

The acquisition of Tense and Agreement in Early Grammars and Early Root Nonfinites (in Child Slovenian) Revisited

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1. Introduction

The nativist approach to language acquisition has been promoting epistemological nativism with a deterministic “all-or-nothing” (i.e., non-probabilistic) outcome. Due to its basic tenets, this research program has rarely attempted to explain performance-based language production and processing—and with them—variation, a notion that has been at the heart of “learning” or “stage” theories, based on stochastic psychological models of language processing and acquisition (Redington and Chater 1997). In contrast, certain schools of behaviorism, absorbed into experimental and cognitive psychology today, have surfaced in the form of various information processing, distributional, connectionist, and other computational theories of natural language acquisition. Still cognitive in nature, these computational and processing approaches to learnability draw from stochastic psychology models of learning in animals and humans in linguistic and non-linguistic domains.

On the basis of early acquisition of tense and agreement, this paper argues that it is not only possible, but required to supplement a nativist approach with neurocognitive approaches, where the term “neurocognitive” loosely refers to psycholinguistic (constructionist) as well as neurolinguistic models of language acquisition and processing. Specifically, the paper aims to demonstrate that a deterministic approach should be supplemented and informed by the evidence from more probabilistic distributional accounts of language acquisition.

The paper is organized as follows. Section 2 briefly (re)evaluates generative linguistic approaches to the acquisition of tense and agreement, sketches their weaknesses, and introduces a couple of major neurocognitive accounts that may successfully address these weaknesses. Section 3 provides a reanalysis of the child Slovenian data that conforms to the view of language acquisition being a dynamic process with interplay between a biologically-given phrase structure computation and “learning” in the stochastic sense. Section 4 sketches a possible instantiation of such a research program. Section 5 concludes the paper.

* I would like to thank Héctor Campos, Pritha Chandra, Bob Frank, Elena Kallestinova, Donna Lardiere, Julian Pine, Filip Smolík, Marta Tryzna, Michael Ullman, and Charles Yang for useful comments and discussions. The usual disclaimer applies.

2. Approaches to the Acquisition of Tense and Agreement

2.1 The Case of Early Root Nonfinites in Generative Linguistic Accounts

Most of recent formal research into early morphosyntax has concentrated on verb forms devoid of morphological marking for tense and/or agreement, which morphophonologically resemble infinitives (i.e., Root Infinitives; RIs) or bare verb stems (BVs). In the syntactic literature in the early and mid 1990s (e.g., Chomsky 1991 ff., in Chomsky 1995), it was generally assumed that there is a direct connection between verb placement (regulated by the Verb Movement Parameter) and morphologically marked finiteness, expressed in Tense and Agreement nodes in the phrase marker. With some minor variation, it was generally contended that although Germanic-speaking children show a high number of omission errors with respect to tense and agreement marking (sometimes up to 90%) and incomplete subject-verb agreement paradigms (generally lacking plural forms), they “know” the distinction between finite and nonfinite verbs due to correct placement of the respective verbs (see Deen 2002 and Guasti 2002 for reviews).¹ Generative studies on early Romance verb morphosyntax have shown time and again that although children supply tense and/or agreement only optionally, the error rates in null subject, morphologically rich languages nevertheless fall below 5% with very few or no attested RIs (see Guasti 2002 and Montrul 2004 for reviews). Resting on this empirical finding, most approaches seem to agree that children learn the inflectional properties extremely early—according to some, e.g., Wexler (1998)—almost instantaneously, a phenomenon which Wexler (1998), for example, dubs as Very Early Knowledge of Inflection, giving children a nickname of “little inflection machines”.²

Despite a general consensus on finiteness research has diverged a great deal in terms of the explanation of the observed limitation of morphological marking in early grammars and—more broadly—the availability of functional material to young children. Five major lines of research have emerged within the formalist linguistic position of deficient tense and agreement observed in early grammars: the omission model, the underspecification model, the phrase truncation model, the “no initial functional material” maturational account, and the performance limitations/utterance planning model. With the exception of the latter, these

1. It was further argued that children “know” the morphosyntactic properties of their ambient language since they do mark tense and agreement in some cases and generally never show wrong-agreement (commission) errors. It was also explicitly argued that children have Verb Movement available to them (but see Clahsen and Penke 1992).

2. Hence, two major assumptions have generally been made in the generative child language acquisition literature: (a) children are fast learners of morphosyntax; and (b) such rapidity and effortlessness reflect the right (early) setting of specific parameters, each responsible for a certain aspect of morphosyntax (e.g., null subjects, null objects, V2, verb movement, etc.).

accounts all assume some limited, optional or immature representation and/or syntactic computation when trying to explain the rise of nonfinite morphology, the lack of elements assumed to be dependent on tense/agreement, and certain aspectual and eventivity constraints that seem to appear with root nonfinite verbs. However, all these accounts suffer from serious weaknesses, either empirical, conceptual, or both.

First, it has been demonstrated that the term RI is much too narrow and that many of the world's early languages do not go through an RI stage, with children producing either bare verb stems (BVs) (Deen 2002; Swift 2004), bare perfective verbs devoid of agreement (BPerfs) (Hyams 2005), or bare (active) past participles (BPs) (Hyams 2005; Rus and Chandra 2005; Varlokosta et al. 1998). Additionally, early grammars sometimes also opt for (active) present participles, such as English *-ing* forms (Brown 1973; Kazman 1991a, b). Hence, the accounts that crucially rely on somehow deficient or impoverished phrase structure cannot predict or account for various morphological outcomes in RIs/RI analogues (now referred to as Early Root Nonfinites; ERNs) as they entirely gloss over morphology and morphological learning.³ Also, the claim that a principle is optional for a certain time only has never been justified or defended, i.e., it is not clear why a principle as part of the innate mechanism of grammar should be temporarily optional. Maturation has at least a biological counterpart and a discrete application (the principle is either present or absent), whereas optionality has neither (Leblanc 2001).

Furthermore, the accounts that rest exclusively on maturation do not fare much better. If nothing else, they are quite vague and even contradict a basic nativist tenet of the existence of a universal, biologically-given computation manipulating thematic and functional categories. While there is no doubt that some aspects of maturation are found in all biological (and hence, cognitive) systems, the way it is often presented in the acquisition literature makes it impossible to tease apart the claim that a certain property of grammar (e.g., tense or phrase structure) matures over a long(er) period of time from the claim that asserts that such a property is simply learned on the basis of experience.

Processing accounts, on the other hand, may sound much more appealing than the competence limitations or maturational accounts for at least two reasons. First, they advocate a very general developmental assumption that children's processing capacities are much more limited than those of adults'. Second, they predict the gradual learning curve that we actually observe—also found in other cognitive domains and favored by psychologists and neuroscientists—rather than an abrupt change or vague maturational assumptions. However, it seems very unlikely that the phenomenon is (mainly) due to processing limitations or the lack of pragmatic/discourse resources, since, for example, there seems to be no independent reason to assume that, say, Spanish children's processing or pragmatic capacity is significantly less limited

3. For example, if the child truncates at the level of VP, why is the outcome a BV, an RI, a BPerf, or even a BP, and in some cases two or even more of these—presumably all VPs syntactically.

than, say, French children's capacity (when trying to account for the nonexistence of RIs in early Spanish and their high number in child French). In other words, one would need to assume some entirely *ad hoc* principle that would distinguish the computational processing abilities in children whose grammar allows RIs/BVs and those whose grammar doesn't allow them. Next, it has been established by now as an empirical fact that the RI stage is a gradual one in that it slowly disappears in a matter of 2 years or so (cf. Legate and Yang in press). Different gradient distribution of RIs is found not only across languages, but also within a language when comparing children of the same language (Brown 1973; Kazman 1991a, b; Yang 2002).⁴

All these empirical facts seem to indicate that the ERN phenomenon cannot be taken as a categorical or universal deficiency in a child's grammar operating on one parameter or operation. The intra- and inter-subject variations and cross-linguistic gradient distribution argue against the classic view of grammatical development as being an on-or-off process of switching parametric values. The existing data on finiteness and RIs never show an abrupt change where children would flip from non-adult to adult grammar instantaneously or in a matter of a very short time, but always a gradual "learning" curve (cf. Blom 2003; Legate and Yang in press). Also, Brown's order of acquisition of morphemes has been pretty much ignored in the recent literature on early morphosyntax (cf. Pye 2002), though it has been confirmed by rigorous linguistic as well as language modeling accounts for both early English as well as languages with more complex morphology (cf. Kazman 1991a, b). Interestingly, Brown's hierarchy of development can translate into a hierarchy of computational complexity account and some neurolinguistic processing and production studies have been able to draw such a connection (see below). The "messiness" in the data with respect to the acquisition of early tense and agreement has led few researchers move from "static" syntax-only accounts to accounts that rely on linguistic interfaces, most notably morphology-syntax (e.g., Phillips 1996), morphology-phonology (Demuth 1994), or syntax-semantics (Hyams 2005). Furthermore, the field has even seen a move to resort to interfaces between linguistic and non-linguistic domains such as computational and processing resources.⁵

Below I sketch a model that views the acquisition of tense and agreement as the learning at the interfaces, where the latter are not to be understood simply as linguistic proper, but also performance and conceptual ones, namely computational complexity as well as cognitive salience. But first, let us sketch a couple of prominent empiricist accounts that—I argue—can inform and supplement a nativist account of early verb morphosyntax.

4. Whereas in some children the RI stage disappears rather quickly, others use RIs well into their third year of language development (see Blom 2003 for Dutch; Brown 1973, Legate and Yang in press, Yang 2002 for English).

5. For example, Rizzi's most recent account (2005) remains one of truncation as a competence limitation, but now allows interaction between UG and performance factors—it asserts that language development is grammatically-based but performance-driven.

2.2 Constructionist and Neurocognitive Accounts of Early Tense and Agreement

Though there are several distributional and statistical approaches to early verb morphosyntax, I will concentrate here only on developmental constructionist accounts (e.g., as in Pine et al. 2005) and the neuroscience accounts based on the processing and generation of verb morphology (e.g., as in Izvorski and Ullman 1999). The biggest contribution from the former comes from careful quantification of the data on very large databases and its argument that the acquisition of tense and agreement is a learning process, while the latter approach has taken seriously a formalist account of a phrase structure by adding a computational complexity dimension to it, which—I argue—translates and supplements Brown’s (1973) developmental hierarchy account.

Though children are probably sensitive to the grammatical distinction of their ambient language from as early as we can test them, generative accounts have said little about the learning of tense/agreement morphology itself. Pine et al. (2005), for example, show that though overall agreement error rates in child Spanish may be extremely low (4.4% and 4.5% for the two children studied), the error rates vary sharply by the (person/number) context (in their words, “systems”), with the rates for the 3rd person plural (3p) present tense forms reaching almost 57%. In other words, the overall data (as generally reported in generative studies—e.g., Torrens 1995 for early Catalan/Spanish) get extremely skewed due to practically non-existing errors in the 3s system of the paradigm (which merely consists of a thematic vowel with no overt tense/agreement morpheme). They also show that the more frequent the verb, the more likely it is to be correctly-inflected and that the learning of tense/agreement is a learning process where children initially default to 3s and are far from being “little inflection machines”. They also claim that compositional forms emerge only later and gradually.

From a neurolinguistic perspective that combines a generative linguistic account of Chomsky (1995), Izvorski and Ullman (1999) similarly argue that their results shows that in English, the bottom-up order of functional categories in the syntactic hierarchy proceeds from the lexical category of verb (V) to the functional categories of (present and past) participial inflection (which they argue is captured in Asp), tense (T), and then agreement (Agr). They show that agrammatic anterior aphasia is associated with greater success at the computation of unmarked forms (e.g., *walk*, *drive*) than of participial forms (e.g., *walking*, *driven*), than of tensed forms (e.g., *walked*, *drove*), than of 3s present tense (i.e., agreement) forms (*walks*, *drives*).⁶

6. The accounts coming from both generative linguistics and neuroscience, generally label the bare verb as “unmarked”, assigning it a spot under the syntactic node of V. This can be incorporated into a Brown-type of hierarchy as the nontensed condition. Furthermore, one must also accommodate early aspectual marking on participles—to do this one can alter the classic Chomskian

I argue below that an adequate learnability model of early morphosyntax should be (at least) that of syntax and morphology and should take a nativist idea of “narrow syntax” as a departure point, but should specifically capture the “morphologically-diverse” ERNs through computational complexity and at the same time take into account cognitive salience.

3. Tense and Agreement in Child Slovenian (Revisited)

The first study on early Slovenian verb morphosyntax was reported in Rus and Chandra (2005) (henceforth, R&C). Finite verbs in the present tense—the only syntactic tense in the language—were reported to be correctly-inflected (adult-like) in obligatory context 99.7% of the time. Even BPs, nontarget (non-adult) ERN forms, carried adult-like agreement (for number and gender) 95.9% of the time. R&C excluded all cases of copula and auxiliary *be* and imperatives, another highly frequent verb form in early Slovenian (later reported in Rus and Chandra 2006). R&C also reported no BVs (<1%) and extremely few RIs (4.8%). They concluded that although the Slovenian children studied show a high number of BPs as ERNs ($\approx 40\%$), they show productive tense and agreement morphology with hardly any omission errors.⁷

I reanalyzed the same batch of data as reported by R&C, this time broken down for different systems of the present tense paradigm.⁸ As Table 1 shows, 3s is by far the most common form, with dual (d) forms being nonexistent and plural (p) forms almost entirely lacking, too.

phrase structure by adding a widely-assumed Asp projection. We will furthermore also assume a separate projection for the infinitive (InfP), particularly useful for languages with verbs surfacing with infinitival affixes. Also, in the present paradigm TP is being used to accommodate agreement and tense. Most acquisition accounts, however, still crucially rely on the presence of both TP and AgrP, generally claiming that morphological errors arise due to a deficit in one or both of the projections. Guasti and Rizzi (2002) specifically claim that theoretical syntax should adopt both projections on the basis of empirical evidence on child language acquisition.

7. Commission errors, however, could not be computed as the children studied were at a very early stage of development with their average MLU of less than 2;0. Slovenian is also a null subject language and early Slovenian is no exception (cf. Rus (2006)). Hence, it was impossible to determine whether the reported verb utterances showed agreement errors.

8. Slovenian shows no overt tense and agreement in 3s present tense, where the verb is clothed merely with a thematic vowel. The same holds true for Czech, Italian, Polish, and Spanish, for example—all “morphologically rich” languages. Interestingly, on the bases of several dozen typologically distinct languages, Bybee (1985) argues that 3s seems to be typologically the likeliest candidate for zero tense/agreement inflection (cf. also Note 9).

Table 1: Agr suppliance broken down for different cells of the paradigm

	s	d	p
1	10	N/A	N/A
2	4	N/A	N/A
3	168	N/A	1

91.8% of all verb tokens are 3s in obligatory 3s contexts—as far as we could tell—though it is impossible to make precise judgments about whether these occurred in non-obligatory contexts too due to limited production at this stage (cf. Note 7). This seems to confirm the conclusion by Pine et al. (2005) for early Spanish.⁹

I then calculated the error rates in the present tense for four children from whom we have the most data, which provides us with a more reliable measurement than collapsing the data across all 15 children (roughly 65% of the entire data come from these four children). The errors are extremely low (none for two children, 2 for 1 child and 1 for one child). The verbs that appear incorrectly-inflected as BVs or as 3s, conjugated in a wrong verb class (*-am* instead of *-em*) are low-frequency verbs in the (output) data (*kakati*, “make a pooh” and *pometati*, “mop”)—none of them occurs more than once. Though we definitely need more data to make a final remark here, the trend that we observe resembles the scenario found in child Spanish.

To see how low the error rates for different verb forms are, I collapsed the figures from all of the existing studies on BPs, finite Vs in the present tense, and imperatives (IMPs) across all 15 children studied. This is reported in Table 2.

Table 2: Agreement error rates for different verb forms

	BPs	Pres T Vs	IMPs
Error rate	4.5%	2.1%	0.9%

I argue that the children reported in all these studies have a mental representation of and access to functional material since it appears over and over again in the data, but are far from perfect when it comes to tense/agreement learning. To further support this hypothesis, I looked at the children’s performance on all markers that express finiteness. Table 3 below reports the

9. The high suppliance rate of 3s implies that it is analogous to an RI form, which is what has been claimed for child Spanish (Davidiak and Grinstead 2004). I argue below that this is indeed a nontensed/default (BV) form, computationally the least costly form that will appear first in early Slovenian and other morphologically complex languages. Besides early Spanish, Italian, and Slovenian, the evidence also includes data from early Czech (Smolík 2002). Tryzna (p.c.) reminds me of the same outcome in early Polish. These languages all seem to parallel those with a BV effect (e.g., English, Inuktitut, Swahili).

agreement error rates (number of tokens with errors/percentage, based on obligatory contexts) for the four children reported above.

Table 3: Present tense verbs with incorrect agreement for the four children

Child	BPs	Pres T Vs	<i>BE</i> (COP/AUX)	All finiteness markers excl. imperatives
Lenart	4 (4.9%)	1 (1.5%)	55 (93.2%)	56 (44.4%)
Katja	2 (6.4%)	2 (4.4%)	55 (46.21%)	57 (34.7%)
Tomaz	0	0	5 (41.67%)	5 (41.67%)
Vesna	0	0	12 (66.6%)	12 (66.6%)

We see that the agreement error rates are extremely variable, spanning from 0% to 6.4% on BPs, from 0% to 4.4% on present tense verbs, and from 41.7% to as high as 93.2% in copula and auxiliary *be* omissions in compositional tenses. The overall error rate on all verbs denoting finiteness is as low as 17.6%, but skyrockets to 66.6% in the case of one girl. True, this overall omission effect is mainly due to the omission of *be*, but it nonetheless shows that errors vary within and across speakers.

Also, more careful and detailed quantificational analyses may reveal the information that otherwise gets skewed in more deterministic accounts that purport to show the “all or nothing” outcome, rather than a more probabilistic outcome with variability. Quantificational analyses may inform more qualifical accounts about where the weaknesses and the strengths of a particular system lie and how learning (and hence, language development) actually proceeds. This, however, does *not* discredit a nativist continuity account—the latter, I argue, refers to some core computational mechanism which may be continuous and operate qualitatively the same way in children as it does in adults. I argue below that what does change (and is hence non-continuous) is the learning that is associated with this core linguistic capacity. Thus, I see a possible model of early tense and agreement as one that combines a deterministic (biological) basis with a probabilistic (learning) system. I sketch such a model below in Section 4.

4. Towards a Possible Model of Early (Verb) Morphosyntax

First, a model of the acquisition of verb morphosyntax should account for children’s early sensitivity to modality (a realis/irrealis distinction) and aspectual distinctions (Brown 1973; Hoekstra and Hyams 1998; Hyams 2005). Second, we now have strong evidence from several early languages that suggest that children are rather poor morphological learners of tense and agreement morphology in early stages and that the “unlearning” of ERNs proceeds in a developmental fashion, following a robust universal pattern, but with a lot of inter- and intra-subject, as well as inter- and intra-language variability (e.g., Brown 1973; Legate and Yang in press; cf. also Pye 2002). Third, children’s information processing and memory capacities are not the same as those of adults’ and the same holds true for production (cf. Jusczyk 1997).

In a working model that I sketch below, I assume a bottom-up processing and generation and adopt the view that children have a complete set of functional categories (given by UG), but nevertheless “access” them (i.e., spell them out) only probabilistically, and with less success at higher branches due to the computational load and the problems of syntax-morphology mapping. This is in line with the Inflectional Hierarchy Hypothesis (henceforth, IHH), as in Izvorski and Ullman (1999). Additionally, I hypothesize that early grammar hooks up to early cognition in trying to grammatically establish aspectual and modal distinctions as early as we can test children. Specifically—in line with the IHH—I predict that children will cross-linguistically start producing aspectual and modality verb forms first, together with BVs. I argue that that such aspectual markers are cognitively-based distinctions and are more primitive and semantically much more salient than agreement markers—the former fall out of general cognition, whereas the latter are purely formal and linguistic-specific markers, merely driving the linguistic computation.¹⁰

Furthermore, I hypothesize that early unmarked aspectual forms are computationally less costly and represent exactly the class of verb forms that generative syntacticians, typologists, and developmental psycholinguists have generally termed default/unmarked (Bybee 1985). In this model, the hierarchy reported in studies on generation and processing in impaired populations holds developmentally for normal children as well, though—crucially—this hierarchy is that of morphological learning and of the morphology-syntax mapping rather than a developmental hierarchy of syntax with respect to functional projections. Specifically, the account sketched here predicts that in line with the IHH of $V_{BV} > V_{INF} > V_{ASP/MOD} > V_T > V_{AGR}$, Agr will be less likely (correctly, obligatorily) supplied than T and this—in turn—will be less likely supplied than Asp, less commonly/correctly supplied than infinitival forms, etc. Crucially also, when two morphological forms compete for the same syntactic spot in the hierarchy, the input will decide on the winner (e.g., early English shows a BV and a present participle winning over an infinitive, early Slovenian a 3s (RI-analogue) form winning over an infinitive)—hence a language-specific property. Generally, default forms are hypothesized to be simply the least-marked, earliest forms at the bottom of the hierarchy, either BVs or RIs, though it may well turn out that all early languages go through an RI stage, only that such a stage disappears extremely quickly in morphologically rich languages. What is crucial about the model outlined here is that (person) agreement is viewed to be purely formal and is predicted to be acquired only after any other verb forms (e.g., bare verb stems, participles, and tensed forms).

The proposed model seriously takes into account the insights from developmental psycholinguistic literature in advocating gradual morphological

10. Since the agreement node(s) in narrow syntax cannot rely on any interface with general cognitive mechanisms, they will be generally much harder to access/map since the morphology-syntax mapping will be much more costly, coming solely from the learning of the actual verb forms in the paradigm(s) themselves.

learning, based on distributional and statistical properties. Furthermore, it is also to a great extent in line—at least descriptively—with phrase structure truncation and optionality accounts in terms of “surface syntax”, though not “syntax proper”, or “narrow syntax”, since Merge or the feature-checking operation in this model would not be rendered unavailable or deficient.¹¹

5. Conclusion

The paper showed that the productivity with respect to tense and agreement marking is much more limited than generally reported in generative acquisition studies. By carefully quantifying data on early verb morphosyntax and breaking them down for specific cells of the paradigms, we saw that although children show productive adult-like (functional) morphology, they nevertheless produce a high number of errors in certain systems. I specifically argued that early non-adult verb forms with respect to tense and agreement are not due to some lack of “knowledge” of syntax or to some central syntactic deficit, limitation, or optional/immature syntactic process—as most generative accounts have argued—but are (probably) due to the “immature”/incomplete morphology that has not been learned yet, the morphology-syntax mapping (which operates on different “levels” with respect to the interfaces), as well as different distributional and statistical properties in the input. I concluded by claiming that “static” deterministic accounts relying on syntax only cannot capture the variability and optionality within and across speakers and within and across early languages and should team up with more probabilistic accounts, specifically developmental constructionist ones that rely on stochastic learning and cognitive salience and on neurolinguistic ones that rely on the notion of computational complexity.

The future goal of the field should then be to turn the specific claims and hypotheses sketched above into a workable, testable model that would combine qualificational and quantificational approaches, accounting for the observed cross-linguistic evidence.

11. This is undesirable in such a model since we crucially want to maintain “intact”, adult-like syntax with respect to its narrow and basic properties (such as hierarchical structure, the existence of thematic and functional categories, and the computation with *Merge*). I believe that if anything at all, it is a generative concatenation operation à la *Merge*, yielding recursion (in both syntax and morphology), that is the likeliest candidate for an innately specified operation in the “narrow” language faculty; hence it is very unlikely that this operation would come as immature/partial/deficient, or would be subject to maturation. Of course, in the case of agrammatic patients as reported in the neurolinguistic literature and possibly also in the case of developmental language disorders, it may well be the case that this operation is dysfunctional.

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