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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.

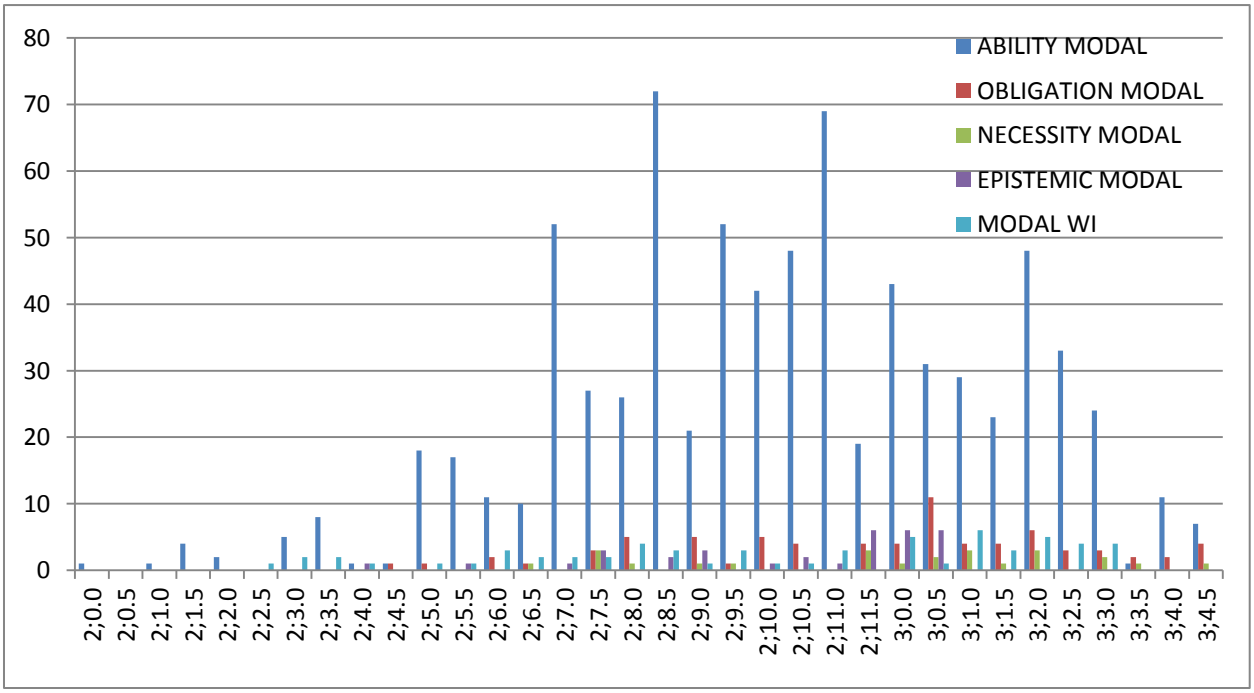

Figure 1. Total production of modals

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.

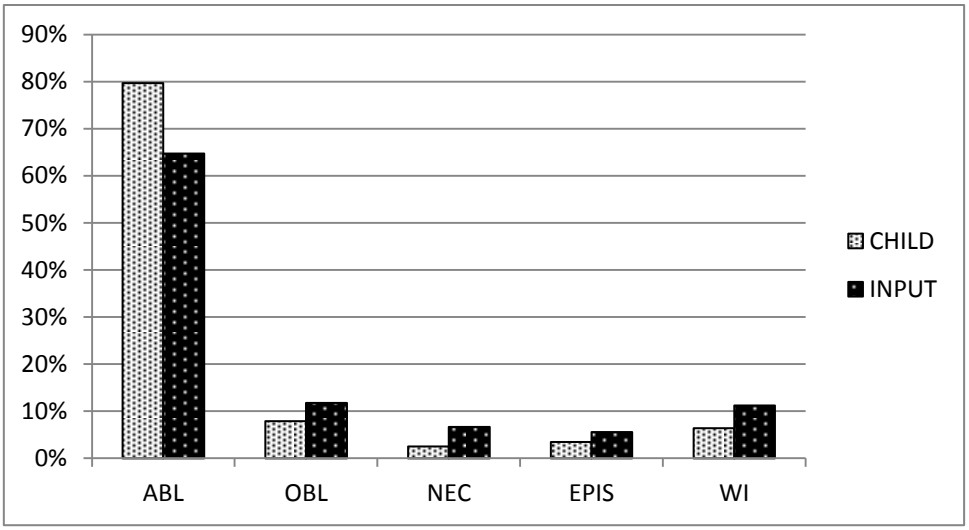

Figure 2. Distribution of Modality in Child Production and Input

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.

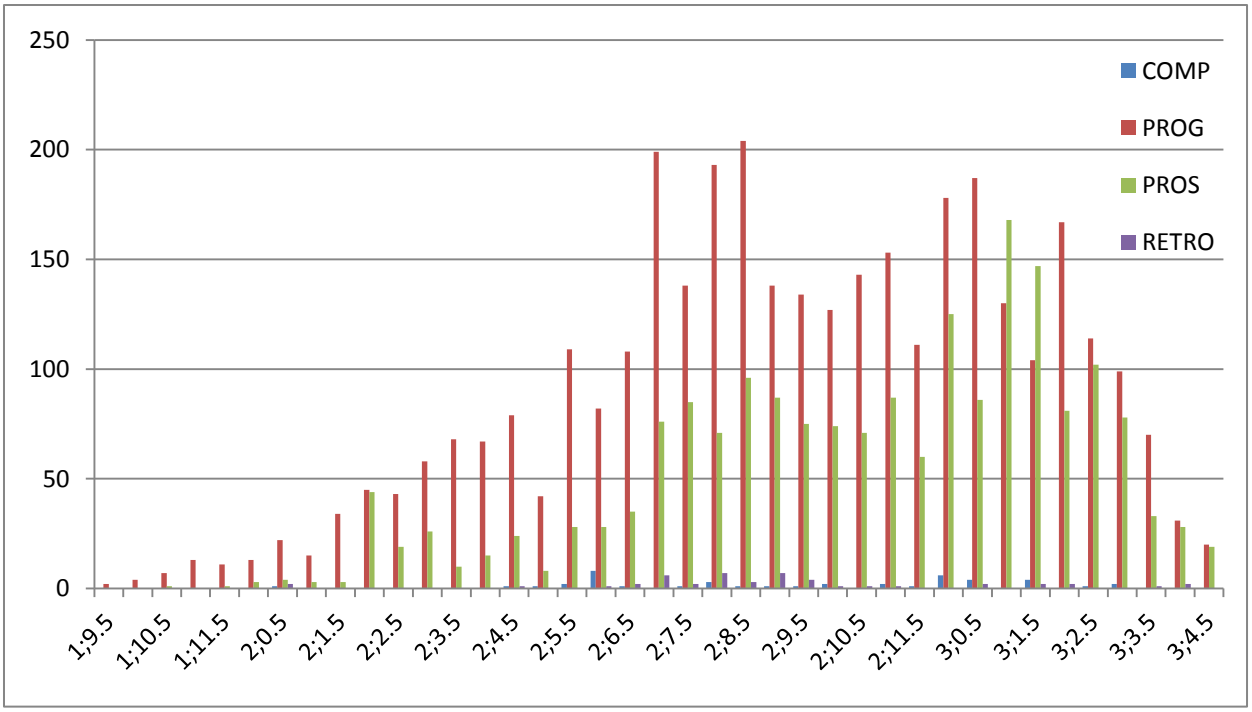

Figure 3. Total Production of Aspect Markers

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.

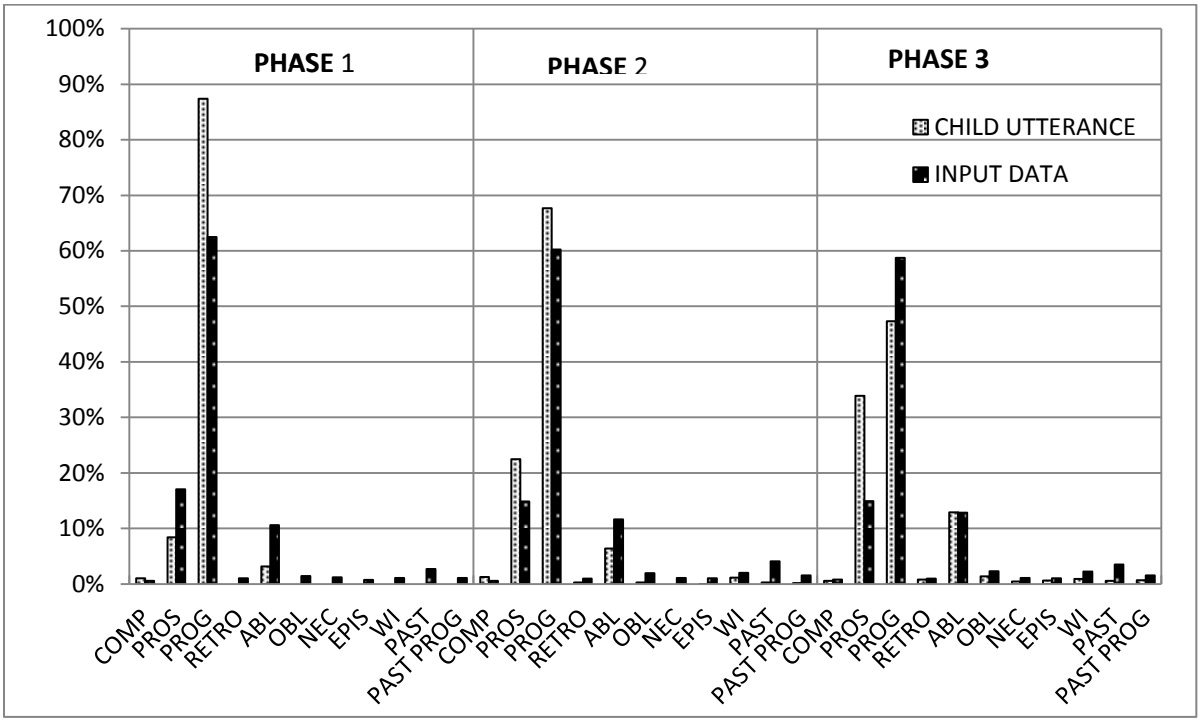

Figure 4. TMA in the input and in child production

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%.

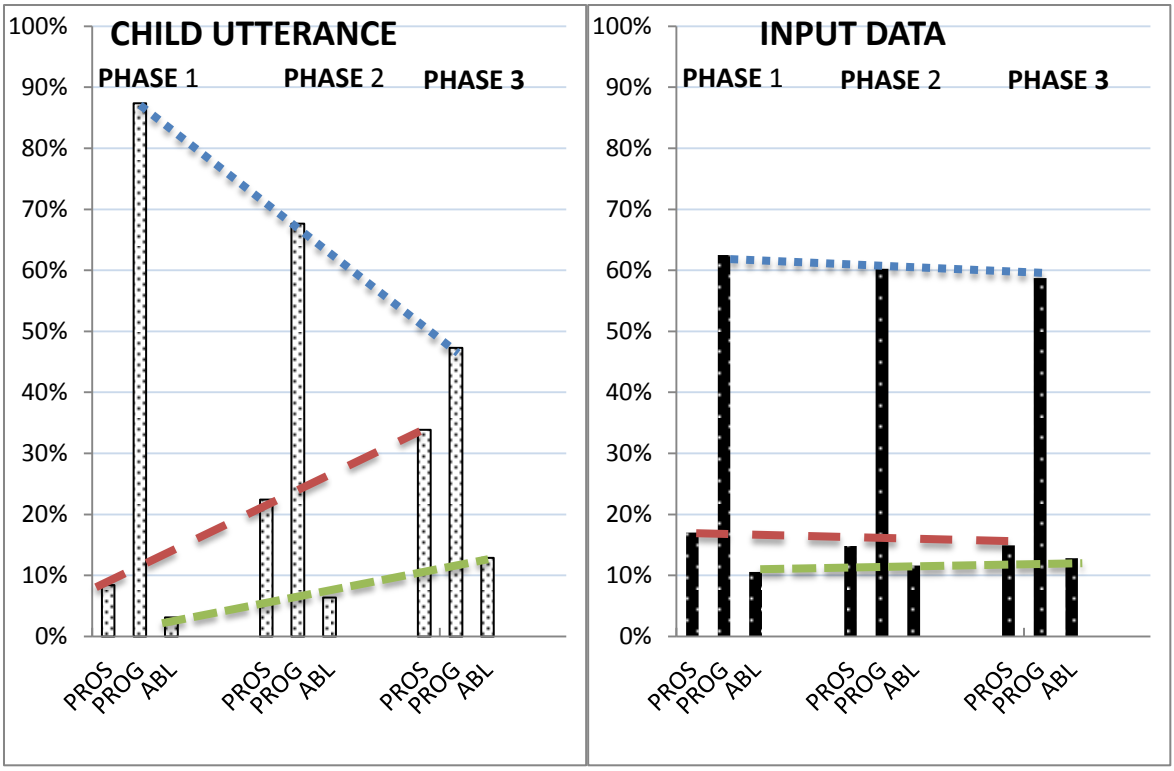

Figure 5. Differences of TMA in the input and in child production

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**

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**

Table 14
Total production of Aspect

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 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**