On how to link child functional omissions to upwards reanalysis*

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Syntactic change research regularly appeals to the child innovator to explain upward reanalysis (V > *v* > INFL; e.g., Roberts & Roussou, 2003; van Gelderen, 2004). In child language, the most pervasive type of syntactic input-divergence, or "error", is the omission of functional morphemes (e.g., Brown, 1973; Snyder, 2007). Following Pannemann (2007), I argue that children learn language-specific syntactic structures by assuming a Maximal Category First approach. Under this analysis, omission-laden child strings represent conservative interim structural analyses (rather than input-consistent analyses with unpronounced elements). When the child fails to revise her interim analysis to the input target, the resultant analysis will be upwards in nature (MIN>MAX), as predicted by the child innovator approach. This paper uses a corpus study of modal verbs (Cournane, 2015) to show that child functional omissions provide evidence for reanalyses up the verbal projection.

1 Introduction

This is an exploration of functional heads in development, both in the child and in the history of a language. In the child language literature, the fundamental question of how children learn the relevant functional categories of their language is rich grounds for debate. I will support a structure-unraveling approach where children begin with maximal categories and only relegate lexemes to lower positions if and when they get positive evidence from the input to do so (Pannemann, 2007; cf., bottom-up structure building approaches, Radford, 1990; Guilfoyle & Noonan, 1992, i.a.). This approach is consistent with what I see as an emerging consensus among Generative linguists in many areas, most notably, in research which aims to salvage the insights of parameters for addressing universal patterns, while bringing learnability, cross-linguistic variation, and language change to a lexically-driven level (see e.g., Biberauer, Holberg, & Roberts, 2014). In this spirit of not throwing the baby out with the bathwater, I explore the possibility that a Maximal Category First approach to syntactic development enables minimalist conservative learning to structure both learning patterns and emergent final states, with the additional benefit of predicting that interim child analyses in development are *higher* than in the input, as predicted by diachronic proposals for syntactic upwards reanalysis (Roberts & Roussou, 1999, 2003; van Gelderen, 2004, 2011). Syntactic change research regularly appeals to the child innovator to explain upward reanalysis (V > *v* > INFL; e.g., Roberts & Roussou, 2003; van Gelderen, 2004). At the center of our exploration of functional heads is the fact that children omit them.

*Many thanks to Ana Teresa Pérez-Leroux, Michela Ippolito, Yves Roberge, Ewan Dunbar, Rebecca Tollan, Barend Beekhuizen, Derek Denis, Ruth Maddeaux, and Dan Milway. And for helpful discussion, thank you to audiences at the LSA2015 in Portland, OR, GALANA6 at UMD (especially Valentine Hacquard, Charles Yang), and GLOW39 in Göttingen (especially Ian Roberts, Bronwyn Bjorkman).

This investigation starts with the observation that child output strings containing verbal modals (e.g., bouletic *want*, future *going*) have omitted functional heads, most notably infinitival *to* and BE (1) (see also Cournane, 2015). These omissions cause verbal modal syntax to pattern – at least on the surface – with target strings for INFL modals like *must* or *can* (2): *subject + modal + bare verb complement*. For example, the future modal *be going to* is regularly referred to by linguists with both its obligatory *BE*-support and the obligatory infinitival *to* of its complement verb (3a). With both BE and *to* omitted, *going* appears in the same syntactic frame as its canonical INFL counterpart, the future modal *will* (3b). This observation could be nothing, given the rampant nature of omissions in child language and the fact that only the *be going to* future has functional material to omit, but that would be ignoring the following facts: (a) in diachrony, there are many documented cases of main verbs being reanalyzed as functional verbs and then in turn, as INFL, amid a wider trend of upwards reanalysis through various functional hierarchies, and (b) the nature of child omissions is far from settled, leaving open the possibility that utterances with omissions, at least sometimes, represent input-divergent analyses of particular lexemes (e.g., Pannemann, 2007; Pérez-Leroux, Pirvulescu & Roberge, to appear).

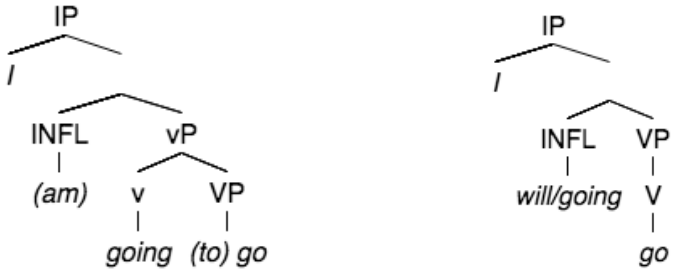
(1) Utterances with V and *v*[1] modals (Sarah; Brown, 1973)

a.	*I want*$_{V}$ *sit dere*	Omitted *to*; 2;07
b.	*I goin*$_{v}$ *touch it*	Omitted *am* and *to*; 3;00
c.	*I have*$_{v}$ *go the bathroom*	Omitted *to*; 3;04

(2) Utterances with INFL modals, (Sarah; Brown, 1973)

a.	*I can*$_{\text{INFL}}$ *come get you*	Target; 2;08
b.	*You mus*$_{\text{INFL}}$ *go to bed*	Target; 3:01
c.	*That would*$_{\text{INFL}}$ *hurt*	Target; 3;09

(3) a. *be going to* frame: b. *will* frame:



The structure of this paper is as follows: First, I will present the diachronic syntactic patterns, focusing on current theories that implicate the child innovator in upwards reanalysis. Next, I will discuss child omissions, focusing on their prevalence and the various approaches that try to account for them. Having discussed the two background areas of relevance, in Section 2, I explicitly link the two areas and articulate my version of the Maximal Category First hypothesis, laying transparent: (a) the predictions for child omission patterns, and (b) how those predictions are compatible with diachronic upwards reanalysis. In Section 3, I present a case study of longitudinal child data, testing the Maximal Category First hypothesis using Sarah's corpus (Brown, 1973). The results show protracted optional omission stages for both infinitival-*to* and BE with the set of little-*v* modals (e.g., *going*), but not for V modals (e.g., *want*).

[1] For simplicity, I will treat the functional modals as little *v* elements, knowing that this is an oversimplification of the syntax of the middle verbal field. What is important in this paper is that they are higher in the structure than main verbs and lower than INFL. I do not, however, want to suggest that particular syntactic properties of each verb are not important to reanalysis.

These modals occur in strings which pattern with the INFL modals for a protracted period of time, compatible with the child analyzing the *v* modals as one-step higher up the tree than in the adult language.

1.1 Upwards reanalysis

Generative theories of syntactic change implicate child learner errors[2] as the source of innovation (e.g., Lightfoot, 1979; Roberts & Roussou, 2003; van Gelderen, 2004, 2011). I will call this approach the Child Innovator Approach (CIA). Contrastively, there are approaches that place explanatory weight on adult speakers (Bybee & Slobin, 1982; Heine et al., 1991; Traugott & Dasher, 2005; Givón, 2009; Diessel 2011, 2012, i.a.). CIA theories all share the assumption that the child uses universal guidelines to posit the simplest structure necessary to capture the facts of the input and in doing so occasionally ends up with a grammar that diverges from the input grammars. Since all children are in principle endowed with the same learning heuristics, we expect similar changes to occur throughout all language continuums (past and present). Syntactic change exhibits unidirectional grammaticalization (e.g., Hopper & Traugott 2003; Roberts & Roussou, 2003; van Gelderen, 2004). In broad terms, we see lexical items or classes of lexical items taking broader/higher scope, becoming more abstract or functional (see von Fintel, 1995, for a formal approach), reducing phonologically, and developing new selectional requirements.

In brief, the current set of canonical modal auxiliaries (e.g, *must, will, should, can*) were once main verbs (V) that took direct objects (Old English present preterit verbs and *willan*; (4a)). These were reanalyzed as functional verbs (*v*), and began to appear without objects but below aspect (4b), possibly in *v* (as assumed here; see also Tollan, 2013). Finally, these modals were reanalyzed to their current position in INFL, above aspect (4c) (Roberts, 1985; Pollock, 1989; i.a.), appearing above aspect marking (for a detailed look at the evidence from Old and Middle English, see Lightfoot 1979; Warner, 1993; Denison 1993, i.a.). Notably, individual lexical items may have been reanalyzed at different times. The diachronic trajectory from V > *v* > INFL for English canonical modals can be generalized from the evidence (e.g., Roberts, 1985).

(4) a. *he cwæð þæt he* ***sceolde*** *him* [***hundteontig mittan hwætes***]
he said that he shall him hundred bushels of-wheat
'He said that he owed him a hundred bushels of wheat'
(Æhom 17:26; Fischer, 2003:25)

b. *we wolden han gon toward tho trees full gladly, if wee* ***had might***
(Visser, 1963-1973, cited in Fischer, 2003:25)

c. *He* ***might've*** *won the race*.

(5) Upwards Reanalysis of English INFL Modals (Roberts, 1985)
O.E (400-1100$_{CE}$) → M.E. (1100-1500$_{CE}$) → Mod.E. (1500$_{CE}$-)
V → ***v*** → **INFL**

For syntactic changes of this type, the CIA predicts that the child will re-categorize a lexeme as higher in the syntactic structure (Roberts, 2010; see also Roberts & Roussou, 2003; van Gelderen, 2004, 2011). Child learners are expected to treat items that are lower in the input as higher elements, for example, treating main verbs as functional verbs or functional verbs as INFL elements (V > v > INFL). These upwards mis-categorizations by the child learner would drive the syntactic modal cycle if they were sustained in the individual or spread to other individuals in the speech community (see Cournane, to

[2] I use the term "error" for any output or analysis by the child that does not conform to the outputs or grammars of the speakers who comprise the child's input. These input-divergent analyses are normally referred to as child "errors", which is the reason I use this term here. The term "error", though convenient, is problematic for many reasons, perhaps the most egregious of which is that these apparent errors only become erroneous when compared to the "correct" analyses of other people's grammars.

appear). The case study for child omissions presented in this paper centers on modal expressions in English in large part because modal change patterns are among the best described, forming the backbone of much theorizing in language change across different frameworks (e.g., Lightfoot, 1979; Roberts, 1985; Traugott, 1989; Roberts & Roussou, 2003; Tagliamonte & D'Arcy, 2007, among many others). This extensive study has provided enough knowledge to allow us to predict, to a certain degree, what current modal lexemes are suitable renewing items for the cycle of grammaticalization (see van Gelderen, 2004). We know, for example, that verbs meaning what *want* or *try* mean in English are potential sources of later functional modals (including future markers as modals, see Enç, 1996) across many different languages (see Bybee et al., 1994). When looking at the data of children, we expect to see innovative patterns, not recapitulations of completed innovations (i.e., we do not expect contemporary *will* to play out its historical pathway from V > *v* > INFL in the development of each individual child, cf. Diessel, 2011, 2012's characterization of the CIA predictions).

A closer look at CIA models for innovation reveals great sensitivity to historical data, the data on which these models are based, but minimal sensitivity to child language. For example, van Gelderen (2004, 2011) proposes a model based on Minimalist economy principles provided by UG that are at work in the first language acquisition (L1A) process. Whenever the learner fails to converge on the target, the effects of these principles are reflected in directional changes (or cyclic change). The most relevant of her principles for lexemes travelling up the functional hierarchy is the Late Merge Principle (LMP), (6). If child learners make use of the LMP, and fail to later correct downwards, they could be considered responsible for those directional changes that involve upwards reanalysis from head to higher head (c.f. Roberts, 2010; based on Cinque, 1999).

(6) Late Merge Principle: *Merge as late as possible*.

Roberts and Roussou (1999, 2003) argue that syntactic changes in many domains (e.g., CP, IP, DP) can be generalized to upwards reanalyses through the hierarchical structure of syntactic heads. In upwards reanalysis, a functional head is reanalyzed as a direct Merged instantiation of a higher head. Like van Gelderen's Late Merge Principle, this instantiates Merge-over-Move (Chomsky & Lasnik, 1993; Chomsky, 1995) because a formerly moved element is reanalyzed by the child as a directly merged higher head. Roberts and Roussou (2003) argue that children learn using an innate functional hierarchy and a simplicity metric (from Longobardi, 2001); grammaticalization is upwards, local, cyclic, and always target[s] functional heads (Roberts 2010). Van Gelderen's LMP does not rely on a cartographic hierarchy and is therefore more in line with current acquisition models, like the maximal category approach of Pannemann (2007).

For the present purpose, we see that both of these proposals back-engineer what the child must do and so it behooves the theory to see how well they hold up to what children actually do. The directional bias of the learner cannot be teleological but must rather be epiphenomenal, arising from the nature of the learning process. Here, I ask, do children indeed show interim analyses in line with diachronic upwards analysis patterns? Is it possible that the acquisition path of the child learner drives grammaticalization?[3]

1.2 Child omissions

The child learner is best represented as a remarkably accurate learner given the undisputed complexity of the task (Maratsos, 1998; Snyder, 2007). Large-scale studies of naturalistic child language have found that while children's sentences sound non-adult-like for several years, it is not because they contain mistakes, per se. Children make very few substantive errors in their naturalistic production (see Snyder, 2007, 2011). Snyder makes the important distinction between errors of commission, those that

[3] It is worth clarifying here that only the aspects of grammaticalization which concern innovation (or reanalysis) are under consideration; the other components of grammaticalization more common in the sociolinguistic literature – transmission, incrementation, diffusion – are not addressed here (see Labov, 2001, 2011, among many others).

show the misapplication of a rule or generalization (7), and errors of omission, those that show the lack of a morpheme when compared to the adult target (8).

(7) Errors of Comission

a.	***him*** *writing*	(subject accusative; Eve, 1;09, Brown, 1973)
b.	*Papa schoenen* ***wassen***	(root infinitive; Dutch, Weverink, 1989)
	Daddy shoes wash-inf	
c.	*we tak**ed** him to the doctor*	(overgeneralization; Ross, 2;09, MacWhinney, 2000)

(8) Errors of Omission

a.	*I got horn*	(determiner omission; Adam, 2;03, Brown, 1973)
b.	*We forgot wash my hand*	(Infinitival-to omission; Eve, 2;02, Brown, 1973)
c.	*get light*	(subject omission; Adam, 2;03, Brown, 1973)

While both types of error occur, errors of comission are the exception rather than the norm; they occur at a frequency much lower than expected if children were learning by analogy or relying on only phrases from the input (e.g., Tomasello, 2003). They are also limited in the scope and duration of their application in child grammars (see Snyder, 2011 for case studies and arguments). Omissions, on the other hand, are the norm. Omissions are most common with functional elements (e.g., Bloom, 1970; Bowerman, 1973; Brown, 1973). Children at the 1-word, 2-word, and telegraphic stages typically produce few if any functional items. Omissions occur in the child language of all languages thus far studied, and while they gradually diminish in frequency, they persist at low rates at least through late childhood (e.g., Snyder, 2007, a.o.). Thus, children sound non-adult-like to our ears mostly because they leave morphemes out of their sentences (not to mention their immature phonology). What explains omissions in child language? Why is it that functional words go missing?

Based on the dearth of functional items in child productions, early approaches to syntactic development postulated that children only make use of lexical content in early development (Brown, 1973; Gleitman et al., 1988, i.a.). However, evidence soon appeared showing a production-comprehension asymmetry; while children didn't produce functional items, they showed sensitivity to their occurrence (or non-occurrence) in listening studies (e.g., Gerken & McIntosh, 1993). Even very young infants are sensitive to the prosodic structure of their input language(s), of which functional morphemes are an integral part (e.g., Morgan & Newport, 1981; Nelson, 1989). Furthermore, functional morphemes are known to provide rich information to learners about category membership. For example, the presence of a determiner leads 18-month-old children to treat novel nouns as common nouns, while the absence leads them to treat novel nouns as proper names (*a zav* vs. *zav*; e.g., Katz, Baker & McNamara, 1974). Gerken and McIntosh (1993) experimentally demonstrate that 2-year-old children are aware of the co-occurrence patterns of specific functional morphemes, and Gerken (1994) shows that children rely on the distribution of functional morphemes to both segment the speech stream and to help determine category membership for lexical items. Further studies show that even in production children may be sometimes producing functional elements but at sub-perceptual levels (detectable in the laboratory) (e.g., Dye, 2011).

However, the comprehension-production asymmetry remains only partially addressed by the perception literature. Children can be said to perceive and make use of functional morphemes to solve the fundamental segmentation problem through statistical co-occurrence information, but perceiving is not the same as comprehending. Despite perceiving and learning from functional morphemes, in naturalistic production, children display avoidance behavior until the target constructions are understood (Maratsos, 1988; Snyder, 2007), and when the semantics of early functional morphemes is explored, children regularly reveal non-target semantics (see, e.g., Paradis & Genessee, 1997).

Snyder (2007) searched for errors of comission with particle verb constructions in English (9), focusing on naturalistic longitudinal data from Sarah (Brown, 1973). This construction is a good choice to look at for potential errors of comission as it is fairly frequent, and the target grammar offers complex

patterns of both preposition choice (e.g., *up*, *out*, *with*) and preposition position. For example, the preposition can come before or after the direct object (10a), but not when the direct object is pronominal (10b). If the child is learning by analogy, it is possible for her to make errors of the type in (10b). Other possible errors include placing a preposition both before and after the direct object (10c), or placing the preposition before the verb, as is possible for particle verb constructions in related West Germanic languages like German (10d).

(9) Mary stood up / lifted the box up / lifted it up / lifted up the box (Snyder, 2011)

(10) a. lifted the box up / lifted up the box
b. lifted it up / *lifted up it
c. *Mary lifted up the box out
d. *Mary has the box up-lifted (cf. German, *Marie hat den Kasten auf-gehoben*) (Snyder, 2011)

Snyder found that Sarah produced 102 particle verb utterances, only 32 of which contained an error, and of those errors, only 3 were errors of comission (e.g., she put past tense on the particle: *down-ed*). The vast majority of her uses occur after 30-months-old, showing a transition from almost no particle verbs to regular usage with very few errors of comission. Children do not produce the kinds of errors that are theoretically possible, nor even those that are predicted based on analogy. Rather, children appear to be tacitly aware of what they do not yet know about their target grammar, and whenever possible use structures they are aware of, omit functional material, or remain silent (= avoidance behaviours). Also telling is that as soon as the child does start producing the structures of interest, here particle verbs, she does so correctly the vast majority of the time. Snyder and colleagues have repeatedly demonstrated this phenomenon of avoidance followed by so-called adult-like usage (see also Villa-García, 2008; Tieu, 2010). Snyder argues that the low frequency of errors of comission, in conjunction with the abrupt appearance of correct structures in longitudinal data, is evidence for a deterministic approach to learning (as with Berwick, 1985). A deterministic learner is very careful, never committing to an analysis that she cannot backtrack from. Snyder argues that the child is a conservative learner (11).

(11) **Grammatical Conservatism (GC):** Children do not make productive, spontaneous use of a new syntactic structure until they have both determined that the structure is permitted in the adult language, and identified the adults' grammatical basis for it. (Snyder, 2011, emphasis his).

Thus, this approach to learning rules out the possibility that the child commits to interim grammars: "If, during the course of language acquisition, the child makes use of "interim" grammars with at least a few incorrectly set, non-subset, parameters, then we ought to see co-mission errors fairly routinely (cf. Sugisaki & Snyder, 2006)" (Snyder, 2011). While it is true that we do not see many errors of comission, note that nearly one third of Sarah's particle verb constructions contained an error of omission, making the pattern as follows: avoidance followed by a non-adult-like optional omission stage. If the child avoids until she learns from positive evidence, then why does she continue to omit functional material that is obligatorily pronounced in the adult structure? Why do errors of omission not count for determining the child's grammar as adult-like or not? Sarah's particle verb construction can only be said to be grammatically adult-like if her particle verb omissions can be fully accounted for by extra-grammatical processes, for example, an immature phonological working memory or processing difficulties, to which functional material is exclusively subject to (for example because of low salience, lack of stress, etc.). While processing effects clearly play a role in child productions (e.g., Gerken, 1990), they do not explain all the differential patterns of omission vs. production of functional morphemes (unless processing breakdowns are linked to grammatical complexity, but that also renders omissions a grammatical problem). For example, children learning Catalan have been shown to differentially interpret bare nouns vs. determiner+nouns, in line with bare nouns in other languages (Gavarro, Pérez-Leroux, & Roeper, 2006).

Focusing further on input-divergent properties of child omission utterances, in earliest child production we see the emergence of what appear to be lexical categories, such as N (e.g., *bear*), prior to the emergence of what appear to be functional categories, such as DP (e.g., *a bear*). Any textbook on first language acquisition will assert that children start by producing lexical categories like N and V. However, what if the apparently bare Ns are in fact full DPs, with only the most salient and referentially defining element pronounced? In this case children are using what for adults are Ns, but mapping those nominals to the maximal category D. This is precisely what Pannemann (2007) proposes. Focusing on the DP hierarchy, she argues that children initially map nouns to their maximal category, thereby inverting hierarchical structure acquisition from a bottom-up process to a top-down one. She does so because both longitudinal and experimental work repeatedly shows that child bare nouns have the referential properties of DPs, such as type-shifting (occurring not as predicates but in argument positions), reference to particular instances, and definite reference (12) (see Pannemann, 2007: 167-168 for summary of further evidence that children begin with DPs, not Ns; see also Pérez-Leroux, Pirvulescu & Roberge,to appear, for an extensive study of object omissions across many child languages, assuming a similar DP-first approach).

(12) Child nominal omissions (Pannemann, 2007: 45)

a.	box gone [= the box is gone] *'The box is gone'*	English, Anne (1;11.04)
b.	mets savon bain [=je mets du savon dans le bain] *put soap bathtub* *'I am putting some soap into the bathtub'*	French, Daniel (1;09.21)
c.	da auch Buch [= da ist auch ein Buch] *there also book 'There is a book, too'*	German, Kerstin (2;0.10)

Nominals with determiner omissions in child language behave not like bare nouns but like DPs. This shows that children have interim grammars that diverge from adult grammars during their omission stages. In Pannemann's approach, nouns first map to DPs, performing all the functions of a DP, but children quickly detect material to the left of nominals (in Dutch, English, French) and, relying only on positive evidence, they map these determiners into the DP. Mapping the determiner causes the DP to unravel downwards, as the child relegates the nominal to a lower position, making room for the determiner. This unraveling occurs successively as the child commits to more and more correspondences between the input D-elements and the structure she is unraveling.

Many factors contribute to the occurrence and resolution of omission errors in child language. In sum, these studies show that from the very beginning children are taking detailed distributional statistics for functional items and are sensitive to disruptions in the input. Children continue to exhibit omissions in naturalistic production, showing strong avoidance tendencies followed by optional omission stages. Furthermore, once children exhibit optional omissions in production, these omissions pattern with possibilities from languages other than the input. Omission patterns thus reveal, at least sometimes, grammatical settings that diverge from the input grammars.

2 Conservative means to innovative ends

The learner is a conservative learner (Snyder, 2007, 2011; Pannemann, 2007). We don't see many comission errors, and this shows that the child is not making grammatical commitments that lead to erroneous outputs. Errors of comission are problematic to learning models because they cannot be a simple deletion, rather they imply: (a) overextensions of rules that then need to be corrected on the basis of negative evidence or blocking effects (e.g., *went* eventually blocks *go-ed*), or (b) parameter settings with output effects that cannot be corrected on the basis of positive evidence (this is not an exhaustive list). I want to maintain that the learner is essentially conservative in the sense of Snyder but further suggest that omission errors are evidence for safe interim grammars – grammars that do not lead to subset

problems (i.e., Berwick, 1985) or to a need for negative evidence (see also Pannemann, 2007). I stress that the child has interim grammars; I do not agree that the child has no representation until she has the correct representation, or that she has only minimal categories until she posits higher layers (for the reasons above, and because higher layers appear at different times for different lexical items rather than all-at-once; for example, infinitival-*to* occurs first with *like* at age 2;06 (Diessel, 2004); cf. structure-building approaches, e.g., Radford, 1990). An interim grammar that produces omission errors is preferable to one that produces comission errors; a top-down grammar will never violate the target grammar in a comission way as the higher layer always contains the lower (i.e., assuming DP subsumes the presence of an N).

I take an approach whereby omission errors are at the same time conservative and target-divergent (=innovative, particularly in the diachronic CIA approach), in line with Pérez-Leroux et al. (to appear):

> *Omissions in young children suggest that children are at the same time innovators and conservative learners. What does this mean? Within a universal grammar approach, one needs early abstract rules and representations to make sense of the input itself. At the same time, results from different domains generally show omissions to both reflect and go beyond the input patterns. In other words, depending on the particular grammatical structure presented in a particular language, patterns of omissions can either approximate the input or lead to differences from the target. This may vary across grammatical domains and implicitly across languages, and can yield evidence of how representational systems for language develop*. (pg., 58)

2.1 The hypothesis: *Maximal Category First derives upwards reanalysis*

Can we reconcile child omissions with the diachronic CIA? Here I will hypothesize that the Maximal Category First model of syntactic development can derive upwards analysis, or the Late Merge Principle, from child language development mechanisms. The strong hypothesis that follows, if children are responsible for diachronic innovations, is that omission-laden child strings represent interim structural upwards analyses (rather than input-consistent analyses with unpronounced elements or the lack of an interim commitment). Following Pannemann (2007) and Pérez-Leroux et al. (to appear), I argue that children learn language-specific syntactic structures by assuming a Maximal Category First approach (shown to best account for nominal omissions, as omitted arguments behave like D-elements, not like N-elements). The child begins with the maximal category and errs on the side of the maximal category so long as the data is inconclusive (13). This learning is lexically driven, accounting for the different onsets of functional elements and different resolution times of omissions both within and across distinct lexical items (Diessel, 2004; Pannemann, 2007). This learning strategy is a safe, or conservative, strategy that minimizes errors of comission (empirically and theoretically desirable) and proceeds on the basis of positive evidence in a minimalist fashion. The MCF is structurally conservative, as the child posits as little structure as possible, while accommodating characteristics of the input that she has already committed to.

(13) **Maximal Category First:** Children assume that lexical items represent maximal projections. Children do not revise their category assignment for lexical items from MAX>MIN until they have both determined that the functional structure is permitted in the adult language, and identified the adults' grammatical basis for it. (modified from Pannemann, 2007; Snyder, 2011).

This method will not show errors of comission, at least not in the domain of DPs or IPs (here, only modal forms are considered), because the morphological and selective properties of the higher categories is a subset of those of the lower categories *on the surface*. For example, an INFL modal will select a bare verbal complement, such as *I must go*. A functional verb modal will select an infinitival complement, such as *I have to go*. The *go* appears in both, and only the lower element has more functional material. Simply, a DP always contains an N, and an INFL projection necessarily contains a V. As the child

deciphers what the operational functional categories are in the language, she revises her structures to accommodate the input, possibly in the manner in (14).

(14) Structural Unraveling

a.	$want_W$ <> INFL	[DEFAULT ASSUMPTION]
b.	$want_W$ <> *v*	[REVISION MAX_{INFL}>MIN_V]
c.	$want_W$ <> V	[REVISION MAX_V > MIN_V]

This learning model predicts upwards reanalyses if and when the child fails to unravel downwards to the level of the adult target grammar (perhaps staying at (14b), rather than updating to (14c)). Thus if modals that are little-*v* in the input are appearing in INFL frames this is compatible with a child analysis as INFL, showing child upwards reanalysis (15).

(15) **Child Upwards Reanalysis:** Children assume lexical items represent their maximal categories until input evidence for functional layers becomes clear. If and when the child does not attain full matching with the input, the analysis for a lexical item, or class of lexical items, will be in the upwards direction (MIN_{INPUT}>$MAX_{INNOVATOR}$).

This general approach allows the child learner to be conservative in the learning task, but nonetheless innovative in diachrony.

3 Case study: Modal *v*-to-INFL reanalysis

In this section I present a corpus study, based on corpus work in Cournane (2015), exploring whether: (a) the omission of functional elements produces strings compatible with patterns from diachronic upwards reanalysis, and (b) whether it is possible that interim child analyses in development are higher than in the input (i.e., INFL rather than *v*), suggesting maximal category development in the verbal domain (IP/vP/VP).

3.1 Methods

This study examines one typically developing child, Sarah (Brown, 1973; CHILDES, MacWhinney, 2000). Sarah's corpus contains a total of 139 files, with 37,021 child utterances recorded between 2;3 and 5;1. I extracted a list of all lexical items used by the child in the corpus and examined the output for any and all verbal domain modal lexemes (listed in (16)), including all *v* modals (*have to, gotta*) and INFL modals (*must, can, might*). I also identified a sample of verbal modals known to be commonly reanalyzed as functional modals (*want, try, know* (*how*), *need*)[4]; these represent a sample of V modals for direct comparison within this study.

(16) Modals identified in Sarah's corpus[5]
better, can, could, may, might, must, shall, should, will, would, got to, have to, need to, ought to, be going to, be supposed to

After identifying all of Sarah's modals, I extracted all utterances containing the chosen lexemes from all of Sarah's files. Only modals with verbal or sentential complements were included (including clear instances of elided VPs, e.g., Mother: *Why don't you get Pebbles and Bam_Bam*? Child: *I can't* [$_{VP}$

[4] Most premodals (verbs with meanings known to be historically reanalyzed as functional modals; Lightfoot, 1979; Bybee et al., 1994) are attitude verbs, with root modal meanings (see Hacquard, 2013).
[5] Sarah also uses the adverb *maybe* and other epistemic lexical modals like *think*, *know*, etc (not known to be reanalyzed into functional or auxiliary modals).

~~*get Pebbles and Bam_Bam*~~])[6]. Contextualizing discourse was used to exclude repetitions, imitations, and routines (e.g., songs), and to exclude irrelevant items (e.g., nominal *can*, the month *May*). Utterances were stored in a spreadsheet in chronological order, noting file number and line of discourse as identifying features. Sarah's age (in months) and mean length of utterance (MLU) were recorded for all utterances. As a baseline measure to control for the variable length of each transcript file, Sarah's # of modal expressions to total # number of utterances per file was recorded.

The following codes were used to classify the utterances:

LEXEME (*have*, *want*, *must*, *maybe*, *will*, etc)**.** The modal lexeme was coded as the bare lexical root (e.g., HAVE for *hafta, have, hasta, had*), allowing all forms of a lexeme to be grouped together.

ADULT CATEGORY (INFL, *v*, V). The target adult category of the modal was coded as INFL, *v,* or V, based on broad adult input categories. (c.f. Diessel, 2004, following Bloom, Tackeff, & Lahey (1984: 297), who argues that *wanna* and *hafta* pattern together[7]; and with Valian, 1991 who finds that subjects pattern differently with INFL and *v* modals showing distinct categories). Modals are divided by category in (17).

(17) Sarah's modal lexemes by category
- a. INFL: *better, can, could, may, might, must, shall, should, will, would*
- b. *v*: *got, have, ought, going, supposed*
- c. V: *want, try, know+how, need*

MODAL COMPLEMENT (BARE, $V_{INF\_REDUCED}$, V_{INF_to}, CL). The complements of the extracted modals were coded for whether they were bare verbs (BARE, as in (18a), (19a)), verbs marked with a reduced infinitival *to* ($V_{INF\_REDUCED}$, as in (18b), (19b)), verbs marked with a full infinitival *to* (V_{INF_to}, as in (18c), (19c)), or a clausal complement (CL, as in (18d), (19d)). A modal was considered to have a clausal complement when there was a nominal intervening between the modal and the second verb (18d).

(18)
- a. must _ go/ have _ go
- b. wan**na** go/ have**ta** go
- c. want **to** go/have **to** go
- d. want **[mom to read]**

(19)

a.	*I want* [VP *dance*]	BARE	
b.	*I wan* [TP ***a*** *dance*] (= *I wanna dance*)	$V_{INF\_REDUCED}$	(=TARGET)
c.	*I want* [TP ***to*** *dance*]	V_{INF_to}	(=TARGET)
d.	*I want* [TP ***you*** (*to*) *dance*]	CL	

[6] Of note, exclusions included many *want*[$_{NP}$ X], which is very frequent from early on and throughout. Other modals in the set under investigation were much rarer with NP or PP complements.

[7] *Wanna* and *hafta*, Diessel argues, in line with Bloom, Tackeff & Lahey (1984: 297), 'function to express the child's mood or wish or intention'. He says, "the occurrence of bare infinitives is characteristic of modals such as *can* and *must*, with which *wanna* and *hafta* are semantically closely related." (Diessel, 2004: 63). He notes that *wanna* and *hafta* cannot be fronted and require *do*-support when negated, and thus are matrix verbs. Like modal auxiliaries though, he says, they take bare infinitives. However, they only take bare infinitives if we analyse the second syllable as part of the verb, rather than contracted *to*. I've shown that if we differentiate between complement types, *want* behaves differently from *have*. It is likely that early uses of contracted *to* are unanalysed. Further, while *wanna* and *hafta* pattern the same in some respects, they are distinct in others. *Want* is characterized as a verb, while *have* is a functional verb, or *v*.

BE-support (PRESENT, OMITTED, *do*-SUPPORT). Two of the little *v* modals require the BE auxiliary, *be-going-to* and *be-supposed-to*. These two modal lexemes were coded for the presence of the BE morpheme (PRESENT (20a)), the absence (OMITTED (20b)), and erroneous *do* (*do*-SUPPORT (20c)). This code, like the modal complement code, measures rates of omissions of obligatory functional material.

(20) BE-support

a.	*I'**m** supposta*	PRESENT	(=TARGET)
b.	*I supposta*	OMITTED	
c.	*I **do** supposta*	*do*-SUPPORT	

3.2 Results

Sarah uses a total of 1214 INFL modals, 621 little-*v* modals, and 604 of the verbal modals in the sample. All three categories appear from the beginning of the corpus at the age of 2;3. *Can* and *will* comprise 59% and 30% of all INFL uses, respectively. Together these two modals make up nearly 90% of all the INFL modals in Sarah's corpus. The future marker *going* is by far the most frequent little-*v* modal, accounting for 69% of child little-*v* modal utterances. *Want* is the most frequent of the root verbal modals and is almost always expressing a clear bouletic meaning (desire, wish)[8]; *know+how* is next most frequent and is always used to denote ability; *try* is next most frequent and consistently has an intention meaning (with some added semantics of the possibility of failure). *Need* only occurs once with a VP complement in the corpus.

Recall the hypothesis that the omission of functional elements would produce strings compatible with upwards reanalysis. Sarah produces *v* and V modals with infinitival-*to* omissions from the beginning of her corpus ((21), (22)). These omissions cause these verbal modals to have divergent bare complements, in line with target bare complements for the INFL modals (23).

(21) V modals with divergent bare complements

a.	I wan [ride a horsie]!	(2;04)
b.	I want [take your nose]	(2;11)
c.	I try [get it]	(4;05)

(22) Little-*v* modals with divergent bare complements

a.	*I got* [*wash it*]	(3;00)
b.	*I have* [*play now*]	(3;04)
c.	*Hey, I go*t [*watch TV*]	(3;11)

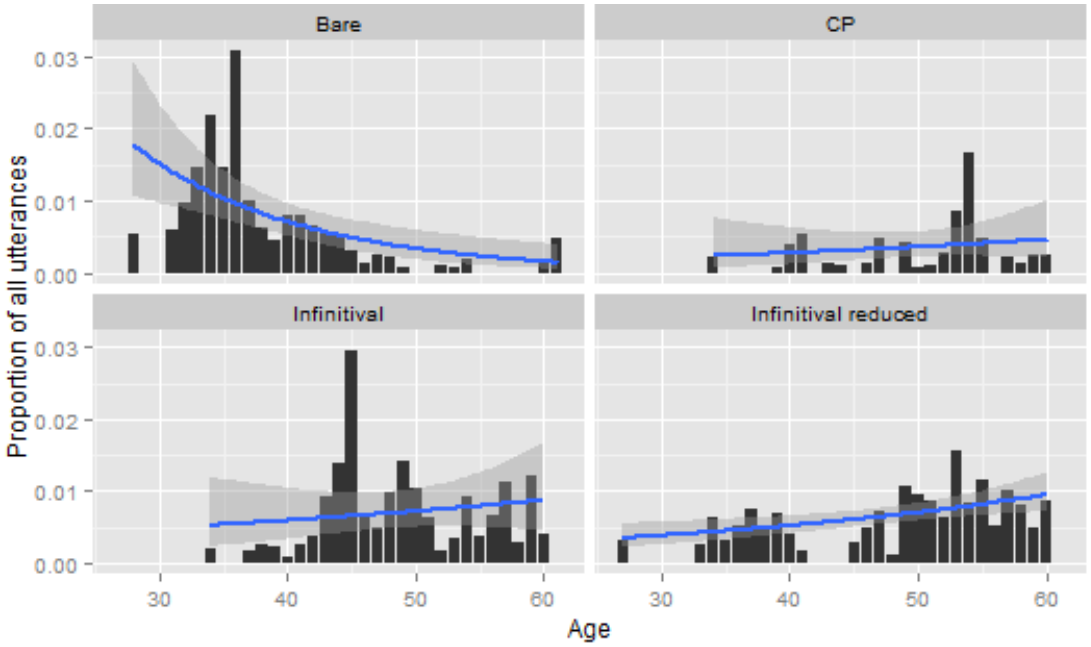
(23) INFL modals with grammatically bare complements

a.	*You must* [*go to bed*]	(3;01)
b.	*I could* [*hit her with my broom*]	(3;08)

The verbal modals studied are a sample of Sarah's verbal development (see also Shatz et al., 1983; Diessel, 2004 for further studies on complements of embedding verbs, with compatible findings). The complements that they take in Sarah's corpus begin almost exclusively bare (root infinitival), but over time bare complements gradually give way to reduced infinitives (*tryna, wanna*), infinitivals (*to* V), and finally clausal complements (overt subject for embedded verb). The development of each complement type for premodals is shown in Figure 1.

[8] A few uses of *want* appear to express non-adult meanings, for example circumstantial modality (e.g., *I want fit in dere*? Sarah, 2;08, in the context of assessing whether or not she will be able to fit toy bunnies in a stroller)

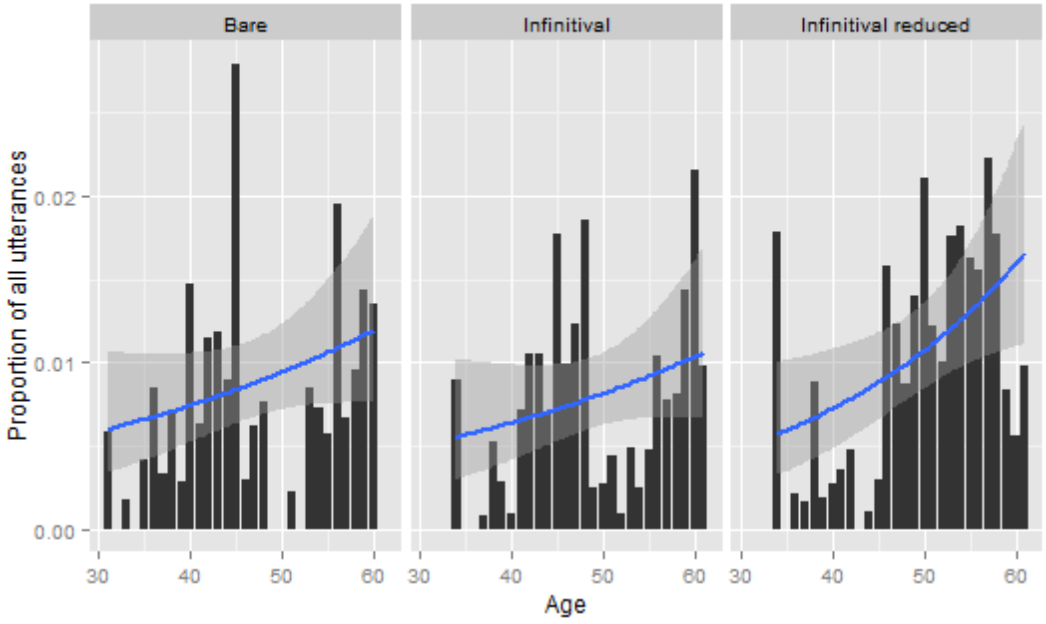
Figure 1: Proportion of V modal complement types by month



When we look at the complements of V modals (Figure 1), we see a steady decline in erroneously bare verbs (e.g., *want go*) and a concurrent rise in target forms: infinitival-marked and reduced infinitival (e.g., *wanna go, want to go*) and clausal complements (e.g., *want Mommy to go*). The utterances with functional omissions (those with bare complements) gradually give way to adult-like utterances, with many of the later files in the corpus showing no instances of bare complements for V modals. Bare complements occur with V modals but give way to target forms after about 3;06 (or 42 months).

The same measure, albeit without the clausal complement possibility, shows a different pattern for little-*v* modal complements. Little-*v* modals maintain bare complements throughout the corpus, showing no decline through to 5;01 when the corpus ends. In fact, as the total proportion of *v* modals grows, both erroneous and target complement types grow (Figure 2). Very first uses in the corpus are with bare complements, and infinitival-marked complements – both full and reduced – appear at the same time just before age 3. There is an overall increase in the frequency of infinitival reduced complements but without a concurrent drop in bare complements (note the slightly steeper slope for infinitival reduced complements).

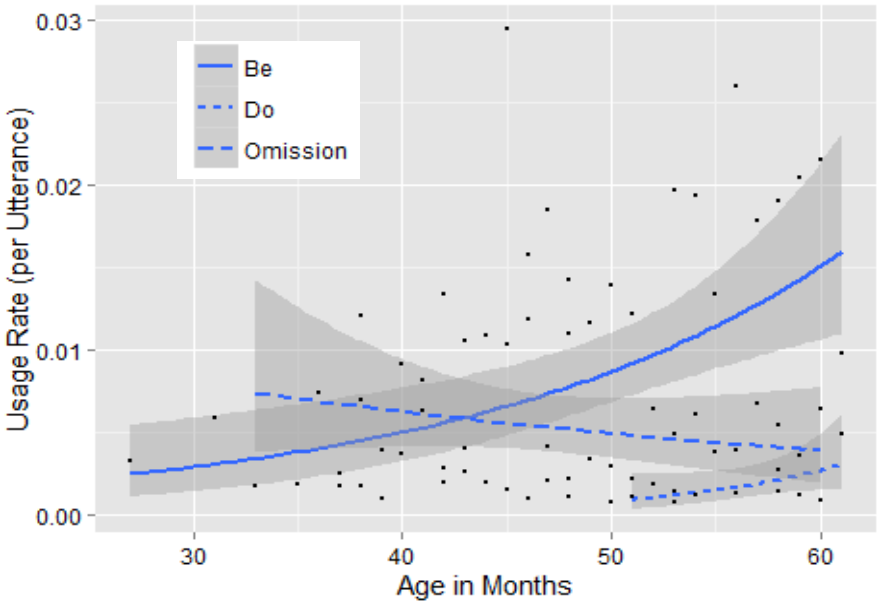
Figure 2: Proportion of v modal complement types by month



In Figures 1 and 2, the BARE graph shows the proportion of bare verbal complements, ungrammatical in the adult-language (=input-divergent) for both V modals and *v* modals. In both cases, bare complements emerge first. For V modals, these bare verbs drop over time, giving way to grammatical complement types (e.g.,*wanna V, want to V*, *want IP/CP*). For little-*v* modals, they actually grow along with a pattern of general increase in the number of functional modals. Studies looking at infinitival-*to* in other children have shown that, across all verbs, infinitival-*to* tends to first appear before age 3 (Kirjavainen et al., 2009). As V modal syntactic frames become gradually more convergent with the adult language, the little-*v* modals continue to pattern – at least some of the time – with the INFL modals in the following frame: [(Subj) modal V_{bare}].

Turning now to the syntactic frames when the child omits infinitival marking and BE-support for little-*v* modals (e.g., *I supposta go*), these syntactic frames are input-divergent, but they are the same frames that INFL-modals appear in (e.g., *I must go*). Thus BE-omission patterns are examined to determine whether there is evidence for input-divergent re-categorization of modal categories in the direction V > *v* > INFL. In Figure 3, we see that Sarah shows development towards more overt BE (the target; solid line) and less omissions (long dash line), but omissions remain more frequent than overt BE until after 3;6, and continue to occur through to the end of the corpus (5;1).

Figure 3: Proportion of BE*-omissions for going and supposed by month*



Further to the persistent presence of bare verb complements (without infinitival-*to*), little-*v* modals also show persistent omissions (and some errors of commission) of the functional material that precedes them, namely BE. The presence or absence of overt BE for those little-*v* modals which require BE (*going, supposed*) was recorded, including several divergent uses of *do* in the place of BE. Erroneous *do*-for-*be* instances emerge at 4;03, late in the corpus; all 7 instances occur with *supposed* (21).

(21) *does it (sup)posed to be like brown?* (4;03)

Unlike with bare complements, the first uses of these modals with BE first occur at low rates with a handful of target forms (e.g., *I'm going X*). Resolution of BE-omission for little-*v* modals is relatively late, up to one year later than other BE-omissions, for example, simple progressives like *to be running* (Brown, 1973) and copular contexts like *He is tall* (Becker, 2002). *Be-going-to* could be considered a progressive, as it comes from a progressive, but only those instances with future meaning (and not those with a motion path meaning) were coded, and these are less clearly progressives in the current language (Klecha et al., 2008; c.f. Copley, 2002). Further, *supposed* is not a progressive, and it patterns similarly to *going* in Sarah's corpus. In sum, Sarah's little-v modals show persistent omissions of infinitival-*to* and BE-support, consistent with a possible top-down analysis.

3.3 Discussion

Sarah's V and *v* modals occurred in frames compatible with a Maximal Category First analysis. The maximal category for verbal elements is assumed to be INFL. Persistence of both bare verbal complements and BE-omission are promising findings for the CIA because omissions cause these V and little-*v* modals – renewing candidates for V > *v* > INFL grammaticalization – to occur in the same frames as INFL modals.

An unexpected asymmetry emerged whereby omission frames persisted longer for *v* modals than for V modals. This finding suggests that Sarah remains unclear as to the light-*v* status of modals like *going, got, supposed* and *have*, for longer than for the V modals (primarily *want*, but also *try, know how*, and *need*). In the MCF model, this would mean that Sarah remains at the default INFL analysis longer for

little-v modals than for V modals. Why might this occur? It is possible that the child remains in the maximal category of INFL for little-*v* modals for longer than for V modals because the default assumption of maximal INFL is a better one semantically: both the INFL and little-*v* modals of English are variable meaning modals (they have both root and epistemic meanings, see, e.g., Kratzer, 1977; Hacquard, 2013) and both show complicated patterns of interaction with Tense and Aspect (see, e.g., Hacquard, 2006; Ramchand, 2012). In Sarah's input, forms exist representing the same set of meanings with both INFL-modal strings and *v*-modal strings (e.g., *must* and *have* overlap in semantic space). The omission string *I going go* is not in the input but is plausible in the input modal-system (fully comparable in both form and general meaning with *I will go*).

Little-*v* modals are thus more similar, or more "confusable", with INFL modals. This similarity may prolong the avoidance phase as the child conservatively waits for unequivocal evidence to unravel the verbal domain downwards for these modals. On the other hand, the V modals vary more from the INFL/*v* modals, with invariant meanings and main verb syntax (i.e., taking sentential complements); the input should provide richer and more frequent cues that these modals belong lower in the verbal domain. Furthermore, upwards reanalysis arises in a stepwise manner (see Roberts & Roussou 2003; Roberts, 2010), so we should expect V>*v*, and *v*> INFL to be more likely than V> INFL; the asymmetry in Sarah's data is in keeping with this expectation.

Sarah appears to be exhibiting avoidance behaviours, especially with the set of V modals. She shows primarily omissions until around 3;06, and then shows predominantly adult-like structures. On the other hand, she shows persistent omissions with functional verb modals, which may also be considered a kind of prolonged avoidance. The child may be avoiding a full representational commitment until she can gather more information (in keeping with Grammatical Conservatism; Snyder, 2004, 2011). I think this avoidance is compatible with a child-as-innovator view; avoidance behaviour should be most likely to occur in the most difficult to learn areas of grammar and may thus point to areas that are more susceptible to innovation (compare with Lightfoot, 1979, who showed that change for modals in Middle English occurred where the grammar had become "opaque"). The Maximal Category approach suggests that a lack of commitment is still an analysis, so as the child avoids, she relies on a conservative maximal default. Pérez-Leroux et al. (to appear: 141), put it this way: "[w]e believe that *omission is a developmental strategy that consists in replacing target forms with minimal forms, until representations are fully acquired*." The representations that take longer to acquire are expected to align with the most likely to change areas of the current grammar.

What about the variable nature of omissions? The child shows variable output (with and without omissions) and the rates typically adjust towards the adult rate. Even though Sarah shows persistent omissions with little-*v* modals, these omission strings occur alongside adult-like strings. Except for very early in the acquisition process, omissions appear to always be in a state of variable occurrence. Pannemann, 2007, argues that her Maximal Category First top-down approach better handles this variability than bottom-up structure building models. One important factor is that in a lexically-driven model, rather than structurally-driven (e.g., adding a DP-layer on top of an extant NP-layer) model, each lexical item may be at a different stage of development with some still showing omissions while others have resolved (e.g., different timing of infinitival-*to* appearing across relevant embedding verbs, Diessel, 2004). A more complicated case is what we see here, where Sarah produces the same modals with different frames, in a sort of free variation. For this case, Pannemann (2007:172), argues that "in terms of the structure unraveling theory two correspondence rules for the same noun can co-exist, which leads to the observed optionality of the determiner in the free variation stage." For Sarah's data, this suggests that she has both a *gonna*$_{\text{INFL}}$ and a *gonna*$_{v}$ in competition, as with grammars in competition in diachrony (Kroch, 1989, 2006; see Yang, 2000 for a related discussion in development).

However, this raises the issue of why the child holds on to an earlier analysis when she has evidence for a lower, more target-consistent, analysis. In a deterministic conservative learning model (like Berwick, 1985; Snyder, 2004, 2011), the child should show omissions and then no omissions when she updates her grammar (omissions are necessarily explained by p-side interface factors). It may be that the conservative child recalls the initial analysis as a sort of safety line, as the input evidence comes in. This

is also consistent with a probabilistic learning model, where the child holds competing representational analyses of the same (in the input) morpheme and gathers information from the input as it comes (Yang, 2000). This is again in line with much diachronic reasoning with regards to competing grammars, but it is unclear to me how to reconcile the conservative aspects of child development with probabilistic or competing grammars. An interrelated possibility to account for variation is that the variation is not free but based on grammatical contexts (see also Kroch, 1989, for this idea implemented in the spread of innovative grammatical properties in diachrony). The child is becoming sure of some contexts of usage for, for example, infinitival-*to*, and committing to lower categorization for lexical items in these contexts, but there are conservative holdouts for those same lexical items where the child has not yet committed to a lower categorization. This hypothesis would need to be tested in fine detail for each lexical item.

Another possibility to explore is that the Maximal Category First model includes that children will not change from having one representation to having another but rather will maintain the conservative representation and innovate the new one based on the input properties. Once the two options are in place (two correspondence rules for phonology to syntax, according to Pannemann, 2007, these two options compete – the child trials the innovative option, gradually allowing it to strengthen). In this way the child only makes conservative decisions for when to update her grammar, but once she makes them she is hesitant to abandon the older more maximal analysis. The probabilistic aspect of learning is thus not willy-nilly parameter-testing, but rather only operative when the question of whether to discard a safe, default analysis arises. This model would privilege the omission vs. adult-like options over comission-creating grammars and perhaps only omission strings would ever enter into competition relationships with innovative analyses (this is a strong claim).

4 Conclusions

This paper explored the possibility that functional head omissions in child development underlie syntactic changes in the history of a language. Children appear to first produce lexical categories, but diachronic patterns of change lead us to the conclusion that child reanalyze lexical items up the functional structure. How can children start with low elements but be responsible for overshooting the input data in upwards reanalysis? I suggest that Pannemann (2007)'s Maximal Category First learning model reconciles the child data patterns with the diachronic upwards reanalysis predictions. The child begins by treating lexical items as representing maximal categories and conservatively unravels the structure downwards as she gains experience with the input. Thus, the child is actually starting higher up the tree than in the input. This is both a useful and a safe interim learning assumption as early bare nouns can nonetheless be referential and early bare verbs can nonetheless be anchored to the world (through INFL, see e.g., Ritter & Wiltschko, 2009). If and when the child does not fully update her interim grammar for one or several lexical items, she will remain at a higher functional category, thus pushing upwards reanalysis (Roberts & Roussou, 2003).

Perhaps the strongest conjecture this child innovator line of research makes is that children don't always have the input evidence necessary to converge with the input grammar(s). When the evidence is not deterministic for a certain feature of the grammar, the grammar nonetheless fixes that feature by default. What I have shown here is that the divergent properties of the child grammar are biased in the right direction to become the changes that diffuse in the historical record. In those rare cases when divergence remains uncorrected, divergent properties are up the tree. This approach allows the child learner to be conservative in the learning task, but nonetheless innovative in diachrony.

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