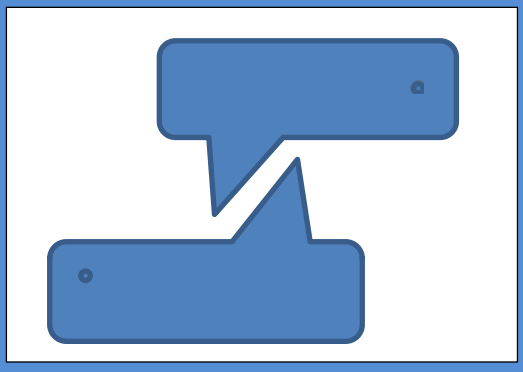
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Table of Contents

Articles

Subject realization in bilinguals: A comparative study of German-Turkish and Russian-Turkish bilingual children 193-207
Çiğdem Sağın Şimşek, Elena Antonova-Ünlü PDF

Aspects of Phonological Acquisition in Children Speaking Sidaamu Afoo...208-218
Abebayehu Messele Mekonnen, Demeke Loje PDF

The Acquisition of Tense, Modal and Aspect markers in Jamaican Creole 219-255
Tamirand Nnena De Lisser, Stephanie Durrleman, Ur Shlonsky, Luigi Rizzi PDF

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Subject realization in bilinguals: A comparative study of German-Turkish and Russian-Turkish bilingual children

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Abstract

The aim of this study is to examine the vulnerability of subject realization in Turkish as an interface structure at the syntax-pragmatics interface. The study compares subject realization of four Turkish monolingual, three German-Turkish bilingual and two Russian-Turkish bilingual children. The language combinations investigated in the study were determined by the fact that Russian is a partially null-subject language, while German is a non-null-subject one and Turkish is a null-subject language. Thus, focusing on the comparison of two different language combinations, the study aims to provide new insights about bilinguals' subject realization patterns and their possible relation to cross-linguistic influence. The data for the study were collected by recording the natural language production of the three groups of children. Analysis of the data revealed that both the German-Turkish and the Russian-Turkish bilingual children overused overt subject pronouns in their Turkish more than their monolingual counterparts. Hence, we hypothesized that the inappropriate subject realizations of the bilingual children cannot merely be explained as evidence for cross-linguistic influence but also as a language processing problem.

Keywords Subject realization, syntax-pragmatics interface, German- Turkish, Russian-Turkish, Turkish

1. Introduction

Sorace and Filiaci (2006) proposed the Interface Hypothesis (IH) according to which structures involving interface between syntax and other cognitive domains are more prone to fossilization and incomplete acquisition in L2 end-states. Initially, this hypothesis was suggested for the very advanced level of ultimate attainment in L2 acquisition, however, later it was expanded to bilingual first language acquisition (BFLA) and to initial stages of L1 attrition. Several studies (Müller & Hulk, 2001; Paradis & Navarro, 2003; Tsimpli, Sorace, Heycock & Filiaci, 2004; Belletti, Bennati & Sorace, 2007; Haznedar, 2010) validated the IH demonstrating that at the syntax-discourse interface, language behavior of L2 learners as well as that of children

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acquiring languages in BFLA differs from monolingual acquisition. Of all the domains that have been examined in relation to the IH, subject realization in null-subject and non-null-subject languages is probably the most representative one.

In the BFLA context, the findings of the studies that examine subject realization were consistent with the L2 research (for instance, see Hacohen & Schaeffer, 2007 for Hebrew–English bilinguals; Müller, Kupisch, Schmitz & Cantone, 2006 for Italian–German bilinguals; Paradis and Navarro, 2003 for Spanish–English bilinguals; Pinto, 2004 for Italian–Dutch bilinguals; Serratrice, Sorace & Paoli, 2004 for Italian–English bilinguals), indicating that bilingual children who acquire a null subject language and a non-null subject language from birth tend to overuse overt pronouns in their null-subject language. These results were interpreted in favor of the IH as evidence that the interface conditions on the use of subject pronouns are susceptible to developmental delays and cross-linguistic influence in BFLA.

Regarding the possible sources of vulnerability of interface structures, Sorace (2011) suggested two plausible explanations: (1) differences between bilinguals and monolinguals at the level of knowledge representation that occur due to the interaction of two competing grammatical systems and, (2) differences in processing resources and strategies between monolinguals and bilinguals. While numerous studies demonstrated that the process of subject realization in null-subject languages is affected by other non-null-subject language in bilingual acquisition, which can be attributed to cross-linguistic influence, several other studies provided a piece of evidence that even in cases when both languages of bilinguals are non-null-subject languages, their subject realization might be different from that of monolinguals (Lozano, 2006; Margaza & Bel, 2006; Sorace, Serratrice, Filiaci, & Baldo, 2009). In this respect, Sorace and Serrtrice (2009) and Sorace (2011) suggested that differences between monolinguals and bilinguals at the syntax-pragmatic interface seem to reflect differences in processing rather than cross-linguistic influence.

Within this framework, the aim of this study is to contribute to the debate about the possible sources of vulnerability of interface structures by comparing the subject realization of Russian-Turkish and German-Turkish bilingual children, who have been exposed to both languages from birth and to examine the extent to which their dominant Russian or German languages may account for non-monolingual-like subject realization in their non-dominant Turkish language. We believe that the comparison of two groups of bilinguals having different subject realization patterns will allow us to speculate on the role of cross-linguistic influence and potential differences in processing between monolinguals and bilinguals at the domain of syntax-pragmatic interface.

The choice of the Russian and German languages as dominant languages of the bilingual participants has been determined by the fact that Russian is a partially null-subject language, while German is a non-null-subject one and Turkish is a null-subject language. Regarding these differences between the languages and assuming potential cross-linguistic influences that might take place between the languages as a possible source of vulnerability of interface structures, it can be hypothesized that the Russian-Turkish bilingual

children will reveal a better overall performance in the realization of null-subjects in Turkish and their performance is expected to be unmarked or less marked with overuse of overt subjects, if compared with the German-Turkish bilingual children. As for the subject realization of German-Turkish bilingual children, it can be hypothesized that their acquisition would be more prone to overuse of overt subjects in Turkish for two reasons. First, even though overt subjects are realized in both Turkish and German, Turkish as a null-subject language that allows omission of subjects, while German is a non-null subject language that relies only on overt subjects. Second, null-subject realization in Turkish is restricted not only by syntactic but also by pragmatic constraints.

The study is structured as follows. First, in order to provide a framework for the study, studies that focused on subject realization among bilinguals will be reviewed. Next, a brief overview of subject realization in the Turkish, Russian and German languages will be described to be able to estimate possible cross-linguistic influences of Russian and German languages on the Turkish language. Then, the present study, the participants and the method will be introduced. Finally, the results of data analysis will be presented and discussed.

1.1. Studies on bilingual subject realization

Several studies focusing on subject realization of simultaneous bilingual children who acquire a null-subject and a non-null subject language have suggested that the topic is vulnerable to cross-linguistic influence. The important research in this respect was conducted by Paradis and Navarro (2003) who investigated the subject realization of a Spanish-English bilingual child between the ages 1;9-2;6. The data collected during the natural speech production of the simultaneous bilingual child revealed that the child used more overt subjects in his Spanish than his Spanish monolingual counterparts, which according to the researchers indicated possible cross-linguistic effects from English to Spanish. Similar results were also reported by Serratrice and Sorace (2003) and Serratrice et al. (2004), who collected data from one Italian-English bilingual child, and by Hacohen and Schaeffer (2007), who collected data from one Hebrew-English bilingual child. Based on the inappropriate overuse of overt subjects in Italian of the Italian-English bilingual child and in Hebrew of the Hebrew-English bilingual child, the researchers discussed the vulnerability of the pragmatic constraints resulting from cross-linguistic influence. These studies, in common, suggested that if a null-subject language is acquired together with a non-null subject language, bilingual children would be inclined to use more overt subjects in their null-subject language than their monolingual counterparts.

If the development of syntactic and pragmatic knowledge in coordination with each other is a demanding task for young children (Avrutin, 1999), then it would not be wrong to assume that bilinguals who acquire two languages having different subject realization patterns (requiring the acquisition of syntactic parameters and the pragmatic constraints of their languages) will experience more difficulties than monolinguals and that the difficulties may

be related to cross-linguistic influence. In fact, the above studies validated this assumption. Nevertheless, if language combination is an essential factor for the existence of cross-linguistic influence, an interesting question would arise how bilinguals who acquire two null-subject languages both of which require syntactic parameters and pragmatic constraints to be developed acquire the appropriate realization of subjects.

To our knowledge, very few studies examined the above question. In one of such studies Schmitz, Patuto and Müller (2011) examined three different language combinations German-Italian, German-French and Italian-French, two of these combinations contained both a null-subject (Italian) and a non-null-subject language (French and German), all of which have different pragmatic characteristics. The study highlighted the importance of the language combinations and demonstrated that while German-Italian bilingual children produced too many subject pronouns (which they interpreted as evidence for cross-linguistic influence), such overuse patterns were not observed in Italian-French bilingual children, although French is a non-null-subject language, like English and German. The researchers argued that not all diverse forms can be explained due to cross-linguistic influence.

As for the studies examining subject realization among bilinguals whose language combinations include the null-subject Turkish language, not much has been revealed yet. In one of the studies, Haznedar (2010) investigated subject realization in Turkish in spontaneous data collected from one simultaneous Turkish-English bilingual child and one Turkish monolingual child. The researcher reported that the bilingual child made use of overt subjects in Turkish at a rate more than 10 times higher than the monolingual child and the bilingual child's use of overt subjects was pragmatically inappropriate. The results of the study were interpreted as evidence for cross-linguistic influence from English regarding the realization of overt subjects in the context of Turkish-English bilingual acquisition. Similar results were also reported by Sağın Şimşek (2009), who compared the subject realization of four Turkish monolingual and four Turkish-German bilingual children aged between 5 and 7;3. The study reported high percentage of inappropriate use of overt subjects and subject pronouns by the Turkish-German bilinguals in Turkish in comparison to their Turkish monolingual counterparts who had the tendency to use null-subjects. Accordingly, the study also suggested cross-linguistic influence as the main source of difficulty in acquiring the pragmatic constraints of Turkish with regards to subject realization.

This study focusing on the comparison of two different language combinations, one of them containing a null-subject and a non-null-subject language (German-Turkish) and one containing one partially-null-subject and one null-subject languages (Russian-Turkish) might allow us to provide new insights about bilinguals' subject realization and its relation to cross-linguistic influence.

1.1.1. Subject realization in Turkish

Turkish is a null-subject language with subjects that are identified via agreement morphemes on verbs as exemplified in (1a) and (1b) (Kornfilt,

1997; Enç, 1986; Özsoy, 1987). In Turkish, subjects can be omitted when their interpretations are discourse or context predictable and when there is an overt agreement marker on the predicate. In examples (2a) -(2c), Ali is introduced as the subject of the event (2a) and in the following utterances, (2b) and (2c), it is possible to drop the subject (Ali) since it is discourse predictable

(1a) Ben kitab-ım-ı oku-yor-um.
I book-POSS-ACC read-PROG-1.sg
'I'm reading my book.'

(1b) Ø kitab-ım-ı oku-yor-um.
book-POSS-ACC read-PROG-1.sg
'I'm reading my book.'

(2a) Ali ev-e erken gel-di.
Ali home-DAT early come-PAST-3.sg
'Ali came home early.'

(2b) Önce ev-i temiz-le-di.
First house-ACC clean-CAUS.-PAST-3.sg
'First, he cleaned the house.'

(2c) Sonra yemeğ-i piş-ir-di.
Then meal-ACC cook-CAUS.-PAST-3.sg
'Then he cooked the meal.'

The realization of subjects in Turkish is mainly determined by pragmatic considerations of the speaker such as expressing new and/or old information, contrast, subject change or indicating emphasis/focus (Erguvanlı, 1984; Kornfilt, 1984; 1997; Enç, 1986; Özsoy, 1987). As presented in (3a)-(3c) in order to indicate new information, contrasting, changing the subject and emphasizing a constituent, subjects are overtly stated.

(3a) Ödev-i ben yap-tı-m Ali yap-ma-dı.
Homework-ACC I do-PAST-1.sg Ali do-NEG-PAST-3.sg
'I did the homework, Ali didn't do it.'

(3b) Ali ev-de uyu-yor-du.
Ali home-LOC sleep-PROG-PAST-3.sg
'Ali was sleeping at home.'

(3c) O uyu-rken, Ayşe ev-e gel-di.
He sleep-CON Ayşe home-DAT come-PAST-3.sg
'While he was sleeping, Ayşe came home.'

1.1.2. Subject realization in German

German is considered to be a non-null-subject language in which the use of subject realization is mainly restricted by syntactic rules. Nevertheless, only rarely, German allows the use of null-subjects. However, the use of null-subjects is not regulated by pragmatic rules rather it only entails informal speech. For instance, both (4a) and (4b) present the same information with a difference in the level of formality. While example (4a) with a null-subject indicates informal speech, example (4b) with an overt subject indicates formal speech style. Thus, subject omission it is not pragmatically but syntactically determined pattern (Müller, 2007).

(4a) *Ø Hab das schon gemacht.*
Have that already done.
'I have already done that.'
(4b) *Ich hab das schon gemacht.*
I have that already done
'I have already done that.'

1.1.3. Subject realization in Russian

Russian is a partial-null-subject language which means that Russian allows null-subjects but under more restricted conditions than consistent null-subject languages. Subject omission is determined by syntactic and discourse conditions in Russian and is limited to the 1st and 2nd person in finite clauses, and 3rd person pronouns "bound by a higher argument" (a context that Holmberg (2005: 539) stated is "rather poorly understood"). Generic pronouns are also not realized overtly. To illustrate, examples (5a) and (6a) define the context, making the subjects in the following examples of (5b) and (6b) discourse predictable and therefore in example (5b) and (6b) the subjects can be omitted.

(5a) Ты что делаешь?
you what do-2.sg-PROG
'What are you doing?'

(5b) *Ø* Доклад готовлю
report-ACC prepare-1.sg-PROG
'I am preparing a report.'

(6a) Где Олег?
where Oleg-NOM
'Where is Oleg?'

(6b) *Ø* Работает в библиотеке.
work-3.sg-PROG
'He is working in the library.'

1.2. The study

This study aims to compare the subject realization of Russian-Turkish and German-Turkish bilingual children in their non-dominant Turkish language. Precisely, the study aims to answer the following research questions:

1. Does the subject realization in Turkish of the German-Turkish bilingual children differ from that of Turkish monolingual children?
2. Does the subject realization in Turkish of the Russian-Turkish bilingual children differ from that of Turkish monolingual children?
3. Does the subject realization in Turkish of the German-Turkish and Russian-Turkish bilingual children differ from each other?

2. Methodology

2.1. The Participants

The participants of this study include three groups of children (Table 1). Group 1 is a control group consisting of four normally developing monolingual Turkish children with the age range of 4;2 to 8;0 (Mean=6;5). The monolingual data examined in the study is taken from Sağın Şimşek (2009).

Group 2 consisted of three German-Turkish bilingual children with the age range from 6;5 to 8;7 (Mean=7;5). The German-Turkish participants had been raised in the German-dominant environment and had been exposed to both languages from birth. The children were all born in Germany in families where mothers were native speakers of German and fathers were native speakers of Turkish. The German-Turkish participants had been living in Germany but they had regular contacts with their Turkish relatives and had been visiting Turkey twice a year. Due to the German-dominant context of the language acquisition, the German language of the participants developed as dominant in their linguistic repertoire.

Group 3 consisted of two Russian-Turkish bilingual children whose ages were 7;0 and 8;6 (Mean=7;8). The Russian-Turkish children had been raised in the Russian-dominant environment and had been exposed to both languages from birth. The children had both been raised in Russia from birth in families where mothers were native speakers of Russian and fathers were native speakers of Turkish. The Russian-Turkish participants had regular contacts with their Turkish relatives and had been visiting Turkey two-three times a year. Due to the Russian-dominant context of the language acquisition, the Russian language developed as dominant in their linguistic repertoire.

Table 1
Information about the participants

Turkish monolingual controls		German-Turkish bilinguals	Russian-Turkish bilinguals
	Age	Age	Age
C1	4;2	6,5	7;0
C2	6;8	7,3	8;6
C3	7;2	8,7	
C4	8		
Mean	6,5	7;5	7;8

2.2. Data collection

Taking into consideration the young ages of the participants, the data were collected recording their natural language production. The participants' utterances were recorded while they were describing their past experiences such as their summer holidays and school experiences and while they were in interaction with their parents.

3. Results

3.1. Subject realization of the Turkish monolinguals

The results regarding the subject realization of Turkish monolinguals were obtained from Sağın Şimşek (2009). Table 2 presents the distribution of null-subjects and overt subjects in the monolingual data referring to their functions and the frequency of use. As can be seen, the Turkish monolingual children used both null-subjects and overt subjects in their language production and most of their usage was considered accurate and appropriate. The monolinguals used null-subjects when the same subject was used within the same discourse and when the subject was discourse predictable and there were very few instances of misuse of null-subjects. The use of overt subjects was preferred in cases when subjects presented new information, when they were contrasted and/or emphasized. As for the inappropriate use of overt subjects, they were few in number.

Table 2
Distribution of subject realization in the Turkish monolingual data

	Distribution of null-subject					Distribution of overt subjects			
	Age	Utterance	Same subject	Context recover-able	Misuse	New info.	Contrast	Emphasis	Overuse
C1	4;2	118	46	24	2	15	16	15	0
C2	6;8	173	40	72	0	44	3	13	1
C3	7;2	149	53	54	2	22	3	9	6
C4	8	133	45	33	3	41	4	5	2

The analysis of the Turkish monolinguals' use of null and overt subjects allowed us to conclude that the Turkish monolingual children had acquired the syntactic and pragmatic constraints of subject realization in Turkish around the age of seven and use both null and over subjects accurately and appropriately.

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3.2. Subject realization of the German-Turkish bilinguals

Analysis of the German-Turkish bilingual data revealed differences between the subject realization of the Turkish monolingual and German-Turkish bilingual children. The results presented in Table 3 demonstrate that the German-Turkish bilingual children also used patterns of null-subject for the same functions as their monolingual counterparts did although with relatively higher number of misuses.

Table 3
Distribution of subject realization in the German-Turkish bilingual data

	Distribution of null-subject					Distribution of overt subjects			
	Age	Utterance	Same subject	Context recover-able	Misuse	New info.	Contrast	Emphasis	Overuse
C1	6,5	96	39	15	5	7	8	4	18
C2	7,3	101	36	18	6	11	2	9	19
C3	8,7	97	29	21	5	21	6	13	22

When the distribution of the overt subjects was examined, it was observed that the German-Turkish bilinguals used overt subjects in order to indicate their pragmatic intentions like Turkish monolingual children. However, the data revealed that the frequency of the inaccurate use of overt subjects was considerably higher in the German-Turkish bilingual data than the Turkish monolingual data. These findings were in line with our expectations. Since Turkish is a null-subject language with syntactic and pragmatic constraints and German does not allow subject omission in general, acquisition of German and Turkish demanded the bilingual children to acquire different constraints of different domains. Examples (7a-7i) illustrate one of the bilingual participants' tendency to overuse overt subjects, specifically the first person pronoun, though the use of overt subject is not syntactically obligatory (as recoverable via the person marker on the verb) and pragmatically necessary.

(7a) Ben yaz tatil-im-de Türkiye'ye git-ti-m.
I summer holiday-POSS-LOC Turkey-DAT go-PAST-1.sg
'I went to Turkey last summer.'

(7b) Orada akraba-lar-ım var.
There relative-3.pl-POSS exist
'There I have relatives.'

(7c) #Biz onlar-ı ziyaret et-ti-k ve beraber çok eğlen-di-k.
We they-ACC visit-do-PAST-3.pl and together very fun-PAST-3.pl
'We visited them and we had fun together.'

(7d) #Ben kuzen-ler-im-le oyun oyna-dı-m, deniz-de yüz-dü-m.
I cousin-3.pl-POSS-AC game play-PAST-1.sg sea-LOC swim-PAST-1.sg

'I played gamed with my cousins and swam in the sea.'

(7e) #Biz büyük kuzen-im için düğün yap-tı-k.
We old cousin-POSS for wedding make-PAST-3.pl
'We gave a wedding party for my elder cousin.'

(7f) Akşam düğün-de eğlen-di-k, dans et-ti-k.
Evening wedding-LOC fun-PAST-3.pl dance-PAST-3.pl
'We had fun and dance at the wedding that evening.'

(7g) #Ben mutlu bir tatil yap-tı-m.
I happy one holiday make-PAST-1.sg
'I had a happy holiday.'

(7h) Sonra aile-m-le Almanya'-ya geri dön-dü-m.
Then family-POSS-AC Germany-DAT back return-PAST-1.sg
'Then I came back to Germany with my family.'
ve #ben burada tatil yap-tı-m.
and I here holiday make-PAST-1.sg
'and I made a holiday here.'

(7i) #Ben tekrar Türkiye'-ye git-mek isti-yor-um.
I again Turkey-DAT go-INF want-PROG-1.sg
'I want to go to Turkey again.'

It is possible to hypothesize that the inappropriately use of overt subjects in null-subject Turkish observed in the German-Turkish bilingual data can be attributed to cross-linguistic influence from German, since the latter is a non-null-subject language.

3.3. Subject realization of the Russian-Turkish bilinguals

Analysis of the data obtained from the Russian-Turkish bilingual children revealed that the Russian-Turkish bilingual children use both null-subjects and overt subjects in their utterances. Only in one instance one of the bilingual children misused the null-subject in Turkish. This result was not unexpected as both Russian and Turkish languages are null-subject languages.

Table 4
Distribution of subject realization in the Russian-Turkish bilingual data

	Distribution of null-subjects					Distribution of overt subjects			
	Age	Utterance	Same subject	Context recover-able	Misuse	New info.	Contrast	Emphasis	Overuse
C1	7;0	86	36	2	1	6	0	0	41
C2	8;6	72	24	18	0	11	0	0	19

However, when the distribution of the overt use of subjects were examined, as presented in Table 4, unexpected results were revealed. We predicted that

the combination of Russian-Turkish would not display observable differences between the Turkish monolinguals and the Russian-Turkish bilinguals regarding the subject realization patterns because both Turkish and Russian are null-subject languages allowing the omission of subjects. Thus, we expected more or less similar subject realization patterns to be used by the Turkish monolingual and Russian-Turkish bilingual children. However, contrary to our expectations the Russian-Turkish bilinguals' overt subject realization patterns were quite different from those of the Turkish monolinguals. The bilinguals had the tendency to make use of overt subjects more extensively than the use of null-subjects. In cases when the subject that was introduced in the discourse was also the doer of the following utterances and therefore, discourse-recoverable via the agreement markers on the verbs, the Russian-Turkish bilingual children preferred using overt subjects rather than omitting them. The overt use of the subjects when they were syntax and discourse predictable was an unexpected pattern. As presented in Table 4, of the 158 utterances of the two Russian-Turkish bilingual children, 60 included overused, inappropriate overt subjects.

(8a) İlk önce #ben git-ti-m Konya'-ya.
First I go-PAST-1.sg Konya-DAT
'First I went to Konya.'

(8b) Konya'-da #ben çok güzel vakit geçir-di-m akraba-lar-ım-la
Konya-LOC I very good time spend-PAST-1.sg relative-PL-POSS-with

ve arkadaş-lar-ım-la.
and friend-PL-POSS-with
'I spent good time with my relatives and friends in Konya.'

(8c) Her gün #ben ve benim aile-m bir yere gid-iyor-du-k.
Every day I and my family-POSS a place-DAT go-PROG-PAST-3.pl
'Every day we used to go somewhere with my family.'

(8d) Sonra #ben ve #benim aile-m Kapadokya'ya git-ti-k.
Then I and my family-POSS Kapadokya-DAT go-PAST-3.pl
'Then we went to Kapadokya with my family.'

(8e) Her gün #biz orada güzel gez-di-k.
Every day we there nice visit-PAST-3.sg
'Everyday we visited nice places there.'

(8f).Sonra #ben Rusya'-ya dön-dü-m.
Then I Russia-DAT return-PAST-1.sg
'Then I came back to Russia.'

The inappropriately overuse of overt subjects in Turkish that are exemplified in the examples (8a-8f) observed in the Russian-Turkish bilingual data cannot be attributed to the cross-linguistic influence from Russian since the

latter is also a null-subject language. Moreover, contrary to our expectations, the similarities between Russian and Turkish regarding subject realization seemed to have no facilitating effect on subject realization in Turkish.

4. Discussion and Conclusions

The analysis of the data revealed that the language behaviour of the German-Turkish and the Russian-Turkish bilingual children was different from the Turkish monolingual children in that both the German-Turkish and the Russian-Turkish bilingual children overused overt subject pronouns in their Turkish. These results are consistent with the findings of the studies that examined subject realization in null-subject languages of bilinguals suggesting that the bilinguals tended to overuse subjects notwithstanding the fact that their other language is a non-null or null-subject one. Research on the issue commonly presented cross-linguistic influence as a factor that accounts for vulnerability of subject realization as a syntax-pragmatics interface phenomenon. This vulnerability is related to the defined conditions of cross-linguistic influence (Hulk & Müller, 2000; Müller & Hulk, 2000; 2001) according to which a grammatical property is a vulnerable grammatical phenomenon when it is similar at the surface level in both languages and when it is at the interface between syntax and pragmatics in one language. However, our findings cannot be merely explained on the basis of cross-linguistic influence since both the German-Turkish and Russian-Turkish bilingual children demonstrated similar subject realization patterns; namely, they both overused overt subjects. If cross-linguistic influence were the only factor that might account for the deviations in subject realizations, different patterns would be expected from the two bilingual groups in their realization of subjects in Turkish; with the Russian-Turkish participants performing better in using the null-subjects. However, our data revealed that similar to the German-Turkish bilinguals, the Russian-Turkish bilingual children overused overt subjects and subject pronouns, particularly the 1st person pronoun, even though both Turkish and Russian are null-subject languages allowing subject omission.

Hence, the inappropriate subject realizations of the Russian-Turkish bilingual children cannot be explained as evidence for cross-linguistic influence only but conceivably as a language processing problem. Serratrice et al. (2004) in their article where they compared subjects and objects in the English-Italian bilingual and monolingual acquisition suggested that languages with pragmatic constraints can be considered more complex than others which do not have any pragmatic constraints and that "the coordination of syntactic and pragmatic knowledge is a demanding task for young children in general" (p.201). Similarly, we believe that the Russian-Turkish bilingual children who use null-subjects in their Russian had to figure out the extent of null-subject realization in their Turkish as the choice between whether to use or to omit the subjects is not only regulated by syntactic but also pragmatic constraints in Turkish. Therefore, it may be hypothesized that if the acquisition of pragmatic constraints in addition to the invariant syntactic rules required additional demand from the bilinguals, and therefore perceived as more complex, then the bilingual children might have preferred to rely on the underlying syntactic structure of Turkish.

Turkish is syntactically a SOV language but due to pragmatic intentions of the speakers it is possible to use other word orders with or without omitting subjects. It might be assumed that in cases when a language of bilinguals necessitates acquisition of pragmatic constraints which are context-bound and require appropriate evaluation of the context, a tendency to use the default option in the languages might be a solution for overcoming the processing difficulty.

Accordingly, it is possible to assume that inappropriate subject realizations might not only characterize subject realization of bilingual children, but also monolingual children. However, the monolingual data analysed in the present study and in the other studies that compared subject realization of the Turkish monolinguals with the Turkish-English bilingual children (Haznedar, 2010) provided evidence that Turkish monolinguals acquire pragmatic constraints of their languages quite early and start using subject omission at very early ages. Therefore, the inappropriate subject realizations should be interpreted as a peculiarity of the bilingual language use and most probably is related not only to the availability of two different linguistic systems in the repertoire but also to the limited input bilinguals might receive in one of their languages. However, our data do not allow us to draw conclusions in this respect. Unquestionably, considering the number of children involved in the study, we accept that our results are not indisputable and further research with more participants is needed to verify our data.

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Aspects of Phonological Acquisition in Children Speaking Sidaamu Afoo

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Abstract

This study tries to describe aspects of phonological developments in children speaking Sidaamu-Afoo, a Cushitic language spoken in Ethiopia, East Africa. Data were collected from six children aged between 3;6 and 4;9 years. The data were first recorded orthographically and then transcribed using IPA. Results showed the speech production patterns noted in the children studied here appear to be varied in type. Some of them can be taken as age appropriate, as similar patterns have already been reported crosslinguistically for the same age rages, while others are language specific. There are still some developmental realisations, which do not appear to be age appropriate for the children studied. Whether the occurrence of these patterns at such late ages is typical in the language or signs of delayed phonological development needs to be verified with comprehensive data taken from larger sample size.

Keywords: language acquisition, phonology, phonological delay, crosslinguistic, Sidaamu Afoo

1. Introduction

Child language acquisition has been studied for a long time in different disciplines using various theoretical approaches. However, it is reasonable to state that systematic study of the acquisition of segmental aspects of phonology by children began with Roman Jacobson (Jacobson, 1941, 1963) who claimed that segments that are typically unmarked are acquired before more marked segments irrespective of language. Validating such claims has been a challenge partly because of the insufficiency of crosslinguistic data on language acquisition, and partly due to the fact that one child differs from the next in various aspects of language acquisition (e.g., Bloom, 1970; Nelson, 1981), particularly in the acquisition of phonology (e.g., Stoel-

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Gammon, 1985; Vihman and Greenlee, 1987; Vihman, 1993). With the advance in crosslinguistic research, it has become apparent that although most of the phonological acquisition patterns attested in children across languages are similar (e.g., Locke, 1983; Ferguson, *et al.* 1992), there are also language-specific features that are increasingly being reported in the literature. These differences often arise from variations, for example, in phonetic inventories, phonotactic constraints, and phonological system of individual languages.

Most of the studies conducted on phonological developments of children manly focus on the acquisition of segmental aspects of language such as order of consonant acquisition, mastery of segmental features, e.g., voicing contrasts, and acquisition of phonological processes. Other studies have studied acquisition of various suprasegmental features such as syllable structure (e.g., Dodd, 1995; Watson & Skucanec, 1997; Xu Rattanasone & Demuth, 2014), tone, stress/intonation patterns, etc (e.g., Kehoe, 2001). The majority of these studies have been conducted in well-known European and Asian languages. This has made it difficult to make generalizations about patterns of language acquisition.

In Ethiopia, an East African country, where the current study was conducted, more than 80 languages are spoken. However, there is only very few sketchy study of language development on Amharic, the federal working language (Abebayehu, 2008, 2013). Very recently, graduate students of the Department of Linguistics at Addis Ababa University started to show interest in pursuing various aspects of language acquisition in another Ethiopian language, Afaan Oromo (Alemayehu & Abebayehu, forthcoming). Apart from these attempts, no other studies have been found on child language development in other Ethiopian languages. Lack of normative date on child language on Ethiopian languages has made it very difficult for various professionals, such as speech language therapists, to objectively determine what is typical in which language. Consequently, such professionals working with clients speaking less-known languages have been forced to use normative data from major European or Asian languages (e.g., Grunwell, 1981) to assess and manage, for example, communication and literacy issues. Examining various dimensions of language development not only helps us better understand "atypical" patterns of language development, but also enables us to learn more on how we as adults process language, by understanding how children acquire language, which in turn enriches theories and practices in disciplines dealing with language and cognition. Hence, it is hoped that the present study, which focuses on examining aspects of phonological development in children speaking Sidaamu Afoo[3], can be considered a contribution to the efforts being made to narrow down the research gap in language acquisition, particularly in Ethiopian context.

[3] It is common to come across in the literature the term "Sidaama" being used to refer to both the language and the ethnic group speaking the language. However, the term actually refers to the ethnic group or the people, whereas the language, as it is referred to as by the people, is "Sidaamu Afoo", which literally means "the mouth of the Sidaamas". The Sidaama people reside in the Southern Nations, Nationalities and Peoples Regional State (SNNPRs), the most ethnically diverse regional state in Ethiopia.

2. Methodology

2.1. Participants

Six participants, balanced for gender, were drawn from a nursery school, using purposive sampling. They were between the age of 3;6 to 5;0 years. Both the participants and their parents were all monolinguals in the language and had no apparent speech or hearing issues.

Table 1
Demographic data on the six children selected for the study

Participants	***Gender***	***Age***
MD	F	3;6
BR	M	4;1
MS	F	3;10
TB	M	3;8
MW	F	4;9
SL	M	3;7

2.2. Data collection and processing

Data were recorded in three contexts: single words, sentence repetition tasks, and spontaneous continuous speech. The data were first written orthographically and then transcribed in IPA. Sets of words and sentences were devised to collect data, using picture naming and picture description tasks. The audio data were recorded using Sony PCM-M10® portable audio recorder, while footages of the children's speech were captured using Sony CCD-TR380E® video camera recorder to supplement the audio data.

2.3. Data analysis

The research took a descriptive design, employing perceptual phonetic and phonological analysis. The childrens' productions were transcribed, using analytical listening technique, following Ashby *et al.* (1996). Perceptual phonetic and phonological analysis was used to analyse the data. Specifically, the analysis of the data was first done by identifying differences of realizations from the target productions, i.e., following error identification approach. Then, realizations of the children were grouped and analysed in terms of phonological processes. Following that, attempts were made to draw possible generalizations from the data.

3. Findings

In this section, the various developmental speech production features attested in the speech of the children studied here are described and discussed below in turn. In this article, only the phonological processes occurred on consonants are covered. Due to spatial limitations, other aspects of phonological developments such as acquisitions of vowels, syllable structures, and other suprasegmental features are not covered here.

3.1. Fronting

Fronting refers here to the replacement of a target phoneme for one produced further back in the oral cavity. Four of the children studied exhibited fronting patterns. Consider the following data and examples.

(1)

Process	**Pattern**	**Word Position**	**Children**	**Age respectively**
Fronting	/k/→[t], /g/→[d]	WI & WM	MD, TB, MW	3;6, 3;8, 4;9
	/k'/ → [t']	WI & WM	MW, TB	3;8, 4;9
	/ɲ/→ [n]	WI & WM	MD, BR, MW	3;6, 4;1, 4;9
	/s/→ [ð]	WM	BR, SL	4;1, 3;7
	/ɡ'/→ [t']	WI & WM	MW	4;9

Examples	**Pattern**	**Target**	**Realization**	**Gloss**
	/k/→[t]	/kila/	[tila]	armpit
	/g/→[d]	/goɡ'o/	[dot'o]	sheep
	/k'/→[t']	/k'as-i/	[t'aʃ-i]	he/it pierced
	/ɲ/→[n]	/ɲammo/	[nammo]	taste
	/s/→[ð]	/kisi/	[kiði]	he/it touched
	/ɡ'/→ [t']	/hoɡ'o/	[hott'o]	cloth

Fronting is one of the developmental phonological processes commonly reported cross-linguistically. Ingram (1974), for example, reported the realization of [t] for /k/ and [d] for /g/ by a 1;9 year old English speaking boy. Abebayehu (2008, 2013) provided data from Amharic. These studies reported some fronting patterns in the speech of 2;0 to 3;11-year-old Amharic-speaking children who realised /k/ as [t] and /g/ as [d], in such words as /kənfər/ '*lip*' realized as [tətəj]; and /gəbəja/ '*market*' realised as [dəbəja].

As can be seen from the above data, some of the fronting patterns noted in the current study are rather uncommon, which may partly be due to the phonological system of the language. The patterns: /k'/→ [t'], /ɡ'/→ [t'], for example, are not commonly reported in the literature because the development of non-pulmonic consonants has not well been studied. While /k/→ [t], /g/→[d] are common fronting patterns reported in several previous studies, /ɲ/→ [n] and /s/→ [ð] are rare patterns. It is interesting however to note that the ages of three of the four children who exhibited fronting patterns in Sidaamu Afoo are older than the age at which fronting patterns are *normally* expected to be eliminated, i.e., 3;6 (Grunwell, 1997; Bowen, 1998; Hegde, 2001). This may suggest a degree of phonological delay in these children, which of course needs confirmation by considering crosslinguistic data, as the majority of the normative data come from Endo-European-speaking children.

3.2. Backing

In this study backing is taken to refer to the substitution of a consonant for one produced further forward in the vocal tract. In this study, four children exhibited backing patterns. Consider the data and examples below.

(2)

Process	**Pattern**	**Word Position**	**Children**	**Age respectively**
Backing	/s/ → [ʃ]	WI & WM	MD, MS, MW	3;6, 3;10, 4;9
	/f/→[ʃ]	WI & WM	MS	3;10

Examples	**Pattern**	**Target**	**Realization**	**Gloss**
	/s/ → [ʃ]	/sima/	[ʃima]	seedling of weese
	/f/→[ʃ]	/fani/	[ʃani]	he/it opened

Backing of the alveolar fricative /s/ to post-alveolar place [ʃ] is not commonly reported in the literature. In contrast, Abebayehu (2008) noted that such pattern is one of the most frequent backing processes observed in Amharic-speaking children aged between 2;00 and 3;4 years. A rather similar pattern has also been observed in Japanese-acquiring children, who substitute the more posterior [ɕ] for target /s/ (Nakanishi *et al.*, 1972; Beckman *et al.*, 2003; Li *et al.*, 2009; Li *et al.*, 2011). However, a converse process is common in children acquiring English, where /ʃ ʒ/ are fronted to alveolar place and realised as [s z], respectively (Weiner, 1979). As can be seen from the data, in Sidaamu Afoo, as it is the case in Amharic, /s/ → [ʃ] is a common processes observed in the children as old as 4;9 years. Whether the occurrence of this process at such late age is typical in the language needs to be confirmed by considering more data. Crosslinguistic comparison is rather difficult as some scholars (e.g., Dean *et al.*, 1990) label backing as an 'unusual' or 'atypical' process, while others (e.g., Weiner, 1979; Shriberg and Kwiatkowski, 1980; Ingram, 1981; Grunwell, 1985) do not even include it in their classifications of typical phonological processes in child speech.

3.3. Gliding

Gliding refers to the substitution of liquid by glide, such as /l/ or /r/ → [w] or [j]. This process was noted in four of the children studied here. Consider the data and examples below.

(3)

Process	**Pattern**	**Word Position**	**Children**	**Age respectively**
Gliding	/l/ → [j]	WI & WM	BR SL	4;1, 3;7
	/r/ → [j]	WM	MD MW	3;6, 4;9

Examples	**Pattern**	**Target**	**Realization**	**Gloss**
	/l/ → [j]	/lalo/	[jajo]	cattle
	/r/→ [j]	/risa/	[jisa]	hawk

The literature (e.g., Grunwell, 1997; Bowen, 1998) generally suggests that gliding should typically be gone by the age of five years. Hence, it can be taken that the gliding patterns exhibited by the children studied here were age appropriate, as the children were all under the age of five.

3.4. Deaffrication

Following O'grady (2003), de-affrication is taken here to broadly refer to the process in which affricates are replaced by non-affricate sounds. De-

affrication of fricatives was noted in the speech of three of the children studied. See the data and examples below.

(4)

Process	Pattern	Word Position	Children	Age respectively
Deaffrication	/ʧ/→ [t] /ʤ/→[d]	WI & WM	MD, TB, MW	3;6, 3;8, 4;9
	/ʧʾ/→ [tʾ]	WI & WM	MD, MW	3;6, 4;9
	/ʧʾ/→ [t]	WI & WM	TB	3;8

Examples	Pattern	Target	Realization	Gloss
	/ʧ/→[t]	/kinʧo/	[kinto]	stone
	/ʤ/→[d]	/ʤaala/	[daala]	friend
	/ʧʾ/→[t]	/ʧuuʧʾi/	[tuutʾi]	feed oneself/another person

Studies (e.g., Bleile, 1995; Bowen, 1998; Hegde, 2001) state that deaffrication should be gone at the age of three, implying that the deaffrication patterns noted in the children studied here may be manifestations of phonological delay, which again needs to be checked with more data. The case of one of the children (i.e., MW) appears to be rather different in that she exhibited three of the four identified deaffrication patterns at the age of 4;9, which further suggests that she, in particular, could be phonologically delayed.

3.5. De-ejectivisation

De-ejectivisation is taken here to refer to realizations of ejectives as non-ejective consonants such as pulmonics, implosives or clicks. In almost all cases, the children studied here de-ejectivised the ejectives of the language and realized them as pulmonic consonants. See the examples below.

(5)

Process	Pattern	Word Position	Children	Age respectively
De-ejectiv-ization	/pʾ/ → [p]	WI & WM	BR, MS, TB, SL, MW	4;1, 3;10, 3;8, 3;7, 4;9
	/pʾ/ → [b]	WI	MS, TB, MW	3;10, 3;8, 4;9
	/tʾ/ → [t]	WI & WM	BR, MS, TB, SL	4;1, 3;10, 3;8, 3;7
	/tʃʾ/ → [tʃ]	WI & WM	BR, MS, TB, SL	4;1, 3;10, 3;8, 3;7
	/kʾ/ → [k]	WI & WM	BR, MS, TB, SL	4;1, 3;10, 3;8, 3;7
	/kʾ/ → [g]	WI & WM	SL	3;7

Examples		Target	Realization	Gloss
	/pʾ/ → [p]	/kʾuuppʾe/	[kʾuuppe]	eggs
	/tʾ/ → [t]	/wotʾe/	[wote]	money
	/tʃʾ/ → [tʃ]	/ʧʾaffa/	[ʧaffa]	swamp
	/kʾ/ → [k]	/kʾas-i/	[kas-i]	He/it pierced
	/kʾ/ → [g]	/maakkʾe/	[maagge]	pot

Realizing ejectives as their pulmonic counterparts is seen often in the speech of children with speech delayed (Abebayehu, 2008). However, there is also evidence, from Amharic, (Abebayehu, forthcoming) that a child as young as

eleven months old produces 'adult-like' /t'/. This suggests that all the children studied here must have been physiological mature enough to be able to produce ejectives. It is not surprising therefore that the children (BR, MS, TB, SL) who were not able to produce /t'/ could not produce the other ejectives as well, again suggesting some degree of phonological delay. A rather unusual realization was noted in the speech of SL, aged 3;7, who sometimes realized /k'/ as [k], when the target is singleton, and as [g] when it is geminated. This may have happened as a result of the child's effort to make perceptual distinction between the singleton and geminated /k'/. This could clearly have phonological implications, as /g/ is also contrastive in the language.

3.6. *De-implosivisation*

In this study, de-implosivisation refers to a replacement of the implosive /ɗ/ with non-implosive consonants such as pulmonics, ejectives and clicks. Such realizations were noted in four of the children studied here. Consider the examples below.

(6)

Process	**Pattern**	**Word Position**	**Children**	**Age respectively**
Implosive to pulmonic stops	/ɗ/ → [t]	WI & WM	BR, MS	4;1, 3;10
	/ɗ/ → [d]	WI	TB, SL	3;8, 3;7
Implosive to Ejective	/ɗ/ → [t']	WI	MW	4;9
	/ɗ/ → [t']	WM	MD	3;6
Implosive to glottal stop	/ɗ/ → [ʔ]	WM	SL	3;7

Examples	**Pattern**	**Target**	**Realization**	**Gloss**
	/ɗ/ → [t]	/ɗibba/	[tibba]	illness
	/ɗ/ → [d]	/ɗibba/	[dibba]	illness
	/ɗ/ → [t']	/ɗibba/	[t'ibbba]	illness
	/ɗ/ → [ʔ]	/woɗa/	[woʔa]	calves

Given that implosives present more aerodynamic and articulatory challenges than other groups of consonants (Ladefoged and Maddison, 1996), it may not be surprising that the children replaced /ɗ/ with its simplified counterparts: [t], [d], [t'] and [ʔ]. However, even the youngest child studied here appears to be mature enough to produce /ɗ/, as children acquiring another closely related Cushitic language, Afaan Oromo, are able to produce /ɗ/, as early as at the age of 2;3 (Alemayehu & Abebayehu, forthcoming). This could further imply phonological delay.

3.7. *Devoicing*

Devoicing is the only assimilation process noted in the children studied, vowel harmony is disregarded in this study, as the focus is only on the acquisition of consonants. Three children demonstrated devoicing patters. In two of these children, devoicing was not context sensitive, while in the

speech of the third one, the process was noted only word-initially. Examples are presented below.

(7)

Process	**Pattern**	**Word Position**	**Children**	**Age respectively**
Devoicing	/d/→ [t]	WI & WM	BR, MS	4;1, 3;10
	/ʤ/→ [ʧ]	WI	SL	3;10
Examples		**Target**	**Realization**	**Gloss**
	/d/→ [t]	/kadi/	[kati]	he/it kicked
	/ʤ/→ [ʧ]	/ʔaʤa/	[ʔaʧa]	young

Studies (e.g., Grunwell, 1997) suggest that devoicing of consonant in children often gets eliminated by the age of 3;0, which is not the case in the children studied here, again suggesting a delayed phonological development, particularly so with the child who is over 4 years old.

4. Conclusions

The speech production patterns noted in the children studied here appear to be varied in type. Some of them can be taken as age-appropriate, as similar patterns have already been reported crosslinguistically for the same age rages, while others are language-specific. For example, the fronting patterns such as /k'/→ [t'], /ʧ'/→ [t'], /ɲ/→ [n] and /s/→ [ð] are not commonly reported in the literature and may be considered as features specific to the language. The realisation of /k'/ by one of the children as [k] and [g] when the target is singleton and geminated, respectively, may also be dictated by the phonotactics of the language. There are still some developmental realisations, which do not appear to be age-appropriate for the children studied. The fact that the ages at which the children exhibited some of the fronting patterns could, for example, be indicative of a degree of phonological delay (Bowen, 1998; Grunwell, 1997). Similarly, the occurrence of backing of the alveolar fricative to its post-alveolar counterpart and deaffrication at the age of 4;9 could also suggest some level of phonological delay. Moreover, the de-ejectivisation and de-implosivisation patters noted in this study do not seem to be age-appropriate, as evidence from other Ethiopia languages suggests otherwise. Of course, if the occurrence of these patterns at such late ages is typical in the language or signs of delayed phonological development needs to be verified with comprehensive data taken from larger sample size.

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Appendices

Consonant Phonemes of Sidaamu Afoo

	Bilabial	*Labio-dental*	*Dental*	*Alveolar*	*Palato-Alveolar*	*Palatal*	*Velar*	*Glotal*
Plain Stop	b		t d				k g	ʔ
Ejective	p’		t’				k’	
Implosive				ɗ				
Fricative		f	s		ʃ			h
Affricate					tʃ dʒ			
Ejective					tʃ ‘			
Nasal	m			n		ɲ		
Liquids Lateral				l				
Trill				r				
Approximant	w					j		

Adapted from Kawachi (2007)

Vowel phonemes of Sidaamu Afoo

	Short Vowels			**Long Vowels**		
	Front	Central	Back	Front	Central	Back
High	i		u	ii		uu
Mid	e		o	ee		oo
Low		a			aa	

Adapted from Anbessa (1987)

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The Acquisition of Tense, Modal and Aspect markers in Jamaican Creole

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Abstract

This work offers an analysis of the development of Tense, Modal and Aspect (TMA) markers as observed in the spontaneous speech of 6 children acquiring Jamaican Creole (JC). In JC, TMA markers overtly show a rich functional hierarchy, which is generally found across creole languages, and is arguably universal. The analyses detail how this functional structure is acquired, revealing that children are knowledgeable of the rules governing TMA combinations and do not entertain target-inconsistent orders. This suggests that children are aware of the articulate cartographic hierarchy as attested in the target language. Additionally, we note that the distribution of the markers in child production is skewed in the same direction as in the input data; however, differences between children's productions as compared to their linguistic environment provide evidence that input alone cannot account for the development of TMA markers in child production.

Keywords Jamaican Creole, tense, modal, aspect, cartography, full competence, generative grammar.

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1. Introduction

1.1. Continuity or Maturational Approach

This work focuses on the production of Tense, Modal and Aspect (TMA) markers in Jamaican Creole (JC). In keeping with the ideas of Durrleman (2000, 2008), inflectional markers in JC are overt manifestations of clausal functional heads, in line with Cinque's (1999) functional hierarchy, as presented in (1):

1) Modepistemic: *shuda, wuda, maita, mosa, kuda* > T(Past): *did* > T(Future): *wi* > Modnecessity: *mos* > Modobligation: *hafi* / Modability/permission: *kyan* > *aredi* T(Anterior) *don1* > Aspcontinuative: *stil* > Aspretrospective: *jos* > Aspgeneric/progressive: *a* > Aspprospective: *go* > Aspcompletive: *don2* > Aspfrequentative: *reduplicated verb*

How is such a complex functional structure acquired? Under the generative framework, two main models may account for this: continuity and maturation. According to the continuity model, grammatical principles are available at all stages from birth and do not change (Pinker 1984, Poeppel & Wexler 1993, Paradis & Genesee 1997, Borer & Rohrbacher 2002; and more recently maintained by Gómez Soler 2012, among others). Early grammar has all the same properties of the adult language, and the gap between child and adult systems is accounted for by the assumption that children must learn language-specific properties, and that development results in growth in other domains such as the lexicon, pragmatic competence and processing abilities. Radical versions of the continuity hypothesis, generally referred to as the Full Competence hypothesis, allow for the least degree of freedom for the child's grammar to diverge from the adult's, and as such relies on external factors to account for changes in development (as discussed by Rasetti, 2003).

In the maturation model (postulated by Radford, 1990, 1995, 1996; Vainikka, 1993/4; Borer & Wexler, 1987; Wexler, 1998; Clahsen, 1996; among others; and gaining more recent support from Ryan, 2017) the basic assumption is that there is a genetically determined maturation of grammatical categories and principles initially absent from child grammars. The gap between early and adult systems is accounted for by the immature state of Universal Grammar (UG). According to this view, not all aspects of UG are readily available and developmental timing for their emergence may be extensive (Borer & Wexler, 1987). In sum, maturation-based approaches postulate that children systems contain only the basic structure of UG, which is modified over time by eventual changes and additions of more specific properties of UG.

The transparently analytical morphological realization of the TMA system in creole languages makes JC an ideal case to investigate the development of the inflectional layer in language acquisition. Does this development follow the maturation or the 'full competence' model? The maturation model would lead us to expect that the TMA zone should emerge incrementally in a bottom-up manner, i.e. in an 'incremental structure building' way: initially, only the lower layers should be attested in natural productions, then higher

layers should appear, in an order respecting the universal hierarchy. In contrast the full competence model, would predict that TMA markers should be available once syntactically significant production starts, although they may be subject to grammatical options such as Truncation (Rizzi 1992, 2000), which would yield omissions that although not necessarily target-consistent remain nevertheless UG-consistent. With the current study, we aim to determine the approach which can best account for inflectional development in child language.

1.2. An overview of Tense, Modal and Aspect in JC

Jamaican Creole does not have bound verbal inflections but there are various free morphemes that accompany the verb to express Tense, Modality and Aspect. In JC, these TMA markers, when used, must intervene between the subject and the verb, as exemplified in (2) – (4):

2) *Mi ben go pan mai chrakta.* (KEM 3;00)
1SG PAST go on POSS.1SG tractor
'I went on my tractor.'

3) *I shuda fit momi.* (ALA 2;07)
3SG MOD fit mommy
'It should've fit mommy.'

4) *Mi a_go*[5] *shuo Jia.* (COL 2;09)
1SG ASP show Jia
'I am going to show Jia.'

The preverbal marker for past in JC is *did* or *ben* (with variants *behn, wehn, ehn, wen* and *en*). According to Patrick (2007), these markers occur more rarely than the classic creole pattern predicts. An unmarked non-stative verb tends to yield a default past reference, while unmarked stative verbs tend to yield a non-past interpretation; however this is not absolute as other factors may impact the temporal reading, including context, a time-adverbial or the nature of the direct object (Durrleman-Tame, 2008). When the discourse context is already focused on a time in the past, the overt use of the past tense marker with non-stative verbs can unambiguously signal a pluperfect (past-before-past) reading (Patrick, 2007).

An unmarked verb alone cannot express progressive aspect, though it can express habitual aspect. The preverbal progressive aspect marker *a, da* or *de*, must be used to indicate progressive action. The past markers may combine with the progressive markers to give *bena/bende, dida*, and *wena* with a meaning corresponding to English past progressive (Bailey, 1966; Durrleman Tame, 2008).

Completive aspect is signaled by *don* in JC. It can appear either before or after the verb phrase, but is restricted to non-statives. Where *don* occurs

[5] Durrleman-Tame (2008) proposed that progressive *a* must be used in combination with the prospective *go* (which may become *ao* in rapid speech) in order to yield a prospective aspectual meaning. For simplicity purposes, throughout this paper, we will treat a+go as a single marker of prospective aspect represented as *a_go*.

pre-verbally, without the stativity restriction, it gives an anterior reading (Durrleman-Tame, 2008). The marker *jos* is used to designate retrospective aspect, along the lines of Standard English 'just' (see also Cinque 1999). Futurity may be expressed by *a_go* and *wi* in JC. *A_go* (with variants *aa, goo, gaa(hn), gwain*) is employed to express prospective aspect or proximal future. *Wi* has been analyzed as future tense (Durrleman-Tame, 2008) and as a modal (Bailey, 1966).
JC has an extensive group of modals which occurs in various combinations with each other. Bailey (1966:45, 141) divides them into two groups by order of occurrence:

Mod 1: *kuda* 'could', *shuda* 'should', *wuda* 'would', *maita* 'may, might' and *wi* 'will'

Mod 2: *hafi* 'have to', *mos(a),* 'must', *kyan* 'can' and *fi* 'ought'

Bailey's Mod 1 (with the exception of *wi*) are epistemic modals and Mod 2 are root modals. Epistemic modals are situated high in the clausal hierarchy, while root modals are situated in the lower domain (see Cinque, 1999). Following Durrleman-Tame (2008) root modals are further divided into 3 classes: ability/permission modals, obligation modals and necessity modals. The inventory of modals for the current work is therefore as follows:

Epistemic: *shuda~shudn, wuda~wudn, kuda~kudn, mosa/ mosi, maita, wi*[6]

Root: Ability/permission: *kyan~kyahn*, Necessity: *mos*, Obligation: *afi*

1.3. Acquisition of Tense Modal and Aspect

Analyses of the development of TMA are well documented in the literature (Papafragou, 1998; Shirai & Andersen, 1995; Bloom et al., 1980 on English; Bar-Shalom, 2002 on Russian; Lorusso, 2007 on Italian; Panitsa, 2010 on Modern Greek; Lee, 2009 on Korean; Green & Roeper, 2007 on African American English, etc.). Research has revealed that modality is generally produced rather late, emerging between 1;10 and 2;06 in English (Radford, 1990; Brown, 1973; Kuczaj & Maratsos, 1975; among others reviewed in Papafragou, 1998). Bloom et al. (1980) put forward the 'Aspect before tense hypothesis', showing where aspectual readings emerge before tense. Weist et al. (1984) however provided counter examples in the acquisition of Polish, claiming that children mark both tense and aspect at early stages. The variance in methods and procedures employed in different studies can

[6] In JC, as a marker of modality, *wi* ranges from root modal (expressing volition/intention as in (1)) to epistemic modal (expressing prediction as in (2)). However, for the purposes of this analysis, *wi* will be analyzed as a single category 'Modal wi' distinct from epistemic modals.

1) Mi wi fiks it. (SHU 2,11)
1SG MOD fix 3SG
'I will (am willing to/intend to) fix it.'

2) I wi muuv ahn slak op. (KEM 3,01)
3SG MOD move and slack up
'It will move and become slack.'

however create differences in interpretation, and thereby generate problems for comparative analysis. Moreover, there are varying accounts in studies of children's acquisition of aspect in terms of the age of acquisition of the aspectual zone, the order of the acquisition of different aspectual expressions, the frequency of production and the interaction between aspect and tense (see Andersen and Shirai, 1996 for discussion). Boland (2006) however outlined that frequency in the use of TMA markers does not show how productive they are. For example if a child uses a TMA marker with only one verb, though the child may produce multiple utterances of the same construction, it is conceivable that the child is not conscious of the TMA + V structure. When the child uses the TMA marker with different verbs, it is more likely that the child has analyzed the form and understands how it is used in different contexts. Qualitative analyses, such as variation in the co-occurrence of TMA markers with different predicates, may be indicative of such productive use of the TMA + V structure. A TMA marker is not held to be acquired until a child is able to produce it spontaneously with different verbs.

1.4. Purpose of Study

This study details the trajectories of 6 monolingual JC children, in the development of inflectional markers. It focuses on their productions of tense, modal and aspectual markers, in order to explain how the complex functional hierarchy of morphosyntactic structures is acquired. As there has been limited focus on the development of creole languages (Adone, 1994, 2012; Adone & Vainikka, 1999; Pratas & Hyams, 2009; De Lisser et al. 2014, 2016), work in this domain is still necessary. JC, being an analytic language, is particularly suited to reveal the moment at which functional markers first appear, their order of acquisition, and the frequency and productivity of their use in children's spontaneous production, thereby providing concrete evidence for language acquisition theories.

1.5. Theoretical Framework

This study is couched within the framework of Universal Grammar (Chomsky, 1981a). The theory of Universal Grammar proposes that there are common properties that all natural human languages share, which are manifested innately without any formal training. Despite the varying circumstances and the relatively limited amount of input data to which children are exposed, linguistic milestones are achieved in a parallel fashion across languages. Cartographic research conducted within the UG approach (see overviews in Cinque & Rizzi 2010, Shlonsky 2010, Rizzi & Cinque 2016) has worked out detailed hypotheses on the functional hierarchy of the clause. The cartographic approach presents a fine-grained structural mapping of morphosyntactic categories, respecting a highly articulate, uniformed functional hierarchy, the core of which is held to be universal. Of central importance for this approach is the hypothesis that all morphemes project their own phrasal category and each is indicative of a part of the clausal architecture (Durrleman-Tame, 2008). As such the IP space is rigidly ordered in line with Cinque's functional hierarchy as detailed in Section 1.1.

According to Shlonsky (2010;8) the universality of the functional hierarchy of the IP space "allowed for a syntactic articulation of verbal aspect and event semantics and studies of the inflectional space made it possible to better 'syntacticize' aspect, tense and mood". This framework therefore offers a natural benchmark for acquisition studies of the TMA system.

1.6. Organization of Paper

The paper is organized as follows: First we outline the methodology on which the study is based then present the results detailing the production of modal, tense and aspect markers in the corpus. After, we present a general overview of the entire TMA zone examining the co-occurrence of tense, modal and aspect in the child production then making comparisons with their distribution in the input. The paper ends with a discussion of the main findings with proposed answers to the research questions, followed by a brief conclusion.

2. Methodology

The data of this study is based on longitudinal recordings of six Jamaican Creole monolingual children, located at the most basilectal end of the continuum[7]. Over a period of 18 months, 60-minute recordings were conducted every 10 days for the first five months and every 15 days thereafter. At the start of the research, the children were within an age range of 1;6 to 1;11 months. The age range and time frame of the research corresponds to the period in which syntax emerges in most children and where target-inconsistencies are most notable. This work is limited to spontaneous, naturalistic tape-recorded conversations between/among child, parent(s), siblings, friends and/or investigator(s). The children were recorded in the comfort of their homes. All recordings were transcribed and morphologically coded along the CHILDES guidelines (MacWhinney, 1995).

2.1. Research Questions

The data collected from this study will answer the following questions:

i. What is the sequence of the development of tense, modal and aspectual markers?

ii. Do children respect the functional hierarchical cartography of the inflectional zone?

iii. Can input be responsible for developments in child language acquisition?

iv. Which approach, maturational or continuity, best accounts for language development in line with the theory of Universal Grammar?

[7] Given the existence of the creole continuum, various factors were considered in identifying and selecting the participants for inclusion in the study. Primary consideration was given to the area of residence and the level of education of the primary care-giver. More specifically, speakers from rural communities with less education were ranked closer to the basilectal end of the continuum (Meade, 2001). In light of this observation, in our search for children to be included in our study, we targeted the 'basilectal' community of Southfield, located in St. Elizabeth.

2.2. Criteria for inclusion of data for analysis

It should be noted that only utterances containing at least one predicate have been taken into account for the present analysis of the development of the Inflectional Phrase (IP). Some utterances containing predicates were however excluded from the data analysis. These include utterances in which any unintelligible portions could be critical for the analysis; utterances where the meaning was unclear based on the context of the discourse; the child's stuttering or self-repetitions without the production of contentful utterances in-between; repetitions of memorized materials, e.g. songs and nursery rhymes; and immediate repetitions of adult's exact utterances. All verbal items were coded for stativity, the presence or absence of tense, modals and aspectual markers and the location of the markers with respect to the verb. Native speakers' intuitions were employed in distinguishing between contexts of utterances that could possibly yield multiple temporal interpretations. Additionally, data produced within the first two months were not included, as this period included finalizing the selection of children for inclusion in the study and familiarization of the researchers with the children.

3. Findings

3.1. Acquisition of modality in JC

The data presented below details the total production of modals by the 6 children throughout the duration of the study.

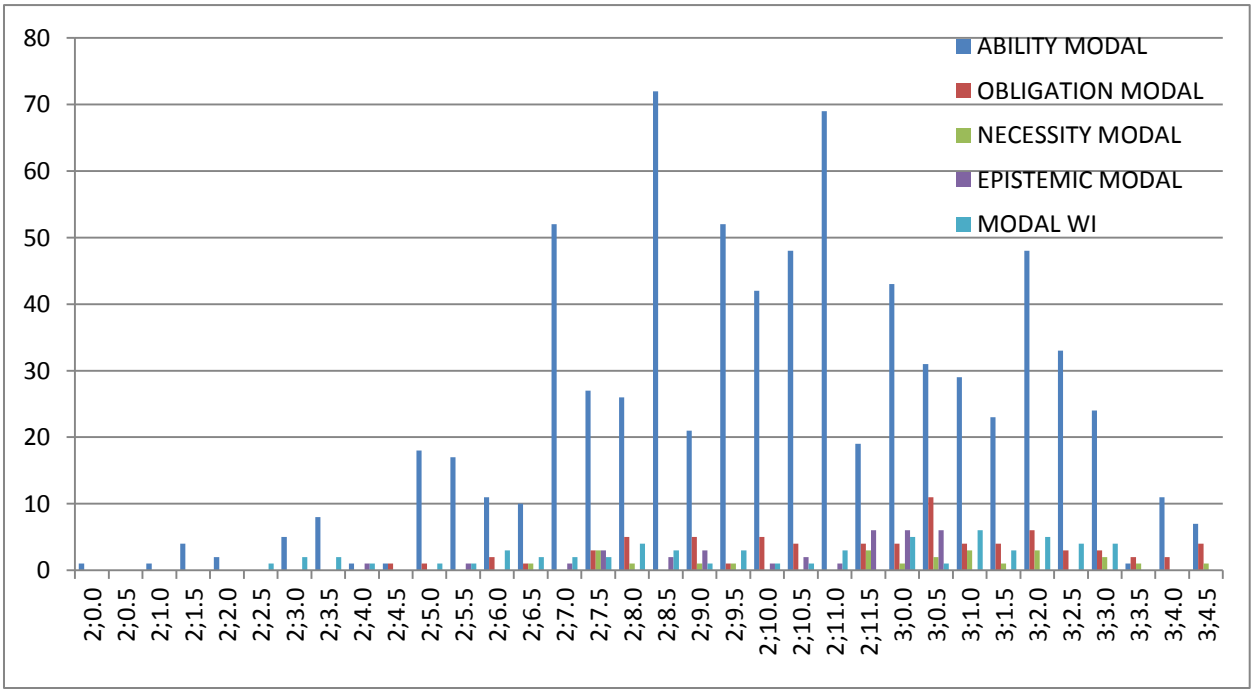


Figure 1. Total production of modals

Figure 1 shows the sequence of modals as they emerge in the data. Based on the data presented in Figure 1 (see tables (1) – (6) in Appendix 1 for details), the ability modal *kyan* and its negative variant *kyaahn*, are the first modals to be produced by all the children in the corpus, with the exception of ALA, who seems to have had a single sporadic production of modal *wi* at 2;2. These ability modals all emerged between 2;00 and 2;3, with the exception of TYA whose first production was much later at 2;10. Figure 1 (See Table 7 in Appendix 1) also illustrates that the ability/permission modal is the most frequently produced, accounting for 80% (757 of 950) of the utterances expressing modality. The root obligation modal accounts for 8% (75 utterances) and the modal *wi* accounts for 6% (61 utterances). The necessity and epistemic modals each accounts for roughly 3% of the data set. From a holistic analysis, the following sequence is their first attestation in the corpus: $Mod_{Ability}$ (2;0) > Mod_{wi} (2;2.5) > $Mod_{Epistemic}$ (2;4) > $Mod_{Obligation}$ (2;4.5) > $Mod_{Necessity}$ (2;5.5). However, we note there are huge individual variations with the order and frequency of production of the modals (detailed in Tables (1) – (6) in Appendix 1). With regards to the production of epistemic modals, the data does not lend itself to a cross-sectional examination of the phenomenon as 87% (29 of 33 utterances) was produced by one informant, ALA.

We present examples of each utterance type produced.

Ability/permission modal

5) *Ø* *kyan* *brok* *dis* *pliiz?* (ALA 2;03)
(2SG) MOD_{abl} break DEM please
'Can you break this please?'

Obligation modal

6) *Mi* *afi* *muuv* *di* *baisikl rait yaso.* (RJU 3;01)
1SG MOD_{obl} move DET bicycle right LOC
'I have to move the bicycle right here.'

Necessity modal

7) *A* *mos* *skid* *i* *oot.* (COL 2;08)
1SG MOD_{nec} skid 3SG out
'I must skid it out.'

Modal *wi*

8) *Di* *naïf* *wi* *kot* *yo.* (KEM 3;00)
DET knife MOD_{wi} cut 2SG
'The knife will cut you.'

Epistemic Modal

9) *I* *mosi* *niem* *sirop.* (ALA 2;11)
3SG MOD_{epis} name syrup
'Maybe it is named syrup.'

In keeping with Boland (2006) frequency in use of TMA markers does not show how productive they are, and as such qualitative analyses are needed. One such analysis is their variation with predicates. There is no general agreement however regarding the number of different predicates a marker must be used with to be considered productive. A criterion of two different

predicates is used in some research (Pizzuto & Caselli, 1994); however Boland (2006) posits that to be a very low standard and thereby sets his criterion to five different predicates. Since the criteria are quite arbitrary, we present two separate analyses, first assuming 2 predicates and then 5 predicates as a standard threshold. Tables 1 and 2 show the age at which the markers are used productively with 2 and 5 different predicates respectively.

Table 1
Use of modals with 2 different predicates

MODAL	COL	ALA	RJU	TYA	KEM	SHU
ABI/PER	2;3,30	2;3,8	2;0,30	2;11,0	2;7,5	2;5,18
OBL	-	2;6,12	3;0,25	-	3;1,15	3;0,28
NEC	-	2;7,18	3;0,25	-	-	3;0,0
EPIS	-	2;6,5	-	-	-	-
WI	2;4,15	2;5,23	2;6,18	-	2;8,19	2;11,3

Table 2
Use of modals with 5 different predicates

MODAL	COL	ALA	RJU	TYA	KEM	SHU
ABI/PER	2;5,14	2;5,7	2;2,0	2;11,28	2;7,20	2;6,4
OBL	-	2;7,18	-	-	3;1,28	3;1,26
NEC	-	2;9,14	-	-	-	3;1,12
EPIS	-	2;9,0	-	-	-	-
WI	2;6,10	2;9,28	2;7,28	-	3;0,10	-

Based on the individual variation and the sporadic occurrences of the modal elements in the corpus, the order in which the forms are productively used cannot be firmly established. It is clear that the ability/permission modal is the first to be produced and used productively by all the children acquiring JC, whether we assume the 2 or 5 predicates criterion. On the other hand, with the exception of ALA, the epistemic modal was never used productively regardless of the criterion adopted. A likely explanation put forward is the role of input: most modal expressions produced by parents to children are those related to permission and ability. Our data seems in line with this view: while there are 3922 (65%) child directed utterances using the ability/permission modals, the other categories are minimally attested, as demonstrated in Figure 2. There are only 714 (12%) cases of the obligation modal, 403 (7%) of the necessity modal, 340 (6%) of the epistemic modal and 679 (11%) modal *wi*. The data reveals a strong correlation coefficient of 0.9987 between the children's productions and the input. This minimal occurrence in the linguistic environment of certain modals may thus help to account for their sporadic production in acquisition.

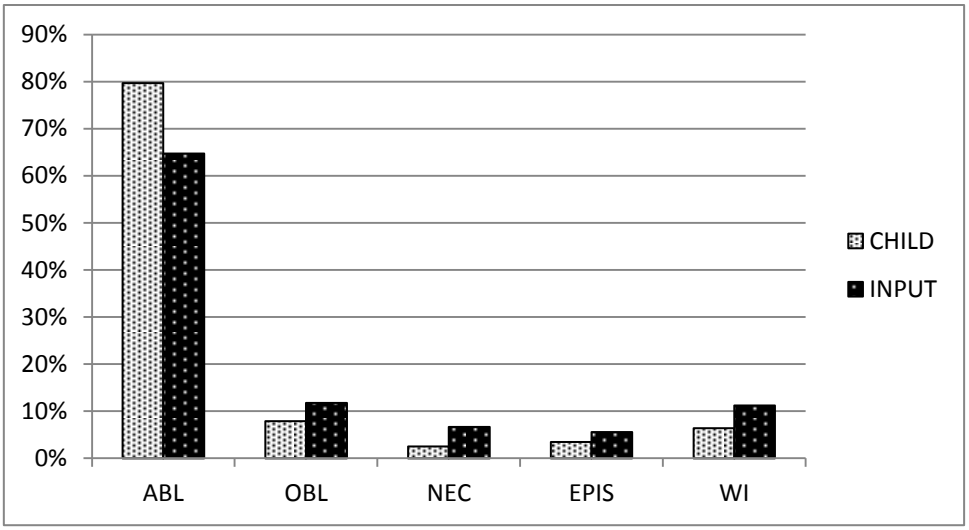


Figure 2. Distribution of Modality in Child Production and Input

The data in Figure 2 shows a striking correspondence between the distribution of the modals in the input and in the children's productions. With the exception of the ability/permission modal, the relative difference between the input data and the children's utterances ranges merely between 3% and 5%. The distribution of the ability/permission modal in the children's utterances is higher than that attested in the input, while all other modality markers are smaller[8]. This suggests that the ability/permission modal is indeed easier to acquire than the other modals, and hence is the first to emerge and to be productively used. We return to the role of input in the cumulative discussion of the entire TMA zone.
We will now turn our attention to the development of tense.

3.2. Acquisition of tense in JC

The data reveals 5765 occurrences of unmarked verbs with a past time interpretation as exemplified in (10), and 4404 unmarked verbs with a present interpretation as exemplified in (11).

10) *Moesha du dem.* (TYA 2;06)
Moesha do 3PL
'Moesha did them.'

11) *Ii av ii baik.* (KEM 2;09)
3SG have 3SG bike
'He has his bike.'

Based on the option of using the unmarked verb to express a past or present reading, the current data does not allow us to determine at what exact point children acquire the concept of tense. As the stativity of verbs is a major

[8] In keeping with the ideas of Boland (2006), we speculate that the production of the Ability/Permission modal is higher than the input because it is communicatively more relevant to the child.

indicator of time referent[9], the occurrence of the overt past marker will be checked in correlation with the stativity of the predicate. We see however that children rarely select the option of using the overt past tense markers, as of the 5836 utterances with a past time interpretation only 71 overtly marked past tense markers were found in the entire corpus as detailed in Table 3. The minimal use of the overt markers is expected, as these markers also occur rarely in the speech of adults (in line with Patrick, 2007).

Table 3
Production of Overt Past Tense Marker

AGE (Y;M)	COL	ALA	RJU	TYA	KEM	SHU
2;1.0	1	0	0	0	0	0
2;1.5	0	0	0	0	0	0
2;2.0	0	0	0	0	0	0
2;2.5	1	0	0	0	0	0
2;3.0	0	0	0	0	0	0
2;3.5	0	0	0	0	0	0
2;4.0	0	0	0	0	0	0
2;4.5	1	0	1	0	0	0
2;5.0	0	0	0	0	0	0
2;5.5	0	0	0	0	0	0
2;6.0	0	1	0	0	0	0
2;6.5	0	0	0	0	0	1
2;7.0	0	7	0	0	0	0
2;7.5	0	3	2	0	0	0
2;8.0	0	0	0	0	0	2
2;8.5	1	2	4	0	0	0
2;9.0	0	2	0	0	0	1
2;9.5	0	0	0	0	0	0
2;10.0	0	0	0	0	0	0
2;10.5	0	0	0	0	0	1
2;11.0	0	1	0	0	1	1
2;11.5	0	2	0	0	0	0
3;0.0	0	2	0	0	1	0
3;0.5	0	0	0	0	0	2
3;1.0	0	0	0	0	10	0
3;1.5	0	0	0	0	3	2
3;2.0	0	0	0	0	1	4
3;2.5	0	0	0	0	1	0
3;3.0	0	0	0	0	0	3
3;3.5	0	0	0	0	3	0
3;4.0	0	0	0	0	0	1
3;4.5	0	0	0	0	0	2
TOTAL	**4**	**20**	**7**	**0**	**20**	**20**

[9] Note that stativity alone does not allow one to freely interpret the verb as being past or present; such reading is dependent on various factors and constraints as was indicated in section 1.2.

The data reveals much individual variation with regards to the use of the overt markers: while there are 20 utterances by ALA, SHU, and KEM respectively, it is never attested in the production of TYA and virtually unattested in COL's and RJU's production. There are also variations in the age of the children regarding their first production of the overt past tense forms.

Closer examination of the data reveals that of the 71 overt past tense markers, 38 expressed past-progressive, as in (12) as compared to 33 which yielded a simple past/pluperfect interpretation, as in (13):

12) *Mi ben a kaal yo.* (KEM 3;00)
1SG PAST PROG call 2SG
'I was calling you.'

13) *A dis did kom an mi an.* (ALA 3;00)
FOC DEM PAST come on 1SG hand
'It is this that came/had come on my hand.'

Since it is only with stative verbs that the marker is obligatory to express past, we checked the correlation between the occurrence of the marker and the stativity of the main predicate. The findings revealed that, in line with the target language, the children acquiring JC did not overextend the use of the past tense marker to stative verbs in contexts requiring a non-past interpretation. Neither did children use the past tense marker inappropriately with non-stative verbs.

Presented in Tables 4 and 5 is the age where the past tense marker is used productively with 2 and 5 predicates respectively, both with a past progressive interpretation and in its bare form. It is shown that ALA is the first child to use the past-progressive marker productively in keeping with both the 2 and 5 predicate criterion, while it never gained productive use in COL's and TYA's productions. COL was the first informant to use the bare past productively based on the 2 predicate criterion, but except for KEM, its productive use is unattested with the 5 predicate threshold. We will return to a discussion of the combination of the overt past marker and the progressive aspect marker in section 3.4.1.

Table 4
Use of past tense with 2 different predicates

TENSE	COL	ALA	RJU	TYA	KEM	SHU
PAST-PROG	-	2;7,5	2;8,12	-	3;0,24	2;11,3
PAST	2;5,0	2;11,1	2;8,12	-	3;0,24	2;9,5

Table 5
Use of overt past tense with 5 different predicates

TENSE	COL	ALA	RJU	TYA	KEM	SHU
PAST-PROG	-	2;7,18	-	-	3;3,11	3;2,30
PAST	-	-	-	-	3;0,24	-

The huge individual variation and the limited production of the overt past tense markers do not allow an in-depth comparative analysis of the acquisition of the phenomenon in the present corpus. We will now examine aspects, the zone following tense in the functional hierarchy.

3.3. Acquisition of aspect in JC

Presented below are examples of target-consistent use of aspectual markers in the corpus:

Completive:

14) *Manski don iit fi ar aredi.* (RJU 2;11)
Manski COMP eat POSS 3SG already
'Manski already finished eating hers (completely).'

Progressive

15) *Mi a wash mi fut gud.* (TYA 2;08)
1SG PROG wash 1SG foot good
'I am washing my foot properly.'

Prospective:

16) *Mi a_go sliip now.* (KEM 2;06)
1SG PROS sleep now
'I am going to sleep now.'

Retrospective:

17) *Shi jos kaal mi.* (SHU 2;11)
3SG RETRO call 1SG
'She just called me.'

Detailed in Figure 3 is the total production of overt aspect markers unfolding the development of the aspectual zone in the corpus (individual production of aspectual markers is presented in Appendix 1, Tables 8 – 13). The data reveals that the progressive aspect marker *a* is the first to be produced, followed closely by the prospective *a_go*. We see a steady increase of overt markings of both the progressive and prospective aspectual markers as the age of the children increases. The production of the completive and retrospective markers appears to be more sporadic and individual variation is significant.

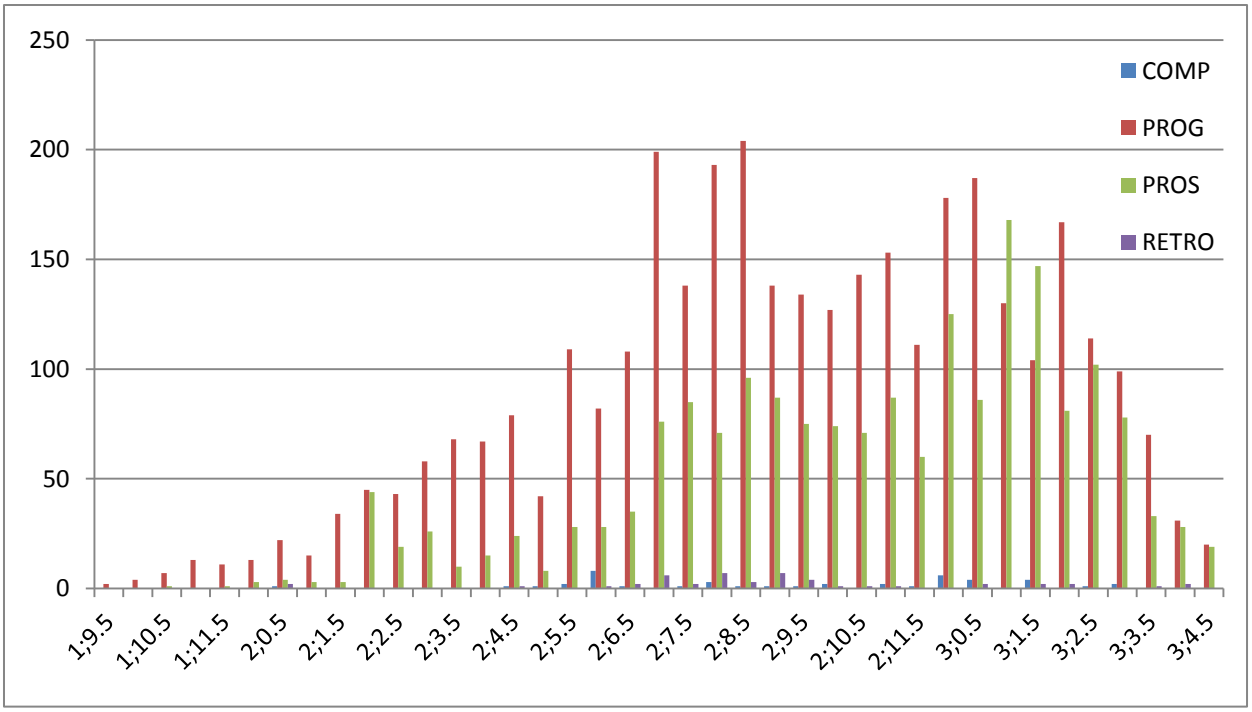


Figure 3. Total Production of Aspect Markers

Examining Figure 3 (the cumulative data presented in Appendix 1, Table 14), we see the following sequence in the order of first attestation in the corpus: $Asp_{progressive}$ (1;9.5) > $Asp_{prospective}$ (1;10.5) > $Asp_{completive}$ and $Asp_{retrospective}$ (2;0.5). The study revealed that the Progressive, Prospective, Completive and Retrospective Aspect were all attested in the corpus before 2;1, the point where the first overt Past Tense morpheme was attested. Using this as a benchmark, the data would seemingly support the 'Aspect before tense hypothesis' in keeping with Bloom et al. (1980). However given that we are unable to provide conclusive evidence as to when past tense is mastered (due to the past interpretation associated with bare non-stative verbs), it would be safer to conclude that aspect is overtly expressed before tense in children acquiring JC.

The data shows that the progressive aspect represents 63% (3462 of 5453 utterances) of the total number of overt aspectual markers produced followed by 35% (1901) prospective utterances. The production of the completive and retrospective markers (43 and 47 utterances respectively) together represents only 2% of the aspectual expressions in the corpus. Again in order not to rely solely on the frequency of use of the markers, we conducted a qualitative analysis of the variation in use of the markers. In table 6 and 7 we present the age at which the markers are used productively with 2 and 5 different predicates respectively. Using both thresholds, the data reveals that the progressive aspect is the first marker to be used productively by all participants, followed by the prospective.

Table 6
Use of Aspectual Markers with 2 different predicates

ASPECT	COL	ALA	RJU	TYA	KEM	SHU
RETRO	2;9,11	2;6,22	2;7,5	-	-	2;10,6
PROG	1;11,1	1;10,25	1;11,4	2;6,24	2;0,21	2;1,23
PROS	2;0,12	2;2,6	1;11,26	2;7,23	2;6,4	2;2,2
COMP	2;8,6	2;5,23	2;9,10	3;1,15	3;0,10	2;9,5

Table 7
Use of Aspectual Markers with 5 different predicates

ASPECT	COL	ALA	RJU	TYA	KEM	SHU
RETRO	-	2;8,1	-	-	-	3;1,12
PROG	1;11,12	2;1,5	2;0,19	2;8,8	2;1,21	2;2,2
PROS	2;0,28	2;3,24	2;1,15	2;10,2	2;6,20	2;2,11
COMP	-	-	2;11,11	-	-	3;0,0

Examining the data where the criterion for productive use is 2 predicates, we see that all the children, except for RJU, used the completive aspectual marker productively before the retrospective marker. This however does not hold for the 5 predicates criterion as only KEM and SHU demonstrated productive use of the completive aspect with 5 different verbs. On the other hand, the data reveals that ALA used the retrospective aspect productively in the 5 predicate criterion without demonstrating productive use of the completive aspectual marker. Regardless of the criterion employed, the retrospective aspects are yet to be used productively by TYA and KEM.

3.4. Cumulative development of the TMA zone

Although there is significant individual variation with the age of attestation of the various markers as demonstrated in the previous sections, the children show many similarities in the qualitative development of the TMA zone. To capture this developmental pattern we divided the corpus into phases on the basis of MLU[10]. For this analysis, we grouped the single word stage (MLU <1.49) and the two word combination stage (MLU 1.5 – 2.49) to form Phase 1 which corresponds to MLU under 2.5. For Phase 2, we presented utterances produced at MLU 2.5 - 3.49, and Phase 3 includes more complex combinations where MLU is 3.5 and over. Table 8 details Phase 1[11].

[10] The MLU is word based: both lexical and functional items are treated as individual words. The MLU for JC therefore differs from languages with morphologically complex words.
[11] No data is included for SHU at this phase as at the start of the recordings her MLU was already over 2.5.

Table 8
TMA Phase 1

PHASE 1

INFORMANT	COL	ALA	RJU	TYA	KEM	SHU	**TOTAL**
AGE RANGE	1;8,17 - 1;11,28	1;9,25 - 2;1,20	1;10,4 - 2;0,30	1;11,2 - 2;7,23	2;0,21 - 2;4,16	-	**1;8,17 - 2;7,23**
ASP COMP	0	0	0	1	0	-	**1**
ASP PROS	1	0	5	2	0	-	**8**
ASP PROG	25	24	10	4	20	-	**83**
ASP RETRO	0	0	0	0	0	-	**0**
MOD ABL	0	0	2	0	1	-	**3**
MOD OBL	0	0	0	0	0	-	**0**
MOD NEC	0	0	0	0	0	-	**0**
MOD EPIS	0	0	0	0	0	-	**0**
MOD *WI*	0	0	0	0	0	-	**0**
PAST TENSE	0	0	0	0	0	-	**0**
TOTAL	**26**	**24**	**17**	**7**	**21**	**0**	**95**

In phase 1 the main TMA marker used is the progressive (also attested in English, as demonstrated by Boland 2006). It is already used rather frequently, with the exception of TYA, who used it only 4 times (4.8% of the progressive aspectual marker in the corpus at this stage). The prospective aspect and ability modal is also used very sporadically. Only TYA has a single occurrence of the Completive marker in phase 1. The children however show a sharp increase in the number of TMA markers in phase 2 as detailed in Table 9 below. RJU's development is most extreme, showing an increase from 17 to 354 TMA expressions. KEM's development is much slower, moving from a total of 21 TMA expressions to only 38. Closer analysis of KEM's files reveals however that he did not remain at the second phase for very long, as after 4 recordings at this stage he has quickly advanced to an MLU over 3.5.

Table 9

TMA Phase 2

PHASE 2

INFORMANT	COL	ALA	RJU	TYA	KEM	SHU	**TOTAL**
AGE RANGE	2;0,12 - 2;6,25	2;2,6 - 2;5,7	2;1,15 - 2;6,18	2;8,8 - 2;10,16	2;5,2 - 2;6,20	2;1,23 - 2;6,20	**2;0,12 - 2;10,16**
ASP COMP	1	1	1	1	1	8	**13**
ASP PROS	42	14	117	8	9	46	**236**
ASP PROG	198	93	205	63	26	126	**711**
ASP RETRO	2	0	1	0	0	0	**3**
MOD ABL	12	14	24	1	2	14	**67**
MOD OBL	1	1	0	0	0	1	**3**
MOD NEC	0	0	0	0	0	0	**0**
MOD EPIS	0	0	1	0	0	0	**1**
MOD WI	6	1	4	0	0	1	**12**
PAST TENSE	2	0	1	0	0	0	**3**
TOTAL	**264**	**124**	**354**	**73**	**38**	**196**	**1049**

In phase 2, we note a significant increase in the use of the progressive markers, moving from 83 occurrences to 711. All children are now using the prospective markers; RJU being exceptionally advanced. The completive aspect is attested once in all the children's data, with the exception of SHU who produced it 8 times. Closer analysis of the 8 occurrences of the completive aspect marker in SHU's data reveals that it was not being used productively as it was restricted to a single verb in only one file. Also we see where the ability modal is used frequently by all children, with the exception of TYA and KEM who produced it only once and twice respectively. A new marker that is produced in this stage is the modal *wi.* It is sporadically produced by all children with the exception of TYA and KEM. The retrospective aspect, obligation modal, epistemic modal and past tense markers were sporadically produced while the necessity modal remained unattested.

In phase 3, (Table 10), MLU is now over 3.5 and there is a considerable increase in the use of TMA expressions, moving from a total of 1049 in phase 2 to 5292. The progressive aspect is still the marker that is predominately used, followed by the prospective aspect and the ability modal. We see a small increase in use of the other TMA markers however with much

individual variation. While all markers are produced at least once in each child's production, TYA is yet to produce a single retrospective aspect, epistemic modal or a past tense marker.

Table 10
TMA Phase 3

PHASE 3

INFORMANT	COL	ALA	RJU	TYA	KEM	SHU	**TOTAL**
AGE RANGE	2;7,8 - 2;11,7	2;5,23 - 3;0,15	2;7,5 - 3;0,25	2;11,0 - 3;2,15	2;7,5 - 3;3,11	2;7,16 - 3;4,13	**2;5,23-3;4,13**
ASP COMP	1	3	5	4	3	13	**29**
ASP PROS	90	221	381	181	694	237	**1804**
ASP PROG	172	631	234	141	935	408	**2521**
ASP RETRO	1	26	5	0	1	11	**44**
MOD ABL	109	187	98	56	124	113	**687**
MOD OBL	0	42	2	2	11	15	**72**
MOD NEC	1	5	3	2	1	12	**24**
MOD EPIS	0	29	0	0	2	1	**32**
MOD WI	1	8	10	1	27	2	**49**
PAST TENSE	1	6	3	0	14	6	**30**
TOTAL	**376**	**1158**	**741**	**387**	**1812**	**818**	**5292**

3.4.1. Co-occurrence of TMA markers

In examining the cumulative development of the TMA zone in JC we note that there are combinations of markers in the same utterance. It is our aim to study the sequence of the co-occurrence of the markers in order to account for the cartographic development[12] of the IP. We have already observed that the progressive marker is seen to co-occur with the overt past tense marker yielding a past progressive interpretation as exemplified in (18):

18) *Yo ben a jraiv i van?* (KEM 2;11)
2SG PAST PROG drive DET van
'Were you driving the van?'

The data reveals much individual variation with regards to the age of production and the frequency of this combination. However it should be noted that the production of this combination is 100% consistent with the cartographic hierarchy of the target system, in that the Tense marker is

[12] See Cinque & Rizzi (2010), Shlonsky (2010), Rizzi & Cinque (2016) for overviews of cartography within syntactic theory.

always realized before the Progressive marker. At no time did the children produce a combination where the Progressive marker was situated above the Tense marker.

Further analysis of the data reveals that other combinations of TMA markers were evident in the children's production. Past tense was seen to co-occur with the ability modal (19); the necessity modal co-occurred with progressive aspect (20); retrospective aspect co-occurred with completive aspect (21) and progressive aspect (22); and epistemic modal co-occurred with the obligation modal (23) and the prospective aspect (24).

19) *Im did kyaahn waak.* (RJU 2;08)
3SG PAST ABL~NEG walk
'He couldn't walk.'

20) *Ø mos a riid.* (RJU 2;08)
Ø NEC PROG read
'She must be reading.'

21) *Ø jos don bied.* (COL 2;00)
Ø RETRO COMP bathe
'I just finished having a bath.'

22) *Ø jos a kum bak.* (RJU 2;04)
Ø RETRO PROG come back
'He is just coming back.'

23) *A wuda afi get som jakit.* (ALA, 2;10)
1SG EPIS OBL get some jacket
'I would have to get some jacket.'

24) *Mosi im a_go jraiv di kyar.* (ALA 3;00)
EPIS 2SG PROS drive DET car
'Maybe he is going to drive the car.'

Due to the scarcity of co-occurrence of markers in the same phrase within the TMA zone, the data does not lend itself to a discussion on the relative sequence in which the combinations were produced. Apart from the co-occurrence of the past and progressive markers, other combinations are only sporadically attested. Nonetheless, in examining the combinations we note that they were all target-consistent. Recall the TMA zone in the target is as follows: *Epistemic modal > Past tense; Future tense > Necessity modal > Obligation modal > Ability/permission modal > Retrospective aspect > Progressive aspect > Prospective aspect > Completive aspect.* The children's production reveals that the combined markers all followed the order of the clausal hierarchy attested in the target language. At no time was a marker which is situated lower in the TMA zone seen to occur before a higher element. The following hierarchical development was demonstrated:

25) i. *Past tense > progressive aspect*

ii. *Past tense > ability/permission modal*

iii. *Necessity modal > progressive aspect*

iv. *Retrospective aspect > completive aspect*

v. *Retrospective aspect > progressive aspect*

vi. *Epistemic modal > obligatory modal*

vii. *Epistemic modal > prospective aspect*

The attested sequences outlined in (25) above confirm that children acquiring JC do not entertain the possibility of target-inconsistent orders in their development of TMA. Structures that are high in the clause are correctly combined with structures located in a lower domain. This target-consistent hierarchical development provides evidence that the child is knowledgeable of the rules governing combinations from an early age. We now examine the distribution of the markers in comparison to their distribution in the adult language.

3.5. Correlation of children's utterance with input data

In examining the data, we see that the markers in the input are basically stable across the three phases. This suggests that there is no 'fine tuning' by the adults to match properties of the child systems. The data also reveals that the use of the markers in the target language is skewed in the same direction as in the children's production. The proportion of progressive and prospective markers is much higher than other aspectual markers; likewise the ability/permission modal is used with much greater frequency than the other categories of modals. The following proportions, as demonstrated in Figure 4 (and detailed in Appendix 1, Tables 15 – 17), represent the distribution of TMA in the input throughout the 3 phases: progressive aspect[13] ~60%; prospective aspect ~16%; ability/permission modal ~12% and all others grouped together ~12%.

[13] The total proportion of progressive and prospective aspects is estimated based on actual calculations of a section of the dataset.

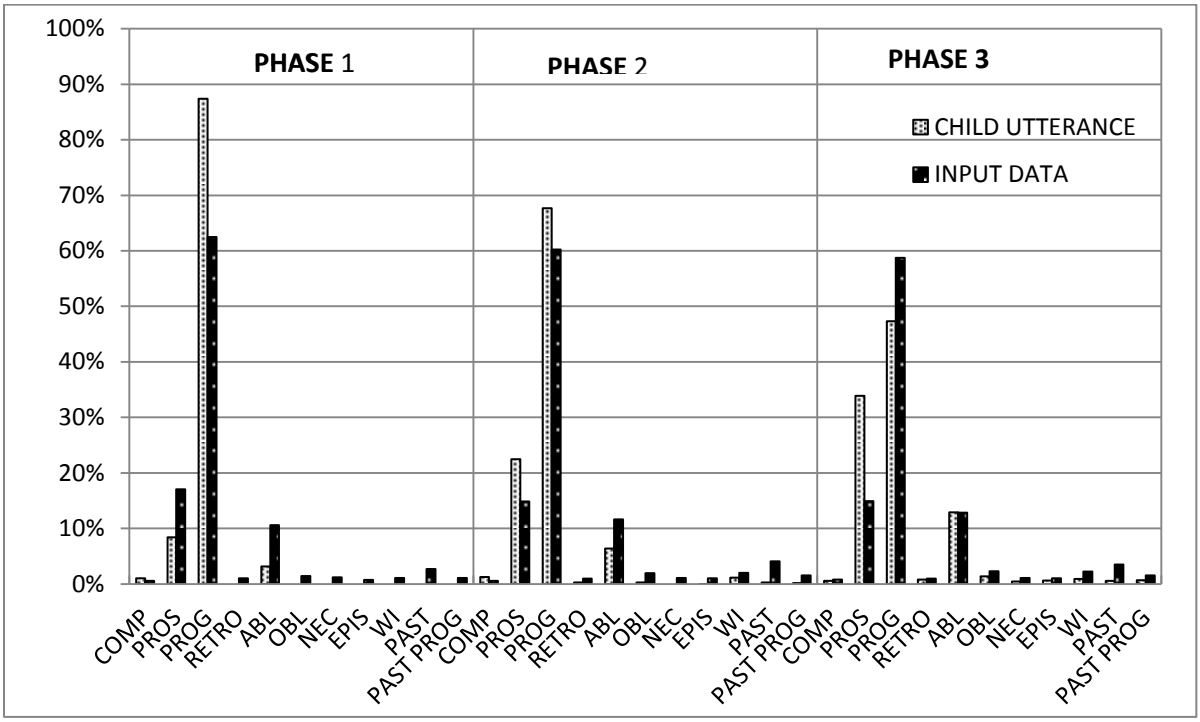


Figure 4. TMA in the input and in child production

Although there are high correlations across phases 1, 2 and 3 (0.9808, 0.9891 and 0.9121 respectively) between the distribution of the TMA markers in the input and in the child production, there are differences. In phase 1 the proportion of progressive aspects is larger than in the input while the prospective and ability/permission markers are lower. In phase 2 the proportion of both the progressive and prospective markers is larger than in the input. In stage 3 there is a great increase in the use of the prospective, a decrease in the use of the progressive and the proportion of ability/permission modal is equal to that in the input.

What immediately sticks out from this figure is the clear decreasing and increasing trends in the child utterance as compared to the stable proportions in the input data as shown in Figure 5 below. At Stage 1 the Progressive aspect was at 87% which was reduced to less than 68% at Stage 2 and continued to lessen to 47% at Stage 3. On the other hand, both the Prospective aspect and Ability/Permission modal increased, the Prospective from 8% to 22% and then to 34% and the Ability/Permission modal from 3% to 6% to 14%.

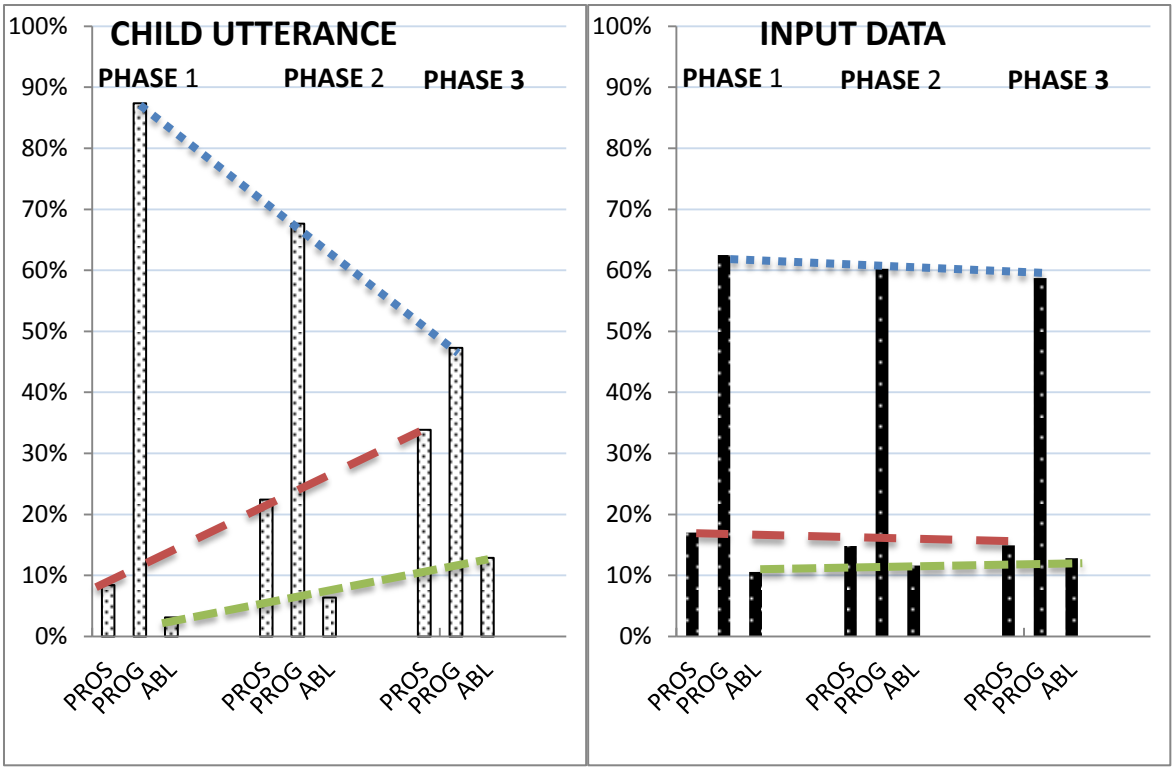


Figure 5. Differences of TMA in the input and in child production

The sharp contrast in the patterns attested in the child production and the input data gives strong support to the view that children are not merely copying the distribution of the input. The input may therefore have some influence on the distribution but, based on its relative uniformity across the three phases and the attested differences in the children's utterance, a parallel production of child directed speech and child speech does not seem to be supported. The input therefore, in and of itself, cannot account for the development of TMA markers in the child production. The main findings will be summarized and a supplementary analysis accounting for the data will be discussed in the next section.

4. Discussion

4.1. Sequence of Development

This section answers the following research question:

i. What is the sequence of development of tense, modal and aspectual markers?

The overall sequence for which the various overt morphemes were first attested in the IP zone and the order of productive use are presented in (26) and (27) respectively[14]:

26) $Asp_{progressive}$ (1;09) > $Asp_{prospective}$ (1;10) > $Mod_{ability/permission}$ (2;00) > $Asp_{completive}$ & $Asp_{retrospective}$ (2;01) > Tense (2;01) > Mod_{wi} (2;02) > $Mod_{epistemic}$ (2;04) > $Mod_{obligation}$ (2;04) > $Mod_{necessity}$ (2;06)

[14] The > sign reflects differences in days for markers which appear to be produced in the same month.

27) $Asp_{progressive}$ (1;10) > $Asp_{prospective}$ (1;11) > $Mod_{ability/permission}$ (2;0) > Mod_{wi} (2;04) > $Tense_{past}$ (2;05) > $Asp_{completive}$ (2;05) > $Mod_{epestemic}$ (2;06) > $Mod_{obligation}$ (2;06) > $Asp_{retrospective}$ (2;06) > $Mod_{necessity}$ (2;07)

In the target system only epistemic modals scope above Tense, thus giving the rise to the possible sequence *'shuda did +V'*, while all root modals and aspectual categories scope below it, as in *'did afi a + V'*. The difference in distribution between the modal types with regard to Tense is linked to the difference in semantic interpretation: modals above Tense are concerned with the speaker's deductions or opinions while those below Tense are strictly subject-oriented properties (Cinque 1999).
Examining the data, we see that the order of attestation and productive use of all the TMA markers in the inflectional zone is not directly predicted by the universal hierarchy. For example, since Root Modals scope over Aspects in the hierarchy, it would be plausible to expect the children to produce and productively use all the Aspectual markers (i.e. Completive, Progressive, Prospective, Retrospective) before producing Root Modals. This was however not borne out, as only the Progressive and Prospective markers were productively used before the productive use of the Permission/Ability Modal. In terms of production however, both Completive and Retrospective Aspects were attested at the same time as the Permission/Ability Modal. Similarly, with regard to Tense, we would expect that all Aspect and Root Modal markers would be produced and used productively before the productive use of Tense, since Tense scopes over these categories in the hierarchy. In line with our expectations, all Aspect markers were produced before Tense, thereby supporting the 'aspect before tense hypothesis'. Contrarily however, only the Ability/Permission Modal was produced before Tense was overtly realized. In terms of the productive use of the makers within these categories, only the Progressive and Prospective Aspects and the Ability/Permission Modal was used productively before the productive use of Tense. With regard to the Modal *wi* we see that it was also used productively before the productive use of Tense. Additionally, the data reveal that once children acquiring JC have TMA systems that contain epistemic modals (the highest element in the clausal hierarchy) they would also have aspectual elements (the lowest elements, located closest to the verb), thus supporting the literature that modality (or epistemic modality) is generally produced rather late (Radford, 1990; Brown, 1973; Kuczaj & Maratsos, 1975; among others reviewed in Papafragou, 1998).

4.2. Cartography of the inflectional zone

This section answers the following research question:
ii. Do children respect the functional hierarchal cartography of the inflectional zone?
With regards to the combination of the markers, despite the scarcity in the data, one major finding was revealed. Children acquiring JC are always target-consistent with respect to the sequence of utterance. In line with the rigid ordering of the cartographic analysis discussed earlier in section 1.5,

TMA elements which are located in higher clausal layers were never realized below elements which are lower in the clausal domain. This shows that children from an early age respect the rules governing the cartographic sequencing of the entire TMA zone.

4.3. Role of Input

The following research question is addressed in this section:

iii. Can input be responsible for developments in child language acquisition?

It appears that the acquisition order may be influenced by the input as the distributions of both are skewed in a similar direction. The categories of progressive aspects, prospective aspects and ability/permission modals are proportionally larger than all other TMA categories. However the fact that children initially produce more progressive aspectual markers and less prospective aspectual markers and ability/permission modals than in the input shows that children do not exactly copy the distribution of the input, and as such the input alone cannot account for the attested order. Clearly, the decreasing proportion of progressive aspect from phase 1 to phase 3, and the increasing proportion of prospective aspect and ability/permission modals, must follow some internal pressure in the child system, rather than being caused by an input which remains constant.

4.4. Maturation or Continuity

This section addresses the last research question:

iv. Which approach, maturational or continuity, best accounts for language development in line with the theory of Universal Grammar?

The data shows that all the children start building the aspectual zone with the following structure: $Asp_{progressive}$ > $Asp_{prospective}$ > $Mod_{ability/permission}$, but individual variation is evidenced thereafter. On the basis of sequence of productive development of TMA markers, the hypothesis that structure emerges overtime incrementally in a bottom-up manner may be too absolute and cannot account for the current findings. If children were building the functional hierarchy according to a strict bottom-up approach, we would expect all the root modals and the aspectual markers to be attested and used productively before the productive use of Tense. The data therefore does not lend support to the 'incremental structure building approach' to language development. Additionally, the study reveals that children from an early age are aware of the rules governing the cartographic sequencing of the entire TMA zone. The target-consistent combination of structures attested at different clausal levels argues in favour of a full competence approach to the development of the cartographic sequence. In accounting for the relative order attested in the children's development of the TMA zone, we propose that all the structure is available from the start of production in line with the full competence hypothesis.

An obvious question is why some markers are more productively used than others, since all the structure is available to the child? We propose that children are apparently aware that not all markers are obligatory and hence their low attestation, in line with the input data. But why is the progressive marker the first to be acquired and used productively? This, we argue, is due

to semantic reasons. According to Brown & Bellugi (1964) children primarily communicate about the 'here-and-now', and as such initially acquire only the forms they need to do so. Progressives refer to here-and-now and are used in describing ongoing activities. In keeping with Boland (2006), operators that are communicatively more relevant and are cognitively less complex are easier to acquire. The analysis of the input shows where the progressive aspect is the most dominant TMA element in the communication of young children and as such is most relevant in their early development, hence acquired first.

5. Conclusion

The analysis of the spontaneous speech of children acquiring the TMA system in JC showed that the ability/permission modal was the first modal to be produced and used productively. The other modals were very sparse in the dataset and individual variation was significant. We saw that children rarely explored the option of overtly marking the verb for past tense and as such conclusive evidence could not be established regarding the development of the overt past tense marker. The progressive and prospective aspect markers were the first and most robust aspectual markers produced and used productively. The data shows that the bottom-up structure building approach cannot account for the fine-grained development of the TMA zone in JC as children do not acquire all aspectual markers before root modals and tense, nor do they acquire all root modals before epistemic modals. The empirical finding that children never produce target-inconsistent TMA combinations provides evidence that children acquiring JC are consistent with the cartographic structure of the entire TMA domain from an early age, thus leaning towards a 'full competence approach' to development. Additionally, the striking correlation between the distribution of the TMA markers and the input data, in and of itself, cannot account for the attested development patterns as there are also significant differences and clear developmental patterns which are not matched by changes in the input data.

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Appendices

Appendix 1: Tables

Table 1
COL Modal Production

COL

AGE(Y;M,D)	ABL	OBL	NEC	EPIS	WI
1;8,17	0	0	0	0	0
1;8,27	0	0	0	0	0
1;9,17	0	0	0	0	0
1;9,28	0	0	0	0	0
1;10,8	0	0	0	0	0
1;11,1	0	0	0	0	0
1;11,12	0	0	0	0	0
1;11,28	0	0	0	0	0
2;0,12	0	0	0	0	0
2;0,28	0	0	0	0	0
2;1,14	0	0	0	0	0
2;2,0	0	0	0	0	0
2;2,16	0	0	0	0	0
2;3,1	0	0	0	0	0
2;3,16	1	0	0	0	0
2;3,30	1	0	0	0	1
2;4,15	0	0	0	0	1
2;5,0	0	0	0	0	0
2;5,14	8	1	0	0	1
2;5,27	1	0	0	0	0
2;6,10	0	0	0	0	3
2;6,25	1	0	0	0	0
2;7,8	5	0	0	0	0
2;7,22	1	0	0	0	1
2;8,6	2	0	1	0	0
2;8,20	31	0	0	0	0
2;9,11	2	0	0	0	0
2;9,24	7	0	0	0	0
2;10,10	13	0	0	0	0
2;10,21	18	0	0	0	0
2;11,7	30	0	0	0	0
TOTAL	**121**	**1**	**1**	**0**	**7**

Table 2
ALA Modal Production

ALA

AGE(Y;M,D)	ABL	OBL	NEC	EPIS	WI
1;9,25	0	0	0	0	0
1;10,4	0	0	0	0	0
1;10,25	0	0	0	0	0
1;11,5	0	0	0	0	0
1;11,16	0	0	0	0	0
2;0,9	0	0	0	0	0
2;0,20	0	0	0	0	0
2;1,5	0	0	0	0	0
2;1,20	0	0	0	0	0
2;2,6	0	0	0	0	0
2;2,22	0	0	0	0	1
2;3,8	3	0	0	0	0
2;3,24	1	0	0	0	0
2;4,9	1	0	0	0	0
2;4,24	0	1	0	0	0
2;5,7	9	0	0	0	0
2;5,23	7	0	0	1	1
2;6,12	2	1	0	0	0
2;6,22	1	1	1	0	0
2;7,5	9	0	0	1	0
2;7,18	7	3	3	3	0
2;8,2	11	5	0	0	0
2;8,16	22	0	0	2	1
2;9,0	7	5	0	2	1
2;9,14	30	0	1	0	1
2;9,28	19	5	0	1	1
2;10,25	18	4	0	1	1
2;11,1	22	0	0	1	0
2;11,18	10	4	0	6	0
3;0,1	5	3	0	5	2
3;0,15	17	11	0	6	0
TOTAL	**201**	**43**	**5**	**29**	**9**

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Table 3
RJU Modal Production

RJU

AGE(Y;M,D)	ABL	OB	NE	EPI	W
1;10,4	0	0	0	0	0
1;10,14	0	0	0	0	0
1;11,4	0	0	0	0	0
1;11,15	0	0	0	0	0
1;11,26	1	0	0	0	0
2;0,19	0	0	0	0	0
2;0,30	1	0	0	0	0
2;1,15	3	0	0	0	0
2;2,0	2	0	0	0	0
2;2,16	0	0	0	0	0
2;3,1	1	0	0	0	2
2;3,18	5	0	0	0	1
2;4,4	0	0	0	1	0
2;4,19	1	0	0	0	0
2;5,3	1	0	0	0	0
2;5,17	1	0	0	0	0
2;6,2	5	0	0	0	0
2;6,18	5	0	0	0	1
2;7,5	12	0	0	0	1
2;7,15	10	0	0	0	1
2;7,28	6	0	0	0	3
2;8,12	16	0	0	0	1
2;8,26	10	0	1	0	0
2;9,10	7	0	0	0	0
2;9,24	4	0	0	0	0
2;10,7	2	0	0	0	0
2;10,29	5	0	0	0	0
2;11,11	1	0	0	0	0
2;11,25	7	1	0	0	2
3;0,11	6	0	0	0	0
3;0,25	12	1	2	0	2
TOTAL	**124**	**2**	**3**	**1**	**1**

Table 4
TYA Modal Production

TYA

AGE(Y;M,D)	ABL	OBL	NEC	EPIS	WI
1;11,25	0	0	0	0	0
2;0,4	0	0	0	0	0
2;0,25	0	0	0	0	0
2;1,5	0	0	0	0	0
2;1,16	0	0	0	0	0
2;2,9	0	0	0	0	0
2;2,20	0	0	0	0	0
2;3,5	0	0	0	0	0
2;3,20	0	0	0	0	0
2;4,6	0	0	0	0	0
2;4,22	0	0	0	0	0
2;5,8	0	0	0	0	0
2;5,24	0	0	0	0	0
2;6,9	0	0	0	0	0
2;6,24	0	0	0	0	0
2;7,7	0	0	0	0	0
2;7,23	0	0	0	0	0
2;8,8	0	0	0	0	0
2;8,22	0	0	0	0	0
2;9,5	0	0	0	0	0
2;9,18	0	0	0	0	0
2;10,2	1	0	0	0	0
2;10,16	0	0	0	0	0
2;11,0	4	0	0	0	0
2;11,14	0	0	2	0	0
2;11,28	7	0	0	0	0
3;0,19	0	0	0	0	0
3;1,1	10	0	0	0	1
3;1,15	11	1	0	0	0
3;2,1	8	0	0	0	0
3;2,15	16	1	0	0	0
TOTAL	**57**	**2**	**2**	**0**	**1**

Table 5
KEM Modal Production

KEM

AGE(Y;M,D)	ABL	OBL	NEC	EPIS	WI
2;0,21	0	0	0	0	0
2;1,0	0	0	0	0	0
2;1,21	1	0	0	0	0
2;2,1	0	0	0	0	0
2;2,12	0	0	0	0	0
2;3,5	0	0	0	0	0
2;3,16	0	0	0	0	0
2;4,1	0	0	0	0	0
2;4,16	0	0	0	0	0
2;5,2	0	0	0	0	0
2;5,18	0	0	0	0	0
2;6,4	0	0	0	0	0
2;6,20	2	0	0	0	0
2;7,5	21	0	0	0	0
2;7,20	5	0	0	0	0
2;8,3	0	0	0	0	1
2;8,19	0	0	0	0	1
2;9,4	0	0	0	1	0
2;9,18	4	1	0	0	2
2;10,1	4	0	0	0	0
2;10,14	9	0	0	1	0
2;10,29	7	0	0	0	2
2;11,12	4	0	0	0	0
2;11,26	17	0	0	0	1
3;0,10	2	0	1	0	1
3;0,24	3	1	0	0	3
3;1,15	11	2	0	0	3
3;1,28	22	4	0	0	5
3;2,11	10	2	0	0	4
3;2,25	5	1	0	0	4
3;3,11	0	0	0	0	0
TOTAL	**127**	**11**	**1**	**2**	**27**

Table 6
SHU Modal Production

SHU

AGE(Y;M,D)	ABL	OBL	NEC	EPIS	WI
2;1,23	0	0	0	0	0
2;2,2	0	0	0	0	0
2;2,11	0	0	0	0	0
2;3,3	0	0	0	0	0
2;3,14	1	0	0	0	0
2;4,7	0	0	0	0	0
2;4,18	0	0	0	0	0
2;5,3	0	0	0	0	0
2;5,18	8	0	0	0	0
2;6,4	4	1	0	0	0
2;6,20	1	0	0	0	1
2;7,16	5	0	0	0	1
2;7,22	4	0	0	0	0
2;8,7	7	0	0	0	0
2;8,22	3	0	0	0	0
2;9,5	2	0	0	0	0
2;9,21	4	0	0	0	0
2;10,6	1	0	0	0	0
2;10,20	1	0	0	0	0
2;11,3	1	0	0	0	1
2;11,16	4	0	1	0	0
3;0,0	7	0	1	1	0
3;0,19	6	0	1	0	0
3;0,28	4	2	1	0	0
3;1,12	1	1	1	0	0
3;1,26	18	2	3	0	0
3;2,17	7	0	0	0	0
3;2,30	19	2	2	0	0
3;3,16	1	2	1	0	0
3;3,27	11	2	0	0	0
3;4,13	7	4	1	0	0
TOTAL	**127**	**16**	**12**	**1**	**3**

Table 7
Total production of Modality

TOTAL MODALS					
AGE(Y;M)	ABL	OBL	NEC	EPIS	WI
1;8.0	0	0	0	0	0
1;8.5	0	0	0	0	0
1;9.0	0	0	0	0	0
1;9.5	0	0	0	0	0
1;10.0	0	0	0	0	0
1;10.5	0	0	0	0	0
1;11.0	0	0	0	0	0
1;11.5	0	0	0	0	0
2;0.0	1	0	0	0	0
2;0.5	0	0	0	0	0
2;1.0	1	0	0	0	0
2;1.5	4	0	0	0	0
2;2.0	2	0	0	0	0
2;2.5	0	0	0	0	1
2;3.0	5	0	0	0	2
2;3.5	8	0	0	0	2
2;4.0	1	0	0	1	1
2;4.5	1	1	0	0	0
2;5.0	18	1	0	0	1
2;5.5	17	0	0	1	1
2;6.0	11	2	0	0	3
2;6.5	10	1	1	0	2
2;7.0	52	0	0	1	2
2;7.5	27	3	3	3	2
2;8.0	26	5	1	0	4
2;8.5	72	0	0	2	3
2;9.0	21	5	1	3	1
2;9.5	52	1	1	0	3
2;10.0	42	5	0	1	1
2;10.5	48	4	0	2	1
2;11.0	69	0	0	1	3
2;11.5	19	4	3	6	0
3;0.0	43	4	1	6	5
3;0.5	31	11	2	6	1
3;1.0	29	4	3	0	6
3;1.5	23	4	1	0	3
3;2.0	48	6	3	0	5
3;2.5	33	3	0	0	4
3;3.0	24	3	2	0	4
3;3.5	1	2	1	0	0
3;4.0	11	2	0	0	0
3;4.5	7	4	1	0	0
TOTAL	**757**	**75**	**24**	**33**	**61**

Table 8
COL's Aspectual Production

COL				
AGE(Y;M,D)	COMP	PROG	PROS	RETRO
1;8,17	0	0	0	0
1;8,27	0	0	0	0
1;9,17	0	0	0	0
1;9,28	0	2	0	0
1;10,8	0	3	0	0
1;11,1	0	6	1	0
1;11,12	0	4	0	0
1;11,28	0	10	0	0
2;0,12	0	8	2	0
2;0,28	1	10	4	2
2;1,14	0	7	0	0
2;2,0	0	3	0	0
2;2,16	0	16	3	0
2;3,1	0	13	1	0
2;3,16	0	6	4	0
2;3,30	0	15	1	0
2;4,15	0	22	10	0
2;5,0	0	25	5	0
2;5,14	0	9	0	0
2;5,27	0	9	3	0
2;6,10	0	5	3	0
2;6,25	0	50	6	0
2;7,8	0	27	10	0
2;7,22	0	12	3	0
2;8,6	1	18	4	0
2;8,20	0	40	17	0
2;9,11	0	11	9	1
2;9,24	0	6	2	0
2;10,10	0	21	29	0
2;10,21	0	18	7	0
2;11,7	0	19	9	0
TOTAL	**2**	**395**	**133**	**3**

Table 9
ALA's Aspectual Production

ALA				
AGE(Y;M,D)	COMP	PROG	PROS	RETRO
1;9,25	0	0	0	0
1;10,4	0	1	0	0
1;10,25	0	1	0	0
1;11,5	0	6	0	0
1;11,16	0	1	0	0
2;0,9	0	4	0	0
2;0,20	0	3	0	0
2;1,5	0	3	0	0
2;1,20	0	5	0	0
2;2,6	0	3	3	0
2;2,22	0	9	3	0
2;3,8	0	5	0	0
2;3,24	0	20	2	0
2;4,9	0	11	0	0
2;4,24	1	33	5	0
2;5,7	0	12	1	0
2;5,23	2	62	6	0
2;6,12	0	17	4	1
2;6,22	0	13	7	2
2;7,5	0	50	2	5
2;7,18	0	47	17	0
2;8,2	0	81	27	7
2;8,16	0	62	26	1
2;9,0	0	37	15	6
2;9,14	0	43	7	3
2;9,28	0	47	10	0
2;10,25	0	51	14	1
2;11,1	0	20	11	0
2;11,18	0	25	12	0
3;0,1	0	25	23	0
3;0,15	1	51	40	0
TOTAL	**4**	**748**	**235**	**26**

Table 10
RJ's Aspectual Production

RJU				
AGE(Y;M,D)	COMP	PROG	PROS	RETRO
1;10,4	0	0	0	0
1;10,14	0	0	0	0
1;11,4	0	3	0	0
1;11,15	0	0	1	0
1;11,26	0	1	1	0
2;0,19	0	3	0	0
2;0,30	0	3	3	0
2;1,15	0	18	2	0
2;2,0	0	11	31	0
2;2,16	0	11	8	0
2;3,1	0	29	21	0
2;3,18	0	14	2	0
2;4,4	0	25	4	0
2;4,19	0	14	11	1
2;5,3	1	18	7	0
2;5,17	0	17	15	0
2;6,2	0	36	5	0
2;6,18	0	12	11	0
2;7,5	0	84	26	1
2;7,15	0	26	29	2
2;7,28	0	19	14	0
2;8,12	0	38	18	2
2;8,26	0	33	8	0
2;9,10	1	24	18	0
2;9,24	1	17	14	0
2;10,7	0	21	21	0
2;10,29	1	11	7	0
2;11,11	1	19	9	0
2;11,25	1	23	50	0
3;0,11	0	35	15	0
3;0,25	0	31	5	0
TOTAL	**6**	**596**	**356**	**6**

Table 11
TYA's Aspectual Production

TYA				
AGE(Y;M,D)	COMP	PROG	PROS	RETRO
1;11,25	0	0	0	0
2;0,4	0	0	0	0
2;0,25	0	0	0	0
2;1,5	0	1	0	0
2;1,16	0	0	0	0
2;2,9	0	0	0	0
2;2,20	0	0	0	0
2;3,5	0	0	0	0
2;3,20	0	0	0	0
2;4,6	0	0	0	0
2;4,22	0	0	0	0
2;5,8	0	0	0	0
2;5,24	0	0	1	0
2;6,9	0	0	0	0
2;6,24	0	2	0	0
2;7,7	0	0	0	0
2;7,23	1	1	1	0
2;8,8	1	21	0	0
2;8,22	0	7	2	0
2;9,5	0	8	0	0
2;9,18	0	1	0	0
2;10,2	0	14	3	0
2;10,16	0	12	3	0
2;11,0	0	18	5	0
2;11,14	0	16	7	0
2;11,28	0	25	3	0
3;0,19	0	1	0	0
3;1,1	0	16	65	0
3;1,15	4	11	69	0
3;2,1	0	36	12	0
3;2,15	0	18	20	0
TOTAL	**6**	**208**	**191**	**0**

Table 12
KEM's Aspectual Production

KEM				
AGE(Y;M,D)	COMP	PROG	PROS	RETRO
2;0,21	0	6	0	0
2;1,0	0	1	0	0
2;1,21	0	1	0	0
2;2,1	0	2	0	0
2;2,12	0	0	0	0
2;3,5	0	0	0	0
2;3,16	0	1	0	0
2;4,1	0	6	0	0
2;4,16	0	3	0	0
2;5,2	0	1	0	0
2;5,18	0	3	1	0
2;6,4	0	3	3	0
2;6,20	1	19	5	0
2;7,5	0	27	35	0
2;7,20	0	41	29	0
2;8,3	0	42	18	0
2;8,19	0	41	27	0
2;9,4	0	40	50	0
2;9,18	0	41	22	0
2;10,1	0	15	9	0
2;10,14	0	38	25	0
2;10,29	0	61	47	0
2;11,12	0	35	24	0
2;11,26	0	69	37	0
3;0,10	1	62	19	0
3;0,24	0	60	61	0
3;1,15	0	69	67	1
3;1,28	0	76	56	0
3;2,11	1	80	69	0
3;2,25	1	79	68	0
3;3,11	0	59	31	0
TOTAL	**4**	**981**	**703**	**1**

Table 13
SHU's Aspectual Production

SHU				
AGE(Y;M,D)	COMP	PROG	PROS	RETRO
2;1,23	0	7	1	0
2;2,2	0	13	7	0
2;2,11	0	10	7	0
2;3,3	0	18	1	0
2;3,14	0	18	5	0
2;4,7	0	3	1	0
2;4,18	0	4	3	0
2;5,3	0	2	0	0
2;5,18	0	18	2	0
2;6,4	8	21	13	0
2;6,20	0	12	6	0
2;7,16	0	11	3	0
2;7,22	0	11	6	0
2;8,7	1	12	8	0
2;8,22	1	16	6	0
2;9,5	1	9	5	0
2;9,21	0	19	26	1
2;10,6	1	13	9	1
2;10,20	0	3	1	0
2;11,3	1	24	8	1
2;11,16	0	16	8	0
3;0,0	5	36	12	0
3;0,19	2	38	12	2
3;0,28	0	23	37	0
3;1,12	0	24	11	1
3;1,26	0	55	13	2
3;2,17	0	16	13	0
3;2,30	1	20	10	0
3;3,16	0	11	2	1
3;3,27	0	31	28	2
3;4,13	0	20	19	0
TOTAL	**21**	**534**	**283**	**11**

TOTAL ASPECT

AGE (Y;M)	COMP	PROG	PROS	RETRO
1;8.0	0	0	0	0
1;8.5	0	0	0	0
1;9.0	0	0	0	0
1;9.5	0	2	0	0
1;10.0	0	4	0	0
1;10.5	0	7	1	0
1;11.0	0	13	0	0
1;11.5	0	11	1	0
2;0.0	0	13	3	0
2;0.5	0	22	4	0
2;1.0	1	15	3	2
2;1.5	0	34	3	0
2;2.0	0	45	44	0
2;2.5	0	43	19	0
2;3.0	0	58	26	0
2;3.5	0	68	10	0
2;4.0	0	67	15	0
2;4.5	1	79	24	1
2;5.0	1	42	8	0
2;5.5	2	109	28	0
2;6.0	8	82	28	1
2;6.5	1	108	35	2
2;7.0	0	199	76	6
2;7.5	1	138	85	2
2;8.0	3	193	71	7
2;8.5	1	204	96	3
2;9.0	1	138	87	7
2;9.5	1	134	75	4
2;10.0	2	127	74	1
2;10.5	0	143	71	1
2;11.0	2	153	87	1
2;11.5	1	111	60	0
3;0.0	6	178	125	0
3;0.5	4	187	86	2
3;1.0	0	130	168	0
3;1.5	4	104	147	2
3;2.0	0	167	81	2
3;2.5	1	114	102	0
3;3.0	2	99	78	0
3;3.5	0	70	33	1
3;4.0	0	31	28	2
3;4.5	0	20	19	0
TOTAL	**43**	**3462**	**1901**	**47**

Table 14
Total production of Aspect

Table 15
Input to Phase 1

INPUT TO PHASE 1

INFORMANT	COL	ALA	RJU	TYA	KEM	SHU	**TOTAL**
AGE RANGE	1;8,17 - 1;11,28	1;9,25 - 2;1,20	1;10,4- 2;0,30	1;11,25 - 2;7,23	2;0,21 - 2;4,16	-	**1;8,17 - 2;7,23**
ASP COMP	3	8	17	12	10	-	**50**
ASP PROS	200	276	207	597	272	-	**1552**
ASP PROG	964	970	850	1855	1048	-	**5687**
ASP RETRO	9	19	18	31	14	-	**91**
MOD ABL	147	202	155	321	140	-	**965**
MOD OBL	15	28	22	33	34	-	**132**
MOD NEC	26	30	4	33	18	-	**111**
MOD EPIS	18	5	5	24	14	-	**66**
MOD *WI*	6	15	16	17	45	-	**99**
PAST TENSE	34	63	22	91	35	-	**245**
PAST PROG	10	30	16	23	22	-	**101**
TOTAL	**1432**	**1646**	**1332**	**3037**	**1652**	**0**	**9099**

Table 16
Input to Phase 2

INPUT TO PHASE 2

INFORMANT	COL	ALA	RJU	TYA	KEM	SHU	**TOTAL**
AGE RANGE	2;0,12 - 2;6,25	2;2,6 - 2;5,7	2;1,15 - 2;6,18	2;8,8 - 2;10,16	2;5,2 - 2;6,20	2;1,23 - 2;6,20	**2;0,12 - 2;10,16**
ASP COMP	10	5	13	8	5	17	**58**
ASP PROS	351	215	326	211	121	318	**1542**
ASP PROG	1687	755	1336	655	466	1358	**6257**
ASP RETRO	20	27	20	6	6	23	**102**
MOD ABL	239	229	335	106	66	236	**1211**
MOD OBL	44	41	37	17	10	55	**204**
MOD NEC	22	22	14	5	12	37	**112**
MOD EPIS	22	26	28	9	6	15	**106**
MOD WI	46	28	88	10	13	23	**208**
PAST TENSE	109	81	106	37	12	80	**425**
PAST PROG	27	34	43	13	20	24	**161**
TOTAL	**2577**	**1463**	**2346**	**1077**	**737**	**2186**	**10386**

Table 17
Input to Phase 3

INPUT TO PHASE 3							
INFORMANT	COL	ALA	RJU	TYA	KEM	SHU	**TOTAL**
AGE RANGE	2;7,8 - 2;11,7	2;5,23 - 3;0,15	2;7,5 - 3;0,25	2;11,0 - 3;2,15	2;7,5 - 3;3,11	2;7,16 - 3;4,13	**2;5,23-3;4,13**
ASP COMP	9	24	24	14	29	36	**136**
ASP PROS	225	460	385	281	544	578	**2473**
ASP PROG	1084	1617	1578	873	2097	2469	**9718**
ASP RETRO	9	53	16	14	23	47	**162**
MOD ABL	217	421	330	197	487	475	**2127**
MOD OBL	40	89	38	27	62	122	**378**
MOD NEC	10	42	13	15	41	59	**180**
MOD EPIS	16	43	23	20	27	39	**168**
MOD WI	29	71	87	6	110	69	**372**
PAST TENSE	58	156	99	23	132	113	**581**
PAST PROG	18	58	83	7	42	44	**252**
TOTAL	**1715**	**3034**	**2676**	**1477**	**3594**	**4051**	**16547**