax and cannot be spelled out (remains phonologically null). Syntactically unanchored functional categories must necessarily be D-linked for interpretation. The following section addresses these theoretical questions in light of the individual results observed in this study.

The comparison of individual results from comprehension and production experiments indicates that clitic production is extremely unlikely in the absence of evidence of comprehension. Thus, knowledge of Principle B seems to be a prerequisite for object clitic production. At the same time, production must be dissociated from comprehension as it seem to emerge after comprehension (i.e. clitic comprehension precedes clitic production). It is also evident that children fall into three categories with respect to production and comprehension of clitics. At the early stage both comprehension and production are low, at the middle stage comprehension emerges but there is little evidence of production, and at the final stage, both comprehension and production become adult-like.

The present findings, which demonstrate that children who do not produce clitics are nevertheless able to correctly interpret them syntactically and pragmatically, undermine the UCC-based approach. If children can consistently parse an utterance containing a pre-verbal clitic following a topicalized constituent, the D-feature must be checked more than once in their syntax. However, children who comprehend clitics may not consistently produce them in obligatory environments. Thus, clitic omission in speech is not strong evidence of the operability of the UCC in the light of evidence of clitic comprehension. An alternative account, in line with Borer & Rohrbacher (2002) would be to consider the clitic phrase open to D-linking as long as the morpho-phonology is not consistently produced (i.e. fully acquired). Following Borer & Rohrbacher, I assume that all functional projections are present from the beginning, while head features might remain underspecified. At a particular developmental stage the child becomes aware that head features must be phonologically realized, but the matching of appropriate phonological realization to the features may not have been achieved. Given this awareness, children might avoid using the relevant forms as they lack certainty as to the appropriateness of the phonological realizations of the specific head features. Rather than making errors, children are likely to omit those forms. In the absence of phonologically realizable grammatical formatives, children utilize another UG strategy for licensing

functional heads, namely D-linking.

D-linking is a mechanism which does not involve the movement of lexical heads to support head features nor does it involve phonological realization of those features. Thus, when D-linking is used to assign range to functional open values, grammatical formatives such as tense, agreement or determiners are omitted. Although, for example, determiners do not require movement, the specific feature value associated with the phonological realization of determiners must be acquired, and until then the child will omit determiners and use D-linking to assign range to a null D. By analogy, object clitics as functional heads might not initially be associated with the feature value [+referential]. A null clitic may be D-linked for interpretation and therefore omitted. It seems that the existence of developmental stages identified in the present study, whereby children progress from a low comprehension/low production stage, through a high comprehension/low production stage, finally reaching a high comprehension and production stage, illustrates the acquisition mechanism which relies on mapping of the functional category (object clitic) onto its morpho-phonological representation, its proper identification in discourse (clitic comprehension) and ultimately its realization (clitic production).

Borer & Rohrbacher further observe that even when children do learn particular morpho-phonological representations, they use them conservatively in order to avoid making errors. This may explain the gap between clitic comprehension and production found in the present study, where children who exhibit adult-like comprehension of object clitics do not necessarily produce them consistently. A theory which assumes that functional projections are available to the child and that the act of learning how to phonologically realize a head feature necessarily precedes its consistent production seems to successfully account for the findings in this study. In particular, children who do not comprehend clitics, i.e. do not show awareness of the phonological realization of referentiality, do not produce them either. This implies that the availability of the syntactic structure and the maturation of pragmatic constraints must be coupled with the acquisition of relevant morpho-phonology for the child to be able to realize referentiality encoded on object clitics.

3   Conclusions

In sum, the childrens inability to produce clitics does not seem to stem from a deficit at the syntax-pragmatics interface. Rather, evidence of clitic comprehension and early knowledge of Principle B are evidence that the syntactic and the pragmatic mechanisms required for clitic interpretation are available to the child. The delay in clitic production may be due to the D-linking mechanism to which the child defaults as long as any uncertainty persists as to the realization of the morpho-phonological material necessary to produce a functional element such as object clitic.

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