THE ACQUISITION OF VERBAL INFLECTION IN CHILD GRAMMARS IN A VARIABILITY MODEL OF EARLY MORPHOSYNTACTIC DEVELOPMENT: A BIOLINGUISTIC PERSPECTIVE

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By

Dominik Rus, B.A.

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Dominik Rus, B.A.
Thesis Advisors: Donna Lardiere, Ph.D. and Charles Yang, Ph.D.

ABSTRACT

This dissertation investigates the acquisition of early verb inflection in child Slovenian from morphosyntactic and morphophonological perspectives. It centers on the phenomenon of root nonfinites, particularly the patterns of omission and substitution errors in verb inflection marking.

It argues that every acquisition model needs to account for the following robust developmental phenomena: initial telegraphic speech, optionality, variability, graded (rather than absolute) morpheme order, and gradualness.

It suggests that current biolinguistic models can be enhanced by supplementing evidence from UG-based studies with that from usage-based and neuropsychological accounts. This proposal is tied to Chomsky’s (2005) hypothesis that language comprises three factors—the innate language faculty, experience, and computational efficiency, and that language acquisition relies considerably on this third factor.

The study motivates the Inflectional Hierarchy Complexity Hypothesis (IHCH), suggesting that while children’s early morphosyntax is adultlike regarding the availability of
functional categories and the concatenation operation, children’s morphophonological spell-out is unreliable due to computational bottlenecks. It is hypothesized that grammars initially contain verbs which may be disguised as adultlike finite forms with minimal or zero morphology (e.g., 3rd singular present [3S] reported in early Romance). Such verbs are arguably vPs and are morphophonologically spelled out with greater success than tensed forms which, in turn, are more successful than person-based forms. That is, a probabilistic hierarchy of bare stems > tensed forms > person agreement verbs is predicted, where the forms to the left are postulated to be spelled out statistically better than those to the right.

Based on lemmatization and frequency counts and syntactic and morphophonological analyses of existing and new child Slovenian data, the study confirms the IHCH. It is shown that early Slovenian verbs are mainly complex bare verbs (CBVs) that carry only the conjugation class morphology with no person/number inflection—homophonous with 3S forms—and past participles that lack auxiliaries (arguably TNSPs). Person-related inflection is supplied statistically less reliably than participle inflection which, in turn, is less reliable than the inflection on CBVs. This hierarchy is observed even at age 2;5+ when overt inflection is supplied 80%-90% of the time and most morphophonological properties have been acquired.
If we knew what it was we were doing, It would not be called research, would it?  
- Albert Einstein -

Soon after I started graduate school I co-founded (with Pritha Chandra from the University of Maryland) the Biolinguistics Reading Group for the Georgetown University and University of Maryland at College Park research communities, advocating a greater understanding of linguistics as a natural science, and—particularly—fostering an interdisciplinary approach in our endeavors to study language and its development. Hoping to attract a wide variety of scholars working in computer science, linguistics, neuroscience, and psychology, and craving for a dynamic, intellectual, and stimulating crowd, I invited David Lightfoot, Massimo Piatelli-Palmarini, and Juan Uriagereka—all distinguished, top-notch scientists in their respective fields. The response exceeded our expectations: the group started with some twenty biologists, neuroscientists, psychologists, and linguists from various backgrounds (from syntacticians, semanticists, and computational linguists, to cognitive linguists interested in input and interaction in second language acquisition). Only for a few weeks, though. For the next year or so, it would be Pritha and I, together with four theoretical linguists and psycholinguists from UMD, discussing anything from the evolution of minimalist syntax to the FOXP2 gene while sipping coffee and munching on chocolate chip cookies. I thoroughly enjoyed our informal colloquies, but I personally mainly realized how unquestionable a lot of linguistic theorizing has been, how many ad hoc proposals linguists have taken for granted, and—particularly—how much conflicting evidence there has been in the field. The more I knew about minimalist syntax, the more I was buying the story of “narrow syntax” being distinct from some broader language capacity that interacts with other non-linguistic, more general cognitive domains. In the same vein, the more I read about generative language acquisition, the more I found myself steering away from the “mainstream” generative credo of parameterized learning that brought me quite a few accolades as an undergraduate student and characterized a great bulk of my studies and research as a novice graduate student.

Numerous conferences and the interaction with various professors, postdocs, and graduate students in the Departments of Linguistics, Psychology, and Neuroscience at Georgetown and Linguistics and Neuroscience at UMD, as well as my interaction with the students and postdocs in the Brain and Language Lab at Georgetown have all sharpened my thinking about language and its acquisition. Though still a generative linguist at heart, I
realized that I have become quite “radical” in my thinking about language acquisition.

The drive for the biolinguistics group eventually waned out and now it was just Pritha and I, scribbling notes on Starbucks or Panda Express paper napkins and defending our views—Pritha generally defending the “classic” Chomskian program and sometimes calling me “maybe too radical”, and me generally objecting to too deterministic linguistic formal acquisition accounts and various constraints and parameters that were multiplying by the dozen every time Chomsky would update his theory or another Linguistic Inquiry issue would come out.

This investigation has grown particularly from my reaction to numerous UG-based accounts of child morphosyntactic and morphophonological phenomena that have put forth myriads of descriptive, extemporaneous principles that—I believe—have had little explanatory power and would as such almost always be immediately superseded by subsequent technological tweaks coming from formal linguistic theories.

I have always argued that evidence from language acquisition should inform linguistic theory in explaining various linguistic phenomena rather than undergo a rigorous test whether a certain technology is successful since the latter approach always runs into a risk of attributing mere technology to our biological linguistic endowment a priori. Moreover, I have argued—within the scope of biolinguistics, though—that fruitful research into language acquisition will be the one that bridges linguistic insights with those from neurocognitive and developmental psychological research.

This dissertation shows that each body of research has contributed an important array of tools and evidence on human language acquisition and—most importantly—that neither line should be undertaken in the absence of the other.

I believe that nowadays with so much substantial evidence from formal linguistic theories, psycholinguistic theories of language processing and development, computational modeling, as well as evidence from brain imaging research, we cannot but agree that language acquisition is a dynamic interplay between biology and learning or—following Chomsky’s (2005) thesis—an interplay between biology, experience, and computational efficiency.
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I have been fortunate to have met many great scholars and to have made so many great friends since I first set foot in the Graduate School at Georgetown.

Donna Lardiere became my first role model in linguistics. Not only did she teach me how to reason and write as a linguist and acquisitionist, she would always support me and listen to my whining about DC weather, work overload, missed plane connections, or overpriced coffee at the school cafeterias. She became my academic advisor on Day 1 and stayed with me until the very end, serving as my dissertation co-director. A lot of ideas in this dissertation grew from our numerous chats about language development. Her great intellect sharpened my thinking about language and she would always dot the i’s and cross the t’s on pretty much anything I’d hand in—be it a piece of homework, a paper for presentation or publication, or dissertation chapters. Donna, you rock! I am forever indebted to you!

Héctor Campos has always been my “syntax hero”—he has read literally hundreds of pages of my syntax and acquisition writing throughout several years and guided me through every single step of being a good syntactician—from gathering and sorting out data to rigorous analysis and persuasive argumentation. He is a superb linguist and a fantastic teacher, always trying to make sure that the syntax in his students’ acquisition papers doesn’t sound “too weird” or “too soft” for die-hard syntacticians. Héctor not only became an inspirational teacher, but also a good friend. ¡Gracias, Héctor, eres lo máximo!

Michael Ullman would always teach me how to balance linguistics with neuroscience and look at every analysis as impartially as possible. His words of wisdom were usually topped with a much-needed dosage of “Michael humor”. He’d always want to make sure that my ideas about development were as neuroscience-friendly as possible and he contributed greatly to my understanding and tackling of the issue of acquisition from various angles of cognitive sciences. Michael, you’re awesome!

Donna, Héctor, and Michael were later joined by Charles Young, a brilliant acquisitionist from MIT who had been pursuing similar research questions to the ones I had been entertaining in my chats, presentations, and papers. After a couple of conversations with Charles, I knew he was the man to step in as a co-director. He read pages and pages of my papers and provided constructive criticism on everything I had to say about language development...not to mention that he’s every grad student’s dream as he’ll read your dissertation chapter and send you three pages of comments in a couple of days. Charles, you rule!

I have benefited also from many Georgetown, UMD College Park, and Johns Hopkins professors in various departments, particularly Raffaella Zanuttini, Paul Portner, Lisa Zsiga, Andrea Tyler, Jeff Connor-Linton, Ralph Fasold, Rhonda Friedman, Darlene Howard, Chandan Vadya, Rachel Barr, David Lightfoot,
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Thanks to the professors and colleagues I’ve met at various conferences over the past few years and with whom I’ve had a chance to talk about my work: Andrew Nevins, Elena Kallestinova, Filip Smolik, John Grinstead, Julian Pine, Karin Stromswold, Laura Sgarlato, Magdalena Fialkowska, Maria Guasti, Maria Zubizarreta, Massimo Piattelli-Palmarini, Nina Hyams, Silvina Montrul, Tanja Kupisch, Željko Bošković—to name but a few.

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Chapter 1: Introduction

1.1 Goals and Preliminaries

Buckets of ink have been spilt on the subject of the acquisition of early verb morphosyntax—from all possible angles of epistemology and learning psychology, within various theoretical approaches, adopting different formal models, in as different domains as prosody and neurolinguistic processing, for both healthy and impaired populations, be they native, non-native, bilingual, or multilingual. It would be no exaggeration to say that the study of language acquisition and processing in the verbal domain (encompassing, for example, the grammatical categories of tense, agreement, aspect, and the interactions among them as well as their interactions with other categories such as specificity, case, etc.) represents much of what modern child language acquisition research is about.

For more than half a century now, research in morphosyntactic and morphophonological acquisition has attempted to answer the following questions in regard to the acquisition of verb morphosyntax and morphophonology:

(1)
(a) Which functors that turn verbs into various morphosyntactic forms and give them various semantic meanings are omitted and/or substituted in early grammatical systems?
(b) In what contexts are these functors omitted and/or substituted?
(c) Are the morphophonological forms of certain verbal categories more likely to be omitted and/or substituted than others, or are the omissions and/or substitutions arbitrary (random)?
(d) What is the representation of truncated/partial grammatical structures? More generally, if morphophonology is lacking in certain systems, is syntax (features, categories, structure-building operations) intact or missing, too?
(e) Why are the functors omitted in the first place? Specifically, what linguistic and/or non-linguistic mechanisms and principles might be lacking or might be partially developed/deficient in child grammars?

While language acquisition research seems to have answered the first question more or less adequately, we see no end to the debate about the last four questions. That is, most modern literature on the acquisition of verb inflection has attempted to account for when, why, how and how often in children’s talk, Mama ride horsie, Papa have it, and Cowboy Jesus wear boots (Brown, 1973) and what the syntactic and morphophonological representations of such non-adultlike utterances are. However, no formal study to date has addressed explicitly whether omission and substitution errors regarding verbal functional morphemes differ in any respect, let alone whether such errors are unpredictable (i.e., random) or whether there seem to be some categorical patterns in the children’s production data (perhaps cross-linguistically), or possibly both.¹

¹ While formal deterministic studies propose descriptively powerful models that can account for a wealth of data, they generally do not predict more than a description stating that in early systems certain inflection errors will appear while others will not. Note that these models fail short of explanatory power since child data are usually “messy” and do not yield all-or-nothing behaviors (see particularly Blom & Wijnen, to appear; Yang, 2002; see Chapter 2 below).
Further, it has not been entirely clear whether children’s truncated (partial) morphophonological representations implicate the lack of (morpho)syntax. In other words, if syntax is taken to be merely a computational system that operates on formal features that combine into phrase markers, as generally hypothesized in modern formal linguistics (e.g., Adger, 2003, 2007b; Chomsky, 1995 et seq.), research should attempt to address more explicitly whether children’s earliest grammatical systems—albeit occasionally devoid of surface morphophonological material—also lack formal features and the morphosyntactic “place holders” (functional categories) associated with such features, and the operations on them (e.g., the concatenation operation).

Last but not least, there seems to be much disagreement as to what linguistic (and perhaps also nonlinguistic) domain(s) and mechanism(s) might play a role in the acquisition of early inflectional material.

This dissertation attempts to answer the above research questions by focusing on the morphosyntactic and morphophonological patterns of omission and substitution errors and proposes a possible mechanism that may account for the reported behavior.

1.2 Background and Rationale

Formal studies of verb inflection framed in the generative (U[niversal] G[rammar]-based) paradigm have shown time and again
that while children omit a great deal of functional morphophonology, they seem to be very sensitive to target morphosyntax (e.g., the position of tensed vs. non-tensed verbs, clitic placement, etc.) from as early as we can test them (see Guasti, 1993/1994; Guasti & Rizzi, 2002; Hoekstra & Hyams, 1998; Hyams, 2001, 2002, 2005; Leonini, 2002; Rizzi, 1993/1994, 2005; Wexler, 1994, 1998, 2007). More specifically, children seem to be sensitive to discrete formal morphosyntactic positions (and perhaps also the features associated with them) although the morphophonological spell-out of (certain) features may be missing or incomplete (see for example, Blom, 2007; Blom & Wijnen, to appear; Hyams, 2001, 2005; Rus, 2006b, 2007b; Salustri & Hyams, 2003, 2006; Yang, 2002). Some generative researchers have even entertained a possibility that gradual development is merely illusionary and that the acquisition of morphosyntax is a near-instantaneous process, with early grammars exhibiting nearly-complete systems of inflectional morphophonology (e.g., Poeppel & Wexler, 1993; Torrens, 1995; Wexler, 1998, 2007).2

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2 Formal accounts differ considerably in regard to the explanation of missing and/or incomplete morphophonology. While most argue for some kind of competence deficit, some put forth maturational accounts or performance (processing) deficits due to computational complexity and/or morphosyntactic complexity (see Chapter 2).

3 For example, Wexler (1998) argues that morphological learning operates via parameter setting where such setting is shaped perceptually and is hence fully operational even before the onset of speech. Wexler further argues that child data offer evidence for children’s near-instantaneous convergence to adultlike systems even regarding morphophonological learning. Wexler dubs such developmental phenomenon Very Early Knowledge of Inflection (VEKI), naming children “little inflection machines”.
However, many researchers working in both generative and various usage-based frameworks argue that deterministic UG-based models postulating all-or-nothing mechanisms cannot account for some of the most robustly-attested hallmarks of early language development, namely what appears to be telegraphic speech morphophonologically (Bittner, Dressler, & Kilani-Schoch, 2003; Brown, 1973; O’Grady, 1997; Radford, 1995), inter-subject and intra-subject variability and optionality (Blom & Wijnen, to appear; Clahsen & Penke, 1992; Gülzow, 2003; Yang, 2002; Legate & Yang, 2007; Rus, 2006b, 2007a, 2007b), acquisition resembling piecemeal learning (i.e., the gradualness effect; Aguado-Orea, 2004; Bittner et al., 2003; Blom, 2007; Blom & Wijnen, to appear; Yang, 2002; Legate & Yang, 2007; see also Radford, 1995; Rizzi, 1993/1994, 2005; Varlokosta, Vainikka, & Rohrbacher, 1998), and a high number of omission and substitution errors in certain grammatical systems (Aguado-Orea, 2004; Aguado-Orea & Pine, 2006; Bittner et al., 2003; Pine, Rowland, Lieven, & Theakston, 2005; Pine, Conti-Ramsden, Joseph, Lieven, & Serratrice, 2008; see also a discussion on deterministic learning and variability in language acquisition in Yang, 2002).

Some of the above-mentioned studies of verb inflection—particularly those formulated in the Constructivist and Natural Morphology traditions—report various frequency and distribution effects found in children’s earliest utterances, most notably the overuse of the inflection used in high frequency verbs and a tendency to default to the most frequent and largest verb
conjugation class (see Aguado-Orea, 2004; Aguado-Orea & Pine, 2006; Bittner et al., 2003; Pine et al., 2005, 2008).⁴

It should nonetheless be pointed out that in regard to the explanation of the acquisition of early verb morphophonology, Constructivist and Natural Morphology models do not fare much better than deterministic, all-or-nothing generative models. Specifically, usage-based accounts merely put forth various observations and descriptions about verb inflection rather than any explicit (formalized) linguistic analyses. As such, they usually remain untestable (see Carnie, 2000) and merely descriptive rather than explanatory, no matter how detailed and informative (see for example, Herdina, 1996, pp. 37-38).⁵

Numerous formal studies carried out in psycholinguistic and neurolinguistic frameworks further show that children’s

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⁴ This line of literature generally argues for an explicit and direct link between distributional and typological properties in the linguistic input and language acquisition. It is usually contended that certain verb forms not only tend to be more frequent but are also more natural (and acquired easier/earlier than others). Although naturalness is generally understood as language-specific system adequacy, which accounts for the regular, productive, and default forms within the morphology of a language, it could also be understood as universal morphological markedness (i.e., system-independent morphological markedness; Dressler, 2003, 2005). For example, it is often claimed that cross-linguistically, the present tense, the singular number, and the third person are more natural than the past tense, plural, or non-third persons, respectively (Bybee, 1985, 2007; Harasowska, 1998; see also Albright, 2002; Harley & Ritter, 2002). It has been argued that not only are such natural forms the earliest to appear in children’s speech, but they are also most commonly misapplied (i.e., applied in contexts that do not require such forms; see Aguirre, 2003; Bybee, 1985; Gagarina, 2002, 2003; Katićić, 2003; Noccetti, 2003).

⁵ This by no means implies that these accounts are “incorrect”. However, such approaches generally merely describe and catalogue early grammatical systems from a perspective of child language without connecting it to adult language. By implication, they do not address the transition problem from child to adult language, and—even less often—the mechanisms that may play a role in this transition.
morphophonology associated with the left periphery of the clause (e.g., focused and topicalized elements, *wh-*) seem to be more challenging (i.e., supplied and/or accessed with less success) than morphophonology dependent on lower, inflectional (i.e., tense and agreement) categories, which in turn, seem to be more challenging than aspectual and lexical positions in the lower clausal domains (see for example, Avram & Coene, 2003; Davidiak & Grinstead, 2004; Grinstead, 2000; Hagstrom, 2000; Ingham, 1998; Legendre, Hagstrom, Vainikka, & Todorova, 2006; Radford, 1995; Rizzi, 1993/1994, 2005; Vainikka & Young-Scholten, 2006, 2007; Varlokosta et al., 1998).

Consequently, the cumulative empirical evidence suggests that an explanatory model of early verb inflection is necessarily multifaceted and much more complex than generally thought (if there can be such a model in the first place). It has to account for at least the following evidence (in regard to production):

(2)
(a) evidence that early syntax is adultlike with respect to some basic computation that operates on discrete formal features (e.g., evidence that one and the same (type of) feature operates (consistently) in some functional syntactic domain, regardless of the presence/absence of surface morphophonology, associated with such (type of) feature.

6 Note that when one posits such a view of language architecture, the question of whether initial syntax is “underspecified”, “developing”, or “lacking” does not arise at all; under this view, syntax is intact, given, and continuous. Note that this is consistent with several accounts that propose the so-called “syntax-first” or “syntax-before-morphology” hypothesis (e.g., Dye, Foley, Blume, & Lust, 2004; Foley, Núñez del Prado, Barbier, & Lust, 2003; Santelmann, Berk, & Lust, 2000; Santelmann, Berk, Austin, Somashekar, & Lust, 2002), sometimes termed “syntax-morphology asymmetry” (Blom & Wijnen, to appear), or “complete representations, incomplete derivations” (Phillips, 1996). These
evidence for early adultlike verb or clitic placement or word order in general
(b) variability and optionality in regard to the suppliance of functional verb morphophonology (a high number of errors in select person/number and/or number/gender systems)
(c) the gradualness effect in regard to the morphophonological suppliance of functional morphophonology
(d) graded (rather than absolute) morpheme order (evidence that children seem to be sensitive and mark [spell out] more reliably and sooner the morphophonology associated with aspect/tense than person agreement (than agreement in highest, discourse-related peripheral domains)
(e) early preference for most frequent and most transparent verbal forms, i.e., those that belong to the most frequent conjugation class(es) with minimal, regular, and default morphophonology

The dissertation shows that it seems that none of the (formal) acquisition studies to date has been able to account for all the evidence listed in (2) above.

It is suggested that this is mainly due to the fact that most studies focus on a single inflection (e.g., tense, aspect) and/or domain (e.g., syntax), and are generally formulated in a single paradigm (e.g., generativism, constructivism), assuming a single learning psychology (e.g., innatist, emergentist). Hence, the dissertation first proposes that in order to approach the issue of morphophonological learnability more holistically and to develop a model that can capture a cluster of robust (but diverse) developmental phenomena, one should combine the evidence from various linguistic traditions, frameworks, and models.

accounts all hypothesize that the child is operating on adult functional structure and the categories associated with it although “surface” morphology may not be adultlike (see also Lardiere [2000], who argues that “syntax does not care about morphology” in the sense that one cannot “learn” and “represent” syntax from the morphological information [p. 135]).
1.3 Proposal

1.3.1 Towards a Conceptual Solution

As a point of departure, the dissertation suggests that in order to be able to address the research questions in (1) above more adequately, the field of language acquisition should move beyond a research program that considers only the issues that are theoretically and methodologically relevant for a specific paradigm and/or psychological school of thought. Specifically, the study argues that one of the major reasons for the fragmented research into early verb inflection has been insufficient interaction (in both directions) between linguistics and other developmental sciences investigating the human mind, particularly cognitive neuroscience and developmental psychology (see Grodzinsky, 2000, pp. 63-64; Marantz, 2005; Miller, 2003; Poeppel, 2007; Poeppel & Embick, 2005; Walenski & Ullman, 2005).

The dissertation argues that the acquisition accounts formulated in deterministic, UG-based models, have not adequately addressed the above-mentioned research questions for four reasons. First, most propose all-or-nothing learning algorithms which cannot adequately address the issues of variability, optionality, a high number of errors in certain systems, and what appears to be the gradualness effect (in regard to morphophonological marking). Second, most argue for full competence/strong continuity and the dissertation contends that
such a strong view of continuity may be unnecessary. Third, most go as far as to propose near-instantaneous morphophonological convergence to adult systems, which under closer scrutiny receives little empirical support. Fourth but not least, although generative accounts seem to be very detailed and informative for the research questions at hand, they frequently put forth numerous mechanisms and constraints from theoretical linguistic as a \textit{priori} components of the innate linguistic endowment.

Nevertheless, the dissertation purports that the biolinguistic acquisition approach in the Chomskian tradition can be enhanced when the evidence from UG-based studies is supplemented with that from usage-based accounts and further

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\textsuperscript{7} Continuity in language acquisition refers to the hypothesis that children’s grammars are subject to the same set of constraints as adult grammars (Atkinson, 1992). Under this view, child grammars are hypothesized to be constrained in some principled ways by the properties of UG. Specifically, though early grammars may differ from target systems, they are postulated to fall within the set of grammars allowed by UG (Crain & Pietroski, 2001, 2002). Note, however, that continuity does not need to imply near-instantaneous acquisition. Though most models do, some explicitly argue against it. For example, by postulating fixed innate parameters which allow morphophonological intra- and inter-subject variability, Legate & Yang (2007) and Yang (2002) uphold continuity in a way that is crucially different from the one purporting instantaneous acquisition (see Chapter 2 below). See also Blom and Wijnen (to appear), who contend that a (more) gradual, learning process is seen almost as an embarrassment to the premises of continuity and that such a position is too strong (p. 3).

\textsuperscript{8} Evidence from language acquisition should inform linguistic theory in explaining various linguistic phenomena rather than undergo a rigorous test whether certain technology (i.e., principles, operations, etc.) proposed by theoretical linguistics deserves merit or not. In other words, testing out the technology on child language data always runs into a risk of attributing technology to biological endowment \textit{a priori}. Hence, rather than simply adopting a specific (theory-internal) principle of grammar in the explanation of child language data, one should first seek to turn highly abstract (often, purely descriptive) linguistic assumptions into testable claims that could be proven empirically (see Newmeyer, 2000, 2004), based on the smallest number of assumptions and—if possible—utilizing no theoretically-unmotivated principles (see Poeppel, 2007).
informed by neuropsychological and neuroscience research into the processing and production of the categories in question (see for example, Embick & Marantz, 2005; Grodzinsky, 2000; Izvorski & Ullman, 1999; Poeppel, 2007; Pancheva & Ullman, 2001). That is, a formal model can account for the evidence listed above when a deterministic learning mechanism is supplemented with a more probabilistic one. Specifically, this dissertation shows that omission and substitution errors in the domain of functional verb morphophonology are not random at all, but follow a specific pattern, albeit not an all-or-nothing one. The study offers a possible explanation for the observed pattern, based mainly on child English and Slovenian.

Importantly, however, the current study does not simplistically present the research in question as a tension between generativism and constructivism (contra many recent accounts of early verb morphosyntax, e.g., Akhtar, 1999, 2004; Dye, 2005; Gathercole, Sebastian, & Soto, 1999, 2002; Goldberg, 2003, 2006, 2009; Tesan, 2005; Wexler, 2007). The issue at hand is necessarily multifaceted and much more complex than the debates between internally-driven and externally-driven approaches have framed it. It is a multi-dimensional one, encompassing syntax, morphology, and phonology, as well as the interaction between linguistic and non-linguistic domains.

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9 Although most formal acquisition models concentrate on a single domain, the idea of studying interfaces in acquisition is not new at all. The field has been aware of various interactions that take place in the acquisition and representation of verb inflection (see for example, Demuth, 2007; Valian, 2007). However, research into the
Last but not least, the dissertation contends that investigating early production of verb inflection goes much beyond proposing a formal model of syntax, or—at the other extreme—claiming that such learning is simply item-based from scratch. Modeling the knowledge of early morphosyntax requires serious and rigorous collaboration of syntax, morphology, and phonology, all interacting with domain-general computational and processing mechanisms that are nevertheless not mere descriptive statements or epiphenomena, but happen in a real biological space, i.e., they have a neurobiological basis.

1.3.2 Towards an Empirical Solution: A Variability Model of Morphosyntactic Acquisition and the Inflectional Hierarchy Complexity Hypothesis

The dissertation argues that the patterns of optionality, variability, a high number of errors (in certain systems), and acquisition resembling stage learning can all be captured in a UG-based model if one takes seriously the more recent hypotheses interfaces between linguistic and non-linguistic domains is much less-commonly entertained in formal acquisition circles. Such a trend is now growing in the fields of developmental psychology and neuroscience that are teaming up more with theoretical psycholinguistics (e.g., Grodzinsky, 2000; Poeppel, 2007; Walenski & Ullman, 2005). It is probably safe to conclude that while linguistic categories and processes are UG-constrained, they nevertheless depend on computational bottlenecks, which could be imposed on UG itself or might depend on more general processing capacities (see Bloom, 1990, 1993; Rizzi, 2005; Wexler, 1998; Weissenborn, 1994; see a more general discussion on this issue in Chomsky, 2005, particularly p. 6, and Phillips, 2004).
about the nature of language from formal linguistics and modern biolinguistic research, given in (3) below:

(3)
(a) There is one engine for generating human language structure and that engine is syntax (Adger, 2003, 2007b; Bartos, 2003; Frampton & Gutmann, 1999, 2004; Marantz, to appear); specifically, morphosyntactic features are the triggers of syntactic operations (Adger, 2003, 2007a, 2007b; Adger & Svenonius, to appear; Chomsky, 1995 et seq.).
(b) The morphosyntactic computation is governed by strict cyclicity; it proceeds bottom-up, is phase-based, and derivational (Müller, 2007; Epstein & Seely, 2002; 2006; Frampton & Gutmann, 1999, 2004; Surányi, 2007).
(c) The syntactic computation is feature-driven, operating on a very restrictive set of basic operations (e.g., Merge, Agree; Adger, 2007b; Adger & Svenonius, to appear).
(d) There are three factors that enter into language growth in an individual (UG, experience, and computational efficiency; Chomsky, 2005), and all three factors need to be taken seriously and evoked explicitly in a model of language acquisition.

The view of the architecture of grammar sketched in (3) above suggests that phrase structure and the operations on it (e.g., Merge) are given by UG (i.e., they come as “free riders”) and as such, they are postulated to be operative at the earliest observable stage of development (i.e., at around 12-14 months of age). In other words, child syntax is predicted to be adultlike in regard to formal features, morphosyntactic categories, and the

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10 That is, morphology is primarily handled in the syntax, but this does not imply that certain parts of morphology cannot apply post-syntactically, like phonology. In fact, I assume a more generic model of Distributed Morphology that is compatible with Minimalist models of syntax (see Chomsky, 2000b), particularly the Minimalist-Distributed Morphology model of Embick & Noyer (2007) and the post-syntactic model of phonological spell-out (see for example, Dobashi, 2003, 2004).

11 That is, I assume some generic derivational model of Multiple Spell-Out that relates morphosyntax with phonology (e.g. Dobashi, 2003, 2004; see Chapter 3 for details).
operations on them. However, the morphophonological spell-out of formal features in early systems may be far from adultlike, even at later stages of development (e.g., at age 3;0 and beyond).

Assuming a theory of minimalist syntax (Chomsky, 2000b et seq.) in a strict derivational model (e.g., Dobashi, 2003, 2004), the dissertation proposes the so-called Inflectional Hierarchy Complexity Hypothesis (IHCH)—the view that children morphophonologically spell out morphosyntactic features with less success at higher branches of phrase structure due to computational bottlenecks. In other words, it is suggested that the more embedded the morphosyntactic categories in a phrase structure, the more computation the morphosyntactic component must perform in order to cyclically spell-out the corresponding feature bundles.\(^\text{12}\)

The idea for the IHCH is borrowed from Izvorski & Ullman’s (1999) and Pancheva & Ullman’s (2001) Hierarchy Complexity Hypothesis (HCH), which proposes computational complexity with respect to the concatenation operation \textit{Merge}. HCH and its similar instantiations (e.g., Friedmann, 2001, 2002; Friedmann & Grodzinsky, 1997, 2000; Gavarró & Martínez-Ferreiro, 2007; Hagiwara, 1995) have been originally proposed for agrammatic interior aphasics and other impaired populations with brain

\(^{12}\) Architecturally then, morphology is assumed to be phase-based, running cyclically and simultaneously with syntax (see for example, Adger, 2007a; Cowper and Hall, 2003; Halle & Marantz, 1993; Marantz, to appear; for details, see Chapter 3).
damage (mainly) to Broca’s area (see detailed reviews in Wenzlaff & Clahsen, 2004 and Clahsen, 2008; see Chapter 2 for details).\footnote{13}{Apart from being implicated in other linguistic and nonlinguistic tasks, Broca’s area seems to regulate particularly concatenation in the domains of morphology and syntax (see for example, Grodzinsky, 2000; Grodzinsky & Amunts, 2006; Grodzinsky & Santi, 2008; Ullman & Pierpont, 2005).}

Though the proposed hypotheses about the omission of functional morphophonology differ with respect to technical details, they all suggest a computational hierarchy of difficulty for production and comprehension, generally that of Bare Verb > Aspect > Tense/Agreement > Complementizer (where the categories to the left are more accessible and produced with more success than the ones to the right).

The current study hypothesizes that such a pattern of morphophonological spell-out arises due to computational bottlenecks in regard to morphosyntactic structure-building. It is shown that such a state of affairs is still persistent even at age 2;5 where person (“high”) agreement inflection is supplied very reliably, i.e., 80%-90% of the time.

More specifically, the study demonstrates that children’s early morphosyntax is adultlike with respect to formal features and the categories that play a role in the computation of these features. For example, the computation of gender/number agreement, associated with low(er) morphosyntactic heads, is shown to be fully operational from very early on since most active and passive past participles are morphophonologically correctly spelled out at age 1;2-1;4. However, it is shown that
early systems morphophonologically exhibit mainly computationally least costly verb forms that typologists and language acquisitionists working in usage-based accounts generally term basic or unmarked (see the collection of papers in Bittner et al., 2003). In initial stages of development, such verb forms may phonologically resemble adultlike finite forms, but the dissertation argues that they are syntactically VPs and morphophonologically nonfinite (specifically, non-Person agreement forms) with zero morphology (for similar conclusions in regard to the morphophonology of such early forms, see Aguirre, 2003; Davidiak & Grinstead, 2004; Davidson & Goldrick, 2003; Gathercole, Sebastian, & Soto, 1999, 2002; Pratt & Grinstead, 2007; Radford & Ploennig-Pacheco, 1995). Under the present model, such verbal forms—viewed as non-adultlike and computed at lower branches of phrase structure with no or little morphophonology—are initially accessed/produced with more success than tense- and person agreement-marked forms.\(^{14}\)

The dissertation shows, nevertheless, that not all early forms are nonfinite (non-adultlike) morphophonologically. Some

\(^{14}\) Cross-linguistically then, early nonfinite forms with minimal or no morphophonology may appear as bare verb stems (early English, Inuktitut, K'iche', Navajo, Quechua, etc.), as verbal stems, containing only thematic vowels, homophonous with third person singular (3S) present tense forms (early Catalan, Czech, Italian, Polish, Spanish, etc.), and as infinitive forms (ending in -en/-n) in early Dutch, German, Icelandic, Swedish, etc.; see Rus, 2007b and the references therein). Though morphophonologically distinct, these forms are all predicted to be computed at lower branches of phrase structure with no or little morphophonology and initially accessed/produced with more success than tense- and person agreement-marked forms. That is, the proposed model places all child languages on a continuum rather than superficially distinguishes between grammars that go through an early root nonfinite stage and those that do not.
verbs are correctly-inflected for person agreement as soon as children produce their first two-word combinations, but—crucially—the overall pattern of morphophonological marking (spell-out) follows robustly the predictions of the Inflectional Hierarchy Complexity Hypothesis. In other words, the suppliance of person agreement (which is argued to be the locus of finiteness computed in FINP, previously AgrS_P, following Adger, 2007a and Bianchi, 2003, 2006, to appear) is supplied statistically less likely than tense, which in turn, is supplied statistically less likely than base/unmarked forms (arguably 3S in child Slovenian).

The IHCH effect also gives rise to the well-known pattern of the morpheme order in early English (Brown, 1973; de Villiers & de Villiers, 1973, 1985; Kazman 1991a, 1991b, 1994; Nicholl & Wilkins, 1991; Paul & Alford, 1993) and this dissertation reports a very similar course of development for child Slovenian.

The investigation concludes that early non-adultlike morphophonological forms and incomplete morphophonological spell out (performance-wise) do not arise due to some central syntactic competence deficit (such as the lack or underspecification of a certain category or formal feature)—as most formal accounts have suggested—but (mainly) due to the computational complexity regarding the morphosyntactic structure-building, observed as the morphophonological spell-out of morphosyntactic features.
1.4 Organization and Summary of Chapters

Chapter 2 BACKGROUND AND RATIONALE introduces the conceptual background necessary for the present study, namely the unification of linguistics with cognitive psychology and neuroscience. It briefly examines the study of language acquisition in the modern biolinguistic research program and introduces Chomsky’s (2005) three factors of language design, which serves as the conceptual foundation for the subsequent chapters. The chapter then reviews at length the empirical data that have appeared in the literature. Five phenomena are addressed and reviewed, namely initial telegraphic speech, optionality, the morpheme order, the gradualness effect, and morphophonological learning. The chapter draws on and further develops the arguments in formal generative approaches and supplements them with a specific neurolinguistic line of research into the processing of inflectional morphology. This leads to a proposal for the Inflectional Hierarchy Complexity Hypothesis.

Chapter 3 ADULT VERB MORPHOSYNTAX: THE KNOWLEDGE OF VERBAL INFLECTION first introduces the theoretical model assumed in the dissertation, i.e., a phase-based Probe-Goal model of morphosyntax (Chomsky, 2000b et seq.), with a slightly revised phrase structure computation (Adger, 2007a; Bianchi, 2003, 2006, to appear). The chapter continues by reviewing the main verbal morphosyntactic and morphophonological processes of adult
Slovenian. It focuses on the description of the verb system, aspect, clitics, and the morphosyntactic structure of a typical phrase marker. The chapter also illustrates a typical derivation of Slovenian clauses in both early and adult languages, framed in the morphosyntactic model motivated earlier in the chapter. It closes with a discussion on the contribution of the theoretical descriptions and generalizations to the Inflectional Hierarchy Complexity Hypothesis and the proposed variability model of morphosyntactic development.

Chapter 4 A VARIABILITY MODEL OF EARLY VERB MORPHOSYNTAX: EVIDENCE FROM CHILD SLOVENIAN first describes in detail the old and new child Slovenian data used in the analysis and then reports in great detail various frequency counts and lemmatization and statistical analyses in regard to the morphophonological and morphosyntactic properties of early verb forms in Slovenian. Specifically, the chapter turns to the acquisition of subject-verb (person) agreement, mini verb paradigms, the productivity of verb inflection, and the status of the third person singular form (3S) as an early nonfinite/default form. The chapter presents and analyzes the data that further support the IHCH and the variability model of acquisition, motivated in the previous chapter. The chapter closes with a summary of results.
Chapter 5 THE PERSON-LACKING COMPLEX BARE VERB AND THE INFLECTIONAL HIERARCHY COMPLEXITY HYPOTHESIS: EVIDENCE FROM ELICITED PRODUCTION provides further evidence for the variability model that rests on the Inflectional Hierarchy Complexity Hypothesis, motivated conceptually and empirically in the previous chapters. The chapter reports a series of elicitation experiments that were carried out to further probe the use and knowledge of verb inflection in young Slovenian children, particularly the hypothesis that the 3S form is the initial, default form which appears as the most common substitution and omission error and is best analyzed as a Complex Bare Verb (CBV). Though carried out on a small number of children in a smaller number of contexts, these experiments nevertheless shed further light on the proposed variability model of early morphosyntax.

Chapter 6 SUMMARY WITH DISCUSSION AND CONCLUSION reviews the hypotheses and results obtained from the analyses of both naturalistic production and elicitation data, evaluating the proposed Inflectional Hierarchy Complexity Hypothesis in light of the introductory philosophical guidelines and the evidence and data presented throughout the dissertation. It closes with a summary of conclusions and a few suggested directions for future research with respect to the proposed variability model of morphosyntactic development and modeling language growth in general.
Chapter 2: Background and Rationale

2.1 Conceptual Background and Rationale

This section reviews and evaluates the conceptual background that is necessary for the approach taken in the present study. Three issues are addressed, namely the unification of linguistics with cognitive neurosciences, the study of language acquisition in the modern biolinguistic research program, and Chomsky’s (2005) three factors of language design.

2.1.1 Linguistics Meets Neurocognitivism Or How and Why to Unify Linguistics with Other Cognitive Sciences

The idea of building bridges between linguistics and various substrata of natural sciences has been proposed by several scholars as diverse as theoretical and developmental linguists, psychologists, evolutionary biologists, philosophers, computer scientists, and neuroscientists—albeit with different doses of optimism (see Berwick & Chomsky, to appear; Chomsky, 2000a; Labelle, 2007; Miller, 2003; Poeppel & Embick, 2005; Walenski & Ullman, 2005).

In a personal account of how the cognitive counter-revolution took place, culminating in the birth of the cognitive sciences, Miller (2003) writes:
I argued that at least six disciplines were involved: psychology, linguistics, neuroscience, computer science, anthropology and philosophy. I saw psychology, linguistics and computer science as central, the other three as peripheral. These fields represented, and still represent, an institutionally convenient but intellectually awkward division. Each, by historical accident, had inherited a particular way of looking at cognition and each had progressed far enough to recognize that the solution to some of its problems depended crucially on the solution of problems traditionally allocated to other disciplines.

Although Miller sounds optimistic regarding the current interdisciplinary trend in the research into human cognition, his assertion of different sciences having developed a “particular way of looking at cognition” comes with some tone of pessimism.

Similarly, Walenski & Ullman (2005) argue that the study of language is currently fractionated and that theoretical linguistics has largely ignored advances in psycholinguistics, which, in turn, has remained largely unconstrained despite the advances in neurolinguistics. The authors argue that these fields have generally worked in isolation, which has resulted in a loss of useful information and seriously impeded progress in the study of human language (p. 2).

Walenski and Ullman have a point, but—as correctly observed by Poeppel & Embick (2005)—it is difficult to reconcile theoretical linguistics with cognitive neuroscience since each field has developed its own array of concepts and methodologies, assuming different levels of abstraction. Poeppel and Embick
identify two challenges regarding the “reconciliation” problem (sometimes termed the “unification problem”; Chomsky, 2000a).

The first one has been dubbed the “Granularity Mismatch Problem” (GMP)—a mismatch between conceptual granularity of the elemental concepts of linguistics and the ones of neurobiology, where the latter are too coarse-grained relative to the corresponding primitives of the former. GMP prevents the formulation of theoretically motivated, biologically grounded, and computationally explicit linking hypotheses that bridge neuroscience and linguistics, which, naturally, applies in any kind of interface science that operates with objects of different sizes (Poeppel & Embick, 2005, pp. 2-3).¹

The second challenge has been referred to as the “Ontological Incommensurability Problem” (OIP)—the fact that fundamental elements of linguistic theory cannot be reduced to or matched up with the fundamental neurobiological units in neuroscience, resulting from a failure to answer the question of how neurological structures could be specialized to perform specific types of computations—linguistic or otherwise.

¹ A typical example would include numerous neuroscience studies that conjecture that Broca’s area in the human brain (BA 44/45) regulates “syntax”. As argued and referenced by Poeppel & Embick (2005), Broca's area has been implicated in a number of linguistic tasks that are not overtly syntactic (e.g., auditory lexical decision, phonetic tasks, such as the processing of rapid phonetic transitions or phoneme sequences, minimal pairs in tone languages, etc.) as well as in numerous non-linguistic tasks, such as motor activation, mental imagery, and working memory tasks. Hence, the claim that Broca's area is devoted to syntax seems to be incorrect, though note that it leaves open a possibility of Broca's area being specialized for some specific mechanism that is characteristic of natural language.
For example, consider the following figure (from Poeppel & Embick 2005, p. 3):

![Fundamental elements of representation and operations in linguistics and neuroscience](image)

Figure 2.1 illustrates some of the primitives that have been entertained in accounting for various linguistic and neurobiological phenomena. There are, of course, principled ontology-process relationships within each domain, i.e., vertical connections, such as “two or more morphemes make up (project) a word that projects a noun phrase via specific rules and under specific conditions”. Similarly in neuroscience, dendrites are the branched projections of a neuron that act to conduct the electrical stimulation received from other neural cells to the cell body. However, as argued by Poeppel and Embick, if these two lists are taken seriously, the interdisciplinary (i.e., horizontal) connections remain, at best, arbitrary. In other
words, the linguistic elements cannot and need not be seen as default parallels to the ones used in neuroscience.

The current conceptual architecture entertained in the fields of formal linguistics and neurobiology may not lead to any type of reduction, forcing the scientific community to conceptually change one or both disciplines (see for example, Carey, 1985). Poeppel & Embick (2005) envisage such a change along the following lines:

Our revised research program diverges from a familiar assumption in linguistic theory, which often proceeds as if experimental evidence—whether from neuroscience or psycholinguistics—is in principle irrelevant to theories of how language works. This assumption, which is often tacit in linguistic theory, is made manifest in the idea that there might be notions of 'psychological' or 'neurological' reality that are distinct from the reality that linguistic theory addresses. This view of linguistic reality is incompatible with our approach to language and the brain. The grammar consists of representation and computations. We assume that linguistic computations are executed in the brain in real time. (pp. 11-12, emphasis in the original)

The authors argue that the prevailing null hypothesis in the generative circles that states that language capacity is independent of real-time computations makes the link between linguistics and neuroscience hard to bridge and that the biolinguistic program should not proceed by ignoring experimental results (p. 12).² Hence, there is a dire need for a conceptual change in formal linguistics to seriously take into account

² The authors argue, however, that these reasons may be historical rather than principled, similarly to Miller’s (2003) remarks from above.
evidence from psycholinguistics and neuroscience and make a
connection between—informally speaking—neuronal function and
linguistic computation. Specifically, the solution to the GMP and
OIP requires a conceptual change in linguistics and the spelling
out of the ontologies and processes in computational terms at an
appropriate level of abstraction so that explicit
interdisciplinary linking hypotheses could be formulated and
tested.\(^3\) In this vein, the “revised” approach proposed by Poeppel
and Embick suggests that the notion of computation rather than
some abstract metaphor for modeling behavior should become
central.\(^4\)

Another reason for a compartmentalized status of the
acquisition field may be methodological. The field has been quite
famous for superficially dividing linguists into various schools
that assume various learning psychologies and even sub-schools
that may assume a common theory of learning but adopt a different
formalism (see for example, Carnie, 2000; Carnie & Mendoza-
Denton, 2003; Newmeyer, 1998). As a result, there has been little

\(^3\) Thus, instead of changing the linguistics research program in which
linguistically postulated categories should first be validated by
biological data, linguistic categories and processes should be taken
seriously and used to investigate how the brain computes them.

\(^4\) Similarly to Poeppel and Embick, the perspective taken in this study
advocates an integrated approach to the study of language development.
For example, it is argued that a candidate that has been described as a
fundamental operation on primitives in morphological and syntactic
computation (Poeppel & Embick, 2005; Poeppel, 2007), namely
concatenation, should be accountable to all forms of evidence,
including psycho- and neurolinguistic experiments. Following Chomsky
(1995 et seq.), I call the concatenation operation Merge. Though
Poeppel & Embick (2005) list Merge as a fundamental operation in
linguistic computation (together with linearization), they do not
elaborate on it further nor mention any studies related to it.
room for associative learning in UG-based accounts and—conversely—little room for linguistic theory with explicit predictions (rather than vague, descriptive generalizations) in usage-based accounts. Consequently, the former have been fiercely criticized by the latter and vice versa.

Last but not least, an issue that might have additionally distanced linguistics from neuroscience is the trend of modeling acquisition in a single domain. Generally, it has been a common practice to gloss over the interaction of one domain with other linguistic domains, especially non-linguistic, more general cognitive ones.⁵

With these points in mind, let us briefly review the major tenets of the Chomskian biolinguistic theory of language and its acquisition.

2.1.2 Language Acquisition in the Chomskian Biolinguistic Tradition

The idea of bridging linguistics with biology is far from new. Lenneberg’s (1967) seminal monograph has been referenced in regard to such a connection for over four decades now and modern biolinguistics (i.e., the research program adopted by Chomsky and

⁵ Most formal studies of verb morphosyntax have been informed by theories of syntax. In the last few years, however, the studies advocating interface learning have grown in number (for phonology-morphology, see Davidson & Goldrick, 2003; Demuth, 2001, 2007; Song, Sundara, & Demuth, 2009; for morphology-syntax, see Blom and Wijnen, to appear; for syntax-semantics, see Hyams, 2005, 2007; Tryzna, 2006; for syntax-pragmatics, see Avrutin, 1999; see Section 2.3 below).
his followers) generally references Lenneberg’s study as the first serious attempt to reconcile human language with human biology (Chomsky, 2000a, 2007; Jenkins, 2000, 2004; Wexler, 2003, 2007; Yang, 2002). The foundation of modern biolinguistics is the idea that if language as a domain of empirical inquiry is to be entertained explicitly, linguistics should aim to identify the biological properties of the object we refer to as “the human language” (genotype) and—consequently—their abstract instantiation in the human mind (phenotype).  

Under this view, most of language is believed to be selectional rather than instructional—i.e., the type of development advocated by biolinguists is internally-driven rather than externally driven (i.e., usage-based).  

Specifically, it is believed that language development is mainly an “organism-internal” process where a child selects from

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6 Specifically, it has been proposed that language development should be formalized as the scientific endeavor that investigates internalized knowledge in a speaker’s mind based on the biological properties that make up language (see especially Berwick & Chomsky, to appear; Boeckx & Piattelli-Palmarini, 2005; Jenkins, 2000, 2004).

7 In sharp contrast to the biolinguistic approach, Goldberg (2003, p. 219) defines usage-based “constructivist” approaches as having the following seven basic tenets: (i) all levels of linguistic description are understood to involve pairings of form with meaning and discourse function, including morphemes, words, and idioms; (ii) emphasis is placed on subtle aspects of the way humans perceive events and states of affairs; (iii) a “what you see is what you get” approach to syntax is adopted; there are no underlying levels of syntax, no movement, and no phonologically empty elements; (iv) constructions are hypothesized to be learned solely on the basis of the input and general cognitive mechanisms (i.e., they are constructed); (v) cross-linguistic generalizations are explained through general cognitive constraints together with the functions of the constructions involved; (vi) language-specific generalizations are captured via inheritance networks (e.g., much like those that have long been posited to capture non-linguistic knowledge); (vii) the totality of our linguistic knowledge is understood as a network of constructions (see also Tomasello, 2003).
an array of pre-existing, innately-given categories and properties and—based on the input—shapes her grammar (see especially Baker, 2003; see also Yang, 2002). As such, language development is described as a maturational process, like that of any other organism that “grows” and “matures”. For example, Wexler (2007) argues that children omit tense and agreement markers because of maturational constraints (in his words, “biology”) rather than due to learning difficulties. He concludes that “there must a gene or a couple of genes that are responsible for early finiteness marking—a biological property like human height is” (see also Wexler, 1998, 2002).

However, although nature abounds with systems with various genetic predispositions biologists have shown time and again that innately-given biological systems quickly alter, sometimes radically.

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8 The “selection-and-mapping” process is by no means new in theories of cognitive faculties. The view that children are universally equipped with UG-given properties is based on analogy with a predominant instantiation of modern immunology theory (i.e., of Jerne, 1955, giving rise to Brunet’s [1957] clonal selection theory; cited in Gazzaniga, 1992), in which a human body forms antibodies—not from scratch, but rather from pre-existing proteins that bind with foreign substances to protect the body from infection. This view was later applied to neurobiological theories of selection and growth (Gazzaniga, 1992).

9 Geneticists tell us, however, that there is probably no such thing as an isolated gene or a cluster of genes that would yield a property like “height”, so Wexler’s analogy seems to be posed at a wrong level of abstraction (Stromswold, 2007; see also Fisher, 2006).

10 MacWhinney (1999), for example, discusses the number of leopard spots, tiger dots, and zebra stripes—arguably all emergent properties that have no one-to-one correspondence between genotype and phenotype, but emerge from the highly-complex interaction among genes and environmental forces (see also MacWhinney, 2002). Weiss (1997, 2000), for example, shows that while butterflies innately prefer certain colors, they quickly adapt their feeding and pollinating behaviors
I now turn to Chomsky’s recent account of the three factors of language design which may allow for a more serious integration of a specific nativist type of acquisition with a (more) biologically and computationally grounded variability learning.

2.1.3 Chomsky’s Three Factors of Language Design

Chomsky (2005) argues that there are three contributing factors that enter into language, namely (i) the genetic endowment, nearly uniform for the species, which interprets part of the environment as linguistic experience—a nontrivial task that infants carry out reflexively, and which determines the general course of development of the language faculty;\(^{11}\) (ii) experience, leading to variation within a fairly narrow range, as in the case of other subsystems of the human capacity and the organisms generally; and (iii) principles that are language- or even organism-independent (i.e., those that are not specific to the language faculty).

The third factor presumably comes in two subtypes, namely (a) principles of data analysis that might be used in language acquisition and other domains and (b) principles of structural

---

\(^{11}\) Chomsky provides two examples of the first factor, namely the core semantics of minimal meaning-bearing elements and the principles that allow infinite combinations of hierarchically organized symbols (p. 4). The latter refers to the capacity provided by a concatenation operation that operates on a hierarchically organized system such as phrase structure.
architecture and developmental constraints, including principles of efficient computation, which would be expected to be of particular significance for computational systems such as language. Chomsky points out, though, that one may allow computational limitations to be imposed on the genetic elements, adding that such limitations will presumably disappear in a regular way through genetically timed maturation.\(^\text{12}\)

The present dissertation argues that formal acquisition accounts should aim at invoking all three contributing factors. First, research in theoretical syntax and formal language acquisition has given us ample evidence for a feature-driven phrase structure computation that exhibits discrete infinity and seems to be uniform across child and adult languages—arguably a genetic property of the language faculty. Second, psychological learning accounts have provided us with informative insights into how the second factor (i.e., experience) may shape specific morphosyntactic categories and how the linguistic material gets mapped to them, yielding stage-like development. Last but not least, there is large and interesting neurocognitive literature on the production and processing of various morphosyntactic categories and its relatedness to efficient computation (see Yang, 2010 for similar ideas in explaining language acquisition and language variation).

\(^{12}\) This line of reasoning has been adopted particularly by Wexler and his colleagues (see for example, Wexler [2003] and some of his more recent work, particularly in regard to the deficits in the verbal inflectional domain by children with Specific Language Impairment).
With this conceptual backbone in mind, let us turn to the empirical evidence that will provide the necessary background for our analysis in subsequent chapters.

2.2 Empirical Background and Rationale

This section reviews at length the empirical data that have been reported in the literature on early verb morphosyntax and briefly reviews some of the major formal (generative and neurocognitive) formalisms that have been proposed to account for the observed data. Note that although I review various accounts, I do not present an exhaustive summary of findings in the literature to date but rather provide enough of a context in which to interpret the data and motivate a model of early verbal inflection.

The section first turns to five robust phenomena reported in the literature on early verb morphosyntax, namely telegraphic speech (i.e., what appears to be telegraphic speech on the surface, i.e., from a morphophonological perspective), optionality and variability, the morpheme order effect, the gradualness effect, and defaulting to most frequent and largest verb conjugation classes. I review and evaluate the data and the observations that have been reported mainly in child Germanic and Romance languages and then draw on and further develop these arguments by supplementing them with a specific line of research into the processing of inflectional verb morphology in various
languages. This leads to the proposal for the so-called *Inflectional Hierarchy Complexity Hypothesis* (IHCH). The chapter closes with specific predictions and the evaluation of the IHCH.

### 2.2.1 Telegraphic Speech, Optionality, and Variability

The observation that early grammars lack “little” functor words or morphemes denoting tense (e.g., English past tense -ed), agreement (e.g., English -s), specificity (e.g., English the), etc. has been around ever since the first child language studies that mainly appeared as a result of diary studies.

For example, Leopold in his (1949) two-year longitudinal study of his English- and German-speaking daughter Hildegard reports that “[t]he child, whose attention is at first drawn only to the major elements of the mechanism of communication, neglects the morphological devices for a considerable length of time” (p. 76). The author further asserts that the elements affected by such neglect are not only morphological endings and “modifications of the word-stem”, but also small words such as prepositions and auxiliaries that are arguably used for the same purpose (ibid).\(^{13}\)

\(^{13}\) Brown (1973) observes that Leopold’s treatment of auxiliary verbs and prepositions is essentially the same as verb inflections (in being functor elements). In more recent syntactic theories, auxiliary and copula verbs (together with infinitival to) have enjoyed the same status as tense and agreement inflections (see particularly Chomsky, 1981, p. 18). The general idea behind this is that finite auxiliaries inflect for tense/agreement and infinitival to serves much the same function in English as infinitive inflections in other languages such as Italian or Spanish, which have overtly inflected infinitives.
In the 1960s, Leopold’s description of the omission of functional elements was described as “telegraphic speech”—a speech that (on the surface) resembles the writing style in telegrams, with utterances consisting only of substantial lexical categories such as nouns and verbs (Brown & Fraser, 1964). Brown and Fraser argue that the children’s initial utterances are systematically reduced in function words that carry limited information. In their view, the child’s initial grammatical representations are non-adultlike and the child is believed to induce general rules governing the construction of novel sentences from reduced representations and to revise and supplement her grammar when she becomes more attentive to details of adult speech (p. 79; see also Braine, 1963 and McNeil, 1966).

In a more general acquisition study on a broad range of phenomena, Menyuk (1969) reports that in regard to early production, most of her 152 English-speaking children, ranging from 3 to 7, start off with uninflected verbs (bare stems), though she provides no specific counts or frequency rates.

Although the studies from the 1950s and 1960s were informative for the field of language development, it wasn’t until 1973 that the first modern systematic empirical study investigating the growth of morphosyntax in children appeared. Roger Brown’s pioneering longitudinal study investigated three English-speaking children whom Brown and his colleagues named Adam, Eve, and Sarah. Brown reported that English-speaking children very often omit functional material such as tense and
agreement morphemes, determiners, and copula and auxiliary verbs, as the following utterances (from Brown, 1973) show:

(1)
(a) Papa have it. (Eve; 1;6)
(b) Cromer wear glasses. (Eve; 2;0)
(c) Mama ride horsie. (Sarah; 2;6)
(d) Cowboy wear boot. (Adam; 2;5)
(e) Write pencil. (Adam; 2;3)
(f) Kitty hiding. (Sarah; 2;10)
(g) Mike gone. (Sarah; 2;3)
(h) He no bite ya. (Sarah; 3;0)
(i) That my briefcase. (Eve; 1;9)
(j) Where ball go? (Adam; 2;3)

Though the examples in (1) above show that some verbs carry distinctive morphological forms (e.g., [1f], [1g]), Brown argues that most early verbs in child English are “generic unmarked forms” (i.e., bare verb stems), which appear in the following contexts:

(2)
(a) Auxiliary (e.g., “gonna”/”wanna”/”hafta”) + Infinitive (expressing intentions)
(b) Auxiliary be + Present Participle (expressing progressive present tense)
(c) Past tense
(d) Imperative (in which case the child’s utterances are adultlike, at least from a morphological perspective)

In modern acquisition literature, such verbs are referred to as Root Infinitives (RIs) or Optional Infinitives (OIs). The former term, proposed by Rizzi (1993/1994), suggests that while in adult grammars such representations are restricted to embedded contexts, child grammars allow them also in matrix clauses. The latter term, coined by Wexler (1994), refers to the fact that
such forms sometimes surface as morphophonological infinitives and other times as adultlike tensed forms.

Figure 2.2 below shows the agreement omission errors (in 3S contexts) in two of the children from the Brown corpus and one child (Nina) from the Suppes corpus (adapted from Hyams & Wexler, 1993 and Poeppel & Wexler, 1993):

<table>
<thead>
<tr>
<th>Child</th>
<th>Age</th>
<th>% Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adam</td>
<td>2;3-3;0</td>
<td>81</td>
</tr>
<tr>
<td>Eve</td>
<td>1;6-1;10</td>
<td>78</td>
</tr>
<tr>
<td>Eve</td>
<td>2;3-3;2</td>
<td>97</td>
</tr>
<tr>
<td>Nina</td>
<td>2;4-2;5</td>
<td>75</td>
</tr>
</tbody>
</table>

**Figure 2.2**: Agreement omission errors in 3S contexts in four English-speaking children from the Brown and Suppes corpora

First, we see that the omission rates in early English are pretty high, ranging from 75% to almost 100%. Next, we observe variability within and across children. For example, while Nina’s sample shows a 75% error rate, Eve’s sample contains 97% errors. Interestingly, Eve also regresses rather than progresses at an older age—while her earlier sample contains 78% of uninflected verbs, her later files show a 97% error rate.

Data from other early Germanic languages and French show a strikingly similar pattern—Dutch-, Flemish-, German-, Icelandic, Swedish-, and French-speaking children in the same age period (i.e., roughly between 2;0 and 3;0) omit a high number of inflectional morphemes, copula *be*, and auxiliaries *be* and *have* in compositional tenses. However, in these languages non-inflected verb forms in matrix clauses do not appear as bare verb stems but
rather as "true" infinitives (e.g., -en infinitives in German and Dutch and -er/-ir/-re infinitives in French).

Consider the following data:

(3)
(a) Moi dessiner la mer
   me draw\textsubscript{inf} the sea     [French]
   (Daniel; 1;10; Pierce, 1992)
(b) Du das haben
    you that have\textsubscript{inf}          [German]
    (Andreas; 2;1; Poeppel and Wexler, 1993)
(c) Hond ook hard rennen
    Dog also fast run\textsubscript{inf}     [Dutch]
    (Hein; 2;6; Haegeman, 1995)

The following table summarizes the omission of verbal inflection (in synthetic present tense) in early Germanic (other than English) and early French:

<table>
<thead>
<tr>
<th>Child</th>
<th>Language</th>
<th>Age</th>
<th>%RI</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maarten</td>
<td>Flemish</td>
<td>1;11</td>
<td>51</td>
<td>Krämer (1993)</td>
</tr>
<tr>
<td>Simone</td>
<td>German</td>
<td>2;0-2;6</td>
<td>52</td>
<td>Behrens (1993)</td>
</tr>
<tr>
<td>“S”</td>
<td></td>
<td>2;1</td>
<td>46</td>
<td>Weissenborn (1990)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2;2</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Embla</td>
<td>Swedish</td>
<td>1;8-1;10</td>
<td>61</td>
<td>Platzack (1990)</td>
</tr>
<tr>
<td>Freja</td>
<td></td>
<td>1;11-2;0</td>
<td>39</td>
<td>Platzack (1992)</td>
</tr>
<tr>
<td>Tor</td>
<td></td>
<td>1;11-2;2</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Eva</td>
<td>Icelandic</td>
<td>1;1-2;4</td>
<td>65</td>
<td>Sigurjónsdóttir (2005)</td>
</tr>
<tr>
<td>Birna</td>
<td></td>
<td>2;0-2;3</td>
<td>36</td>
<td>Hoekstra &amp; Hyams (1998)</td>
</tr>
<tr>
<td>6 kids</td>
<td>Dutch</td>
<td>1;7-2;1</td>
<td>71</td>
<td>Blom (2003, 2007)</td>
</tr>
<tr>
<td>Laura</td>
<td></td>
<td>1;8-2;1</td>
<td>36</td>
<td>Guasti (2002), after</td>
</tr>
<tr>
<td>Tobias</td>
<td></td>
<td>1;10-1;11</td>
<td>36</td>
<td>Weverink (1989)</td>
</tr>
<tr>
<td>Fedra</td>
<td></td>
<td>1;10-2;1</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Hein</td>
<td></td>
<td>2;4-3;1</td>
<td>16</td>
<td>Haegeman (1995)</td>
</tr>
<tr>
<td>Nathalie</td>
<td>French</td>
<td>1;7-2;1</td>
<td>76</td>
<td>Rasetti (2000)</td>
</tr>
<tr>
<td>Nathalie</td>
<td></td>
<td>1;9-2;3</td>
<td>49</td>
<td>Pierce (1992)</td>
</tr>
<tr>
<td>Phillippe</td>
<td></td>
<td>1;9-2;6</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Daniel</td>
<td></td>
<td>1;8-1;11</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2.3:** Root Infinitives in early Germanic and French
As we can see from the table above, RI rates in these systems seem to be slightly lower than BV rates in English. Furthermore—like in early English—the omission percentage rates vary within and across languages.\textsuperscript{14}

In sharp contrast to early Germanic, most of formal acquisition research into early Romance (other than French) reports unattested RIs and near-perfect knowledge of tense/agreement. For example, the studies on early Italian (e.g., Guasti, 1993/1994; Leonini, 2002; Salustri & Hyams, 2006) and Spanish- and Catalan-speaking children (e.g., Bel, 2001; Félix-Brasdefer, 2006; Torrens, 1995; see Montrul, 2004 and the references therein) report almost no RIs and very low error rates, as the following two tables show:

<table>
<thead>
<tr>
<th>Child</th>
<th>Language</th>
<th>Age</th>
<th>%RIs</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denis</td>
<td>Italian</td>
<td>2;0-2;7</td>
<td>2.8</td>
<td>Leonini (2002)</td>
</tr>
<tr>
<td>Martina</td>
<td></td>
<td>2;1-2;7</td>
<td>0</td>
<td>Salustri &amp; Hyams (2006)</td>
</tr>
<tr>
<td>Diana</td>
<td></td>
<td>2;0-2;7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Viola</td>
<td></td>
<td>2;1-2;7</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Gisela</td>
<td>Catalan</td>
<td>1;7-3;0</td>
<td>0</td>
<td>Ezeizabarrena (2002), after Bel, (1998)</td>
</tr>
<tr>
<td>Pere</td>
<td></td>
<td>1;9-2;4</td>
<td>3.7</td>
<td>Salustri &amp; Hyams (2006), after Bel (2001)</td>
</tr>
<tr>
<td>Pep</td>
<td></td>
<td>1;8-2;5</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>Julia</td>
<td></td>
<td>1;7-3;0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Marti</td>
<td></td>
<td>1;9-2;4</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Maria</td>
<td>Spanish</td>
<td>1;7-2;6</td>
<td>1.6</td>
<td>Ezeizabarrena (2002), after Bel (1998)</td>
</tr>
<tr>
<td>Emilio</td>
<td></td>
<td>1;8-2;11</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Juan</td>
<td></td>
<td>1;7-2;10</td>
<td>3</td>
<td>Liceras, Bel, &amp; Perales (2006)</td>
</tr>
</tbody>
</table>

\textbf{Figure 2.4:} Root Infinitives in early Romance

\textsuperscript{14} Nathalie, Phillipe, and Daniel, for example, show 20\%-76\% errors in almost the same age range. Moreover, Natalie’s omission rate is considerably higher between the ages of 1;7 and 2;1 when compared to the ones between 1;9 and 2;3.
<table>
<thead>
<tr>
<th>Child</th>
<th>Language</th>
<th>Age</th>
<th>n</th>
<th>%S-V Agr Err</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claudia</td>
<td>Italian</td>
<td>1;4-2;4</td>
<td>1410</td>
<td>3%</td>
<td>Pizzuto &amp; Caselli (1992)</td>
</tr>
<tr>
<td>Diana</td>
<td>Italian</td>
<td>1;10-2;6</td>
<td>610</td>
<td>1.5%</td>
<td>Guasti (1993/1994)</td>
</tr>
<tr>
<td>Marti</td>
<td>Catalan/ Spanish</td>
<td>1;9-2;5</td>
<td>178</td>
<td>0.56%</td>
<td>Torrens (1995)</td>
</tr>
<tr>
<td>Josep</td>
<td>Catalan/ Spanish</td>
<td>1;9-2;6</td>
<td>136</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Gisela</td>
<td>Catalan</td>
<td>1;10-2;6</td>
<td>81</td>
<td>1.2%</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2.5:** Verbal inflection error rates in early Romance

Liceras, Bel, & Perales (2006) and Perales, Liceras, & Bel (2006), however, challenge the conclusion that RIs in early Romance are unattested. Reviewing various studies of verb inflection, they show that initial RI rates generally range between 10% and 20% in child Spanish and 10% and 30% in child Catalan. The authors contend that although these rates are considerably lower than those reported for early Germanic and French, they are systematic and consistent and should not be ignored.15

Related to the phenomenon of omission errors is the observation that children’s earliest utterances lacking tense and agreement morphemes generally occur side by side with tensed clauses, sometimes even in adjacent utterances, as the examples below show (from Radford, 1995, p. 501):

---

15 The authors show that the reason why most studies in early Romance report no RIs lies in the fact that RI rates get deflated when initial data get collapsed with those coming from an older age. Specifically, most RIs in early Romance appear between the ages of 1;7 and 1;10 and pretty much peter out before 2;2 or so. The RI stage in early Romance is thus extremely short-lived and as such much more difficult to capture in early data.
This “now-you-hear-it-now-you-don’t” phenomenon (Hyams, 2001) suggests that older accounts purporting “across the board” telegraphic speech cannot be entirely correct. What emerges in the data time and again is a picture of optionality (see Demuth, 1992; Legate & Yang, 2007; Radford, 1995; Yang, 2002). Specifically, children sometimes supply the inflection and sometimes omit it, even on the very same verb in the same syntactic, semantic, and pragmatic contexts.\(^{16}\)

Optionality is sometimes equated to or subsumed under variation or variability, which can be either of the inter-subject or the intra-subject type. The examples in (4) above are of the former type, where the same child optionally supplies a functor in the same morphosyntactic context, while the intra-subject type would refer to cases where two (or more) children at

\(^{16}\) For example, the children studied by Brown (1973) reached the 90% criterion level in obligatory contexts (as defined by Brown, 1973, p. 271) at different ages: Eve at 2;3 and Adam and Sarah at 3;6, and 4;0, respectively. Note that there is a gap of almost two years in the attainment between Eve and Sarah and that an acquisition model should somehow account for this. Note also that Brown’s criterion entailed 90% use of morphemes in each of three successive recording sessions, meaning that not only did the children use functors at variable degrees prior to reaching the criterion, but they might have reached it in one or two successive recordings earlier.
the same developmental stage morphologically marked the (same) verb in the same context differently.\textsuperscript{17}

Brown (1973) further argues that bare stems are not used in present simple tense contexts (pp. 317-319). This conclusion, however, might be a bit hasty, if not impossible to evaluate at a very early (e.g., two- or three-word) stage. For example, it is extremely hard to determine whether an utterance like “Papa have it” refers to “Papa wanna (=wants to) have it”, “Papa is having it”, “Papa had it”, or “Papa, have it!” (cf. Brown’s contexts for generic verbs above).\textsuperscript{18} CHILDES contains the following exchange between Eve and her mother (MOT=Mother, CHI=Child [Eve; 1;6], coding abbreviations with morphological and syntactic analyses omitted):

\begin{quote}
(5)
\begin{verbatim}
MOT: that's Papa's tray.
CHI: Papa tray.
MOT: he's sick.
MOT: and he had his breakfast in bed.
CHI: Papa breakfast.
MOT: Papa's breakfast # yes.
CHI: have it?
MOT: no # you may not have it # no.
CHI: Papa have it.
MOT: Papa had it.
CHI: oh cookie.
\end{verbatim}
\end{quote}

\textsuperscript{17} All early languages studied so far show robust variability effects (see particularly Legate & Yang, 2007 and Yang, 2002; see also a detailed review in Rus, 2007 and the references therein).

\textsuperscript{18} The utterance is not transcribed with a question mark in the CHILDES database (MacWhinney, 2000, after Brown, 1962; file: eve01.cha), though it appears with one in Brown (1973, p. 207) and most sources that cite Brown.
The pragmatic context now allows one to see that Eve
probably wanted to use the past tense, though—again—one cannot
conclude this for sure.

Contrary to Brown (1973), Hyams (2005) shows that early
English bare verbs have either a present tense meaning or—less
frequently—a past tense meaning. She further notes that English
bare verbs can refer to ongoing eventualities.\textsuperscript{19} She concludes
that this is in marked contrast with the adult English finite
verb, which only has a generic or habitual meaning.

Interestingly, functor morphemes do not seem to be acquired
in some random order, but seem to follow a particular
developmental path, which is what I turn to next.

2.2.2 The Morpheme Order and the Gradualness Effects

Regarding production, Brown (1973) shows that besides
variability, English-speaking children go through similar
developmental milestones. Children generally start off with verb
stems and -ing participles, then acquire aspectual -en/-ed
participles and past tense -ed forms, and only later the present
tense and agreement -s forms. Brown argues that although some
variation has been observed with respect to -ed and -s, it
generally holds that -ing is the first bound morpheme acquired in
child English, with -s generally coming online several months

\textsuperscript{19} Hyams cites the sentence in (1e) above, noting that Adam uttered it
while writing on someone’s pen.
This phenomenon of inflectional morphemes being acquired in some regular developmental fashion has been referred to as “the morpheme order effect”—a robust developmental pattern reported in numerous studies in child English and a few other early languages (Brown, 1973; see below).

Following Brown’s study, de Villiers & de Villiers (1973) conducted a cross-sectional study based on their own data from 20 English-speaking children. Although their methodology differed considerably from Brown’s, the authors reported the same morpheme order regarding production, i.e., that of -ing > irregular past > -ed > -s > irregular -s.

Formulated in the framework of Natural Morphology21, Gülzow’s (2003) more recent study reports that Nina from the Suppes corpus (age 1;1 to 3;3; data from 27,799 utterances) is aware of the -ing inflection at the earliest stage, observed in the specification of the suffix in various person/number contexts as well as overgeneralizations with -ing (p. 205). Gülzow shows that the earliest “pre-morphological” stage is predominantly nonfinite and that the child uses almost exclusively bare stems,

---

20 Specifically, all three children reported by Brown start off with uninflected verbal forms and fully attain -ing in at least 90% of all obligatory contexts in Stage II already, where MLU does not exceed 2.25. -s, on the other hand, is acquired only in Stage V by Adam and Eve (MLU=4.00) and in Stage IV by Sarah (MLU=3.50).

21 Natural Morphology proposes two stages of early morphological acquisition, namely a pre-morphological stage—characterized by holophrases, the use of very few verb tokens/types, non-finite verb forms, and the lack of overgeneralization—and a proto-morphological stage whose hallmark is the emergence of so-called mini-paradigms—sets of three different verb forms of the same verb token (Bittner et al., 2003; Gülzow, 2003; see below).
-ing participles, and occasionally, -ed participles (p. 215). Finite -s and -ed do not gain a morphosemantic status until several months later and the author argues that at this early stage, they “hardly contribute to the new types of morphological contrasts that begin to appear from the age of 2;5 onwards” (p. 205). She further shows that -s hardly ever appears before 2;5 and when it does, it only appears on the verbs go, need, say, and want. Its number, however, sharply increases after 2;5.

Most importantly, Gülzow reports that the few verbs that occur with -s also regularly occur with -ing. She interprets this as evidence for the child’s extraction of the verb from its morphosyntactic and semantic contexts in the sense that the child has learned the verb and now knows that it can take multiple inflections denoting various morphosyntactic functions.

Figure 2.6 provides the results of my meta analysis of the studies that have explicitly reported the morpheme order in the acquisition of English verbal morphemes (though not necessarily with any quantitative analysis):

---

22 Specifically, finite -ed does not appear with any regularity before 2;5—it only occurs on the verb cry while past tense is generally expressed by bare verb stems, irregular verbs, or overgeneralized irregular verbs (e.g., blowed, falled, seed). However, it has been suggested in the literature that early -ed may not encode temporality but rather an aspectual contrast (i.e., the so-called “Aspect-before-Tense Hypothesis”; see Weist, 2002 for a review). I leave this issue aside in the dissertation as I do not address (much of) the interpretation of children’s early verbal forms but rather their morphophonological and morphosyntactic properties.

23 Specifically, the verbs that are not marked for 3S -s are the ones that are believed to not have been fully acquired morphophonologically. For a similar conclusion (but with a different set of inflections that appear in early Dutch), see Blom & Wijnen (to appear).
Hulit & Howard (2006) report a meta analysis of several studies that establish an explicit age range of mastery for Brown’s morphemes. Their ranges are reported in months as the periods between the functor’s first occurrence (emergence) and its 90% mastery for seven of the Brown morphemes, shown in Figure 2.7 below (note that the morphemes in the left column are listed in the order of attainment as reported in Brown, 1973 and de Villiers & de Villiers, 1973):

<table>
<thead>
<tr>
<th>Morpheme</th>
<th>Age Range of Mastery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Progressive (-ing)</td>
<td>19-28 mos.</td>
</tr>
<tr>
<td>Irregular Past Tense (e.g., had)</td>
<td>25-46 mos.</td>
</tr>
<tr>
<td>Regular Past Tense (-ed)</td>
<td>26-48 mos.</td>
</tr>
<tr>
<td>Regular 3S (-s)</td>
<td>26-46 mos.</td>
</tr>
<tr>
<td>Irregular 3S (e.g., has)</td>
<td>28-50 mos.</td>
</tr>
<tr>
<td>Contractible Copula</td>
<td>29-49 mos.</td>
</tr>
<tr>
<td>Contractible Auxiliary</td>
<td>30-50 mos.</td>
</tr>
</tbody>
</table>

**Figure 2.7:** Age range of mastery of verbal inflectional morphemes in child English

The -ing ending appears as the first morpheme to get fully acquired (at age 28 months), whereas -ed and regular -s get fully
acquired considerably later (roughly 1.5 years later than -\textit{ing}), with irregular \textit{3S} getting acquired even later.

An additional piece of evidence for the morpheme order effect comes from computational simulations, most notably from Kazman (1991a, 1991b, 1994). Kazman argues that early English becomes fully “functional” (i.e., with all functors supplied in 90\% of obligatory contexts) only when agreement correct reaches a threshold of 90\%. Based on 44,000 input words from the Brown corpus, Kazman reports the \textit{-ing} > \textit{-ed} > \textit{-s} order of acquisition (in regard to bound affixes). His result replicates the findings in Brown (1973), correlated at a level of 0.99 and de Villiers & de Villiers (1973), correlated at a level of 0.96.

It seems that the morpheme order effect is very robust yet most, if not all, of the existing formal acquisition models entirely gloss over it. This, in turn, makes it a somehow mysterious and still unexplained developmental hallmark (Hulit & Howard, 2006; Ingram, 1989; Pye, 2009).

Note that one of the most striking observations from Figure 2.7 above is that morphemes do not get mastered in a matter of a few weeks or months—it takes as long as two years to fully master the \textit{-ed} and \textit{-s} inflections (i.e., correctly supply them in at least 90\% of obligatory contexts).

\footnote{Kazman’s system (\textit{Babel}) models development as a lexical acquisition procedure that discovers the roots and affixes of any given language by comparing semantically related words and creating affixes to describe the morphological attribute changes between related input forms.}

\footnote{Kazman’s simulations hence confirm that it is agreement rather than tense that represents the last stage in the acquisition of the English verbal inflection (at least production-wise).}
Another piece of evidence for a robust stage-learning effect comes from the study on early German verb inflection reported in Clahsen & Penke (1992):

<table>
<thead>
<tr>
<th>Source: Clahsen &amp; Penke (1992)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[the Simone corpus]</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>2;0</td>
</tr>
<tr>
<td>2;6</td>
</tr>
<tr>
<td>3;0</td>
</tr>
<tr>
<td>4;0</td>
</tr>
</tbody>
</table>

**Figure 2.8:** The acquisition of German tense and agreement exhibiting the gradualness effect

Note that the rate of RIs in early German at age 2;0 is 72%, which drops to 4% over a course of two years. Most importantly, while the rate of non-tensed forms decreases, the rate of tense- and agreement-marked verbs increases from 28% to as much as 96%.²⁶

### 2.2.3 The Acquisition of Verbal Inflection and Going Beyond Token Frequency

Brown (1973) and de Villiers & de Villiers (1973) also discuss the variables that may contribute to the morpheme order. Both studies show that frequency does not seem to be one of them.

²⁶ The gradualness effect has been reported practically in all early languages across linguistic traditions (see Ezeizabarrena, 2002 for Basque; Bel, 2001, Liceras et al., 2006 for Catalan; Blom, 2003 and Blom & Wijnen, to appear, for Dutch; Dye, 2005 for French; Legate & Yang, 2007 and Yang, 2002 for English; Clahsen, 1986, 1990 and Clahsen & Penke, 1992 for German; Varlokosta et al., 1998 for Greek; Aguado-Orea, 2004, Aguado-Orea & Pine, 2006, Bel, 2001, Liceras et al., 2006 for Spanish). See also Bittner et al. (2003) for a collection of papers on the acquisition of verb morphology in a variety of typologically distinct languages, all of which show a gradualness effect.
Specifically, they show that raw frequency of verb forms in the children’s input does not yield a high correlation with the actual acquisition (for example, determiners a and the are some of the most frequent forms that English-speaking children hear in the input, yet children frequently omit them).

Moerk (1980), however, argues that when certain morphemes are omitted from the count, Brown’s data show significant rank-order correlations. Specifically, he argues that significant correlations can be obtained when one analyzes all the expansions and imitations by the parents, which—according to Moerk—constitute as much as 30% of the entire input.\footnote{A similar point is taken in Block & Kessel (1980), who argue that some morphemes may simply be less frequency-sensitive or not frequency-sensitive at all. Pinker’s (1981) reply to Moerk (1980) and Block & Kessel (1980), however, rightly points out that this assumes that we adopt a noncircular, a priori basis for eliminating (only) certain morphemes from the list.}

An interesting point to note, however, is that neither Brown nor Moerk used the entire data in the calculation, nor did they use all fourteen morphemes across all recorded sessions. As Pinker (1981) correctly observes, it makes a big difference to look at the outcome across all sessions versus those immediately preceding the periods when the morphemes were acquired.

To avoid this controversy, Cheng’s (2004) study investigates all fourteen morphemes across all sessions for all three children. Cheng morphologically tagged all transcripts but discarded the utterances that do not come from the parents but from other caretakers who had conversed with the children (in
order to make the input more representative). The following graph (from Cheng 2004, p. 10) reports his findings:

![Figure 2.9: Correlations between parental frequency and acquisition rankings for Brown’s fourteen morphemes (all children)](chart)

The graph above shows the ranking information with respect to parental frequencies (on a 1-14 scale) and the 14 morphemes of interest, similarly to the methodology adopted by de Villiers & de Villiers (1973). The first three columns refer to the morpheme ranking, while the fourth column reports the actual acquisition (i.e., suppliance in obligatory contexts), collapsed across all three children. The result shows that there seems to be a lot of discrepancy between parental input and acquisition. Cheng’s calculation of Pearson’s coefficients (i.e., relative input frequency against the order of acquisition) yields r=0.133 for Eve, r=0.521 for Adam, and r=0.349 for Sarah—all non-significant correlations. Regarding the acquisition of bound morphemes,
Cheng’s results replicate those reported by Brown (1973), de Villiers & de Villiers (1973), and Kazman (1991a, 1991b, 1994), i.e., the order of suppliance is –ing > –ed > –s.

Note also that Cheng’s results show that the bars for frequency and acquisition rankings are wider apart for –ing when compared to the same ratios for –ed and –s (the latter are also higher than for the –ing bars, indicating lower frequency and later acquisition).

This is more obvious in Eve’s individual data, showing more clearly that the acquisition of –ing seems to be somehow less dependent on the input, whereas the acquisition of –ed and –s seems to be somehow more dependent on the input.28

![Eve Frequency vs Acquisition Ranking](image)

**Figure 2.10:** Correlation between parental frequency and acquisition rankings for Brown’s fourteen morphemes (Eve)

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28 The difference between input frequency and the acquisition ranking for –s might serve as an independent piece of evidence for agreement markers to have the highest place in the inflectional hierarchy and thus require more morphophonological computation. In other words, if agreement is more input-sensitive, it should show fewer errors—contrary to fact.
2.2.4 Morphophonological Learning: Defaulting

Various morphophonological phenomena have been attested in the literature on the acquisition of early verb inflection, particularly in the Constructivist and Natural Morphology traditions. One such phenomenon, namely piecemeal morphological learning was reviewed above. Here I turn to another phenomenon that has frequently appeared in the morphological literature, namely defaulting.

Various interpretations of the term default have been proposed in both theoretical and developmental literature, though most do not seem to be fine-grained or inclusive enough (see Albright, 2002). Specifically, there is no consensus as to what makes a certain verb form default/unmarked theoretically (e.g., a high number of input tokens, little or no inflectional marking, etc.), and much less developmentally (e.g., early emergence, position salience, most frequently supplied form, most frequently misapplied/overused form, etc.; see Bybee, 1985, 2007).

In typology and various studies on frequency effects, it is generally argued that certain verb forms tend to be more “basic”, “natural”, and “general” than others. For example, it is often claimed that the present tense, the singular number, and the third person are cross-linguistically more natural and basic than past tense, plural, or non-third persons, respectively (Bybee, 1985, 2007; Harasowska, 1999). Collectively then, the 3S present tense form is believed to be the most basic and natural verb form.
In the same tradition, it is often argued that certain conjugation classes of verbs are more natural (frequent and regular). For example, Spanish -ar verbs are much more frequent than -er and -ir verbs and the verbs that get newly-admitted to the Spanish lexicon generally follow the -ar conjugation class (Bybee, 1985).

Generative studies of language acquisition generally suggest that a default form is an early emergent form that gets supplied most frequently in the early phases of development when children do not/cannot use the correct tensed-/agreement-marked forms (whatever the reason for such non-adultlike spell-out might be). Apart from early emergence and a high frequency of suppliance, these morphophonologically non-tensed verbs have been shown to occur in utterances lacking tense- and agreement-based material such as (case-marked) subjects. Since such representations arguably lack Tense and Agreement projections,

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29 In adult (written) Spanish, for example, 3S is almost twice as frequent as 1S (44% vs. 23%), which is the second most frequent form (Bybee, 1985, p. 71). Many factors may contribute to this phenomenon, namely (i) 3S is usually the form with the highest token frequency; (ii) 3S often appears with null affixation; (iii) morphosyntactically, 3S may be the “least marked” member of the conjugation paradigm. As Bybee points out, these factors are highly correlated—the inflectionally least marked forms tend to be the most frequent and tend to have the least overt morphological marking. It is, however, impossible to conclude in most cases which of these factors is responsible for making one form more/most basic—all these factors probably contribute to such state of affairs collectively (Albright, 2002, p. 107). Interestingly, Bybee further notes that such basic, most frequent and morphologically most impoverished forms also tend to emerge first in child grammars (see below).

30 Italian, which is like Spanish in having three macroclasses of verbs, namely -are, -ere, and -ire, represents a similar case: 67% of all lemmas (or 61% of all verb types in child-directed Italian) are -are verbs (Noccetti, 2003, p. 369).
they should not appear with C-related material either—most literature has found such a correlation by showing that early RIs and RI-analogues do not appear with wh-questions, nor Focus and Topic DPs, which presumably are housed in the C projection(s) (see for example, Hyams, 2005).

Some generative and constructivist studies further suggest that a default/unmarked form is not only the one that emerges early and gets spelled out most frequently, but especially the one that gets overused/misapplied most often. In this vein, it is suggested that a default form in early Romance (particularly in Catalan and Spanish) may be the 3S form, homophonous with the 2S imperative form and a bare stem with a thematic vowel (Aguado-Orea, 2004; Aguado-Orea & Pine, 2006; Serrat & Aparici, 1999, cited in Liceras et al., 2006; Davidiak & Grinstead, 2004; Ezeizabarrena, 2002; Rodríguez-Bou, 1952, cited in Bybee, 1985; Grinstead, 2000).\textsuperscript{31}

In the Natural Morphology tradition, several factors are considered when defining the "easiest/most accessible" verb forms besides early emergence, namely the frequency of specific verb

\textsuperscript{31} Several child Spanish studies have shown the same proportion between 3S and non-3S forms as the adult studies reported above. However, Davidiak & Grinstead’s (2004) and Aguado-Orea & Pine’s (2006) accounts seem to be the most explicit about why 3S in Spanish could be treated as unmarked. Both studies show that not only is 3S the most common form, it is also the most frequently misapplied form in non-3S contexts. That is, the low error rates reported in many UG studies above seem to be skewed due to a very high number of 3S tokens that almost never show errors (versus other non-3S systems that exhibit error rates as high as 70%). Furthermore, 3S seems to account for most errors (more than 80\% in some person/number systems). The authors conclude that Spanish-speaking children simply show a tendency to default to the simplest and most accessible form when they are unable to produce the correct form (though they remain silent on what kind of form 3S is morphosyntactically and why it behaves the way it does).
tokens and verb types, misapplication errors, early semantic contrastive marking, and the use of mini paradigms. Early emergence, a very high frequency (overuse), and the substitution of 3S have been shown in numerous early null subject languages such as Croatian (Katičić, 2003), Czech (Smolik, 2002), Italian (Noccetti, 2003), Lithuanian (Wójcik, 2003), Polish (Smoczynska, 1985), Spanish (Aguirre, 2003), and Russian (Gagarina, 2003, 2004), though—similarly to the constructivist tradition—these studies remain silent on the morphosyntactic status of 3S.

Some researchers point out the importance of the interpretative characteristics of default forms in early grammars. For example, it is argued that early RIs are subject to the Modal Reference Effect (with the majority of RIs having a modal, irrealis interpretation) and the Eventivity Constraint (with the majority of RIs referring to events; Hoekstra & Hyams, 1998). Consequently, infinitives, imperatives, bare participles and bare perfectives (i.e., participle-like forms that appear in languages that do not have “real” participles, e.g., Greek) arguably obey both semantic constraints and are thus used in early Germanic (other than English), early null subject Romance and Slavic, and early Greek, respectively (Hoekstra & Hyams, 1998; Hyams, 2002, 2005, 2007; Salustri & Hyams, 2003, 2006; but see Rus, 2006a and Rus & Chandra, 2005, who argue that bare participles in Slovenian do not behave like RIs semantically).

Most formal acquisition accounts of early unmarked/default forms have been challenged (see Liceras et al., 2006; Rus, 2006a,
However, two questions from this large and interesting body of literature on default and morphological learning seem to be important for the present study: (i) what is the morphosyntactic status of early constructions with 3S forms (and related to this, why 3S in early null subject languages consistently emerges first and appears as the most common form in misapplication errors); and (ii) whether much less studied languages such as child Slovenian, which is also a null subject language (with no overt person and tense marking on 3S), shows any similar pattern of default forms reviewed above.

Equipped with the necessary empirical background, let us now turn to some of the major models of the acquisition of verb inflection that have appeared in the literature. I review each account and evaluate it against the data and phenomena illustrated above and the guidelines on modeling language acquisition proposed by Yang (2002; see below).

2.3 Approaches to Verbal Inflection

2.3.1 Generative Linguistic Approaches to Verbal Inflection

The large and interesting literature on the acquisition of verb morphosyntax in the generative tradition offers a wide range of detailed accounts of developmental facts that are used as empirical evidence in favor of one formal model or another. Generative acquisitionists have generally tried to account for
early omission of inflectional material, early acquisition of verb placement, and sometimes also optionality in regard to agreement and tense marking. More broadly, however, the generative field has focused on the issue of the availability and development of functional categories and the operations on them.

Three conceptual lines of research have appeared in the generative acquisition literature on verb morphosyntax—the full (strong) continuity account, the weak continuity version, and the discontinuity hypothesis.

Strong continuity assumes that the children’s grammatical representations obey both UG principles and the values of the parameters of the target system. Specifically, it contends that children have the knowledge of a full-fledged sentence structure (with lexical and functional features and projections) from the earliest stages of development. Regarding early verb inflection, two major claims have been made in the literature on strong continuity: (i) children are extremely fast learners of the morphosyntactic properties of the target systems and (ii) such rapidity and effortlessness reflect the right (early) setting of specific parameters, each responsible for a certain aspect of grammar (e.g., null subject, V2, verb movement, etc.; see particularly Baker, 2003, 2005; Guasti, 1993/1994, 2002; Hoekstra & Hyams, 1998; Hyams, 2001 et seq.; Poeppel & Wexler, 1993;
Weak continuity proposes that the child’s grammatical representations obey UG principles but need not contain the parametric values of the target language (e.g., Börer & Wexler, 1987; Whitman, 1994). An even weaker version of weak continuity proposes that some functional categories and principles may be missing at the onset of acquisition while others are already in place. Under this view, early representations may be deviant from the target system but are still considered to be constrained by UG (Lebeaux, 1988; Meisel & Müller, 1992; Vainikka, 1993/1994; Vainikka & Young-Scholten, 2006, 2007).

Finally, discontinuity approaches, generally associated with biological maturation, suggest that UG is not accessed and operable at the onset of acquisition but is biologically driven and becomes available in the course of development in a stepwise fashion (e.g., Bickerton, 1984, 1991; Felix, 1992; Platzack, 1992; Radford, 1990, 1995). Under this view, the child’s early

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32 For example, Wexler (1994 et seq.) argues that children converge to an adult-like morphosyntactic system almost instantaneously, a phenomenon which he dubs Very Early Knowledge of Inflection (VEKI), giving children a nickname of “little inflection machines”. He postulates that parameters are probably set perceptually even before the onset of production and certainly at a two-word stage, which is arguably the earliest observable stage. Wexler calls such phenomenon VEFS—Very Early Parameter Setting. Rizzi’s (2005) conclusion is similar to that of Wexler’s—he argues that major morphosyntactic parameters are set on the target-consistent values already at a time when syntactically significant production only begins. Similarly, Hoekstra & Hyams (1998), Hyams (1996 et seq.), and Salustri & Hyams (2006) all argue for so-called Early Morphosyntactic Convergence (EMC)—in their words, “[e]arly English is essentially English, early German is essentially German, and so on” (Salustri & Hyams, 2006, p. 159).
representations are generally believed to violate UG constraints, though some mixed accounts putting forth maturation and some stronger version of continuity have also appeared in the literature (e.g., Wexler, 2001, 2007).

Though conceptually same or similar, the formal generative models of early verb inflection put forth very different mechanisms, most of which—as argued by Yang (2002)—suffer from formal sufficiency, developmental compatibility, or both.33

Below I review the most commonly entertained generative models, namely the Underspecification models, the Truncation model, the Maturational model, and the Variational model.

The earliest Underspecification model (Wexler, 1994) assumes that when a morphosyntactic feature fails to be specified or is missing in a clausal representation, the functor morpheme corresponding to that feature will not surface phonologically. Wexler’s early work proposes the Tense Omission Model (TOM), where it is assumed that Tense (T) and Agreement (AGR) are separate syntactic projections and that the English tense, encoded by the inflections -ed and -s, copula be, modals, and auxiliaries, may be (optionally) phonologically omitted. In order

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33 Yang (2002) argues that any acquisition model should be formally sufficient and developmentally compatible. The former requirement contains causality (i.e., a model should explain rather than merely describe how acquisition occurs), concreteness (i.e., a model should explain how something is acquired rather than vaguely state that children somehow “pick it up”), and correctness (i.e., a model should show how children proceed from initial to terminal state). The latter requirement is defined through quantitiveness, explicitness, and variation—a model must confirm child language data, state explicitly the learning mechanism that explains such data, and capture the variability observed in the data, respectively.
to accommodate the fact that RIs do not occur with AGR-related weak subject pronouns and subject clitics (contrary to TOM’s prediction), Schütze & Wexler (1996) and Wexler (1998) revise TOM and propose ATOM—Agreement Tense Omission Model—arguing that in children’s clauses either the T or AGR feature is underspecified. Regarding cross-linguistic differences, ATOM links the RI phenomenon to the null subject property in the grammar—it is argued that in null subject languages with “rich” inflection, AGR is pronominal and does not need to be checked (hence, the subject DP gets checked against T only). Although a theory-internal requirement, it makes a very strong prediction, namely that children learning null subject languages should not manifest the RI phenomenon.

ATOM/UCC faces several empirical and conceptual challenges and many have been already spelled out in the literature. Though formally (quite) sufficient, ATOM/UCC fails to be developmentally compatible. Specifically, it cannot tackle the fact that RIs are not robustly attested in all non-null subject languages (e.g.,

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34 Wexler (1998) assumes that in Germanic languages, a subject DP must check its D-features (person/number/gender) against the T and AGRs heads by moving to their Spec positions. The verb’s features are assumed to be checked by moving the verb to the heads of the corresponding functional projections (T and AGRs). Wexler further assumes that initially children can only check the subject’s D-feature once and since the D-feature must be checked twice in Germanic, this limitation prevents children from producing a finite form of the verb. The assumption behind Wexler’s single-checking requirement is framed as the Uniqueness Checking Constraint (UCC), which basically states that a DP can check the EPP feature of at most one functional category.

35 For null subject systems, Wexler’s ATOM/UCC model hence predicts no RIs for simple finites and bare present and past participles (for compound finites).
Danish; Hamann, 2002) and are attested—albeit with lower rates—in null subject languages (Bel, 2001; Liceras et al., 2006).  

Furthermore, the account does not sufficiently define “rich” inflection, (e.g., Danish is morphologically rich yet it does not seem to support ATOM; Hamann, 2002). Next, if RIs are syntactically tensed (finite), then nothing would prevent children from producing RIs in other finite contexts other than VPs, such as CPs (e.g., wh-questions, etc.), which is generally unattested in the data (Guasti, 2002, p. 139; Hyams, 2001; Lasser, 2002). Moreover, the model neither accounts for the gradual increase in inflectional morpheme use (Legate & Yang, 2007; Yang, 2002) nor the morpheme order effect. Last but not least, the model remains silent on the various morphological instantiations of RI-analogues and various morphophonological phenomena observed in child data (e.g., defaulting to 3S).

Conceptually, ATOM/UCC comes with many theory-internal requirements and ad-hoc stipulations (e.g., the UCC assumption about single-feature checking itself).  

Specifically, the theory does not predict that tense is optional, but merely stipulates

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36 More specifically, ATOM/UCC predicts that the infinitive is an unmarked verb in all non-null subject languages. Note also that the model does not clearly define what “infinitives” refer to in a cross-linguistic context and remains silent on the morphological RI-analogues in other early languages.

37 Note, however, that Wexler (1998) does discuss the possibility of UCC being some kind of processing constraint rather than a constraint on grammatical representations, which many authors seem to have ignored in their criticism. Wexler states, though, that based on empirical grounds alone, both options sound plausible, but even if UCC is a processing constraint, it must be highly specific and enmeshed with the grammatical (competence) system.
Furthermore, it is not clear why tense is optional as opposed to some other functional category (Montrul, 2004). Next, it has been argued that the claim that a principle is optional only for a certain time has never been well justified, i.e., it is not clear why a principle as part of the innate grammatical mechanism should be temporarily optional—maturation has at least a biological counterpart and a discrete application (the principle is either present or absent), whereas optionality (without maturation) has neither (Leblanc, 2001). Moreover, in adult languages with RIs, children’s RIs must become more adultlike with age—this would be surprising if RIs were the result of a mechanism such as sporadic and optional underspecification (Lasser, 2002). Last but not least, the theory is unmotivated by independent neuropsychological evidence.

38 In other words, UCC does not solve the problem of optionality since even if UCC were operational in early grammars, one would still need to stipulate that the constraint itself is optional due to the fact that besides non-adult RIs/BVs children produce also correctly-inflected tense/agreement forms. Wexler attempts to formalize such optionality by invoking the so-called Minimize Violations Constraint (MVC), which is arguably operable in both child and adult grammars. MVC states that when faced with two representations, the grammatical system will choose the one that violates as few constraints as possible; when two representations violate the same number of constraints, then either can be chosen. Note that neither UCC nor MVC have been entertained in morphosyntactic theories, but are simply stipulated in Wexler’s work (though MVC resembles “soft”, violable constraints found in Optimality Theory in phonology).

39 Many (e.g., Böser, Lust, Santelman, & Whitman, 1992; Dye, 2005; Hyams, 2001; inter alia) criticize ATOM by saying that Wexler’s view of optionality is incompatible with current Chomskian linguistic theory since the paradigm has moved away from optional rules, which are now ruled out by licensing principles and principles of economy, and that optionality is thus “unlearnable”. Note that such criticism is valid only when one assumes a deterministic, all-or-nothing model of acquisition. Since the dissertation argues that optionality can be captured by making all-or-nothing models more probabilistic, I do not take this criticism to be valid in the present context.
The original Truncation model builds on Wexler's (1994) assumption of tense being stripped away in early clauses. Rizzi (1993/1994) proposes the so-called “axiom of clausal representation”, namely all clauses have a uniform representation and CP is the root of all clauses, finite or nonfinite. Hence, whereas in adult grammars all clauses are CPs, in child grammars some clauses will surface as CPs, while others will be less than CPs. Under this view, functional projections will be truncated below CP and a category that is lower than CP (AGRP, TP, or VP) will be the root of the clause.\textsuperscript{40} Rizzi further argues that the reason why children acquiring morphologically rich, null subject languages do not go through an RI stage follows from the fact that finite verbs in these languages do not raise as high in the structure as they do in Germanic languages. In turn, truncation in these languages does not typically result in infinitival utterances.\textsuperscript{41}

The Truncation model seems to be developmentally more compatible than ATOM/UCC, but suffers from formal sufficiency. Specifically, though the truncation mechanism seems to account

\textsuperscript{40} Truncation thus operates at the top level of the structural hierarchy, stripping away every projection above the truncation site. However, it cannot remove the projections from the middle of the tree (e.g., it is not allowed to omit AGRP and project a CP).

\textsuperscript{41} In a more recent (2005) truncation account, however, Rizzi takes a root sentence to be a FORCEP or CP, arguing that languages vary in regard to the inventory of functional categories that can function as a root. Force is assumed to be the unmarked case that is always available, while TOPP, TP, ASPP, etc. are other permittable options. Under this view, RIs are viewed as syntactically nonfinite, merely projecting a VP. When children produce overt subjects, these are assumed to be checked for Case in AGRP—hence the prediction that RIs do not appear with Nominative-marked subjects.
for optionality and variability across languages, it does not allow for the gradedness of functional categories within individual children or within individual languages unless one necessarily assumes that the requirement "CP=Root" is flexible across speakers and languages and can be altered at any time.\textsuperscript{42} Next, the model accounts for neither the morpheme acquisition order nor the gradualness effect. Last but not least, the model is silent on various morphophonological instantiations of root non-tensed verb forms and various morphological phenomena observed in the data (e.g., defaulting to 3S).

Conceptually, the model strongly relies on a theory-internal stipulation that the root of the clause is a CP (or, more recently, a FORCEP). However, the idea that a root principle is underspecified in child grammars (but not adult grammars), does not seem to follow from any principle, especially since Rizzi wants to maintain the idea that all syntactic projections in children are qualitatively the same as in adults (Montrul, 2004, p. 109). However, Rizzi’s (2005) account—which remains that of truncation as a competence limitation—now opens a possibility for interaction between UG and performance factors, though this is merely stated as a possibility rather than entertained technically.\textsuperscript{43} Last but not least, though the model

\textsuperscript{42} In other words, it is not clear what would prevent a child from truncating the syntactic structure higher, nor when this would be the case (assuming, of course, that the model is that of competence and is deterministic).

\textsuperscript{43} Specifically, Rizzi asserts that processing may affect truncation by pruning the structure at different sites and at various times, though
has some independent neuropsychological evidence (e.g., Friedmann & Grodzinsky, 1994, 1997, 2000; Hagiwara, 1995, see below), it is generally represented as an all-or-nothing effect, which might be difficult to accept given so much variability within and across individual subjects (Izvorski & Ullman, 1999; Pancheva & Ullman, 2001).

Non-continuity accounts generally invoke maturation and propose that the functional material is entirely missing in the child’s earliest representations and appears later in development as part of a biological program (Clahsen, 1990; Platzack, 1990; Radford, 1990 et seq.; Vainikka, 1993/1994).

Laying out a comprehensive and detailed maturational theory of morphosyntactic acquisition, Radford (1990, 1995, 1996) reports that the initial stage is pregrammatical in containing only lexical categories. However, he shows that at around 20 months of age, two striking changes occur: (i) the size of the child’s vocabulary (particularly lexical categories) sharply increases and (ii) a wide range of combinatorial patterns, conforming to X-bar syntax emerges (for a similar analysis and conclusion, see Bickerton, 1999).

Empirically, Radford’s maturational model seems to fare better than the Underspecification and Truncation models. It

he does not explicate on the issue further nor does he provide any analysis for his claim. He merely states that language development is grammatically based but performance-driven. In his words, non-target consistent properties observed in language development correspond to genuine UG options, but the factors determining their temporary adoption by the child lie in the growth of performance systems, outside the grammatical system proper.
accounts for the gradual increase in inflectional morpheme use and the morpheme order effect. It also correctly predicts that early grammars will opt for an RI or RI-analogue at the VP level, though the model does not offer any cross-linguistic morphological account of such nonfinites. The biggest empirical challenge for the maturational account, however, seems to be the data that clearly show overt tense/agreement markers or utterances that require tense-related projections to accommodate various word order facts (which, in some datasets, may be as much as 80% of all utterances). In other words, Radford and his followers would have to assume that such representations are merely “impostors”, i.e., rote-learned tensed clauses, which may be difficult to accept (Demuth 1992, 2001). Furthermore, the model remains silent on the various morphological instantiations of RI-analogues and various morphophonological phenomena observed in child data, similarly to the truncation and underspecification accounts reviewed above.44

Conceptually, one could argue that in the modern biolinguistic context, a maturational account fares well since it views language development as analogous to any kind of biological growth, a desirable methodology in biolinguistics. However, although maturation may well play a role in language development, the proposal that it is all about maturation is not entirely

44 The model contends that it is the “functional structure” of phrase markers (i.e., syntactic computation) rather than morphology that “matures” or is “learned” in a piecemeal fashion. As such, the model seriously undermines the children’s very early capacity for combinatorial syntax and various syntactic phenomena related to such computation (cf. Wexler, 1998, p. 29).
satisfactory. Specifically, biological mechanisms are not well understood and when invoked in language acquisition, they generally appear as vague claims rather than specific proposals of the biological mechanisms that may play a role in language development (Lasser, 2002, pp. 785-586; Legate & Yang, 2007; Yang, 2002). Last but not least—and just like the truncation model reviewed above—the maturational account has some independent neuropsychological evidence (e.g., Friedmann & Grodzinsky, 1994, 1997, 2000; Hagiwara 1995), though it is generally represented as an all-or-nothing phenomenon, which might be difficult to accept given so much variability within and across individual subjects (Izvorski & Ullman, 1999; Pancheva & Ullman, 2001; see below).

The most recent model of early verb inflection in the generative tradition is Yang’s (2002) Variational model (VM), which views language acquisition as a process where learning directly shapes UG-given parameters via grammar competition. A more articulated account of inflectional morphology is found in Legate and Yang’s (2007) study, which proposes a parametric difference between [+T] and [-T] languages, where the former

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45 Many (e.g., Dye, 2005; Lust, 1999; Legate & Yang, 2007; Wexler, 1998, 2007) criticize maturational approaches for being discontinuous in the sense that they abandon the Continuity Hypothesis. However, I argue that continuity should not be understood as the (surface) suppliance of morphophonology but rather some discrete morphosyntactic computation and the operations on it (for a similar conclusion, see Blom & Wijnen, to appear).

46 Under this approach, developing grammars are believed to be partial systems rather than “wholes”, where learning (via probability) informs the parameters, successfully rewarding or punishing their discrete values.
class refers to languages in which T is an active morphosyntactic feature (which Legate and Yang equate with “morphologically expressed”) and the latter class to systems where T is inactive (i.e., where temporal relations are expressed with temporal adverbs and/or aspjectual markers rather than inflection on the verb). Specifically, a child acquiring a [+T] language (e.g., English) must rule out the [-T] option (e.g., Chinese); when the child fails to do this, a matrix clause will surface with an RI or BV. The length of the RI stage in VM is hence directly correlated with the number of ambiguous morphological [+T] tokens in the input—the more the input rewards the [+T] grammar, the less inclined the child’s system will be to allow RIs.

VM comes with numerous advantages over all previous generative models. It is developmentally compatible in being quantitative, explicit, and able to capture the gradualness effect and variability within and across subjects and languages. Moreover, it appears to be formally sufficient in being explicit and putting forth a specific mechanism that may be responsible

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In probabilistic learning terminology, the [-T] grammar can be accessed non-zero times before it is eliminated as a permissible option by the ambient grammar. Specifically, tensed verb forms that morphophonologically do not overlap with any other non-tensed (“nonfinite”) forms and morphophonological verb stem changes arguably require tense for their realization and hence count as [+T] tokens, rewarding a [+T] grammar. Put simply, the child rules out the [-T] option on the basis of overt morphology, although it is not entirely clear how the child knows which form is tense-based and which is not—this is presumably learned from experience (Yang, p.c.).

Legate and Yang quantify such distribution in three languages that differ with respect to the rates of RIs/BVs, namely early Spanish, French, and English. In Spanish, RI rates are very low—they generally fall between 1% and 5%; in French, they vary between 30% and 70%, while in English BV rates fall between 75% and 90%.
for the acquisition of verb inflection. Last but not least, it incorporates “nature” (UG) and “nurture” (a learning component)—a desirable approach in any language modeling.

VM comes with few challenges, though, particularly in regard to methodology. First, since the learning cues in VM are directly linked to surface morphophonology, it is not immediately obvious what impact to grammar competition certain morphological forms represent. VM crucially assumes that all overt tense/agreement forms (that do not overlap with any other nonfinite forms) implicate tense, hence rewarding [+T] grammars. For example, the model assumes that 3S forms in a system like Spanish do not implicate tense since they overlap with imperatives and stems with thematic vowels.

Though I agree with Legate and Yang’s hypothesis that the 3S form does not implicate tense, the analyses in theoretical and developmental literature are not conclusive about the exact representation of the 3S form (and you will remember that this is the most common form in null subject Romance and Slavic child and adult systems). Similarly, imperatives (which Legate and Yang analyze as tense-dependent, thus rewarding the [+T] grammar) have received various treatments in both theoretical and developmental

49 For example, in early Portuguese, Catalan, Italian, and Spanish, 3S forms have been argued to be regularly tensed (“finite”) forms (e.g., Guasti, 1993/1994; Hyams, 2001 et seq; Montrul, 2004; Torrens, 1995), “underspecified” forms (with no further elaboration or analysis on whether they are tensed or not; Aguirre, 2003; Aguado-Orea & Pine, 2006; Castro & Gavruševa, 2003; Noccetti, 2003), and non-tensed, RI-analogues (Clahsen, Aveledo, & Roca, 2002; Grinstead, 2000, 2004; Davidiak & Grinstead, 2004; Pratt & Grinstead, 2007; Radford & Ploennig-Pacheco, 1995; see also Kupisch & Rinke, 2007, who speculate about this conclusion).
Furthermore, the status and use of bare participles (in Slavic and Romance) are still highly debatable—they have been analyzed as tenseless/agreement-lacking clauses (Radford, 1990 et seq.) or—more specifically—RI-analogues (e.g., Wexler, 1998), modality-based finites with underspecified T (e.g., Hyams, 2005), and full-fledged CPs with underspecified T/AGR, i.e., with a morphologically silent auxiliary be (see Rus & Chandra, 2006a and the references therein).

Furthermore, Legate and Yang argue that a verb’s stem change always implicates tense. Though it is true that the majority of Spanish stem-changing verbs does not exhibit a morphophonological stem change in non-tensed forms, some verbs, in fact, do. Consider the verb colgar, which exhibits no morphophonological change in tensed forms: colgando [hang PROGR.PART]; colgado [hang PERF.PART]; cuelgo [hang 1s.PRES.IND]. Now consider the verb volver, “to return”: volviendo [return PROGR.PART]; vuelto [return PERF.PART], or the verb pedir, “to ask”: pidiendo [ask PROGR.PART]—pedido [ask PERF.PART]; pido [ask 1s.PRES.IND].

While most theoretical accounts claim that imperative phrase markers are stripped of TP (e.g., Platzack & Rosengren, 1998), some (e.g., Milojević Sheppard & Golden, 2000, 2002; Rupp, 2003) argue that they contain TP. Similarly in developmental literature, while most studies show that early imperatives in null-subject languages cannot have the status of RIs and are thus full-fledged tensed clauses (Bohnacker, 1999; Líceras et al., 2006), Salustri & Hyams (2003, 2006) argue that they are RI-analogues, on a par with infinitives.

Not only do these irregular stem-changing (non-tensed) participles exhibit a vowel change and hence implicate a [+T] option in a model like Legate and Yang’s, they are usually also the most common verbs in child-directed Spanish (see for example, Aguado-Orea, 2004).
Next, Spanish shows a clear split between tensed and non-tensed verbs in regard to the placement of pronominal clitics—a property that suggests that not all that is at stake in the categorization of “finiteness” may lie in the verb’s surface morphophonology. Specifically, in tensed clauses, clitics precede the verbs, while in non-tensed clauses, clitics follow the verbs:

\[(6)\]
\[(a) \text{La } \text{canta.} \quad \text{It}_{\text{CL3SFEM}} \text{ sing}_{\text{3SFPRESIND}} \quad \text{“S/he sings it”} \]
\[(a) \text{¡Cántala!} \quad \text{Sing}_{\text{IMP-IT}} \text{ it}_{\text{CL3SFEM}} \quad \text{“Sing it!”} \]

Unlike the previous generative models, which say little about the morphophonological representation of early matrix non-tensed verbs, VM remains silent on the syntactic representation. As such, it does not capture the status and use of morphosyntactically non-affixal tense/agreement-dependent forms (e.g., auxiliaries, copula verbs).\(^{52}\)

Furthermore, though VM puts forth a precise and explicit morphological analysis, it predicts and explains only omission errors and does not tackle errors of substitution and defaulting, which—as we saw above—are quite common in the data. At the same time, VM neither explains the morpheme order nor is it motivated by any independent neuropsychological evidence.

\(^{52}\) VM focuses on surface morphophonology and as such, it cannot say much about the syntax-morphology interface except for the assumption that the morphosyntax of verb inflection is necessarily parameterized, which might be theoretically and/or conceptually questionable itself (see for example, Gelderen, 2010; Haider, 1993).
Conceptually, VM comes across as a weaker acquisition model since the proposed parameter remains questionable. Though Yang’s (2002) model contains commonly-entertained binary parameters in formal linguistics circles (e.g., V2, subject drop, object drop, etc.), no theoretical or acquisition account has ever entertained the [+T] parameter proposed in Legate & Yang (2007).

As a response to the accounts reviewed above—particularly the Omission, Underspecification, and Truncation models—most researchers, especially those working in the Constructivist framework, argue that formal models do not adequately describe acquisition, let alone explain it (see particularly Aguado-Orea, 2004; Aguado-Orea & Pine, 2006; Freudenthal, Pine, & Gobet, 2004, 2006; Pine, Rowland, Lieven, & Theakston, 2005; Rubino & Pine, 1998). Specifically, it is argued that many details regarding morphological learning and various input-based salience and frequency effects (including defaulting) go unexplained, leaving room for mainly descriptive (albeit formalized) generalizations that run a risk of being treated as innate constraints.

53 Interestingly, although Yang explicitly rejects older (deterministic) parameter-switching models, he still crucially relies on the notion of UG parameters that (ideally) come in binary oppositions. Note that I am not suggesting that the parameter proposed by Legate and Yang is necessarily incorrect, let alone that parameterized acquisition models are conceptually inferior to non-parametric models. I am simply suggesting that for a model like Legate and Yang’s, one would need more theoretical and developmental evidence and a more explicit account of the interplay between syntax and morphology.

54 In the vocabulary of the present study, most acquisitionists in the biolinguistic tradition seem to have resorted to Chomsky’s (2005) “first factor” effects only and have glossed over the factors of learning (“second factor”) and computational efficiency (“third factor”); see for example, Kazman, 1991b; Tomasello, 2003).
To sum up this section, we saw that VM fares better than any other formal account to date since it accounts for most developmental milestones observed in the data and captures two of Chomsky’s (2005) three factors that enter into language and its acquisition. However, since the dissertation argued in the introduction above that one would ideally want to supplement theoretical and developmental evidence with neurocognitive data, possibly entertaining all three of Chomsky’s three factors, I turn to a specific line of research into the use and processing of verb morphosyntax that will help inform the current debate.

The area of research I review below not only advocates a program where neuropsychological studies inform theoretical evidence (and vice verse), in the sense of Miller (2003), Poeppel & Embick (2005), and Walenski & Ullman (2005), but also relies on explicit formal linguistic theory. As such, the studies formulated in this framework do not appear merely descriptive as most usage-based accounts do. Furthermore, a flurry of research has been carried out in this paradigm on diverse populations and languages, though I feel it has not been given the weight it deserves in theoretical and psycholinguistic circles.

2.4 Neuropsychological Approaches to Verbal Inflection and the Inflectional Hierarchy Complexity Hypothesis

The majority of sentences are clearly not stored in the human mind by rote but must be combined online via some
concatenation operation, which is believed to be a fundamental
processes in human language (Chomsky, 1995 et seq.; Hauser, 2007;
Poeppel, 2007). Since concatenation is a fundamentally motoric
process, it is expected to be handled in the premotor cortex and
inferior frontal areas of the brain (Friedmann, 2002; Ullman,
2004; Ullman & Izvorski, 2000). Damage to these areas generally
leads to omission of functional material, observed cross-
linguistically in production, and—to a slightly lesser extent—in
elicitation judgment tasks (see Friedmann, 2001, 2002; Friedmann
& Grodzinsky, 1997, 2000; Gavarró & Martínez-Ferreiro, 2007;

Though the hypotheses about the omission of functional
material differ in regard to the details of linguistic theory,
the majority of the literature suggests some hierarchy of
difficulty, generally that of “unmarked”/Verb Stem > Aspect >
Inflection (Tense/Agreement) > Complementizer.\(^{55}\)

Hagiwara (1995), for example, reports data from four
Japanese agrammatic aphasics, showing that in spontaneous speech,
all her subjects omit a great deal of complementizers and AGR-
related material but have less spared T- and NEG(ation)-dependent
words. On a grammaticality judgment task, two agrammatic aphasics
perform better with negation and tense than with CP-related
material such as wh-words and complementizers. Hagiwara frames

\(^{55}\) In other words, unmarked verbs are computed/accessed/produced easier
than aspect-marked verbs than tense/agreement-marked verbs than
complementizer-marked/related verbs. Many accounts, however, split
Inflection into two separate heads, namely T and AGR, generally arguing
for a hierarchy of V > T > AGR, or less often, that of V > AGR > T (see
below).
her analysis in a truncation model, arguing that her study suggests that different aphasics may converge at different functional layers, which explains inter-subject differences.\(^{56}\)

Friedmann and Grodzinsky report numerous studies on Hebrew and Arabic agrammatism (e.g., Friedmann, 2001, 2002; Grodzinsky, 2000; Friedmann & Grodzinsky, 1994, 1997, 2000). Their data include both spontaneous speech and experimental results from elicitation, repetition, judgment, and comprehension tasks. The authors report a very refined pattern of selectivity: while T- and CP-related material seems to be severely disrupted in their patients (with suppliance rates generally averaging at chance), AGR-related material seems to be completely spared (generally, 90-100\% correct).\(^{57}\) Specifically, their data show impaired inflection for tense, omission of copula and subject pronouns, and ordering errors of copulas and negation—arguably all T-dependent properties. Furthermore, their data show no embedding and no \textit{wh}-question production. At the same time, however, AGR-marking inflection is almost always error-free.\(^{58}\) Similarly to

\(^{56}\) However, as correctly observed by Izvorski & Ullman (1999) and Pancheva & Ullman (2001), Hagiwara’s proposal does not allow for graded success across and within individual speakers but rather predicts an all-or-nothing pattern of performance within subjects. In other words, according to the model that Hagiwara assumes, a given patient should be completely impaired at all functional categories above the point of convergence and completely spared below it.

\(^{57}\) Note that Friedmann and Grodzinsky’s clause structure for the languages in question is that of VP-NEGP-AGRP-TP-CP, suggesting that their patients arrive to as high as AGRP and cannot go beyond it.

\(^{58}\) Note that in order for Friedmann and Grodzinsky’s account to receive cross-linguistic support, the authors are forced to reconsider the widely-assumed clausal architecture of VP-TP-AGRP-CP for Germanic and Romance languages (though the authors reference studies on English and
Hagiwara (1995), the authors explain the findings with the truncation model (the Tree Pruning Hypothesis; TPH). TPH argues that the observed deficit differs in severity across patients, suggesting that the pruning site differs among patients and that the higher the functional projection in the phrase marker, the greater the impairment.59

Numerous studies have confirmed Friedmann and Grodzinsky’s general idea of selective impairment by showing that the deficit manifests differently with tense than it does with agreement. However, since most studies probe Germanic and Romance languages where AGR is presumably higher than T, it has been generally argued that tense is acquired/accessed sooner/more easily than agreement (e.g., Benedet, Christiansen, & Goodglass, 1998; Höhle, 1995, cited in Wenzlaff & Clahsen, 2004; Kolk, 2000; Pancheva & Ullman, 2001).

Wenzlaff and Clahsen’s more recent study (2004) investigates subject-verb agreement through sentence-completion and grammaticality-judgment tasks in seven German-speaking agrammatic aphasics. The study reports that while agreement is supplied correctly in 81% of the cases across all subjects, tense marking is severely impaired at 57% correct. The authors argue that the classical truncation hypothesis cannot explain the French that propose the architecture identical to theirs) and argue that subject-verb agreement is checked in VP.

59 Recall, however, that such pruning does not allow for deficits to be graded across functional categories within individual patients; rather, it predicts an outcome that equally affects all projections above the pruning site (i.e., presumably rendering them completely inaccessible).
observed data since (i) AGR in German is presumably higher than T and (ii) AGR and T are no longer split projections in syntactic theory (with AGR being more of a grammatical relation rather than a category).\footnote{The authors explain the dissociation between tense and agreement in both agrammatism and language acquisition as a consequence of T being tense-defective (i.e., lacking T features). Specifically, they hypothesize that T is specified for [±Realis], but not for [±Past]. However, as correctly pointed out by Gavarró & Martínez-Ferreiro (2007), not only is it empirically impossible to tease apart the evidence for the specification of the [±Realis] distinction in early or deficient systems, Wenzlaff and Clahsen’s model finds it hard to account for a wealth of data in agrammatism and language acquisition that shows various cross-linguistic deficits at the TP level, resulting in disruption of subject nominals, copula, auxiliary use as well as the lack of the V2 phenomenon.}

Analyzing 21 Catalan, Galician, and Spanish agrammatic patients, Gavarró & Martínez-Ferreiro (2007) come to a similar conclusion—they report relatively spared agreement and more severely disrupted tense.\footnote{The repetition task yielded almost no errors (the Catalan group: 6% tense and 1.43% agreement errors; the Galician group: 1.43% tense and 0.57% agreement errors; the Spanish group: 2.57% tense and 0.28% agreement errors). On the completion task, all three groups performed significantly lower: the Catalan group: 18% tense and 5.14% agreement errors; the Galician group: 41.71% tense and 8.86% agreement errors; the Spanish group: 28.86% tense and 13.14% agreement errors.} In order to explain the data in the truncation model, Gavarró and Martínez-Ferreiro are forced to reject Chomsky’s (1995 et seq.) phrase structure of V−v−T−AGR−C, resorting to the syntactic framework of Cinque (1999) with multiple T projections, some of which are located above AGR.\footnote{The authors propose the following structure: ModP_{Epistemic} > TP(past) > TP(Future) > MoodP_{Irrealis} > AspP_{Habitual} > (…) > TP(Anterior) > AspP_{Terminative} > AspP_{Continuative} > VP. Note that if the operation Agree is responsible for PERS/NUM checking and some tree pruning hypothesis with a deficient T and spared AGR holds, Agree must take place between V and a functional category other than T. Under this view, the \( \phi \)-features must reside somewhere lower than TP (Past)—the authors propose that this might be ASPP. As such, the movement of the subject DP would no longer}

\begin{align*}
\text{Analyzing 21 Catalan, Galician, and Spanish agrammatic patients, Gavarró & Martínez-Ferreiro (2007) come to a similar conclusion—they report relatively spared agreement and more severely disrupted tense.} \\
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\end{align*}
Models such as the ones proposed by Friedmann and Grodzinsky or Gavarró and Martínez-Ferreiro appear problematic both conceptually and empirically. First, these models generally completely gloss over the errors of substitution.\(^{63}\) Second, nothing in these studies is said about zero morphology in regard to substitution errors—hence 3S forms in non-singular, non-tensed conditions are always taken to be uninflected roots and thus represent omission errors.\(^{64}\) Third, in order to maintain that T is impaired while AGR is spared and explain such a state of affairs with a tree pruning hypothesis in Minimalist terms, the authors must reconsider the classis syntactic architecture and the operations on it, which generally results in proposing various non-standard theoretical refinements (e.g., subject DP checking in VP) that have not been entertained in the syntactic literature. That is, such novel proposals run into a risk of the hypotheses being attributed to merely typological differences rather than some broader, universal phenomena, which weakens the models’ conceptual value. Last not least, it is not obvious what be motivated by \(\varphi\)-features (but presumably by some other feature such as EPP), but agreement checking would now be forced to occur anywhere (lower) in the structure, e.g., in the VP and ASPP domains—a nonstandard conclusion, similar to the one put forth by Friedmann & Grodzinsky (1997, 2000), reviewed above.

\(^{63}\) For example, Friedmann & Grodzinsky (2000) state that when inflection for tense is completely missing from the patient’s utterances, it is usually impossible to determine the target tense form; hence, substitution errors go undetected and unexplained (p.3).

\(^{64}\) Such omission errors may well be substitution errors (a phenomenon widely-reported in child Spanish, as reviewed above). Specifically, 3S forms go unaccounted for in tree pruning models like Friedmann and Grodzinsky’s or Gavarró and Martínez-Ferreiro’s since they necessarily assume that TPs in syntactic representations are stripped off.
mechanism exactly causes truncation in the reported subjects and why. In other words, none of the models reviewed so far—just like the truncation accounts reviewed earlier—put forth a (more) principled cause of lack of success on the suppliance and processing of functional morphology and/or account for inter- and intra-subject variability.

The account that seems to be more successful in explaining variability regarding the use of functional morphemes is put forth by Izvorski & Ullman (1999), articulated in more detail in Pancheva & Ullman (2001). The model, referred to as the Hierarchy Complexity Hypothesis (HCH), proposes technology similar to that in classic truncation accounts yet it differs from all previous (and subsequent) models in a fundamental way: it posits that the severity of impairment is a consequence of the relative height of a given category in a phrase marker.65

Specifically, linguistic forms dependent upon higher categories (with a larger number of categories embedded below them) are predicted to be probabilistically, not categorically, more challenging than those dependent upon lower categories—hence, the higher, more complex the category, the more probable and the more pronounced the impairment. Crucially, the resulting

65 Two non fluent anterior aphasics (who suffered a left hemisphere stroke) showed the following suppliance rates on the production task from: 29% (unmarked), 20% (participles): 17% (-ing) and 3% (-en), 0% (3S -s). Data from 5 non fluent posterior aphasics on the same task showed the following suppliance rates: 7% (unmarked), 0% (on all other verb forms). The reading task was administered to 9 anterior and 3 posterior aphasics and the results were very similar to those obtained on the production task. Note that the contrasting patterns found between the two groups of aphasics suggest that left anterior brain structures play a particularly important role in concatenation.
impairment is not an all-or-nothing one. Rather, the deficit affects the likelihood of a successful combination. Therefore, a graded pattern within and across individual subjects is predicted with linguistic forms (inflections or free function words) dependent upon higher projections more likely to be computed/accessed than linguistic forms dependent upon lower projections.

Although Pancheva and Ullman agree that a number of deficits could in principle lead to the observed pattern, they suggest that the deficit lies in the concatenation operation (which they call Merge, following Chomsky, 1995 et seq.). The authors argue that the proposed deficit explains much of the observed data in a neuropsychologically-principled way, integrating the linguistic manifestation of agrammatism with independent properties of the brain systems implicated in several neurolinguistic studies probing the verb morphosyntax of agrammatism.

2.5 Impaired/Incomplete Merge and the Inflectional Hierarchy Complexity Hypothesis: Extension to Child Language Development

HCH suggests that the functionality of Merge is graded to various degrees in various patients, presumably based on the intensity of their brain lesions. This suggests that if Merge was a fundamental operation that depended simply on the complexity of
computation (in the sense that more complex/higher were less successful), healthy adults would be predicted to show the same hierarchical pattern of success at morphological marking.\textsuperscript{66}

Consequently, two hypotheses could be formulated regarding the status and function of Merge.

The first one suggests that Merge as a fundamental motoric operation is fully operational in the brain/mind at the onset of development, leaving the issue aside whether it is given by UG or is part of some other cognitive module (e.g., motor control), or whether it is human-specific or shared with other species.

The second hypothesis suggests that the operation develops with age, on a par with other biological systems (again, leaving the issue aside whether the operation is language-specific or part of some other cognitive mechanism). Most biolinguists suggest the former, arguing that it is a language- and human-specific operation (e.g., Chomsky, 2006, p. 4; 2007), though they admit that it might be an organic property of other systems (e.g., Chomsky, 2004, p. 105; for a relevant discussion, see Gelderen, 2008).\textsuperscript{67}

\textsuperscript{66} With control subjects generally performing above 90\% on all experimental conditions, this obviously does not seem to be the case. However, Ullman (p.c.) speculates that such pattern might indeed exist also in a healthy population, but might be just much less pronounced. To my knowledge, no research into monolingual adult language processing has been conducted to test this claim, though it seems plausible to me.

\textsuperscript{67} While Ullman & Izvorski (1999) claim that HCH puts forth a deficit in Merge and/or Move, Pancheva & Ullman (2001) state that the proposed impairment is that of Merge, distinguishing it from the accounts that suggest impairments of head-to-head movement. Interestingly, Salustri & Hyams (2006) argue that children’s earliest grammar contains Merge but not Move. Note that—at least theoretically—the two operations enjoy the same status in modern analyses, with Move being described as Double
Note that both hypotheses could easily be accommodated in truncation models, particularly the probabilistic ones of the Pancheva and Ullman-type. Under the first hypothesis, children’s Merge is rendered given (intact), but due to memory bottlenecks (computational constraints), early grammatical systems exhibit tree-pruning/inflectional hierarchy effects in regard to inflectional morphophonology. Under the second hypothesis, children’s Merge is rendered an operation that “matures” to a certain degree in any given child at any given time in the course of development (much like Merge can be disruptive to various degrees in various patients with language breakdowns). Following most work on theoretical and comparative biolinguistics that argues that a concatenation operation is a fundamental process in human language, I assume the former hypothesis here, though in principle, nothing would exclude the latter one.\textsuperscript{68}

The dissertation extends Pancheva and Ullman’s HCH to early morphosyntactic acquisition, arguing that due to computational bottlenecks with respect to Merge, the morphophonological spell-out of (UG-given) formal features is probabilistically more costly at higher branches of phrase markers. Specifically,merge, Re-Merge, or Internal Merge\textsuperscript{68} (Chomsky, 2001 et seq.), which I also assume in the present study. As an extension, I assume that Merge and Move are not distinct operations developmentally.

\textsuperscript{68} You will remember that a similar argument is found in the acquisition literature (e.g., Wexler, 1998). Specifically, it seems to be impossible to tease apart processing challenges with those of representation regarding Merge in structure pruning models, especially due to the absence of a well-articulated theory of (online) processing. In the current study, I take the phenomenon to be a processing constraint, but one that very strictly follows linguistic-specific morphosyntactic constraints.
morphosyntax must be supplying more structure vis-à-vis bottom-up processing and the more embedded the category is, the less reliable morphophonological suppliance (spell-out) will be. Crucially, it is suggested that this state of affairs is not present only initially in the earliest stages of acquisition but persists throughout early development. I call this hypothesis the Inflectional Hierarchy Complexity Hypothesis (IHCH).

Note that this hypothesis makes a strong prediction regarding emergent verbs: children’s earliest verbs are predicted to be computationally least costly and appear (morphophonologically) as verbs that have been termed default/unmarked, even though these may at resemble adultlike tensed/agreement-marked forms with zero morphology (such as the 3S form in Romance).

The IHCH also predicts a probabilistic morphophonological hierarchical pattern manifested throughout early development (persisting until age 2;5-3;0 when agreement [finite] verb inflection is applied 80%+ of the time). Specifically, unmarked verbs and bare participles/perfectives are predicted to be computed with more success (i.e., supplied with more accuracy) than tense-marked verbs, which, in turn are supplied more accurately than person agreement-marked verbs. That is, IHCH predicts a Brown-type of morpheme order of acquisition.⁶⁹

⁶⁹ This suggests that initially, grammars exhibit a lack of reliable (morphophonological) suppliance of CP material (manifested as a lack of embedding, focus, topic, and wh-structures) and a lack of (morphophonological) suppliance of person agreement-marked elements.
Furthermore, as noted above, the probabilistic outcome of $V > v > T > AGR > C$ is posited throughout early development (see Chapter 3 for details on the slightly revised phrase structure). 

Furthermore, the model predicts morphophonologically-diverse Early Root Nonfinites cross-linguistically. Initially, these non-agreement-marked forms are posited to be limited to bare verbs (or infinitives) and bare participles. Crucially, together with these forms, “default” forms such as 3S in Romance and Slavic are predicted to appear as early non-tensed forms. Note that such an account predicts inter-subject and intra-subject variability, following the IHCH effects.

2.6 Summary and Conclusion

The chapter first reviewed the conceptual background necessary for the subsequent chapters. It addressed the unification of linguistics with cognitive neurosciences, the study of language acquisition in the modern biolinguistic (manifested as a lack of person agreement marking on finite verbs as well as a lack of copulas and auxiliaries).

Note that this does not entail that the morphosyntactic structure is incomplete or deficient. As this dissertation shows, child language data demonstrate that structure-building and various morphosyntactic features that play a role in diverse layers of phrase structure are in place very early in language development. What is missing, though, is reliable (90%+) suppliance of morphophonological spell-out of functional categories in high(er) morphosyntactic projections.

Note that under this view, the phenomenon of ERNs is viewed on a continuum rather than one of two opposing poles. All languages go through this stage, but in some early systems, the phenomenon is short-lived and/or manifests itself in forms that resemble adultlike forms which nonetheless lack person agreement inflections and material.
research program, and Chomsky’s (2005) three factors of language design.

It was argued that there is a dire need for a conceptual change in theoretical linguistics to seriously take into account evidence from experimental psychology and cognitive neuroscience. Such a change is believed to require a conceptual shift in linguistics and the spelling out of processes in computational terms so that linking hypotheses could be formulated and tested.

Further, it was argued that Chomsky’s account on the three factors of language may fare well in explaining early language acquisition by identifying the variables that arguably enter into language—the genetic endowment, experience, and efficient computation. Specifically, research in theoretical syntax has given us ample evidence for a feature-driven phrase structure computation that operates on a small number of discrete morphosyntactic categories and exhibits discrete infinity—arguably a genetic property of the language faculty; psychological and psycholinguistic accounts have provided informative insights into how experience may shape specific linguistic categories and how the morphosyntactic material gets mapped to them, yielding what appears to be stage-like development (in regard to morphophonological marking); neurocognitive studies have shed much light on the production and processing of morphosyntactic categories, putting forth various analysis of functional morpheme omission and substitution in various populations.
The chapter then reviewed at great length the empirical data reported in the literature on early verb morphosyntax and morphophonology and some of the major hypotheses that have been formulated to account for the observed data. Five robust phenomena were reviewed, namely telegraphic speech, optionality, the morpheme order effect, the gradualness effect, and morphophonological learning. The review of the cumulative empirical evidence led to a proposal for the Inflectional Hierarchy Complexity Hypothesis (IHCH).

The IHCH predicts that due to computational bottlenecks regarding the concatenation operation (Merge), the morphophonological spell-out of formal features is probabilistically more costly at higher branches of phrase structure. That is, morphosyntax must be supplying more structure vis-à-vis bottom-up processing and the more embedded the morphosyntactic category is, the less reliable morphophonological suppliance will be. Specifically, unmarked verbs (bare verbs, complex bare verbs, and infinitives) are predicted to be supplied (i.e., spelled out morphophonologically) significantly with more success than tense-marked verbs, which, in turn, are predicted to be supplied significantly better than person agreement-marked verbs. More generally, the error rates in the verb systems that are computed in higher morphosyntactic heads are predicted to be statistically higher than the errors in the systems that are computed in lower morphosyntactic heads.
Such a probabilistic morphophonological hierarchical pattern (which is a consequence of processing constraints but follows linguistic-specific morphosyntactic constraints) is not only predicted for initial stages of development, but is believed to persist throughout early language acquisition—even after the idiosyncratic morphophonological pieces of inflection have been presumably all acquired and inflection is correctly supplied 80%-90% of the time (at age 2;5-3;0).
Chapter 3: Adult Verb Morphosyntax: The Knowledge of Verbal Inflection

3.1 Introduction

The purpose of this chapter is twofold. First, it describes the theoretical framework assumed in the study. Second, it describes the verb morphosyntax and morphophonology of adult Slovenian in order to provide sufficient background for the analysis of the child data in the subsequent chapters.

In the tradition of formal language acquisition, young children’s learning of verb inflection has been generally studied in regard to the acquisition of subject-verb (person) agreement, tense, aspect, and (subject) case marking, focusing more generally on the acquisition of functional (morphosyntactic) categories and the operations on them.

Section 3.2 formulates these phenomena in a phase-based Probe-Goal derivational model of morphosyntax (Adger, 2003, 2007a, 2007b; Chomsky, 2000b et seq.; Dobashi, 2003, 2004; inter alia).\(^1\) Section 3.3 provides a description of adult Slovenian

\(^1\) I make no attempt to be comprehensive and focus only on the aspects of the models that are relevant for the analysis presented in this study. As such, I set aside various theoretical details that are being investigated. For example, I assume by now quite a standard instantiation of a derivational, phase-based Probe-Goal model of syntax, although the precise nature of phase-based morphosyntactic computation is still part of ongoing debates in the literature (see
3.2 A Strict Derivational Minimalist Model of Language

3.2.1 The Minimalist Architecture of Language

In the most recent framework of the Chomskian paradigm (the Minimalist Program; henceforth MP), the language faculty is postulated to contain a discrete computational system called “the Faculty of Language in the Narrow Sense” (Fitch et al., 2005; Hauser et al., 2002) or “narrow syntax” (Chomsky, 1995 et seq.). MP hypothesizes that there is a single engine for the generation of language structure and that engine is syntax (Adger, 2003, 2007b; Chomsky, 2000b et seq.). Specifically, syntax is taken to be a lexically driven combinatorial system that links phonological and semantic meaning by generating hierarchically organized phrase structures built from bundles of phonological, morphosyntactic, and semantic features. Syntax interfaces with a sensory-motor (S-M) system (including phonetics and phonology; sometimes referred to as an articulatory-
perceptual system, A-P), a conceptual-intentional (C-I) system (including semantics and pragmatics), and possibly also other systems (Fitch et al., 2005, p. 182; Hauser et al., 2002, p. 1571ff.). In such an austere theory of language, the language faculty is posited to contain only (i) a UG-given set of formal features that combine into feature bundles, (ii) a computational system that manipulates feature bundles, and (iii) the S-M and C-I interface levels, interpreting the Phonetic Form (PF) and the Logical Form (LF), respectively.

A standard MP model of the architecture of language is illustrated in Figure 3.1 below:

![Diagram of the Minimalist Program architecture of Language](image)

Figure 3.1: The Minimalist Program architecture of Language

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2 MP requires that all linguistic mechanisms be reduced to a bare minimum and that the mechanisms be motivated solely by the requirements imposed at the interfaces or by independent principles of efficient computation (Chomsky, 1995 et seq.).
The mental dictionary (the Lexicon) is hypothesized to contain roots, the primitives that alter the roots (e.g., inflectional and derivational morphemes), a set of phonological, morphosyntactic (sometimes called formal; henceforth, FF), and semantic features\(^3\), and (d) a set of abstract category heads.\(^4\)

The syntactic computation accesses a set of syntactic primitives selected from the Lexical Array (LA; Chomsky, 2000b), previously dubbed Numeration (Chomsky, 1995). This set gets fed into syntax, which rearranges and organizes the terminals into larger phrasal constituents (e.g., phrases and sentences) through an iterative operation of Merge. After the narrow syntax is complete, the operation Transfer sends the derivation to the phonological component \(\Phi\) and the semantic component \(\Sigma\), generating a pair \(<\text{PHON}, \text{SEM}>\) (Chomsky, 2001; Dobashi, 2004).

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\(^3\) MP hypothesizes that a set of FF is genetically endowed by UG (Chomsky, 1995 et seq.), though some accounts propose that FF are acquired incrementally through exposure to the input, albeit maturationally (Radford, 1990 et seq.; Vainikka, 1993/1994). Some mixed accounts have appeared in the literature, suggesting that FF provided by UG are coarse-grained (prototypical) and become refined (language-specific) via pruning or induction (e.g., Harley & Ritter, 2002; Hegarty, 2005). I remain agnostic about the ontology of FF but assume that morphosyntax is feature-driven (see below).

\(^4\) These have been called into question in so-called label-free syntactic models (e.g., Collins, 2002; see also Dobashi, 2003, 2004). I assume that category labels are part of the computational system and that a “reprojection” mechanism re-labels them in the course of derivation, possibly in the sense of Hornstein & Uriagereka (2002); see Hornstein, Nunes, & Grohmann (2005, pp. 200-204) for a discussion on the importance of the algorithm that determines which representation is the head and which the complement; see also Adger (2007a, 2007b) for relevant discussions.
3.2.2 Derivational Syntax and the Operation Merge

Let us see how sentences are built in a combinatory system briefly sketched above.

Take the sentence *John loves the girl*, for example. The LA in this case presumably includes the following set of "atoms" from the Lexicon: \{nGIRL, DETTHE, vLOVE, INFL, nJOHN\}.\(^5\)

First, *Merge*\(^6\) joins the terminals [nTHE] and [nGIRL], forming the phrase [nTHE [nTHE nGIRL]], or graphically:

(1a) [nTHE [nTHE nGIRL]]

\[ \begin{array}{c}
\text{nTHE} \\
\text{\textendash} \text{Merge} \\
\text{nGIRL}
\end{array} \]

This newly-created phrase is merged with the verb [vLOVES]. Graphically, this can be represented with bracketing (1b) or a phrase structure tree (1c):

(1b) [vLOVES [vLOVES [nTHE [nTHE nGIRL]]]]

\[ \begin{array}{c}
\text{vLOVES} \\
\text{\textendash} \text{Merge} \\
\text{nGIRL}
\end{array} \]

---

\(^5\) I gloss over the FF of the lexical items here and represent tense and (person) agreement as a unitary syntactic terminal INFL (Inflection) in order to maintain as generic and model-free position as possible. I revise this position below where I address INFL in more detail.

\(^6\) This is generally referred to as External Merge (i.e., the operation that merges two separate objects; Chomsky, 2001 et seq.).
A functional verb $v$ is merged with the newly-construed VP, creating $[vP \, v\, [vP \, V \, OBJ]]$. Next, the SUBJ John is merged with $vP$, creating $[vP \, SUBJ \, v\, [vP \, V \, OBJ]]$. INFL is then merged with $vP$, creating $[INFLP \, INFL \, [vP \, SUBJ \, v\, [vP \, V \, OBJ]]]$. Finally, John is moved to INFLP, creating $[INFLP \, SUBJ \, INFL \, [vP \, <SUBJ> \, v\, [vP \, V \, OBJ]]]$.

The narrow syntax is done when the configuration looks like the one illustrated in Figure 3.2:

![Figure 3.2: A typical Minimalist Program phrase structure](image_url)

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7 Note the notation and abbreviations: Subject: SUBJ; Object: OBJ; <...>: a trace of a moved constituent.

8 More recent models argue that the narrow syntax is even sparser than previously thought with Merge being the only mechanism and Move being merely a result of Merge (sometimes dubbed Internal Merge or Re-Merge, i.e., the operation that merges two objects when either of them is part of the other; Chomsky, 2001 et seq.; see also Putnam & Stroik, 2010).
In such a model, \( v \) is taken to be responsible for the \( \Theta \)-role assignment of the SUBJ and the case checking of the OBJ. The SUBJ is believed to be generated in [Spec, \( vP \)] and moves to (is re-merged with) [Spec, INFLP] due to the (EPP) feature of the INFL.\(^9\)

### 3.2.3 Feature Interpretability and the Operation Agree in a Probe-Goal Model of Morphosyntax

The tenets of a feature-driven model of morphosyntax adopted in this dissertation are given in (2) below (adapted from Adger, 2007b; Adger & Svenonius, to appear; Chomsky, 2001):

\[(2)\]
\[
\begin{align*}
(a) & \text{Features are represented as atomic symbols from the set } F = \{A, B, C, D, E, F\ldots\}. \\
(b) & \text{A Lexical Item (LI) is a set of FF, for example, } LI_a = \{A, B, G, K\}; \text{ } LI_b = \{C, D, K\}. \\
(c) & \text{LIs are defined as sets, and as such, there cannot be more than one instance of the same feature in each set; an example of an LI would be } LI_x = \{T, \text{ past, singular}\}. \\
(d) & \text{Deriving morphosyntactic structure is merely feature matching in the sense that one feature must have exactly one property that will ensure that there is a matching feature elsewhere in the structure.} \\
(e) & \text{The feature that has a given property is interpretable and the matching feature that “needs” this property is uninterpretable (what Adger calls the “match me” property of uninterpretability).}
\end{align*}
\]

\(^9\) An EPP feature (or EPP licensing) is interpreted as a requirement for a functional phrase (generally, INFL, C, or \( v \)) to have its Specifier position filled (e.g., the surface SUBJ in [Spec, INFLP], the surface wh-phrase in [Spec, CP]; Chomsky, 2000b, 2001). This study assumes a valuation-driven mechanism where EPP is dispensed with rather than a target-driven mechanism where a target has an EPP property, but empirically nothing would change if elements were posited to move in order to satisfy the target’s EPP (see Bošković, to appear; see below).
Interpretability can be thought of as follows: phonological FF are taken to be readable at PF but not at LF, while semantic FF are readable at LF but not at PF. FF that are interpretable at one of the two interfaces are interpretable (iFF) while those that are not are uninterpretable (uFF). In a convergent derivation, PF FF must be teased apart from LF FF—a process that occurs at the point of Spell-Out (Chomsky, 1995 et seq.).

The technology of feature checking/valuation and elimination has been revised numerous times since the early 1990s and is still an ongoing debate in the literature (see for example, Adger & Svenonius, to appear; Bošković, to appear; Chomsky, 2007, 2008; Epstein & Seely, 2006; Pesetsky & Torrego, 2004, 2007; Putnam & Stroik, 2010). What has been quite standard, though, is the assumption that the FF that play a central role in the analyses of morphosyntax include Case, EPP, the $\phi$-FF of the functional categories $v$ and INFL and the $\phi$-FF of the lexical categories N (D) and V (Chomsky, 1995 et seq.).

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10 This is basically Chomsky’s (1986, 1995) principle of Full Interpretation (FI), stating that every element in the syntactic structure must be (semantically) interpreted. In a feature-driven model, this would imply that uninterpretability is driven by feature checking (i.e., all uFF must undergo checking and be eliminated before reaching the interfaces). Note that the term Spell-Out here refers to the PF/LF valuation rather than the actual phonological spell-out.

11 For example, in John loves the girl, John determines the form of loves, suggesting that the relevant $\phi$-FF (PERS/NUM/GEND) are iFF on the argument but uFF on the predicate. Besides semantic and phonological FF, loves contains [3rd PERS], [singular], [present tense], [indicative], associated with the inflectional marker -s, pronounced as [z]. Both [z] and a bundle of FF are arguably manipulated by morphosyntax, but after
Earlier models of MP (e.g., Chomsky, 1995) postulated that LIs were selected from the Lexicon (via Numeration) and were fed into syntax morphologically fully-inflected. Functional heads such as INFL or C were hypothesized to carry the information about the corresponding FF. Interpretability was postulated to be an inherent property of FF—the uFF of a constituent had to be checked (and eliminated) against the matching iFF in higher functional projections, resulting in a movement of that constituent to higher projections since leaving a feature unchecked resulted in the crash of the derivation (due to FI).

In the most recent proposal (Chomsky, 2000b et seq.), the semantically-based notions interpretable and uninterpretable are no longer sufficient and are supplemented by the notions valued (valFF) and unvalued (unvalFF). It is assumed that some FF enter the derivation valued, i.e., they are “LF-interpretable” (e.g., the ϕ-FF of D), while some enter unvalued (e.g., EPP, Case, and the ϕ-FF of INFL and V/v). Chomsky (ibid) further argues that all and only uFF are unvalFF and that given FI, they must be valued and eliminated before reaching the interfaces.12

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12 Hence, valuation is seen as a prerequisite for elimination. For instance, the feature [Pers] is assigned a value (e.g., [1], [2], etc.) when associated with an argument (noun/pronoun) but not when associated with a verb. The verb has to acquire the corresponding value from the argument which gets deleted as it is semantically uninterpretable.
The operation responsible for assigning feature values for morphophonological reasons (PF) and eliminating them for semantic purposes (LF) is called Agree. When it applies, a Probe (i.e., an element with a set of uFF) “probes” its locally c-commanded item (=Goal) that contains the same set of iFF.\(^{13}\)

Figure 3.3 illustrates a typical Probe-Goal configuration:

![Diagram of a Minimalist Probe-Goal configuration](image)

**Figure 3.3:** A Minimalist Probe-Goal configuration

For example, the derivation of the sentence *He loves her* consists of the following steps in a typical Probe-Goal computation (adapted from Hornstein et al., 2005, p. 319)\(^{14}\):

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13 That is, an unval feature (a Probe) on a given head searches its c-command domain for another instance of that feature (a Goal). If the Goal has the value needed by the Probe, that value gets assigned to the Probe. If there is a match, the Goal merges with/moves to the Probe (Chomsky, 2000b et seq.; Pesetsky & Torrego, 2007).

14 Note the notation and abbreviations: PERS = [Person]: 1 [1\(^{st}\)], 2 [2\(^{nd}\)], 3 [3\(^{rd}\)]; NUM = [Number]: S [singular], P [plural]; GEND = [Gender]: MASC [masculine], FEM [feminine]; CASE: NOM [Nominative], ACC [Accusative]; strikethrough: valued and deleted uFF.
Having $\upsilon$-FF, $\nu$ acts as a Probe, searching for a Goal. It finds it in the OBJ pronoun (PRON), which bears $i\phi$-FF and an uCase feature, which makes it active for the purpose of Agree (3a). After Agree applies, the $\nu$'s $\upsilon$-FF get valued and deleted, (also) resulting in the OBJ pronoun to be (later—D.R.) spelled out as ACC (3b). Next, the INFL head and another PRON are merged into the structure, yielding (3c). INFL as a Probe bears a set of $\upsilon$-FF and searches for a Goal. The OBJ PRON is not active (its FF have been checked and deleted already), nor accessible (the subject PRON intervenes between INFL and the OBJ PRON). Agree thus applies to INFL and the SUBJ PRON in [Spec, $\nu$P], checking their FF (3d). The (EPP) feature is checked by a nominal element by the Internal Merge (Re-Merge) of the subject PRON (3e). After the traces are deleted and the phonological FF associated with morphosyntactic specifications inserted into the structure, the
derivation converts into (3f), which in turn, converts into the representation of *He loves her*.\(^{15}\)

By not allowing the checking between two uFF and/or between an interpretable unval Probe feature and an uninterpretable val Goal feature, Chomsky’s (2000b et seq.) model becomes quite restrictive with narrow(er) empirical coverage (Bošković, to appear). At the same time, case checking does not receive a straightforward treatment (Bošković, ibid; Pesetsky & Torrego, 2004, 2007). Specifically, Case is semantically uninterpretable on both a Probe (e.g. finite INFL) and a Goal (SUBJ DP) and since Chomsky disallows Agree to apply between two uFF, he invokes the notion of “reflex checking”, where case checking proceeds through the checking of another feature.\(^{16}\) Bošković and Pesetsky and Torrego propose that Case is a val uninterpretable feature on (finite) INFL, entering in a checking relationship with an unval uCase feature on subject DP, integrating Case into the system of agreement.\(^{17}\)

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\(^{15}\) Note that some mechanism of linearization and syntax-phonology mapping must be assumed here since the computation glosses over the morphophonological spell-out and only suggests that the derivation converges “after further computations in the phonological component” (Hornstein et al., 2005, p. 320).

\(^{16}\) As per Chomsky, the uFF of INFL probe the iFF of DP and as a reflex of this, DP receives NOM case. As Bošković and Pesetsky and Torrego correctly point out, such checking seems to be quite mysterious given that INFL does not even have a Case feature to begin with.

\(^{17}\) More generally, Bošković argues that in order to increase empirical coverage and simplify feature checking, val uFF should be allowed. Pesetsky and Torrego go even further, proposing that all four logical types of FF should be allowed, namely val uFF, unval uFF, val iFF, and
3.2.4 (Multiple) Spell-Out and Phase-Based Syntax

Following the analyses of Epstein, Groat, Kawashima, & Kitahara (1998), Uriagereka (1999) and many others, Chomsky (2001) revises the operation of Spell-Out, arguing that it must be cyclic. He asserts that cyclicity follows from online feature interpretability and legibility. He proposes that the incremental chunks (phases) that undergo cyclic Spell-Out are built from separate LAs, hypothesizing that the morphosyntactic and semantic information of phases gets interpreted by PF and LF as soon as they are created.

Further, Chomsky asserts that a phase-based system of syntax is not only desirable conceptually but also empirically. Conceptually, such a system reduces a computational load in a derivational bottom-up system. Empirically, phases seem to play

unval iFF. Note that the Bošković and the Pesetsky and Torrrego systems are both valuation-driven where elements move in order to be valued and eliminated from the computation. That is, these studies contend that movement is triggered by the moving element rather than the target, contrary to Chomsky's interpretability-driven system where it is the target—generally containing an EPP feature—that causes the movement of the element. I remain agnostic as to what exact FF LIs contain interpretability-wise, but assume that lexically unval FF must be valued in the course of the derivation (see below).

Such a model restricts search and memory although it is not entirely clear how Spell-Out would operate since it somehow needs to access previously-spelled material/chunks (e.g., pronominal binding at LF or intonation patterns at PF; see Boeckx & Grohmann, 2007). Crucially, however, this proposal is conceptually compatible with Chomsky's (2005) hypothesis about "third factor" effects, and as such, with the neurocognitive accounts that suggest that morphosyntactic structure-building utilizes computational resources, yielding hierarchy complexity effects (reviewed in Chapter 2 above).
a role in fronting, extraposition, and response fragments and seem to be “propositional” (i.e., they have a full argument structure). Based on these phasehood tests, Chomsky proposes that the categories that constitute phases are v and C.

Various challenges have been identified in regard to such model of Spell-Out. First, it has been argued that besides v and C other categories should enjoy the status of being phases. Second, some recent literature suggests that Spell-Out should not be posited to be cyclic merely due to feature interpretability. Third, it is not entirely clear what exactly is interpreted (spelled out to PF/LF) at each phase/cycle and when the derivation ceases to spell out all the features.

19 Legate (2002), for example, shows that raising and passive verbs pass Chomsky’s (2001) tests for phasehood the same way transitive verbs do, suggesting that VP and TP may be phases, too. Similarly, Bošković (2002) shows that TP passes the isolability test and should—judging by this test—count as a phase. Some accounts have shown that even DP and PP count as minimal domains for uFF valuation (see Boeckx and Grohmann, 2007 for details and the references cited therein).

20 Epstein & Seely (2002), for example, argue that in the Chomsky (2001) system where all uFF are initially unval and get valued and eliminated in the course of derivation, it is hard to see how Spell-Out is able to determine which FF are iFF at LF, considering that Spell-Out is not a semantic operation and has no access to LF. Specifically, Spell-Out can see the val vs. unval distinction, but once the uFF are val it cannot know what PF information to strip away from LF as it has no access to the LF-interpretability of the now valFF. In other words, Chomsky’s model requires a system of lookahead and lookback—undesirable aspects of the computation system. Epstein and Seely conclude that it is not clear how any convergent derivation can be generated in the Chomsky system at all (p. 74; italics mine).

21 Specifically, Chomsky (2001) suggests that at each phase, it is the complement of a (strong) phase head that gets spelled out, with the head and the edge (specifier) being available for further computation (selection and Re-Merge). He formulates this as the Phase
As a response to the criticism regarding his (2001) system, Chomsky (2004) revises his model, making it level-free with no PF and LF interpretation strictly speaking but simply a computation mapping LA to \(<\text{PHON, SEM}\) piece-by-piece cyclically. He asserts that it remains to be determined what phases are and how the proposed operations work—either simultaneously or consecutively in a cyclic fashion.\(^\text{22}\)

Most recent accounts of syntactic derivation merely offer preliminarily sketches of verb morphosyntax. The majority concentrates on expletive constructions, which was Chomsky’s original motivation for the phase-based model. Furthermore, although most accounts adopt the Probe-Goal system of valuation/elimination, they come with the vestiges of lexicalism (e.g., at the level of vP, they assume that the verb is fully-specified/inflected morphologically simply after the valuation operation). This assumption is still pervasive in most MP

\textit{Impenetrability Condition} (PIC), which basically states that Agree cannot look into a strong phase below its head. That is, once a phase is built, its complement domain is sent to PF/LF and frozen syntactically due to PIC.

\(^{22}\) Since for the purpose here nothing would change empirically, I remain agnostic as to whether v and C are the only categories that constitute phases or whether other categories should enjoy the same status. In the most stringent view of compositionality, each instance of Merge would result in a PF/LF valuation process (i.e., each XP would constitute a phase or “cycle”, as some have termed it; see Bošković, 2007; Epstein & Seely, 2002, 2006; Marantz, 2007, but see Boeckx & Grohmann, 2007 on how such accounts differ from Chomsky’s where each phase induces a PIC). Most recent strict derivational models that argue against Chomsky’s phase-based model (with PIC) do away with phases \textit{per se}, trying to further eliminate other theory-internal constructs such as EPP and PIC (see Epstein & Seely, 2006; Putnam & Stroik, 2010).
accounts, though not incompatible with Distributed Morphology(-type) frameworks (Embick & Noyer, 2007; Marantz, 2007; see also Dobashi, 2003, 2004; see below).

In the present study, I adopt an Agree-based Probe-Goal analysis of morphosyntax, as summarized in (2) and illustrated in Figures 3.2 and 3.3 above, with a slightly revised model of phrase structure in order to accommodate the developmental and processing differences between Tense and Agreement, reviewed in Chapter 2 above and addressed morphosyntactically in 3.2.5 below. I adopt a valuation-driven system where nominals enter the derivation lexically valued for NUM/GEND (and unvalued for Case), and finite Vs enter the derivation unvalued for PERS[NUM agreement but with a valued tense specification. More generally, unvalued elements are re-merged (i.e., they move) in order to get their FF valued, irrespective of whether the Probe’s FF are interpretable or uninterpretable; see below for details and a slight revision).

Before going into the exact details of the phrase structure adopted in the present study, I turn to three additional notions that have been generally addressed in the literature on (early) verb morphosyntax, namely (split) INFL, finiteness, and Case.

3.2.5 (Split) INFL, Finiteness, and Subject Case Checking

For many years, INFL was believed to be a single category until it was split into Tense (TNS) and Agreement (AGR) and each
was postulated to project its own phrasal category with TNSP dominating AGRP (Pollock, 1989). TNSP and AGRP were soon accepted as separate projections, albeit with AGRP dominating TNSP (e.g., Belletti, 1990; Chomsky, 1995, and most of the literature in the early and mid 1990s).

However, following Iatridou (1990), the two projections were unified into a single category again (labeled TNSP or TP\(^{23}\)) on the grounds that (i) agreement is a relation that holds between constituents rather than a category itself and (ii) the fact that the same data that motivated split-INFL could be theoretically accounted for without postulating an additional AGR category. This view is still predominant in modern MP models.\(^{24}\)

Nevertheless, several syntacticians argue that in order to account for certain or more data, the architecture with both projections should be reintroduced (e.g., Cinque, 1999, 2002 for a range of Romance languages; Guasti & Rizzi, 2002 for Modern English; Santorini & Kroch, 2007 for Middle English), while many researchers in both syntactic and acquisition accounts simply

\(^{23}\) I will use Pesetsky & Torrego’s (2004, 2007) notation and label the Tense category as TNS and the Tense feature as T.

\(^{24}\) Chomsky (1995) argues that the line of reasoning for eliminating AGRP is not simply against the postulation of an additional projection, but rather against the postulation of categories that cannot be motivated in terms of interface levels. Hornstein et al. (2005) state, however, that the data from Dutch and Icelandic expletive constructions that (additionally) motivated the split INFL hypothesis might force one to reconsider the Pollockian system. In their words, it might be that “our theoretical tools are not yet sharp enough to detect its [AGR’s—D.R.] effects at LF.” (p. 168). The authors suggest that further research is needed to shed more light on the matter, but that they will assume the INFL system without AGR “for expository purposes” (ibid).
continue to assume the split-INFL architecture (e.g., Ordóñez, 2000 and Montrul, 2004 for Spanish). "^25"

Similarly, many recent acquisition accounts not only still assume the split-INFL hypothesis for both adult and child grammars (e.g., Guasti, 2002; Hegarty, 2005; Montrul, 2004), but explicitly argue that linguistic theories should postulate both projections to accommodate child language data (e.g., Guasti & Rizzi, 2002 for English; Grinstead, 2000 for Spanish; see also Hagstrom, 2000 for French).

By the same token, several studies show distinct developmental paths of tense and agreement (or even more fine-grained distinctions in the agreement domain), with agreement generally being acquired not only later, but with much less reliability than tense (i.e., with many more omission and substitution errors—at least initially; see particularly Brown, "^25"

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"^25" See also Gelderen (1993), who references various older works from the early 1990s that defend the split INFL architecture and presents further data that implicate both projections. Gelderen is cautious, though, and argues that INFL projections are not universal but language-specific and that languages like Modern English and Dutch only require the CP and VP domains. See also detailed discussions on AGR projections and clause structure in general in Belletti (2000, 2004, 2006), arguing that at least two AGR projections should be postulated (the SUBJ and OBJ AGR positions), though not necessarily with these names. Belletti references other studies that defend various AGR projections, sometimes even "microprojections" within the "higher AGR" and the "lower AGR". See also a more general discussion on clause structure in Cinque & Rizzi (2008, particularly p. 49), arguing that the typical CP—TP—VP—VP system in MP models should not be taken literally, but as a general indicator that each clause has four major domains (peripheral—inflectional—lexical—base) which can all be split into various subdomains depending on the construction and/or language.
For instance, based on the data from three French-speaking children, Hagstrom (2000) shows that agreement marking is initially completely absent from the young children’s utterances. While tense starts to be used at a nearly-adult level, agreement is essentially completely absent. Hagstrom further shows that the presence of overt subjects (in the form of pronominal clitics) does not depend on but is rather inversely correlated with the presence of agreement marking.27

Similarly, based on the data from four Spanish-speaking children, Grinstead (2000) postulates not only TNSP AGRP, but splits the latter into PERSONP and NUMBERP, arguing that in Catalan and Spanish, PERSON, TNS, and NUMBER must all be “active”  

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26 I take this as a much stronger piece of evidence than theoretical evidence. Theoretical linguists might object to my reasoning, arguing that disparate developmental paths or patterns of breakdown do not necessarily imply that both categories should be postulated theoretically. However, if developmental and neurolinguistic evidence should indeed inform linguistic theory (in the sense of Embick & Marantz, 2005; Guasti & Rizzi, 2002; Labelle, 2007; Miller, 2003, inter alia), a distinction between theoretical postulates (such as TNS and AGR) should be taken seriously and should be captured by linguistic theory. As stated by Hagstrom (2000), the goal in the kind of research pursued in the field of formal language acquisition, is to determine how and to what extent children represent tense and agreement (and tense and agreement features—D.R.). See also Smolik (2002) for a similar discussion.

27 Specifically, tense and agreement initially compete and when the acquisition of tense shows a dip, agreement emerges. Interestingly, all agreement initially comes in the form of 3S, which appears to be a default, overgeneralized form that gets supplied (equally) in both 3S and non-3S contexts. When person agreement becomes productive (i.e., when children start marking non-3S systems phonologically), RIs start decreasing, roughly linearly dropping to zero.
heads in order for NOM to be assigned and the SUBJ pronouns (correctly) morphophonologically spelled out. He also argues that when compared to adult Spanish, early Spanish shows a disproportionate use between overt and covert SUBJs, further showing that overt pronominal SUBJs do not appear until person, tense and number are (contrastively) used (in this order). ²⁸

Similarly, Hoekstra, Hyams, & Becker (1999), following Hoekstra & Hyams (1998) split the SUBJ AGR projections into PERSP and NUMP and propose that the latter is missing/underspecified in early grammars. Specifically, they propose that the lack of plural morphology and determiners in DPs suggest that early grammars lack the NUM feature and consequently, finite INFL (which must be specified for NUM) does not get spelled out as finite but rather infinitival.

Last but not least, a wealth of neurocognitive research into language breakdown reports disparate behavior of tense and agreement processing- and production-wise (as reviewed in Chapter 2 above).

²⁸ Grinstead suggests that the developmental differences among fine-grained categories that he postulates should not be attributed to some “global” cognitive development since research suggests that children are conceptually aware of and sensitive to temporal references and number distinctions from very early on (citing Gallistel & Gelman, 1992), yet they consistently fail to contrastively grammatically mark number (and perform better on tense and person). Note that Grinstead takes acquisition to be “contrastive marking” (e.g., present vs. non-present, singular vs. plural, etc.) rather than mere emergence or (reliable) suppliance (i.e., in 90% of obligatory contexts).
If our assumption that INFL is split into TNS and AGR is on the right track, what could we say about the role of the AGR node/category in the morphosyntax? Note that in the pre-MP era, AGR was hypothesized to take care of NOM case marking and verb movement to AGR was driven solely for that purpose, with subject-verb agreement being a mediator of such movement.\textsuperscript{29} However, in a split-INFL system, TNS and AGR must handle different tense/agreement specifications and as such, must serve as different loci of semantic interpretation.

Similarly to Pesetsky & Torrego’s (2007) distinction between TNS (category/head), carrying an unval interpretable T feature and c-commanding (i.e., serving as a Probe for) a finite verb with a valued T feature, one could adopt a similar line of reasoning for agreement. AGR could be postulated as a category/head that contains an unval interpretable AGR feature, while some AGR specification on the finite verb (e.g., PERS, NUM, or—more broadly—FIN, see below) would carry a val interpretable feature. Two questions remain, though, namely (i) what is the AGR

\textsuperscript{29} Many recent accounts in the literature, however, have reverted to this idea. Kornfilt (2003), for example, argues that the case of a SUBJ DP (which is generally NOM, but can be GEN or DAT in Turkish) is handled by AGR rather than TNS (she provides further references that come to the same conclusion). Similarly, Cechetto & Oniga (2001) argue that in Latin (and to a certain extent in Modern Greek), AGR has to be evoked to account for SUBJ case marking. Bianchi (2003, 2006, to appear) cites numerous works that come to a similar conclusion by tying (some specification of) finiteness (e.g., agreement or various features of agreement) and hence SUBJ case checking with higher inflectional or lower peripheral (CP) projections, all positioned higher than TNSP. See also Gelderen (1993), who references various older works from the early 1990s that show that in many languages traditional finiteness is handled in the left periphery rather than the inflectional domain.
category/head the semantic locus of if agreement itself is a relation rather than a feature and (ii) which agreement (or agreement-dependent) feature would come as valued in the verb’s lexical entry? Here, I build on Bianchi’s (2003, 2006, to appear) and Adger’s (2007a) insights and analyses which link agreement’s semantic locus to the traditional notion of finiteness.

It is now commonly accepted that finiteness is not a universal and unitary term that would correspond in any deterministic way to the idea of traditional grammar (see for example, Adger, 2007a; Cowper, 2002; see a collection of papers in Nikolaeva, 2007). Both Adger and Bianchi argue that morphosyntactically, finiteness resides in the lowest layer of CP—which they label FINP—following Rizzi (1997). However, they argue that finiteness cannot be taken as a unitary formal feature (contra Rizzi, 1997), but rather a semantically interpretative position, or—in other words—a category that is dependent on the speech event. Specifically, FINP is postulated to be semantically identified deictically [finite] or anaphorically [nonfinite]. It is arguably tied to the licensing of NOM, which for Bianchi crucially depends on the PERS feature.30

Though Adger adopts Bianchi’s analysis the syntax-semantic interpretation of FINP, he extends PERS as a “finiteness feature”

30 The idea that PERS (or PERS/NOM) establishes a link between the inflectional domain (generally TNSP in the MP literature) and the peripheral field (CP) has been independently proposed by many other researchers (e.g., Ritter & Rosen, 2007; Sigurðsson, 2004; Speas & Tenny, 2003; all cited in Bianchi, to appear).
to other categories that have been traditionally associated with finiteness (e.g., tense and other specifications of person/number agreement). Specifically, he argues that FINP hosts the FF that are parasitic on the finiteness information elsewhere in the clause—either in TNSP or an even lower domain (e.g., ASPP/vP or VP). He asserts that one specification in FINP may be a traditional [+FIN], but the position may also bear other uFF of agreement—sometimes even tense.\(^{31}\)

This hypothesis makes a strong prediction that the only way a clause can be finite (in the traditional sense) is to project a FIN domain above TNS. In the system with a unitary CP, FINP could be postulated as a separate projection immediately dominating TNSP (e.g., AGR\(_{SP}/AGRP\) in older notations). In other words, nothing changes substantially if we assume that agreement FF that yield finiteness and handle NOM are checked in AGRP rather than in the lowest head of CP. That is, the morphophonological expression of tense in the TNS domain does not suffice for finiteness, nor SUBJ (NOM) case checking. Hence, while there is

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\(^{31}\) He convincingly shows that languages differ as to what can be licensed in FINP, which may sometimes be completely independent of the surface verbal morphophonology in the TNSP (or vP/VP domain). For example, in Irish and Gaelic, FINP can bear uT FF that are more rudimentary than more refined FF on the finite V in the TNS domain (e.g., tensed/non-tensed or finite/non-finite morphophonological specification in FINP vs. morphological marking for specific tense, e.g., past in TNSP). Further, Adger shows that in Scottish Gaelic, certain nonfinite clauses are necessarily merely VPs while some are arguably TNSPs. Adger’s account is hence more generic than that of Bianchi’s but does not exclude that finiteness is checked by PERS, as originally proposed by Bianchi and adopted in the present study.
only one type of finite clauses (FINP), nonfinite clauses can be of various types, e.g., TNSP, ASPP, vP, or VP. Adger (ibid) argues that these could be full-blown CPs with the specification [-FIN] in FINP or alternatively, phrase markers truncated below FINP (as in Rizzi, 1993/1994, 2005 and Wurmbrand, 2003).

To sum up this subsection, the model proposed here is built on Pesetsky & Torrego’s (2004, 2007) distinction between TNS (category), carrying an unval (interpretable) T feature and a finite verb’s valued (uninterpretable) T feature, and Bianchi’s (2003 et seq.) and Adger’s (2007a) analyses of finiteness. Specifically, the dissertation hypothesizes that FINP is a semantically interpretative position where FIN is a category that is dependent on the speech event and is semantically identified as deictically [finite] or anaphorically [nonfinite]. It is postulated that finiteness is tied to the licensing of NOM, i.e., the FIN head checks SUBJ case, which depends on either a more rudimentary FIN feature or a more refined, FIN-related feature such as PERS. \[32\] Technically speaking, FIN is postulated to be a

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\[32\] I will label such a feature simply as FIN and remain agnostic as to whether the feature in question is PERS or perhaps a combination of PERS and NUM. However, I show in Chapter 4 below that at least in Slovenian, PERS seems to be the feature that contributes to finiteness and seems to be challenging for young children (who can compute number and gender agreement near-perfectly at a very early stage). While Bianchi’s account of PERS being the feature in question may be applicable to most commonly studied (Indo-European) languages, it may not receive universal support (as shown by Adger, 2007a), where some other feature needs to be identified as the one implicating finiteness. I believe that it has been difficult to define finiteness particularly as it has been hard to pin down the exact FF that yield finiteness and the domains where it applies. Moreover, agreement morphemes generally come
category/head that contains an unval (interpretable) FIN feature, while some specification on the finite verb (e.g., PERS, NUM, or—more broadly—FIN) carries a val (uninterpretable) feature.

Equipped with the necessary technical details, let us now turn to the exact morphosyntactic computation that such details bring about.

3.2.6 The Morphosyntax and Morphophonology of Early Verb Forms

3.2.6.1 The Architecture

As noted above, the dissertation assumes a derivational (bottom-up) approach to structure-building (via Merge) where feature valuation is taken to be agreement checking. That is, elements enter the derivation carrying unval FF and are re-merged (cyclically) to have their features valued. Agreement is hence postulated to be a morphological consequence of feature checking (Pesetsky & Torrego, 2004, 2007).

I gloss over many technical details that are currently being investigated (e.g., whether all ϕ-FF of N are lexically valued or whether some may come already valued from the lexicon; whether Probe-Goal relationships need to induce movement or can features simply be shared between two elements; whether verbs enter the derivation in V or v; see Bošković, to appear; Putnam & Stroik, 2010; Pesetsky & Torrego, 2007).
I do not commit myself on the issue of whether each derivation is built from a single Lexical Array (LA) or whether there are multiple subarrays, perhaps one per phase/cycle (Chomsky, 2001). I also leave aside the question of whether the LAs/subarrays are part of a separate memory buffer or whether Lexical Items (LIs) are pulled directly from the Lexicon, which interfaces with the syntax throughout the derivation (possibly in the sense of Putnam & Stroik, 2010).  

Importantly though, structure in the model proposed here operates in four clausal domains: base, lexical, inflectional temporal and inflectional FIN-related (glossing over the highest, peripheral domain), yielding a clause structure of VP—vP—TNSP—FINP(—FP).  

Also important is the hypothesis that morphophonology supplies (spells-out) as much material as syntax computes—no more and no less. That is, there is a direct mapping between morphosyntax and morphophonology and there are no hidden or empty syntactic positions that lack morphological representation (though morphology can, of course, be null in cases of null affixation or null arguments).  

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34. That is, when the structure is not built entirely (due to computational bottlenecks, for example), the unused LIs either remain in a separate LA or are simply not pulled from the Lexicon.

35. As remarked above, the structure is judged based on the word order, the presence of verb inflection, adverbials, and arguments (and the case they bear), as well as the socio-pragmatic information (about the target forms) in the transcript. For example, if a child
3.2.6.2 The Syntactic and Morphological Computation

As reviewed above, children’s first utterances are morphologically generally bare verbs (BVs), root infinitives (RIs), bare participles/perfectives (BPARTs), and imperatives (IMPs). Occasionally, children will produce full-fledged sentences in the present tense. Copulas and auxiliaries are generally omitted in initial stages and as such, modal, conditional, and other periphrastic constructions rarely appear in the earliest stage. Let us review each verbal form in turn.

While BVs are simply VPs (or Vs that have not projected), Complex Bare Verbs (CBVs)—BVs that carry conjugation class morphemes (i.e., thematic vowels)—do exhibit some morphology, albeit minimal. These forms generally appear as default forms that may be homophonous with finite forms (e.g., 3S in Romance). Here, they are assumed to be more than VPs but less than TNSPs, i.e., vPs. Specifically, they cannot be TNSPs or FINPs for three reasons. First, they come as non-tensed in the traditional sense, i.e., without tense/agreement inflection. Second, they consistently lack (pronominal) SUBJ DPs, although they may appear morphophonologically spells out lexical-aspectual information only (rather than inflectional or left periphery-related information), no categories are postulated to be present above vP. Note that this does not entail that all of the child’s phrases will be vPs; the child may pronounce elements associated with higher categories (e.g., wh, focus) in the phrases immediately preceding or following that of vP, but the overall morphophonological suppliance follows the predictions of the Inflectional Hierarchy Complexity Hypothesis (see below and Chapter 4).
with OBJ DPs.\textsuperscript{36} Third, they never appear with PERS-dependent clitics (Grinstead, 2000, 2004; Radford & Ploennig-Pacheco, 1995; see Chapter 4 for a detailed analysis of 3S CBVs).\textsuperscript{37}

Under the present model, BPARTs could be analyzed as vPs or TNSPs. I analyze them as TNSPs for three reasons. First, they exhibit temporal, aspectual, and person-related morphology that BVs, CBVs, and RIs do not. For example, present PARTs have been traditionally marked [+Pres] or [+Progr] and past PARTs [+Past] or [+Aspect] (see Belletti, 2000, 2004; Gelderen, 1993; Montrul, 2004); some BPARTs may even show NUM/GEND [-PERS] inflection that agrees with SUBJ DPs (e.g., in Romance, Slavic). Second, BPARTs almost always appear without (Nom-marked) SUBJ DPs (Rus & Chandra, 2005, 2006a, 2006b). Third, analyzing PARTs as TNSPs releases the tension between interpreting them as VPs/vPs (Chomsky, 1995 et seq. and the majority of the syntactic

\textsuperscript{36} Though extremely rarely, CBVs may appear with SUBJ DPs. However, when they do, they are almost never pronominal and almost always come in the form of a child’s name (see Grinstead, 2000 and the references therein). Grinstead (ibid), for example, argues that all lexical SUBJPs are initially default case-marked in nonfinite phrase markers and that Nom is acquired not only when pronominal SUBJ DPs emerge, but when the child uses lexical and pronominal DPs distinctively.

\textsuperscript{37} I abstract away from RIs here as they almost never appear in child English and Slovenian, but note that they could be analyzed the same way as CBVs, i.e., as vPs. In fact, some syntactic literature on Romance weak pronouns and Middle English object shift from the early 1990s offers evidence for a separate INFP projection below TNSP. In this body of syntactic literature, movement is generally triggered by the need to satisfy the Case filter and the Acc Case feature is assumed to be checked by INF (e.g., Kayne, 1991; see Jarad, 2003 and the references therein).
literature) and phrases with a specially dedicated head such as AGR₀ or PART above VP/vP (e.g., Belletti, 2000, 2004, 2006).

Assuming that all verbs are base-generated in V or v (but see Pesetsky & Torrego, 2007, who claim that this is not entirely clear) and that PARTs are more than VPs/vPs, PARTs require an extra step in the derivation, i.e., an additional application of Merge (basically, Move or Re-Merge). Various analyses have been proposed for such movement, putting forth numerous technical details of feature-checking. Since I adopt a valuation-driven mechanism, I assume an analysis along the lines of Bošković (to appear) and Pesetsky & Torrego (2007), but remain agnostic as to the exact interpretability nature of the features that PARTs contain. What is important for us, though, is the fact that a PART enters the derivation with unval NUM/GEND FF which receive their values after undergoing agreement with a noun that already has val NUM/GEND FF (e.g., perhaps feature sharing in the sense of Pesetsky & Torrego, 2007). When a PART appears with an auxiliary clitic, the clitic PART ends up in TNS, whereas the clitic is merged in FIN.

Belletti suggests that if finiteness is handled in the lower level of CP (e.g., FINP in our model), the “lower” (OBJ) AGR projection may handle tense, which is basically the way I analyze PARTs here. As such, our model does not need to postulate any additional projection between vP and TNSP to accommodate participles. Further, Pesetsky & Torrego (2007) argue that the TNS category is the locus of tense and, as reviewed above, PARTs have traditionally always been associated with tense (besides perfectivity).
The morphosyntactic status of IMPs is still a matter of controversial debates in both linguistic and language acquisition accounts (see for example, Bohnacker, 1999; Rupp, 2003; Rus, 2005, 2007c; Rus & Chandra, 2006a, 2006b). It has been generally claimed that IMPs lack the TNSP projection (in our system, FINP), while some accounts have maintained the hypothesis that they are full-blown CPs (in our system, FPs). In a derivational model assumed here, IMP phrase markers could be analyzed either as TNSPs, FINPs, or FPs. If analyzed as TNSPs or FINPs, though, it must be assumed that the locus of the IMP force must be in some projection below FINP, which is contrary to a standard assumption (cf. Rupp, 2003). In acquisition accounts, however, IMPs have been analyzed as RI analogues on a par with INFs in adult languages (Salustri & Hyams, 2003, 2006), tense-based phrase markers (with no commitment in regard to what syntactic phrases IMPs are; Legate & Yang, 2007), and full-blown CPs (here, FPs; Rus & Chandra, 2006a, 2006b).

The proposed system yields the following combinatorial algorithm:

(4)
(a) V and OBJ are merged, creating \([_{VP} V \ OBJ]\]
(b) \(v\) is merged with VP, creating \([_{VP} v \ [_{VP} V \ OBJ]]\]
(c) SUBJ is merged with \(v\)P, creating \([_{VP} \text{SUBJ} v \ [_{VP}]]\]

It seems plausible to me to analyze them as TNSPs in the system proposed here, however, for the very same reasons as BPARTs, but I leave this issue for future research (see Chapter 4 on the non-productivity of child Slovenian IMPs and further evidence suggesting that IMP phrase markers are smaller structures than FPs).
(d) \(\text{vP} \) is spelled out \([\text{STOP}] \) → morphophonological spell-out\(^{40}\)

If the derivation ceases at (4d) (indicated by \([\text{STOP}]\), signaling that there are no further computational resources left), the structure is a \(\text{vP}\). \(\text{vPs}\) are predicted to lack case-marked \(\text{SUBJ}\) DPs (which may be default case-marked) but may appear with (correctly case-marked) \(\text{OBJ}\) DPs.\(^{41}\)

The derivation can proceed as follows (glossing over the traces left after the V’s and the \(\text{SUBJ}\) DP’s Remerge operations):

(4)

(e) TNS is merged with \(\text{vP}\), creating \([\text{TNSP TNS } [\text{vP SUBJ } \text{v } [\text{VP V OBJ}]]]\)

(f) \(\text{SUBJ}\) is re-merged with \(\text{TNSP}\), creating \([\text{TNSP SUBJ TNS } [\text{vP } [\text{VP}]]]\)

(g) TNSP is spelled out \([\text{STOP}] \) → morphophonological spell-out

\(^{40}\) Although Spell-Out (i.e., the operation that sends the valued chunks to LF/PF) always transfers only the material that is a sister to a (strong) phase head (v, C) due to the PIC (Chomsky, 2001), the whole phrase (XP) needs to be spelled out phonologically in the model assumed here when the derivation cannot continue since after the Spell-Out is complete no Spec needs to serve as an escape hatch to continue into the derivation. Note also that the derivation in this case may cease even earlier, resulting in a VP (morphophonologically a BV), and as such, it would be plausible to analyze free-standing BVs as VPs. However, as soon as \(\text{SUBJ}\) and/or \(\text{OBJ}\) DPs appear, one needs to posit a minimal structure of \(\text{vP}\) (where θ-roles are assigned and \(\text{OBJ}\) agreement handled).

\(^{41}\) Note that the mere presence of overt lexical NOM-marked \(\text{SUBJ}\)s may not suffice as evidence for productive NOM case marking in languages where NOM is taken to be default. Various studies have shown that the initial \(\text{SUBJ}\)s in emerging grammars are generally lexical rather than pronominal, (Grinstead, 2000; see also Guasti, 2002, Chapter 5 for a detailed review), particularly in the form of proper nouns, e.g., first names (Rus & Chandra, 2006a; Rus, 2007), if overtly supplied at all. Here, I take the position that all NOM-marked \(\text{SUBJ}\)s count as reliably case-marked DPs, but I distinguish between (and provide a breakdown of) NOM-marked lexical \(\text{SUBJ}\)s and NOM-marked pronominal \(\text{SUBJ}\)s.
At (4g), the structure is morphosyntactically a TNSP. The sentences at this level are predicted to appear with reliable OBJ case-marking and without reliable SUBJ case-marking. Morphophonologically, TNSPs will surface as verb forms with overt tense but no overt person agreement (e.g., BPARTs in Slavic and Romance, Bare Perfectives in Greek, etc.).

The derivation can proceed to the FIN domain (again glossing over the traces after the applications of Re-Merge):

(4)

(h) FIN is merged with TNSP, creating \([\text{FINP \ FIN \ [\text{TNSP \ SUBJ \ TNS}} \ [vP \ [vP]]]\]

(i) SUBJ is re-merged with FINP, creating \([\text{FINP \ SUBJ \ FIN \ [\text{TNSP \ TNS}} \ [vP \ [vP]]]\]

(j) FINP is spelled out \([\text{STOP} \rightarrow \text{morphophonological spell-out}}

At the FINP level, the NOM case is correctly-supplied morphophonologically on overt SUBJ DPs. The verb appears with reliable overtly-expressed person agreement morphophonology.

---


43 I take reliability of inflection to refer to the morphophonological suppliance of inflection in 90%+ obligatory contexts (after Brown, 1973, p. 255; see Chapter 4 below).
The following chart summarizes the morphosyntactic and morphophonological properties of all phrases that the proposed computation predicts:

<table>
<thead>
<tr>
<th></th>
<th>OBJ DP Case</th>
<th>SUBJ DP Case</th>
<th>TNS/ASP INF</th>
<th>FIN [+PERS]</th>
<th>PRON CLs</th>
<th>wh, TOPIC, FOCUS</th>
<th>MORPH-PHON FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>VP</td>
<td>NONE</td>
<td>NONE</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>BV (?)</td>
</tr>
<tr>
<td>vP</td>
<td>ACC/OBJ</td>
<td>NONE/DEF</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>BV, RI, 3S (Default)</td>
</tr>
<tr>
<td>TNSP</td>
<td>ACC/OBJ</td>
<td>NONE/DEF</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>BPART, IMP (?)</td>
</tr>
<tr>
<td>FINP</td>
<td>ACC/OBJ</td>
<td>NOM/SUBJ</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>&quot;Full&quot; CP</td>
</tr>
</tbody>
</table>

**Figure 3.5:** Morphosyntactic and morphophonological properties of typical clause types in early grammars

Since such a model adopts an intimate link between the syntactic computation and morphophonological information, we must say something about the morphological marking. Though the exact and detailed architecture of the morphological computation is beyond the scope of this dissertation, section 3.2.6.3 below briefly describes the Minimalist-Distributed Morphology Model, which is compatible with the proposed morphosyntactic model.

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44 Note the abbreviations: DEF=Default Case; PRON CLs=Pronominal Clitics; MORPH-PHON FORM=Morphophonological Form.
3.2.6.3 Distributed Morphology and Phonological Spell-Out

I assume a Distributed Morphology (DM) model (Halle & Marantz, 1993; Harley & Noyer, 1999) that is compatible with the MP syntactic models, calling it (after Parrot, 2007) the “Minimalist-Distributed Morphology” (MDM) model (see Embick & Noyer, 2007; see also also Marantz, 2007).

Whereas in earlier instantiations of DM all syntactic terminals were postulated to lack phonological features, Embick & Noyer argue that the phonological features of roots are late-inserted in the course of syntactic computation, whereas those of abstract (=functional) elements (e.g., Tense and Agreement morphemes) are late inserted in the Morphological Component post-syntactically via so-called Vocabulary Insertion.\(^45\)

Consider the nominal phrase the puppy, for example. In DM, the semantic representation of the roots is given in small capitals inside a square root symbol and of the abstract functional morphemes in square brackets. The phonological representation of the roots is given in subscripted slash brackets (in the IPA form). Puppy is a root terminal and as such it has phonological realization, while the functional head that

\(^45\) I follow a now standard MDM model in which lexical primitives are syntactically terminal nodes, which can be either roots (with phonological realization) or abstract morphemes (without phonological realization). The latter can be either word category heads (noun, verb, etc.) or functional heads (e.g., determiners, tense, agreement, etc.).
represents the is a functional terminal with no phonological representation (semantically denoting definiteness):

\[(5a) \quad \sqrt{\text{PUPPY}}_{\text{p}}\]
\[(5b) \quad D_{[\text{Def: +}]}\]

The Root combines with the category head in the syntax:\[46\]

\[(5c) \quad n + \sqrt{\text{PUPPY}}_{\text{p}} \rightarrow nP_{\text{p}}\]

The nominal category head \((n)\) combines with a DP complement, which in turn, consists of an abstract definite determiner morpheme \((D)\) and an \(nP\) from \((5c)\) above:

\[(5d) \quad D_{[\text{Def: +}]} + nP \rightarrow DP_{\text{p}}\]

This can be graphically represented as a morphosyntactic tree, show in \((5e)\) below:

\[(5e) \quad \begin{array}{c}
\text{DP} \\
D_{[\text{Def: +}]} \\
\sqrt{\text{PUPPY}}_{\text{p}} \\
\hline \\
nP \\
n \\
\end{array}\]

\[46\] Note the notation for the heads corresponding to morphological representation, e.g., nominalizing \(n\), verbal \(v\), and adjectival \(a\)—"the little categories" (see Alexiadou, 2001; Embick & Noyer, 2007; Harley & Noyer, 1999; Marantz, 2007).
For the sake of simplicity and ease of exposition, I will abstract away from Root and category head structures and simply use the notation with subscripted capital letters for syntactic category and with capitals inside square brackets for the phonological realization of the roots, as in (5f) below:

(5f) 

\[ \text{DP} \]

\[ D_{[\text{Def}:+]} \rightarrow [\text{PUPPY}] \]

Suppose the grammar needs to compute the sentence *She loves the puppy*. The child’s grammar can minimally compute a VP (assuming that structure can be less than a VP), with the possible morphosyntactic and phonological outcomes given in (6) below:

(6a) \[ \text{[VPL} \text{OVE}_{[-T/-PERS]}] \rightarrow /\lambda \text{av}/ \]
(6b) \[ \text{[VPL} \text{OVE}_{[-T/-PERS]} [\text{DP} \emptyset [\text{PUPPY}_{[-\text{Case}}]]] \rightarrow /\lambda \text{av} \text{ pap}/ \]
(6c) \[ \text{[VPL} \text{OVE}_{[-T/-PERS]} [\text{DP} \text{THE PUPPY}_{[-\text{Case}}]]] \rightarrow /\lambda \text{av de pap}/ \]

47 This architecture suggests that the elements such as nouns and verbs are defined as roots that combine with category determining functional heads (see Halle & Marantz, 1993; Harley & Noyer, 1999; Marantz, 2007). Most instantiations of the MP, however, only posit the category of v (“little v”; Chomsky, 1995, who builds on Larson, 1988 and Hale & Keyser, 1993), glossing over the details of morphophonemics associated with other “little” abstract categories (e.g., n, p, a).

48 The (last) application of Spell-Out must somehow define a linear order among the lexical items in the domain of p-phrases in the PF component, possibly in the sense of Dobashi (2003, 2004), who proposes that the phonological string p, created by Spell-Out, is mapped to a flat representation where there is no hierarchical relation among p-phrases, e.g.: (SUBJ V-FIN)\(_p\) (\(<\text{SUBJ}> V<-\text{TNS}\ <V>-\text{v}\)\(_p\) (\(<V> \text{OBJ}\)\(_p\). The linear order in such a system is defined solely by virtue of c-command.
The child’s grammar may sometimes compute even less structure, i.e., merely a DP, as in (6d) or (6e):

\[(6d) \ [\text{DP} \text{THE PUPPY}_{-\text{Case}}] \rightarrow /\text{ðə \ ŕə \ pər}\text{i}/ \]
\[(6e) \ [\text{DP} \ ø \ [\text{NPUPPY}_{-\text{Case}}]] \rightarrow /\text{pər}\text{i}/ \]

At the \(vP\) level, the possible morphosyntactic and phonological outcomes would be the following:

\[(6f) \ [v \ [vP\text{LOVE}_{-\text{T/-PERS}}] \ [\text{DP} \ ø \ [\text{NPUPPY}_{+\text{Case}}]]] \rightarrow /\text{lʌv \ ŕə \ pər}\text{i}/ \]
\[(6g) \ [v \ [vP\text{LOVE}_{-\text{T/-PERS}}] \ [\text{DP THE PUPPY}_{+\text{Case}}]]] \rightarrow /\text{lʌv \ ðə \ pər}\text{i}/ \]

At the TNSP level, the possible morphosyntactic and phonological outcomes would be the following (descriptively, a present or past tense form, possibly also an imperative form):

\[(6h) \ [\text{TNSP (PRON_{SUBJ}-\text{Case})LOVE}_{+\text{T/-PERS}}\ldots [\text{DP THE PUPPY}_{+\text{Case}}]] \rightarrow /(S\text{UBJ}) \text{lʌv \ ðə \ pər}\text{i}/^{49} \]
\[(6i) \ [\text{TNSP (PRON_{SUBJ}-\text{Case})LOVE}_{+\text{T/-PERS}}\ldots [\text{DP ø PUPPY}_{+\text{Case}}]] \rightarrow /(S\text{UBJ}) \text{lʌv \ pər}\text{i}/ \]
\[(6j) \ [\text{TNSP (PRON_{SUBJ}-\text{Case})LOVED}_{+\text{T/-PERS}}\ldots [\text{DP ø PUPPY}_{+\text{Case}}]] \rightarrow /(S\text{UBJ}) \text{lʌvd \ pər}\text{i}/ \]
\[(6k) \ [\text{TNSP (PRON_{SUBJ}-\text{Case})LOVE}_{+\text{T/-PERS}}\ldots [\text{DP THE PUPPY}_{+\text{Case}}]] \rightarrow /(S\text{UBJ}) \text{lʌvd \ ðə \ pər}\text{i}/ \]

Note that the only way one could distinguish the outcome in (6h) from the one in (6g) is the presence of NOM-marked SUBJ in the latter. If the SUBJ is pronominal, it will be predicted to surface in the ACC form, which is believed to be the default form in English; e.g., *Her\ love\ the\ puppy*; see Schütze, 1997; Schütze & Wexler, 1996 and the references therein). Furthermore, the presence of TNS-related adverbs and negation may also need to be considered when analyzing the structure in question.

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Finally, at the FINP level, the possible outcomes would be the following (descriptively, a present or past form with subject-verb person agreement):

\[(6l)[\text{FINP PRON}_{\text{SUBJ} [+\text{Case}]} \text{ LOVES}_{(+T/+\text{PERS})} \ldots [\text{VP v}_{[\text{VP} \ldots \text{DP THE PUPPY}]]})]
\[(6m)[\text{FINP PRON}_{\text{SUBJ} [+\text{Case}]} \text{ LOVED}_{(+T/+\text{PERS})} \ldots [\text{VP v}_{[\text{VP} \ldots \text{DP THE PUPPY}]]})\]

\[\rightarrow/\text{ji: ləνz ɖə pəpɪ}/, \text{ʃi: ləνd ɖə pəpɪ}/\]

3.2.6.4 The Computation and the Inflectional Hierarchy Complexity Hypothesis

As noted in Chapter 2 above, the Inflectional Hierarchy Complexity Hypothesis predicts a probabilistic morphophonological hierarchical pattern in initial grammars and throughout early development. Specifically, unmarked BVs/RIs and CBVs (vPs) are predicted to be supplied (i.e., morphophonologically spelled out) significantly better than tense-marked verbs and BARTs (TNSPs), which, in turn, will be supplied significantly better than “finite”, person agreement-marked verbs (FINPs). That is, the error rates are predicted to be significantly lower in the BV/RI/CBV system than in the TNS system, which in turn, will exhibit fewer errors than the FIN system.

Note that the initial unreliable suppliance of finiteness (in regard to surface morphophonological marking) does not imply the lack of syntax (e.g., morphosyntactic categories, phrase
structure operating on formal features, etc.)—children’s earliest verb forms may surface as root nonfinites due to limited computational resources, for example, as hypothesized here.

In fact, I show in Chapter 4 below that while many earliest verbs appear as the computationally least costly verb forms, children’s early syntax must be taken to be adultlike with respect to the availability of the phrase structure and some basic computation on it (e.g., the operation Merge, yielding adultlike verb placement and word order in general). However, children’s morphophonological marking in the verbal system as a whole is not adultlike at all, particularly when associated with high(er) morphosyntactic heads, i.e., PERS agreement-carrying auxiliaries, copula verbs, and (non-3S) PERS agreement-carrying verbs in the present indicative tense. That is, although children supply morphophonological information at all syntactic levels of phrase structure (i.e., ranging from VP to FINP, and even FP), the success of the suppliance of inflection at certain phrasal levels varies considerably. It is hypothesized here that this is due to the computational resources in regard to the concatenation operation, which is framed as the Inflectional Hierarchy Complexity Hypothesis.

Let us now turn to adult Slovenian. Section 3.3 describes the aspects of verb morphosyntax and morphophonology that are necessary for the later analysis of child Slovenian formulated in the derivational model motivated above.
3.3 Adult Slovenian

3.3.1 About Slovenian

Slovenian is an Indo-European language belonging to the South Slavic language group. It is spoken by roughly 2 million people, the majority of whom lives in Slovenia, with some minority groups living in Italy, Austria, and Hungary. There are 9 major regional dialects with several subgroups, bringing the total number of dialects to almost 50 (Toporišič, 2002).

3.3.2 The Verb System

Traditionally, the Slovenian verb system has been described as having three voices (active, passive, middle), three moods ([IND]icative, [IMP]erative, exclamative), two aspects ([PERF]ective, [IMPERF]ective), and one synthetic tense (the present). The grammatical system comprises three persons (1, 2, 3), three genders (MASC, FEM, NEUT), and three numbers (S, D, P).

Traditionally, the infinitive, the supine\(^{51}\), the gerund, the present participle (PART), the active past PART, and the passive...

---

\(^{50}\) Some dialects are (almost) unintelligible to some speakers. In these cases, Slovenians use the standard dialect, generally that of the media. This section refers to the standard spoken (colloquial) language (which also served as the input to the children studied here).

\(^{51}\) The supine is used after verbs of movement, expressing intention. It was used in Proto-Slavic but was later replaced by the infinitive in most languages. In Slovenian written texts, the supine and the
past PART have been considered the nonfinite forms in the language (Toporišič, 2002, p. 402).\textsuperscript{52}

The present tense is the only synthetic tense; all other tenses, i.e., the past tense (P\textsc{ast}), the future (F\textsc{ut}) tense, and the now-obsolete pluperfect are compositional (periphrastic), composed of the AUXBE \textit{biti} followed by the active past PART (“the \(-l\) participle”) in the active voice and the passive PART (“the \(-n/-t\) PART”) in the passive voice. In the formation of the past tense, including the past tense of the verb \textit{biti} itself, Slovenian uses the present tense of \textit{biti}, followed by the \(-l\) PART. In the formation of the future tense, however, Slovenian uses the future form of \textit{biti}, followed by the \(-l\) PART. The future tense of \textit{biti} itself is synthetic, unlike the past tense of \textit{biti}.

Consider the highly suppletive verb \textit{biti} (to be)—copula (COPBE) or AUXBE—in the above-mentioned three-tense system:

\footnotesize
\begin{itemize}
  \item[\footnotesize{52}] Nonfinite complementation is limited. Slovenian has no ECM verbs (e.g., \textit{I believe Mary to be intelligent}), nor does it have the \textsc{for+dp+to-infinitive} construction (e.g., \textit{It was mandatory for John to go there}). Nonfinite forms appear only after modal verbs (which represent a small, restricted class), so practically no lexical verb subcategorizes for an infinitival clause except in supine constructions (see Toporišič, 2002, p. 612). However, Slovenian commonly uses the \(-t(i)\) verbs after the preposition \textit{za} (“for”) in clauses of purpose (similarly to English “in order to”) as in (i) below:

\begin{itemize}
  \item[(i)] Rabim nož za narezat\textit{(i)} sir.
    need\textsubscript{1spres} \textit{knife}\textsubscript{SACC} for \textit{cut}\textsubscript{1imp} \textit{cheese}\textsubscript{SACC}
    “I need a knife to cut the cheese”.
\end{itemize}
\end{itemize}
Both the present and the future forms of AUXBE are clitics (CLs) and have no full counterparts, but may be stressed for emphasis or contrast (Milojević-Sheppard, 1997). AUXBE has two nonfinite forms, the infinitive *biti* and the past PART *bil*. It always agrees with the SUBJ DP in PERS and NUM ("high agreement") and with the PART in NUM and GEND.

The sentences in (7) below list a few constructions with active past PARTs:

(7)
(a) Peter je kupil avto.
   "Peter has bought/bought a car"
(b) Peter bo kupil avto.
   "Peter will buy a new car"
(c) Marija je kupila avto.
   "Mary has bought/bought a car"
(d) Marija bo kupila avto.
   "Mary will buy a new car"
Slovenian is a typical null SUBJ language with second position clitics (note the position of AUXBE in examples in [7]). In sentences with AUXBE, a typical structure is that of SUBJ + AUXBE + PART /+.../ or that of PART + AUXBE + SUBJ pro /+.../. The pattern with a fronted past PART, a phonologically overt SUBJ, and the AUXBE in the second position is generally referred to as Long Head Movement (LHM) and is a common structure in Slavic.54

Consequently, a sentence from (7a) above can also occur in the form given in (8):

(8) Kupil je avto.
    bought PERF MASC SUBJ pro be 3SPRES car SACC

"He has bought/bought a car"

54 There is no consensus as to why exactly it occurs and in what clausal domain. The successive cyclic movement of the PART across AUXBE has been questionable by some (e.g., Embick & Izvorski, 1995), proposing that PART fronting is a non-syntactic last resort operation at PF in order to prevent the CL from being in the first position. Milojević Sheppard (1997), however, shows that such accounts cannot explain Slovenian word order facts, arguing that the choice of LHM is determined by the requirements of information structure. Specifically, LHM is an optional context-dependent process, tied to markedness (i.e., neutral vs. emphatic/marked reading, depending on the new vs. old information in the clause). What is important for us, though, is that whatever requirement triggers LHM and whenever it applies, the PART always ends up structurally above the FIN head in the left periphery since AUXBE is housed in FIN (by being the finiteness marker, marked for Pers). As noted above, I label such a phrase simply FP, i.e., some functional projection in the left periphery that is associated with Topic or Focus.
3.3.3 The Present Tense

The present tense paradigm is quite complex with suffixes carrying both tense and agreement inflections that cannot be teased apart morphophonologically (portmanteau morphs). Verbs are inflected as per the schema given in (9) below:

(9) [root + thematic vowel]stem + suffix (tense/person/number)

Each verb in the present tense paradigm has nine conjugation cells (but 8 morphophonologically distinct forms), as the following paradigm for the verb igrati (to play) shows (note the segmentation as per the schema in [9] above):

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>D</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>igr+a+m</td>
<td>igr+a-va</td>
<td>igr+a-mo</td>
</tr>
<tr>
<td>2</td>
<td>igr+a-š</td>
<td>igr+a+ta</td>
<td>igr+a-te</td>
</tr>
<tr>
<td>3</td>
<td>igr+a-Ø</td>
<td>igr+a-ta</td>
<td>igr+a-jo</td>
</tr>
</tbody>
</table>

Figure 3.7: Present tense of igrati (to play) in Slovenian

The present tense paradigm exhibits complex morphophonology with several phonological changes in the verb stem and/or suffix. According to descriptive grammar, there are five major classes of verbs regarding such changes, given in Figure 3.8:
<table>
<thead>
<tr>
<th>Class</th>
<th>-am</th>
<th>-im</th>
<th>-jem</th>
<th>-em</th>
<th>-m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb</td>
<td>igrati (to play)</td>
<td>narediti (to make)</td>
<td>piti (to drink)</td>
<td>pasti (to fall)</td>
<td>hoteti (to want)</td>
</tr>
<tr>
<td>1S</td>
<td>igram</td>
<td>naredim</td>
<td>pijem</td>
<td>padem</td>
<td>hočem</td>
</tr>
<tr>
<td>2S</td>
<td>igraš</td>
<td>narediš</td>
<td>piješ</td>
<td>padeš</td>
<td>hočeš</td>
</tr>
<tr>
<td>3S</td>
<td>igra</td>
<td>naredi</td>
<td>pije</td>
<td>pade</td>
<td>hoče</td>
</tr>
<tr>
<td>1D</td>
<td>igrava</td>
<td>narediva</td>
<td>pijeva</td>
<td>padeva</td>
<td>hočeva</td>
</tr>
<tr>
<td>2D</td>
<td>igrata</td>
<td>naredita</td>
<td>pijeta</td>
<td>padeta</td>
<td>hočeta</td>
</tr>
<tr>
<td>3D</td>
<td>igrata</td>
<td>naredita</td>
<td>pijeta</td>
<td>padeta</td>
<td>hočeta</td>
</tr>
<tr>
<td>1P</td>
<td>igramo</td>
<td>naredimo</td>
<td>pijemo</td>
<td>pademo</td>
<td>hočemo</td>
</tr>
<tr>
<td>2P</td>
<td>igrate</td>
<td>naredite</td>
<td>pijete</td>
<td>padete</td>
<td>hočete</td>
</tr>
<tr>
<td>3P</td>
<td>igrajo</td>
<td>naredijo</td>
<td>pijejo</td>
<td>padejo</td>
<td>hočejo</td>
</tr>
</tbody>
</table>

**Figure 3.8:** The five conjugation classes of Slovenian verbs

The conjugation classes are traditionally named by the 1S form (Toporišič, 2002), though not intuitively so since the vowels are phonologically part of the stems while the post-vocalic affixes are part of the PERS/NUM inflection.\(^{55}\)

Morphophonological changes affect both thematic vowels and roots. Dozens of descriptive rules have been proposed to account for phonological changes such as palatalization, sibilization, epenthesis, etc. (see Herrity, 2000, pp. 163-174; Toporišič, 2002, pp. 370-388). The -am (-a-) class is the most natural

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\(^{55}\) Herrity (2000, p. 165), for example, classifies the five conjugation classes based on the nature of thematic vowels—probably a more precise division. He calls the first four classes thematic, where the thematic vowel (-a-, -i-, -e-, -je-) precedes the inflection and the last class athematic, with no (or zero—D.R.) thematic vowel.
class: it is the largest, the most frequent in the (spoken and written) input, and (most) regular in the sense that it admits newly-coined and borrowed verbs that come into the language (e.g., from the media, computer science, and sports).\footnote{Consider the following new coinages in adult Slovenian: (z)guglati (to google up), (z)loadati (to download), kopipejstati (to copy-paste), forwardirati (to forward an email), faulirati (to faul), etc.}

Morphophonologically then, one could predict three (broader) types of early morphophonological errors in the present tense, namely (i) verb class generalization (defaulting), (ii) morphophonological generalization, and (iii) omission of tense/agreement morphophonology. The first type would occur due to children’s misconjuration of non-am verbs (i.e., children would conjugate them as if they belonged to the most natural class). The second error type would occur due to children’s not knowing of various morphophonemic and phonotactic irregularities affecting root consonants and vowels. Lastly, the third type of error could occur for several reasons (e.g., due to some central syntactic competence deficit such as the underspecification or lack of various morphosyntactic categories, features, or the operations on them, or a more general performance deficit such as computational bottlenecks, as reviewed above in Chapter 2 and hypothesized in the present study).

The Inflectional Hierarchy Complexity Hypothesis (IHCH) remains silent on early defaulting to natural verb classes as it is not essentially a phonological account. It does, however,
predict errors of agreement and defaulting to early vP-based forms, such as the Complex Bare Verb (CBV)—a default form that is homophonous with the finite 3S form. The hypothesis further predicts errors of omission regarding other FIN-related material, such as pronominal CLs and AUXBEs in past PART constructions. The morphophonological outcomes in these cases are predicted to be utterances lacking person-related (long) pronominal CLs and utterances with BPARTs, respectively. More generally, since the IHCH predicts a probabilistic pattern, Slovenian CBVs (vPs) are predicted to be morphophonologically spelled out with significantly more success than tense-marked BPARTs, which, in turn, are predicted to be spelled out more reliably than PERS agreement-marked verbs and auxiliaries (FINPs). That is, the error rates are predicted to be significantly lower in the 3S system than in the PART system, which, in turn, is predicted to contain lower error rates than the finiteness-related systems (i.e., non-3S present, COPBE, and AUXBE).

3.3.4 Aspect

Slovenian has rich aspectual morphology. All verbs in all tenses and voices carry either perfective or imperfective aspect lexically and most have minimal pairs. Roughly speaking, the PERF denotes a completed action, while the IMPERF denotes a continuous
one. For example, the concept of painting can be expressed in the infinitive as slikati\textsubscript{I\textsc{mp}}\textsubscript{Erf}, roughly corresponding to English to be painting (continuously), and naslikati\textsubscript{P}\textsc{erf}, roughly corresponding to English to paint (once). Aspect is expressed with prefixes (\textit{na}-, \textit{pre}-, \textit{po}-, \textit{s/z}-, \textit{u}-, \textit{za}-, generally denoting perfectivity), stem changes (e.g., to come: priti\textsubscript{P}\textsc{erf}, prihajati\textsubscript{I\textsc{mp}}\textsubscript{Erf}), and suppletion (e.g., to do: narediti\textsubscript{P}\textsc{erf}, delati\textsubscript{I\textsc{mp}}\textsubscript{Erf}; see Herrity, 2000, pp. 150-151).

Most generative accounts of Slovenian verb morphosyntax argue that in order to capture the “rich” aspectual system and the fact that PARTs do not get spelled out in the (higher) inflectional domain (i.e., they do not exhibit what has been generally referred to as V-to-TNS movement), an ASP head should be postulated below TNSP but above \(vP\) (see for example, Ilc, 2002; Ilc & Sheppard, 2002, 2003, and the references therein). Note that in the system assumed in the present work, there is no need to postulate any aspectual categories since PARTs are captured in TNSP, which is crucially a [-FIN] position (see below for the derivation for constructions with past PARTs).

3.3.5 Verb Placement, Negation, and Clause Structure

It has been generally argued in the morphosyntactic literature that when judged by the “classic” adverb placement, Slovenian affirmative clauses do not show a typical V-to-TNS
movement, but rather a shorter one (possibly, V-to-ASP). Further, most accounts conclude that in the case of the majority of verbs, such movement is, at best, optional (see for example, Ilc, 2002; Ilc & Sheppard, 2002, 2003).

Adopting Cinque’s (1999) clausal architecture, Ilc & Sheppard (2002, 2003), for example, argue that tensed verbs in affirmative clauses raise only as far as ASP\textsubscript{Freq}, which is postulated to be one of the lower heads in the inflectional domain.\footnote{However, Rus (2003) shows that in affirmative clauses, verbs of movement, purpose, wanting, wishing, and hoping do exhibit V-to-TNS movement, suggesting that verb movement is not entirely optional.} Further, Ilc and Sheppard show that verb movement does occur in constructions with modals, AUXBE, COPBE, and in interrogative clauses. Finally, the authors argue that in \textit{wh}-interrogatives, INFL-to-C movement (here, TNS-to-FIN) is triggered by the [FIN] feature, independent of the [\textit{wh}] feature.

All these facts can be fully accommodated in our system. In neutral (non-topicalized, non-focused) affirmative clauses, finite (PERS-agreement carrying) verbs, modals, and AUXBE are always (re)merged in the FIN head (in Ilc and Sheppard’s analyses in some INFL domain in a split-INFL architecture),\footnote{Note again that in child speech, regular tensed verbs in non-3S forms are always analyzed as FINPs, while 3S forms are ambiguous: they can be either vPs (CBVs) or FINPs. As noted above, 3S forms are judged based on the presence of arguments and the case they bear, the presence of ADVs, and the socio-pragmatic context. In Chapter 4, I analyze all 3S forms as unambiguously as possible by using all possible criteria.} PARTs in the TNS head (in Ilc and Sheppard’s analyses in ASP, which is
crucially [-FIN]), and non-inflected verbs in V/v. While analyzing finite (tensed and person-marked verbs) may be straightforward in the model proposed here, periphrastic constructions, such as the past and future tense need some further elaboration.

The figure below shows a derivation of a Slovenian past tense construction in the morphosyntactic model proposed here (with the elements in bold type in their final positions)$^{59}$:

![Diagram of Slovenian past tense construction]

**Figure 3.9:** The analysis of Slovenian past tense constructions

Note that in Slovenian, a SUBJ DP always agrees with the PART in NUM and GEND. Such an agreement relationship could be handled between a DP and a PART in vP—possibly in the sense of Pesetsky & Torrego’s (2007) feature sharing/association, so that

$^{59}$ Modern syntactic literature is inconclusive in regard to whether the PART enters the derivation in V or v. Here, I represent it under V, following Pesetsky & Torrego (2007), but contra Pesetsky & Torrego (2004).
the PART’s unval NUM and GEND features would get associated with those of the SUBJ’s (leaving aside now whether PART’s FF are actually valued in the vP or whether the PART actually moves out of vP to have its features valued and checked).  

Next, a FIN head and an AUXBE are merged into the structure above TNSP. The AUXBE carries unval PERS and NUM features and a val FIN feature, while the FIN head/category carries an unval uFIN and a val uCase feature. Hence, besides the regular SUBJ case marking, two agreement relationships must be established here: the AUXBE must get its unval PERS and NUM features valued from the SUBJ DP and finiteness features between the FIN feature of the AUXBE and that of the FIN head must be checked.

In marked constructions with topicalized SUBJ DPs, fronted AUXs and OBJ DPs, or fronted PARTs (as in examples with LHM), the

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60 If the PART is re-merged to satisfy its unval NUM/GEND FF, as proposed by some valuation-driven analyses (e.g., Bošković, to appear), it is not entirely clear how a PART would establish a further Probe-Goal agreement relationship between its val T feature and the T feature of TNS in the system proposes here (unless these two operations were postulated to somehow occur simultaneously, i.e., as soon as the PART moves to TNS, the T features between the PART and the TNS are checked).

61 Regarding the former relationship, agreement must be established between the AUXBE and the SUBJ. This is captured straightforwardly under the condition that the SUBJ is now in [Spec, TNSP]—presumably on its way to [Spec, FINP]. Regarding the latter relationship, it must be assumed that inserting (i.e., externally merging) an AUXBE (whose unval FIN feature gets valued from the SUBJ DP) gets checked against the unval uFIN feature of the FIN head (in the same position). That is, the AUX must get its FIN/PERS feature valued before finiteness can be established and interpreted. Note that in such checking of finiteness, one must dispense with a Probe-Goal type-of agreement analysis through c-command and simply assume that feature sharing/checking can proceed through lexical insertion (where the lexical item carries a val feature) into the position that has un val feature of the same type.
verbs may end up in the FP domain (i.e., some peripheral domain above FINP).  

Negation in Slovenian is formed by placing the negative ne (no/not) in front of a verb—be it tensed or nontensed. Ilc (2004) lists various types of sentence negation and argues that in unmarked environments (i.e., when NEG is an unstressed negator), Slovenian follows the so-called “prefix type”, where NEG requires a finite verb for a host. Ilc further argues that ne+V_{FIN} is a morphosyntactic unit, functioning as a host for a second position CL: 

Consider the data in (10) below:

(10)  
(a) Ne pravi ji več laži.  
not tell_{3SPRES} her_{CL3DATFIN} more lies_{PGEN}  
“He’s not telling her lies anymore”  
(b) Nikoli ji ga nihče ne bo dal.  
never her_{CL3DATFIN} it_{CL3DATMAC} no-one not be_{3SFUT} given_{PERF SNACC}  
“No one will ever give it to her”  

Note that Slovenian ne cannot be analyzed as reflexive or pronominal clitics since it is not subject to the second position constraint. Ilc (2004) hence concludes that negation in Slovenian

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62 For example, in LHM constructions, PARTs must be accommodated above the FIN head, which is occupied by an AUXBE. In these cases, the FP domain would obviously have to be split to accommodate various word order effects related to the left periphery, which goes beyond the scope of this dissertation.

63 See also Ilc & Milojević Sheppard (2003, p. 279) for convincing evidence that ne+V_{FIN} is a morphosyntactic unit.
is not an individual head projecting a NEGP, but rather a reflection of a morphophonological process within the VP/vP. Consequently, negation in Slovenian does not suffice as evidence for "classic" verb movement (and I avoid judging structure based on the presence of negation).

3.3.6 Clitics

The last phenomenon reviewed in this section are clitics, which have always been theoretically described and analyzed as related to "tenseness" or finiteness in regard to the structural position (see for example, Franks, 2000; Franks & King, 2000; Golden & Milojević Sheppard, 2000). A clitic is a word that lacks word-level prosodic structure, and—as such—must attach to another prosodic word in order to be pronounced (Franks & King, 2000).64

The Slovenian clitic system comprises three types of clitics, namely the verbal clitics (traditionally, auxiliaries), the pronominal clitics (traditionally, clitic pronouns), and the

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64 Clitics supply grammatical rather than lexical information, and as such, they have been traditionally classified as closed-class items, generally in the form of determiners, pronouns, prepositions, conjunctions, and complementizers. Most clitics in the world’s languages are simple, i.e., they have no other idiosyncrasy but the requirement that they attach to some host in order to be pronounced. Complex clitics, on the other hand, are peculiar in the sense that they need to occupy specific syntactic positions in a phrase structure. Such are the clitics of the South and West Slavic languages, including Slovenian (Franks & King, 2000; see particularly pp. 31-47).
se clitics (traditionally, reflexive pronouns; see Rivero & Milojević Sheppard, 2003). The only clitics auxiliary in Slovenian is AUXBE.

Pronominal clitics are like pronouns—they inflect for NUM, GEND, and Case. Traditionally, they have been divided into long (11a) and short (11b) forms, as the following two examples show (CL=clitic):

(11)  
(a) Njega/ njiju/ njih   vidim.  
     himCL3SGenMasc themCL3DGenMasc themCL3PMasc see1SPres  
     “I see him/them/them”  
(b) Vidim ga/ ju/ jih.  
    See1SPres himCL3SGenMasc themCL3DGenMasc themCL3PMasc  
    “I see him/them/them”

While not all forms appear as short clitics, all appear as long clitics. Further, long clitics are used pre-verbally, while short forms generally appear post-verbally.65

Although the word order is generally free, the pronominal clitics—just like AUXBE—always appear in second position in a clause, regardless of what phrase appears first (Golden & Milojević Sheppard, 2000, but see Marušič, 2008, who argues that Slovenian clitics need not be in second position).

Consider the following data (with clitics in bold type):

65 Environments with pre-verbal long CLs are considered marked where the CLs are stressed for emphasis. For example, in (11a) above, the reading of “I see him” is contrastive, denoting “I see him but not someone else”. Note also the structural position of long CLs—as pre-verbal elements they must be accommodated structurally above the FIN head.
When both DAT and ACC clitics are used, the former appear first, with the latter immediately following:

(13) Marija mi jih stalno kupuje.

“Mary constantly buys them to me”

A more detailed account of clitics is beyond the scope of the present dissertation. What is important for us, however, is that pronominal clitics have always been treated as (functional or full lexical) heads (X’s) or phrases (XPs) that are either base-generated in the VP/vP and undergo raising to higher, functional projections (at least TNSP or AGRP, if not to CP, depending on the analysis; cf. Franks, 2000; Franks & King, 2000). In some cases, clitics need to appear higher than the FIN head in our system (e.g., in constructions with FOCUS- and TOPIC-related long CLs or Long Head Movement constructions), either for prosodic (PF) or syntactic reasons.66

I leave aside reflexive CLs and concentrate on pronominal CLs only since reflexive CLs are intimately connected to the verb itself and can appear adjoined to or below the tensed verb.

66
Let us see how the morphosyntactic computation illustrated above would be applied to child Slovenian.

### 3.3.7 The Morphosyntactic Computation in (Child) Slovenian

Take the following set of LIs, for example: \{SARA, VID-E\[sex:i\], TNS, FIN, KUŽI\[PUPPY]\}. At the VP level, the possible morphosyntactic and phonological outcomes would be the following:

\[ (14a) [v \{VP VID-E\[-T/-PERS\] [DP KUŽI\{+Case\}]]] \rightarrow /\text{vid}(\text{e/i}) \text{ kužija}_{\text{Acc}}/^{69} \]
\[ (14b) [v \{VP VID-E\[-T/-PERS\] [DP KUŽI\{+Case\}]]] \rightarrow /\text{vid}(\text{e/i}) \text{ kužija}_{\text{Acc}}/ \]

Note that at the VP level, the child can either use the Complex Bare Verb (CBV) with a generalized thematic vowel –e–, a CBV with the correct thematic vowel –i–, or the form without a thematic vowel, i.e., /vid/—an abbreviated form of /vidi/, commonly used in colloquial speech. Note that /vidi/ is, in fact, ambiguous between a CBV and a “real”, finite 3S form (remember

\[ ^{67} \text{Videti} \text{ belongs to the –i—(-im) conjugation class and has the following forms in the present tense singular (note the morphophonological change in the thematic vowel): vid-i-m, vid-i-s, vid-i-ø.} \]

\[ ^{68} \text{Note the morphophonological case endings of the noun “puppy”: Nom KUŽI/kuži/, Acc KUŽIJA /kužija/, colloquially sometimes KUŽA/kuža/}. \]

\[ ^{69} \text{As noted above for English, one may postulate an even smaller structure than VP, i.e., VP, particularly if there is evidence in the data that an OBJ DP is not Acc-marked. This is not very obvious in child English due to impoverished case morphology, but in Slovenian, Acc is morphologically distinct from Nom.} \]
our discussion from above on how to judge the earliest verb forms as unambiguously as possible).

At the TNSP level, the possible morphosyntactic and phonological outcomes would be the following (i.e., BPART [14c], possibly an IMP [14d]):

\[(14c) \{ \text{TNSP (SARA\text{-Case}) VID(E)LA \{+TNS/-PERS\} \ldots [DP KUŽI\{+Case\}] \} \rightarrow /\text{(SUBJ) vid(e)la kužija}/^70 \}
\]

\[(14d) \{ \text{TNSP (SUBJ\text{PrO}) VID-E \{+TNS/-PERS\} \ldots [DP KUŽI\{+Case\}] \} \rightarrow /\text{poglej kužija}/^71 \}
\]

Finally, at the FINP level, the outcomes would be the following (descriptively, a present tense construction [14e] or a past tense construction [14f])^72:

\[(14e) \{ \text{FINP (SARA\text{-Case}) VID-E \{+TNS/+PERS\} \ldots [VP \text{ vid(i) kužija}]} \rightarrow /\text{(sara) Nom vid(i) kužija}_{\text{Acc}} / \}
\]

\[(14f) \{ \text{FINP (SARA\{Case\}) BE_{3SPRES\{+PERS\}} VID-E \{+TNS/+PERS\} \ldots [VP \text{ vid(e)la kužija}]} \rightarrow /\text{(sara) Nom j(e) vid(e)la kužija}_{\text{Acc}} / \}
\]

^70 The active past PART of *videti* (to see) in the singular feminine is *videla*, colloquially generally pronounced as *vidla*.

^71 *Poglej* is the suppletive imperative form of *videti* (to see).

^72 Note that in the case of a past tense construction, the Lexical Array must include an extra LI, namely an AUXBE, which gets accommodated in the FIN head as the finiteness marker (as the analysis reviewed above in section 3.3.5).
3.4 Summary and Relevance for the Inflectional Hierarchy Complexity Hypothesis

The present chapter proposed a model of verb morphosyntax and morphophonology that provided a necessary background for the analysis of child data in the subsequent chapters. The model, which postulated an intimate link between the morphosyntactic computation and morphophonological information, proposed an Agree-based valuation-driven system where Ns enter the derivation lexically valued for NUM/GEND and unvalued for CASE, and finite Vs enter the derivation unvalued for PERS[NUM] agreement and valued for tense and finiteness. It was proposed that unvalued elements are re-merged (i.e., they move, if possible/needed) in order to get their FF valued (irrespective of the interpretability of the Probe’s FF; Bošković, to appear; Pesetsky & Torrego, 2007).

Verb inflection was analyzed in three clausal domains: that of verb’s conjugation class (base—lexical), that of number/gender [-PERS] agreement (temporal—aspectual), and that of subject-verb [PERS] agreement (finite/PERS-related). The analysis focused on the functional categories of V, v, TNS, and FIN, leaving aside the peripheral domain (FP). Based on various morphosyntactic, acquisition, and neurocognitive studies that purport theoretical, developmental, and processing differences
between Tense and Agreement, the chapter proposed a clause structure of VP-vP-TNSP-FINP(-FP).

Similarly to Pesetsky & Torrego’s (2004, 2007) distinction between TNS (category), carrying an unvalued interpretable T feature and serving as a Probe for a finite verb that carries a valued T feature, agreement was postulated to be captured via a FIN category, carrying an unval interpretable FIN feature that enters into an agreement relationship with a valued interpretable FIN feature on the finite verb.

Drawing from the analyses in Bianchi (2003, 2006, to appear) and Adger (2007a), the semantic locus of FIN was postulated to be that of traditional finiteness. It was hypothesized that finite clauses must project a FIN domain above the temporal one (TNS). That is, it was established that the morphophonological expression of tense in the TNS domain does not suffice for finiteness nor SUBJ case checking.

Finite verbs in affirmative clauses were postulated to be FINPs (or more, i.e., FPs when additional functional heads are required in structures with fronted, focused and topicalized DPs, and pre-verbal pronominal clitics). Participles were argued to be accommodated in TNSP, possibly together with imperatives. It was noted, however, that in marked constructions with fronted participles (as in examples with Long Head Movement), the participles may appear in the FP domain. Non-adult verb forms that may resemble adultlike forms but contain merely a thematic
vowel (e.g., 3S in Slovenian) were posited to be vPs. Non-adult bare participles (and possibly bare perfectives, which appear in place of bare participles in certain languages) were analyzed as TNSPs. Root infinitives and verbal stems were argued to be accommodated in VP.

Besides general word order, morphosyntactic structure was argued to be judged by the presence of arguments and the morphological case they bear, the presence (suppliance) of morphophonological verb inflection, and the information on the target forms from the detailed transcripts.

It was stated that various issues of feature checking and architecture are still hotly debated in the syntactic literature and various technical details and challenges were identified but glossed over in the present study as they go beyond the scope of investigation. For example, based on the morphosyntactic computation of Slovenian past tense constructions, it was noted that an agreement relationship might not always be that of Probe c-commanding its Goal. Agreement checking may simply be feature sharing/association, perhaps in the sense of Pesetsky & Torrego (2007), such as the agreement relationship between a SUBJ DP and a participle (if assumed to take place in vP). Further, agreement may also be the insertion of (i.e., external Merge of) an element that carries an instance of a valued interpretable feature into a head/category which itself has the same type of unvalued
uninterpretable feature, such as a possible solution for finiteness checking between the FIN feature of AUXBE and that on the FIN head.

Finally, it was noted that the Inflectional Hierarchy Complexity Hypothesis (IHCH), motivated in Chapter 2 above, relates to the model proposed here in the sense that it predicts errors of omission regarding FIN-related material, such as (person) agreement, copula and auxiliary BE, and pronominal clitics. At the same time, it predicts defaulting to early vP-based forms, such as the Complex Bare Verb (CBV)—a form that in Slovenian is homophonous with a finite 3S form.

More specifically, since the IHCH predicts a probabilistic morphophonological pattern of suppliance of verbal inflection, Slovenian CBVs (vPs) are predicted to be morphophonologically spelled out with significantly more success/reliability than tense-marked BPARTs, which, in turn, are predicted to be supplied significantly better than PERS agreement-marked finite verbs, auxiliaries, and copula verbs (FINPs). In other words, the error rates are predicted to be significantly lower in the 3S system than in the PART system, which, in turn, is predicted to show fewer errors than finiteness-related systems.

Note that the initial unreliable/partial suppliance of finiteness (in regard to surface phonological marking) does not imply the lack of syntax (e.g., morphosyntactic categories,
phrase structure operating on formal features, etc.)—children’s earliest verb forms may simply surface as root nonfinites and tense-based (aspectual) forms due to limited computational resources, for example, as hypothesized in the present work.

In fact, I show in Chapter 4 below that while many earliest verbs do appear as the computationally least costly verb forms, children’s early syntax must be taken to be adultlike with respect to the availability of the full phrase structure and the concatenation computation on it (e.g., the operation Merge, yielding adultlike verb placement and word order in general). However, children’s morphophonological marking in the verbal system as a whole is not adultlike at all, particularly when associated with high(er) morphosyntactic heads, i.e., PERS agreement-carrying auxiliaries, copula verbs, and (non-3S) PERS agreement-carrying verbs in the present indicative tense. That is, although children supply morphophonological information at all syntactic levels of phrase structure (i.e., ranging from VP to FINP, and even FP), the success of the suppliance of inflection at certain phrasal levels varies considerably. It is hypothesized here that this is due to the computational resources in regard to the concatenation operation.
Chapter 4: A Variability Model of Early Verb Morphosyntax: Evidence from Child Slovenian

4.1 Introduction

Based on the evidence from child Slovenian, this chapter provides further support for the Inflectional Hierarchy Complexity Hypothesis (IHCH), motivated in the previous chapters theoretically and developmentally. I describe and analyze in detail two corpora of naturalistic data, namely the longitudinal cross-sectional naturalistic production data reported in Kranjc (1999) and the longitudinal cross-sectional naturalistic production data that were collected for the purpose of this dissertation.

The results of various frequency counts and statistical morphosyntactic and morphophonological analyses confirm the predictions of the IHCH by showing that while Slovenian children’s early syntax must be taken to be adultlike with respect to the availability of the (full) phrase structure and some basic computation on it (e.g., the operation \textit{Merge}, yielding adultlike verb placement and word order in general), children’s morphophonological spell-out in the verbal system as a whole is not adultlike, particularly when associated with high(er) morphosyntactic heads, i.e., person agreement-carrying AUXs, copula verbs, and non-3S person agreement-carrying verbs in the
present tense, i.e., finiteness-dependent environments. It is shown that although Slovenian children supply morphophonological information at all syntactic levels of phrase structure (i.e., ranging from VP to FINP, and even peripheral FP), the success of spell-out varies significantly from one level to another.

Specifically, in the earliest stages of development, Slovenian children show a preference for the forms that resemble 3S forms—arguably, Complex Bare Verbs (CBVs)—even in non-3S contexts, and bare Past Participles (BPARTs). It is further shown that the error rate in the CBV system is almost zero, while the error rate of the BPART system is low, albeit significantly higher than in the case of CBVs. That is, children seem to show a robust order of CBVs > BPARTs > person-marked (FIN) verbs in initial stages of development—structurally corresponding to a syntactic hierarchy of vP—TNSP—FINP—(FP)—where the categories on the left are morphophonologically supplied earlier and with significantly more success than those on the right. It is also shown that at age 2;5+ when person agreement is supplied 80%+ of the time, the proposed hierarchy still holds although it is much less pronounced.

The chapter further demonstrates that initial CBVs must be taken to be a default, non-person-marked (i.e., traditionally, "nonfinite") forms that children produce at the onset of development when person agreement is not reliably marked yet. This conclusion is based on six observations. First, early Slovenian exhibits an extremely high number of CBVs—
disproportionate when compared to child-directed and adult-directed speech. Second, CBVs account for the majority of errors in non-3S contexts, sometimes even with overt non-3S subjects. Third, the 3S system in both younger and older children shows almost no errors, while the non-3S systems exhibit up to 60% of error rates. Fourth, most mini paradigms never contain any other form in the present tense but the 3S form. Fifth, the acquisition of CBVs is shown to be inversely related to the acquisition of person-marked verbs. That is, when the PERS feature (arguably an indicator of finiteness, as motivated in the previous chapter) becomes marked more reliably, CBVs peter out. Last but not least, CBVs are shown to be syntactically vPs since they appear bare, do not carry any (SUBJ) arguments or FIN-related (high) adverbials, and do not appear in structures with pronominal clitics or wh-questions.

The chapter is organized as follows: Section 4.2 describes the subjects and data used in the investigation. 4.3 describes the coding procedures and the quantitative and qualitative analyses carried out in the study. Section 4.4 reports the results of various frequency counts and statistical analyses, focusing on the emergent forms, the appearance of mini paradigms, overt subject-verb (person agreement) marking, the status of early non-person-marked 3S forms, the behavior of 3S errors, and the phenomena of (graded) variability and the gradualness effect in morphosyntactic development. Section 4.5 concludes the chapter with a summary of results.
4.2 Subjects and Data

The first corpus for our analysis comes from Kranjc (1995), analyzed in more detail in Kranjc (1999). These data have been split into two datasets, the “younger” group (here, A1) and the “older” group (here, A2). A1 and A2 contain naturalistic production data collected at a daycare center while children were at play, either with their peers, kindergarten teachers, or both. The A1 dataset is made up of 11 recordings over a 3-month period (between 10/9/1992 and 1/14/1993) of 17 children (9 girls and 8 boys). At the beginning of the recording, the youngest child was 1;2 and the oldest 1;11 (average 1;7). At the end of the recording, the youngest was 1;6 and the oldest 2;3 (average 1;10). Kranjc (1999, p. 80) reports that A1 contains 6,086 words, 1,466 of which are verbs (but see below for my report on the “clean” data). The A2 dataset is made up of 14 recordings of 25 children (16 boys and 9 girls). At the beginning of the

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1 Two children were excluded due to scarce data. An additional two were discarded because they were older than 2;0 at the beginning of the study. Specifically, it is widely-accepted in acquisition research that children above age 2;0 have already entered a period of so-called vocabulary spurt when more complex syntax appears (Plunkett & Schäfer, 1999, pp. 63-64; Berko Gleason, 2005, p. 255). According to many (e.g., Radford, 1995; Varlokosta et al., 1998) children’s earliest utterances are devoid of (productive) functional material and only emerge in the “functional” stage at 23-25 months of age. In order to investigate the earliest morphosyntic performance possible, A1 only contains children that were younger than 2;0 at the beginning of the recording.

2 Some of the initial 25 children were removed from the groups and a few new children arrived at various points of the study. Most of the time, the group comprised 17 children. Kranjc (1999, p. 80) states that she started recording group A2 on 10/22/1992 and finished on 1/28/1993. However, there are two additional recordings in her original written transcript, one from 3/18/1993 and the other from 4/1/1993 that are not
recording, the youngest child was 1;11 and the oldest 2;7 (average 2;3). At the end of the recording, the youngest child was 2;3 and the oldest 2;11 (average 2;7).³ A2 contains 12,183 words (Kranjc, 1999, p. 80), but Kranjc offers no information about the number of verb lemmas or lexemes.

Kranjc’s transcription offers valuable information about the children’s morphophonological development by providing the children’s forms and the corresponding adult forms. However, her transcript contains limited information about the pragmatic contexts.⁴ Since Kranjc’s study is focused on the communicative role of early utterances, it reports only frequency counts of various linguistic forms and the communicative roles associated with such forms, with no further statistical analysis over specific morphological forms.

Since Kranjc’s analyses make use of the entire data, including repetitions, nursery rhymes, and fixed phrases, I first cleaned the data, discarding all direct repetitions, nursery rhymes, and rote-learned phrases.⁵ I then computed the number of reported in Kranjc (1999). I counted them to be part of the A2 dataset, so A2 reported here is larger than in Kranjc’s study (see below).

³ A2 is made up of children who were approximately as old as the ones in the A1 sample at the end of the recording. Hence, the advantage of Kranjc’s data is that they serve as longitudinal data, roughly from the ages of 1;0 to 3;0.

⁴ Note that the data reported here are based exclusively on Kranjc’s written transcripts.

⁵ I discarded all direct repetitions after the caretaker or another child, unclear and incomplete utterances, nursery rhymes, and rote-learned phrases in specific socio-pragmatic contexts (e.g., prosim, lit. please.1SPres, “Please” or “You’re welcome”, used when the child is asking for or thanking for something, respectively). A1 reported here
words, verb utterances (i.e., the utterances that were produced as continuous strings of words that contained at least one verb), and the children’s MLU, which was calculated on the basis of all of the child’s utterances. In A1, MLU ranged from 1.4 to 2.3, with a mean value of 1.55. In A2, it ranged from 1.5 to 3.1, with a mean value of 2.05.6

The second corpus was collected between 2005 and 2006 specifically for this dissertation (the Rus & Rogač data). The data include audio and video information and are transcribed in great detail. The corpus contains two datasets, the “younger” group (here, B1) and the “older” group (here, B2).

B1 is made up of 13 recordings over a 6-month period and contains data from 9 children (2 girls, 7 boys), observed at play among each other and/or with two daycare teachers in Ljubljana, Slovenia’s capital.7 At the beginning of the recording, the youngest child was 1;4 and the oldest 1;6 (average 1;5). At the end of the recording, the youngest was 1;10 and the oldest 2;0 (average 1;11).8 MLU ranged from 1.2 to 1.75, with a mean value

---

6 Measuring MLU in morphologically rich languages is somehow problematic due to a great variation in morphological complexity and, particularly, due to the presence of portmanteau morphs. Here I follow the guidelines given in Berko Gleason (2005, pp. 157-158), who follows Brown (1973), and report MLU based on words rather than morphs.

7 The 13 recordings were made on 11/25/05, 11/26/05, 12/19/05, 12/23/05, 1/6/06, 1/19/06, 1/20/06, 2/17/06, 3/14/06, 4/14/06, 5/12/06, 5/18/06, and 5/26/06. The data from one boy were discarded as they contained only a few utterances.

8 Note that the children in the Rus and Rogač B1 group are generally a couple of months younger than those in the Kranjc A1 group since we
of 1.53 across all children. B1 contains 3,570 words, which make up 489 verbal utterances, with 504 verbs in total.

B2 is made up of 14 recordings over a 6-month period and contains data from 10 children (5 girls, 5 boys). At the beginning of the recording, the youngest child was 2;0 and the oldest 2;4 (average 2;3). At the end of the recording, the youngest was 2;6 and the oldest 2;10 (average 2;8). MLU ranged from 1.7 to 2.5, with a mean value of 2.12. B2 contains 5,575 words, which make up 1,413 utterances. 760 utterances are verbal, with 799 verbs in total.

Though smaller in size, there are several advantages of the Rus and Rogač corpus. First, our data contain both audio and video information, making it easier to speculate on the pragmatic contexts of the children’s utterances. Second, the transcription provides much more detailed information on the children’s morphophonology since it is transcribed in informal register with the exact forms as used by the children as well as the corresponding (colloquial) adultlike forms. Third, the data contain a much larger dataset of child-directed speech since the two caretakers speak more frequently with the children than Kranjc does in her study—a paramount aspect in any quantitative analysis of child-directed speech (see below). Fourth, both

wanted to see how acquisition proceeds at the earliest observable stage of development. Consequently, the Rus and Rogač B1 data are sparser than Kranjc’s A1 data even though they contain more hours of recording.

9 The 14 recordings were made on 11/25/05, 11/26/05, 12/2/05, 12/19/05, 12/23/05, 1/19/06, 2/2/06, 3/7/06, 3/9/06, 3/31/06, 4/14/06, 4/21/06, 5/5/06, 5/8/06.
groups are much more homogeneous when compared to the two groups studied by Kranjc—all children in our groups were present from the beginning to the end of the investigation.

C1 and C2 contain experimental (elicitation production) data from groups B1 and B2, respectively. They focus on the use of nonce verbs in the present and past tense. The analysis of these data is given in the following chapter.

The following chart illustrates the characteristics of the three corpora used in the present study (Avg. MLU: average MLU; Recs: Recordings; WW: words, VUs: verb utterances; Vs: verbs).

<table>
<thead>
<tr>
<th>Data set</th>
<th>Data Type</th>
<th>#Childr.</th>
<th>Avg. MLU</th>
<th>#Recs.</th>
<th>#WW</th>
<th>#VUs</th>
<th>#Vs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Longitud. Natural. Prod.</td>
<td>17</td>
<td>1.94</td>
<td>11</td>
<td>6,086</td>
<td>1,104</td>
<td>1,132</td>
</tr>
<tr>
<td>B1</td>
<td>Longitud. Natural. Prod.</td>
<td>9</td>
<td>1.53</td>
<td>13</td>
<td>3,570</td>
<td>489</td>
<td>504</td>
</tr>
<tr>
<td>B2</td>
<td>Longitud. Natural. Prod.</td>
<td>10</td>
<td>2.12</td>
<td>14</td>
<td>5,575</td>
<td>760</td>
<td>799</td>
</tr>
<tr>
<td>C1</td>
<td>Elicited Prod.</td>
<td>9</td>
<td>1.53</td>
<td>4</td>
<td>N/A</td>
<td>N/A</td>
<td>44</td>
</tr>
<tr>
<td>C2</td>
<td>Elicited Prod.</td>
<td>10</td>
<td>2.12</td>
<td>5</td>
<td>N/A</td>
<td>N/A</td>
<td>94</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>53 (excl. C1&amp;C2)</td>
<td>N/A</td>
<td>52 (excl. C1&amp;C2)</td>
<td>31,176</td>
<td>6,032</td>
<td>6,458 (excl. C1&amp;C2)</td>
</tr>
</tbody>
</table>

**Figure 4.1:** Characteristics of the three corpora used in the analysis
4.3 Notes on Methodology

4.3.1 Coding

I first manually tagged all verbs and defined all verbal obligatory contexts, i.e., those that contained or should have contained at least one verb (following the guidelines for defining obligatory contexts in Brown, 1973, p. 255). I refer to these contexts as “verb utterances” (VUs).  

In each VU, I manually tagged the verb form as unambiguously person-marked (non-3S, AUXBE, or COPBE), imperative, unambiguously lacking person (bare verb, infinitive, active or passive past participle), or 3S. 3S was further broken down to unambiguously person-marked (when accompanied by a case-marked subject DP, a FIN-related [high] adverb, or a pre-verbal pronominal clitic) and “other 3S” forms (arguably, CBVs).

The same tagging procedure was applied to child-directed speech. However, since it is extremely scarce in the Kranjc data and would not allow for any robust quantitative analysis, I analyze the child-directed speech only in the Rus and Rogač data.

10 There is a very small amount of VUs in the two younger groups since most of the utterances are one-word utterances that contain simple nouns. Coordination and embedding are still very scarce at this stage of development. However, the number of verbs increases significantly in the older groups, who also show examples of embedding and coordination, albeit infrequently (roughly 8% of all utterances are biclausal, consisting of two VUs).

11 All data are reported exactly the way they appear in the transcription. Kranjc’s transcription sometimes contains formal written forms or the corresponding adultlike formal written forms, while the Rus and Rogač data are always faithful to the audio information and provide the same form that was used by the child, be it in its colloquial or formal form.
4.3.2 Quantitative and Qualitative Analyses

One of the first indicators of the knowledge of verb morphophonology is the organization of verb paradigms and the productive use of verb inflection—two notions frequently investigated in constructivist (e.g., Aguado-Orea, 2004) and Natural Morphology (NM) frameworks (e.g., Bittner et al., 2003).

The following are the usual conclusions from NM studies: (i) emergent verbs are mainly bare stems/infinitives and bare past participles; other verbs may appear, including adultlike finite forms, but are arguably rotes; (ii) emergent verbs generally have no corresponding paradigm members, i.e., there are no lexeme triplets (and hence no “real” productivity); (iii) finite inflections become supplied more frequently/accurately

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12 Note that the NM literature argues that the premorphological phase is the one “before the emergence of verbs” or the one indicating “the onset of verb production” (Gagarina, 2003, p. 137) where the majority of verbs is nonfinite. This is technically incorrect as verbs do appear at the earliest observable stage, as reviewed in Chapter 2 above. However, Gagarina states that she takes all earliest verbs as rotes—hence her definition. Note that in the absence of clear evidence that suggests that all early forms are rotes, it is hard to make such an assumption. Specifically, though such forms might be rotes if one uses only adultlike phonology as a criterion for finiteness, one needs some other independent evidence (e.g., clitic placement, word order in general, etc.) for such a claim. That is, overt morphophonology should not be taken to be the only evidence because it cannot distinguish early-stage from later-stage verb forms.

13 NM generally defines true paradigms as sets of at least three morphophonologically unambiguous and distinct inflectional forms of the same lemma used in contrastive syntactic and pragmatic contexts in the same month of recordings (Bittner et al., 2003, p. xvi). Hence, paradigms of two members are generally referred to as “mini paradigms.” Note that the absence of lexeme triplets and quadruplets does not necessarily suggests a lack of productivity since computational analyses of adult corpora show that verb token and type frequency follow Zipfian (or near-Zipfian) distribution (Chan, 2008). That is, not even adults may show the productivity predicted by (many) usage-based theorists.
with a decline of root nonfinites/bare stems; (iv) morphophonological marking of inflection is gradual rather than (near-) instantaneous\textsuperscript{14}; (v) children’s learning of morphophonology yields three types of misapplication: substitution\textsuperscript{15}, overgeneralization\textsuperscript{16}, and conjugation class errors. In order to systematically study these aspects of verb morphophonology, I performed various verb lemmatization and frequency counts.\textsuperscript{17} The results about emergent verb forms, early verb tokens, lemmas, and types, and the overall organization of verb paradigms are reported in 4.4.1.

I then analyzed the suppliance rate of subject-verb agreement in obligatory contexts in the following three contexts: non-3S present tense, COPBE, and AUXBE. I examined in detail the error rates, error types, and error distribution within and

\textsuperscript{14} Note that most usage-based accounts take suppliance of inflection to mean “knowledge”, as noted in Chapter 2. That is, gradual suppliance of inflection is taken to be a consequence of “gradual learning”.\textsuperscript{14}

\textsuperscript{15} Such errors have also been termed mapping errors (Blom & Wijnen, to appear), commission errors (Deen, 2002), or wrong-form errors (Lardiere, 2000). They occur when children supply a wrong inflection in a specific context (e.g., 3S in the 1S context). From the morphosyntactic perspective (especially in the generative circles), it has been argued that when children show commission errors, they may have mapped a wrong morphological form to a set of adultlike morphosyntactic features either due to the morphology-syntax mapping problem or computational bottlenecks (e.g., Blom & Wijnen, to appear).

\textsuperscript{16} Overgeneralization (sometimes termed overregularization) arises when a child supplies a rule-based inflection on verbs that do not follow the regular rule, but exhibit irregular morphology. It is believed that children have segmented and acquired the rule as a productive one and mapped the right form to the set of (adultlike) morphosyntactic features, but for some reason failed to retrieve the irregular form from memory. This can be due to the children’s not knowing the irregular form yet or for transitory processing reasons (Pinker, 1999).

\textsuperscript{17} Most frequency counts were performed in the Concordance software for text analysis (http://www.concordancesoftware.co.uk/). Some, however were computed manually.
across the two age groups, focusing on the frequency and behavior of 3S errors when compared to non-3S errors. The analyses include verb lemmatization, frequency counts, and various analyses of ANOVA and paired samples t-tests. These results are reported in 4.4.2.

I then focused more closely on the constructions with 3S forms. I compared the frequency of 3S forms in child speech with that of child-directed and adult-directed speech. In order to support the hypothesis that 3S is the initial, PERS-lacking (nonfinite) form, I also examined the 3S forms syntactically. This result is reported in 4.4.3.

I then summarized all error rates at various syntactic levels and in order to confirm the IHCH-based pattern of morphophonological suppliance and examined the syntactic structures that cannot be captured only by postulating only some minimal VP/vP-based initial syntax. This is reported in 4.4.4.18

4.4 The Acquisition of Verbal Inflection in Early Slovenian
4.4.1 The Emergence of Verbs and Mini Paradigms

At the earliest observable stage (roughly between the ages of 1;0 and 1;6), a small number of verbs is detected. Most of the earliest VUs are monoclausal, containing a simple N (e.g., kuža, “doggy”, Nina), a demonstrative pronoun (PRON) followed by a N,

18 All quantitative analyses are supported by qualitative data showing intra- and inter-subject variability, the gradualness effect, and the active learning of morphophonology.
lacking COPBE (e.g., To vlak, “this train), or a demonstrative PRON followed by an ADJ, lacking COPBE (e.g., To mokro, “this wet”, To moje, “this mine”). Most early forms are in the 3rd person singular present tense (3SPRES), the 2nd person singular imperative (2SIMP), and the bare past participle (BPART) form. Some root infinitives (RIs) and bare verb stems (BVs) also appear at this stage, though their rates are negligible.

Consider the first 10 VUs from Kaja and Maruša’s files from the A1 dataset:

<table>
<thead>
<tr>
<th>Kaja (1;4) [MLU=1.7]</th>
<th>Maruša (1;6) [MLU=1.4]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUPA drink3SPRESINPERF</td>
<td>PALA fallenBPARTPFNM</td>
</tr>
<tr>
<td>PI drinkBV2</td>
<td>TOLE KAM thisNOM where</td>
</tr>
<tr>
<td>PILA drunkBPARTINPERF</td>
<td>MUCKE TOLE kittensNOMPF theseNOMF</td>
</tr>
<tr>
<td>KAJ TO? whatNOM thisNOM</td>
<td>PALA fallenBPARTPFNM</td>
</tr>
<tr>
<td>LEJ look1MNP2S</td>
<td>PILA drunkBPARTINPERF</td>
</tr>
<tr>
<td>LEJ look1MNP2S</td>
<td>PADA fall3SPRESINPERF</td>
</tr>
<tr>
<td>TI roll3SPRES</td>
<td>PADA fall3SPRESINPERF</td>
</tr>
<tr>
<td>KAJ TO? whatNOM thisNOM</td>
<td>LEJ TO TUKI look1MNP2S thisNOM here</td>
</tr>
<tr>
<td>LEJ, MUC look1MNP2S kittenNOM2Mac</td>
<td>LEJ TO look1MNP2S thisNOM2</td>
</tr>
<tr>
<td>LALA play/sing3SPRESINPERF</td>
<td>LEJ look1MNP2S</td>
</tr>
</tbody>
</table>

Figure 4.2: The first ten utterances in two children from the Kranjc A1 dataset

---

19 Demonstrative PRONs are morphologically different from determiners (DETs) in nominal clauses. Here, I analyze verbal utterances only.

20 Pupati is a “baby verb” (henceforth, baby V) used by children and parents meaning piti, “to drink”.

21 The full adult verb is piti, “to drink”.

22 The full adult form is vrti se, a reflexive verb that requires a reflexive clitic se.

23 Lalati is a baby V used by children and parents meaning igrati, “to play” in the sense of “operating electronic equipment” or “to sing”.
Now consider the first 10 VUs from Tim and Aja’s files from the B1 dataset:

<table>
<thead>
<tr>
<th>Tim (1;6) [MLU=1.6]</th>
<th>Aja (1;5) [MLU=1.57]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEJ ŠE giveІш2s more</td>
<td>MA AUTO haveІшPres carішNom/АccS</td>
</tr>
<tr>
<td>AUTO MA carішNom/Аcc SMASC haveІшPres</td>
<td>AUTO MA carішNom/АccS haveІшPres</td>
</tr>
<tr>
<td>ČAJ NOSI teaішNom/АccS carryІшPresІшИнфер</td>
<td>ŠALA NIMA scarfішGenSMASC not- haveІшPres</td>
</tr>
<tr>
<td>PADL fallenішBPartFнFPMASC</td>
<td>LEP TO beautiful thisішNomS</td>
</tr>
<tr>
<td>DOL JE PADL down beішCOPBEіш3ІшPres</td>
<td>TO BEL thisішNomS whiteішNomSMASC</td>
</tr>
<tr>
<td>TAM NOTEL JE there inside beішCOPBEіш3ІшPres</td>
<td>JE DOBLA beішCOPBEіш3ІшPres goodішNomFнFen</td>
</tr>
<tr>
<td>OBLEKLI put on clothesішBPartFнFPMASC</td>
<td>MOJA NAJVEČJA mineішNomFнFen biggestішNomFнFen</td>
</tr>
<tr>
<td>POSPLAVILI tidy upішBPartFнFPMASC</td>
<td>DAJ giveІш2s</td>
</tr>
<tr>
<td>MACKA TO catішNomFнFen thisішNomS</td>
<td>POJDI STRAN goІш2s away</td>
</tr>
<tr>
<td>TUKI MEDO here teddyішNomSMASC</td>
<td>POJDI go/leaveІш2s</td>
</tr>
</tbody>
</table>

**Figure 4.3**: The first ten utterances in two children from the Rus and Rogač B1 dataset

As we can see from the two figures above, the data from the four children show a similar inventory of the first verb forms, with some subtle differences: while Kaja and Maruša do not produce any person-marked verbs (but mainly verbs that would be handled in vP and TNSP in our system), both Tim and Aja produce one example of COPBE each (arguably in FINP; but see how many utterances lack COPBE). Also, while Tim’s first utterances do not contain any imperatives, the other three children all produce several instances of this form. Interestingly, however, Aja’s first and third utterances—which both contain a 3S form—show preposed (focused) OBJ DPs (which would be handled in FP above FINP in our system), suggesting that these forms must be finite.
In sum, we see a lot of variation within and across kids in as few as 10 utterances that range from VP/VP to FP.

To investigate the forms and frequencies of the emergent verb forms, I ran the A1 dataset through Concordance. The following table reports the result:

<table>
<thead>
<tr>
<th>V TYPE</th>
<th>3S</th>
<th>NON-3S</th>
<th>IMP</th>
<th>BPART (ACT, PASS)</th>
<th>BE (COPBE/AUXBE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lemmas</td>
<td>26</td>
<td>7</td>
<td>8</td>
<td>27</td>
<td>39,6</td>
</tr>
<tr>
<td>Lexemes</td>
<td>37</td>
<td>10</td>
<td>9</td>
<td>35</td>
<td>82,7</td>
</tr>
<tr>
<td>Tokens</td>
<td>157</td>
<td>20</td>
<td>17</td>
<td>603</td>
<td>201,7</td>
</tr>
<tr>
<td>%Tokens</td>
<td>13.9%</td>
<td>1.8%</td>
<td>1.5%</td>
<td>53.3%</td>
<td>17.8%, 0.6%</td>
</tr>
<tr>
<td>Total lexemes</td>
<td>189</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total V tokens</td>
<td>1,132</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total V tokens w/ overt person</td>
<td>112 (10%) [excl. “ni”]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INF1</td>
<td>147 (13%) [incl. “ni”]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.4: Lemma, lexeme, and token frequencies per verb type in the Kranjc A1 dataset.

The data show that the majority of the first recorded verbs are in the form of 3S, IMP, and BPART. Specifically, roughly 86% of all verb tokens do not show overt person (PERS) inflection. Besides the highly irregular and suppletive BE, which accounts for 4% of overt inflection (7% if one includes ni; cf. Note 26),

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24 It seems to be somewhat safer to speculate on the children’s earliest attainment from the A1 dataset since Kranjc’s data span across a period of only 3 months, while the Rus and Rogač (B1) data span across a period of 6 months.

25 Note that this analysis refers to emergence rather than suppliance in obligatory contexts. I return to the latter below.

26 81 cases of BE are recorded, but 35 of them are free-standing ni, which children might use as a rote-learned form for “not”. I provided both counts above as I do not commit myself to whether these are “real” finite verbs or not.
we are left with only 10 lexemes (20 tokens) with overt PERS morphology. These are shown in Figure 4.5 below:

<table>
<thead>
<tr>
<th>Lexeme</th>
<th>Meaning</th>
<th>Example(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJAM</td>
<td>lay down/sleep</td>
<td>[spim; baby V]</td>
</tr>
<tr>
<td>AM</td>
<td>eat/bite</td>
<td>[grizem, jem\textsubscript{IMPERF}]</td>
</tr>
<tr>
<td>DAM</td>
<td>give</td>
<td>[spim; baby V]</td>
</tr>
<tr>
<td>IMAM</td>
<td>have</td>
<td>[spim; baby V]</td>
</tr>
<tr>
<td>LUPIS</td>
<td>peel</td>
<td>[olupiš\textsubscript{PERF}]</td>
</tr>
<tr>
<td>MAM</td>
<td>have</td>
<td>[coll. for imam]</td>
</tr>
<tr>
<td>MAS</td>
<td>have</td>
<td>[coll. for imaš]</td>
</tr>
<tr>
<td>NIMAM</td>
<td>not-have</td>
<td></td>
</tr>
<tr>
<td>PADAJO</td>
<td>fall</td>
<td></td>
</tr>
<tr>
<td>VIDIS</td>
<td>see</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.5: Verbs with overt (non-3S) person agreement inflection in the Kranjc A1 dataset

Examining the data in Figure 4.5 above, we can see that the 10 recorded lexemes come from 7 lemmas. 6 lexemes are in the 1\textsuperscript{st} person singular, 3 in the 2\textsuperscript{nd} person singular, and 1 in the 1\textsuperscript{st} person plural. 8 lexemes belong to the –am conjugation class and 2 to the –im class; no other classes are recorded at this early stage.

In sum, emergent verbs seem to be limited in number, form, and morphological class, and most of them (roughly 85%) come in three forms that are not overtly marked for PERS, namely IMP, BPART, and 3S. I analyze each in turn in regard to their morphophonological form, token and lemma distribution, conjugation class, and mini paradigms.

I turn to imperative forms first.

\textsuperscript{27} The number of tokens is listed in brackets preceding the gloss and the target form, if different from the child’s representation, is listed in square brackets following the gloss.
Figure 4.6 lists all imperatives found in the A1 dataset:

<table>
<thead>
<tr>
<th>Lexeme</th>
<th>Meaning</th>
<th>Lexeme</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJI....(3)</td>
<td>sleep_{imp.2stpers} [spi; baby V]</td>
<td>ODVIJ....(1)</td>
<td>unwrap_{imp.2stpers}</td>
</tr>
<tr>
<td>BEJZ....(9)</td>
<td>go away_{imp.2stpers}</td>
<td>PAZI....(2)</td>
<td>watch out_{imp.2stpers}</td>
</tr>
<tr>
<td>CAKI....(4)</td>
<td>wait_{imp.2stpers}</td>
<td>PEJT....(2)</td>
<td>go_{imp.2stpers}</td>
</tr>
<tr>
<td>CICI....(1)</td>
<td>sit_{imp.2stpers} [sedi; baby V]</td>
<td>PELJI....(3)</td>
<td>drive_{imp.2stpers}</td>
</tr>
<tr>
<td>DAJ.....(7)</td>
<td>give_{imp.2stpers}</td>
<td>PIJ.....(6)</td>
<td>drink_{imp.2stpers}</td>
</tr>
<tr>
<td>DEJ.....(81)</td>
<td>give_{imp.2stpers} [variant of daj]</td>
<td>PNI.....(1)</td>
<td>tie up_{imp.2stpers} [zapni]</td>
</tr>
<tr>
<td>GLEJ....(21)</td>
<td>look_{imp.2stpers}</td>
<td>POGLEJ....(4)</td>
<td>look_{imp.2stpers}</td>
</tr>
<tr>
<td>ISKI....(1)</td>
<td>look for_{imp.2stpers} [poišči_{perf}]</td>
<td>POKAKI....(2)</td>
<td>make pooh_{imp.2stpers}</td>
</tr>
<tr>
<td>JEJ.....(1)</td>
<td>eat_{imp.2stpers}</td>
<td>POKAZ......(1)</td>
<td>show_{imp.2stpers}</td>
</tr>
<tr>
<td>KAZ.....(1)</td>
<td>show_{imp.2stpers}</td>
<td>POKAZI....(3)</td>
<td>show_{imp.2stpers}</td>
</tr>
<tr>
<td>KAZI.....(1)</td>
<td>show_{imp.2stpers}</td>
<td>POMAGAJ....(8)</td>
<td>help_{imp.2stpers}</td>
</tr>
<tr>
<td>LEJ.....(408)</td>
<td>look_{imp.2stpers}</td>
<td>PRIMI......(1)</td>
<td>hold_{imp.2stpers}</td>
</tr>
<tr>
<td>MAGI....(8)</td>
<td>help_{imp.2stpers} [pomagi]</td>
<td>PUST......(3)</td>
<td>leave_{imp.2stpers}</td>
</tr>
<tr>
<td>MAKNI....(1)</td>
<td>move_{imp.2stpers} [premakni]</td>
<td>PUSTI.....(9)</td>
<td>leave_{imp.2stpers}</td>
</tr>
<tr>
<td>NEHAJ....(1)</td>
<td>stop_{imp.2stpers}</td>
<td>SKRIJ.....(3)</td>
<td>hide_{imp.2stpers}</td>
</tr>
<tr>
<td>NEHI.....(1)</td>
<td>stop_{imp.2stpers} [coll. for nehaj]</td>
<td>STISNI....(1)</td>
<td>squeeze_{imp.2stpers}</td>
</tr>
<tr>
<td>OBUJ.....(1)</td>
<td>put on (shoes)_{imp.2stpers}</td>
<td>VLECI.....(1)</td>
<td>pull_{imp.2stpers}</td>
</tr>
<tr>
<td>ODPRI....(1)</td>
<td>open_{imp.2stpers}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.6: Imperative lexemes in the Kranjc A1 dataset

27 lemmas and 35 lexemes bring about a total of 603 imperative tokens. These appear with both aspects (e.g., kaž(i)_{perf} vs. pokaž(i)_{perf}) and are generally context-based. Specifically, all but “help” are concrete, used only in specific pragmatic contexts.

Though very numerous and adultlike with respect to overt inflection (the suffix is morphophonologically correct in 99% of the cases), imperatives make a very weak case for the productivity of inflection. Two types of evidence may be in favor of such a position, the lemma/token ratio and the use of a single morphological inflection.

28 The data contain one negative infinitive with IMP force, an adultlike construction, which I do not include in the analysis below.
Consider the following graph:

![Graph showing distribution of verbs in early child Slovenian](image)

**Figure 4.7:** Most frequent imperatives in the Kranjc A1 dataset

433 tokens (or 72%) are derived from the verb *gledati*, “to look”, which comes in the forms of *glej*, *lej*, and *poglej* (*poglej* is perfective while *glej* and *lej* are imperfective, but there are no semantic differences between the two). If we add the tokens for *dati*, “to give”—the second most frequent imperative verb—we notice that 86% of all imperative verbs come from two lemmas only. From this perspective, there is little, if any, productivity of inflection.

Second, every single imperative carries the 2S inflection. There are no instances of dual or plural imperatives, not even

---

29 Many researchers, including some working in the generative paradigm, argue that highly-frequent imperatives such as “look” and “give” are merely rote-learned forms which appear in one person/number inflection only (Aguado-Orea, 2004; Salustri & Hyams, 2003). I believe that this may also be true for early Slovenian where the earliest imperatives are possibly rotes, used almost as interjections in appropriate (adultlike) pragmatic contexts that require imperative verbs.
with the two most common verbs.\textsuperscript{30} 2S appears on 27 lemmas, but the number of tokens is larger than 600. In other words, 22 tokens per lemma (on average) are simply repetitions of the same lexeme, scattered throughout the data. From this perspective the imperatives seem to be non-productive, too.\textsuperscript{31}

Let us now turn to past participles—the second most frequent form in child Slovenian.

There are 208 past participles in the A1 dataset, 201 of which are active and 7 passive. I concentrate on the active participles first and turn to the passive ones below. Past participles come in 39 lemmas, bringing about 82 lexemes and a total of 201 tokens.

Consider the figure below (note that an asterisk in front of the participle denotes an error of gender/number inflection; the exact errors in obligatory contexts are reported below in 4.4.4):

\begin{quote}
Based on the transcript alone, however, it is impossible to identify the target form for most imperative verbs as there is little, if any, information about the context.

Productivity, however, can be measured in two ways. One type of evidence comes from mini paradigms, the suppliance of different inflections on the same lemma (i.e., the presence of lexeme triples and quadruplets). This type is mainly advocated in Natural Morphology (e.g., Bittner et al., 2003; Gagarina, 2003) and constructivism (e.g., Goldberg, 1995), as noted above. A second type of evidence comes from the generalization of the same inflection on different verbs. This type is generally embraced by generativists (e.g., Guasti, 2002; Hyams, 2002 et seq.). I believe that both types are required, particularly in studies with a small(er) number of lemmas like ours. That is, some generativists may object to our claim that imperatives show no productivity since all of them carry 2S morphology. I leave this issue aside, particularly as I remain agnostic in regard to the exact representation of imperative clauses, which is still hotly debated in the literature, as noted in Chapter 3 above.
\end{quote}
**Figure 4.8:** Past participles in the Kranjc A1 dataset

Four types of evidence speak for great productivity of the past participle -l/-u inflection in early Slovenian.
First, with the exception of \( \text{papu}_{\text{PERF/SMASC}} \), a baby V for \( \text{jedu}_{\text{IMPERF/SMASC}} \), “eaten” and \( \text{pala}_{\text{PERF/SPFEM}} \), “fallen”, which make up 50 tokens, the tokens are quite evenly spread across various lexemes (unlike the imperatives where 80% of the tokens come from two lemmas only, as we saw above).

Second, past participles do not appear invariably in the singular since 15 lexemes (or 18.3%) carry the dual or plural inflection. Though this may be considered low, it is still much higher than in the case of non-3S verbs and imperatives, where dual and plural are virtually non-existent. In general, early Slovenian past participles show a variety of aspect and gender/number inflections.\(^{32}\)

Third, the ratio between the number of lemmas and the number of tokens is very low (roughly 1:5), suggesting that the participial inflection is found on many verbs and there is little repetition of the lexemes in the data (remember the lemmas vs. tokens ratio in imperatives was 1:22).

Fourth, participles appear with verbs that belong to all five conjugation classes: 9 lemmas (23.1%) refer to the most natural and transparent -a (-am) class, 10 lemmas (25.6%) to the -i (-im) class, 7 lemmas (18%) to the -jem class, 12 lemmas (30.8%) to the -em class, and 1 (2.5%) to the -e class.

Morphosyntactically, almost all participles appear without \( \text{AUXBE} \), which, in the adult language, is obligatory and carries

---

\(^{32}\) The dual number and the neuter gender are rare, which is a common characteristic of early grammars across nominal and verbal domains (see, for example, Fidler & Rus, 2007).
the person agreement information. Only 8 past participles (or 4%) in the entire data appear with AUXBE—2 with je₃SPASS, “is”, 2 with so₃PPASS, “are”, 2 with sem₁SPASS, “am”, 1 with boš₂SFUT, “will be”, and 1 with bo₃SFUT, “will be”.³³

Interestingly, some participles are non-adultlike with respect to lexical aspect (Aktionsart). Specifically, 14 lexemes (roughly 17%) are imperfective, lacking an overt perfective prefix, generally po-, na-, od-, and za-. Note that these prefixes are phonologically word-initial, unstressed syllables and that their omission is completely independent of the omission or commission of the gender/number suffix. Furthermore, some participles are not spelled-out entirely even though their lexical aspect and the inflection are adultlike. For example, participles like kil or kil (hidden_PERF_SMaC) and kila or skila (hidden_PERF_SFem), which in the adult forms are skril and skrila, respectively, show deficient phonology but adultlike lexical aspect and inflection (the aspect in this case is changed verb-medially, yielding a lengthened root, e.g., skrival_UmperpSMaC, skrivala_UmperpSFem).

There are a number of examples like these in the data, but they are all adultlike morphophonologically since the gender/number inflection is supplied correctly.³⁴

³³ None of the reported contexts requires a free-standing past participle (which is licit in certain marked contexts in adult Slovenian). As such, 96% of all past participial constructions in early Slovenian are non-adult from a syntactic perspective.

³⁴ This is why it is hard to resort to some phonotactic theory of inflection (e.g., Demuth, 1996, 2001, 2007). Slovenian children do not
Let us now turn to the 3S form. The following are all 3S present tense verbs that appear in the Kranjc A1 corpus, irrespective of the contexts they appear in (note that an asterisk denotes a conjugation class error):35:

<table>
<thead>
<tr>
<th>Verb</th>
<th>Morphology</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJA..(1)sleep</td>
<td>[spi; baby V]</td>
<td></td>
</tr>
<tr>
<td>*BRISA..(1)wipe off</td>
<td>[brišem]</td>
<td></td>
</tr>
<tr>
<td>CAKA..(1)wait</td>
<td>[smrdi]</td>
<td></td>
</tr>
<tr>
<td>DA......(2)give</td>
<td>[obesa]</td>
<td></td>
</tr>
<tr>
<td>DI......(1)stink</td>
<td>[smrdi]</td>
<td></td>
</tr>
<tr>
<td>DISI....(1)smell</td>
<td>[diši]</td>
<td></td>
</tr>
<tr>
<td>GLEDA....(3)look</td>
<td>[pade]</td>
<td></td>
</tr>
<tr>
<td>GREE......(6)go</td>
<td>[pše]</td>
<td></td>
</tr>
<tr>
<td>GE.......(8)go</td>
<td>[poje]</td>
<td></td>
</tr>
<tr>
<td>IGRA....(2)play</td>
<td>[šraufa]</td>
<td></td>
</tr>
<tr>
<td>IMA......(5)have</td>
<td>[pije; baby V]</td>
<td></td>
</tr>
<tr>
<td>JOKA..(8)cry</td>
<td>[pomaga]</td>
<td></td>
</tr>
<tr>
<td>KADI....(1)smoke</td>
<td>[kadi se]</td>
<td></td>
</tr>
<tr>
<td>KAKA....(6)pooh</td>
<td>[šraufa]</td>
<td></td>
</tr>
<tr>
<td>LAJA....(1)bark</td>
<td>[strga se]</td>
<td></td>
</tr>
<tr>
<td>LALA....(13 play, sing</td>
<td>[teče]</td>
<td></td>
</tr>
<tr>
<td>LULA....(10)pee</td>
<td>[brušem]</td>
<td></td>
</tr>
<tr>
<td>MA......(16)have</td>
<td>[obesa]</td>
<td></td>
</tr>
<tr>
<td>MAGA....(5)help</td>
<td>[inpri]</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.9:** 3S forms in the Kranjc A1 dataset

The A1 dataset contains 37 3S lexemes, which are derived from 26 lemmas. There are a total of 151 tokens, giving rise to the lemma vs. token ratio of roughly 1:6. This is slightly higher seem to be omitting participle inflection due to some phonotactic constraints as (i) while rarely omitted, inflection is sometimes missing regardless of whether Aktionsart information is adultlike or not, and (ii) even in cases where Aktionsart is erroneous due to a possible phonotactic filter (e.g., deletion of word-final, unstressed syllables), the gender/number inflection is generally adultlike.

35 3S generally appears before PARTs in most children but some show the opposite pattern. Note also that these data refer to the lemmatization data (surface forms) and can report only (obvious) conjugation class errors. I examine the 3S contexts and inflection errors in obligatory contexts below where I analyze the 3S form morphologically and syntactically.
than in the case of past participles (1:5) and much lower than in the case of imperatives (1:22), suggesting that the productivity of inflection in 3S forms is slightly lower than in the case of past participles and much greater than in the case of imperatives.

By far the most common verbs that appear in the 3S form are padati, “to fall”, lalati, a baby verb meaning “to play” or “to sing” (in the sense of electronic equipment such as a radio or voice recorder), lulati, “to pee”, ma, “to have” (coll. for ima), and vrteti se, “to roll”. These four verbs represent 40% of all 3S tokens. Lalati (lala) and vrteti se (ti, vrti) both refer to the researcher’s recording equipment during the investigation and are hence heavily influenced pragmatically (almost 20% of all verb tokens come from these two lemmas alone). In addition, the data contain 14 tokens (or 10% of all tokens) of the verb gre and its phonologically deficient counterpart ge, highly irregular and suppletive forms of iti, “to go”, and a large number of the verb imeti, “to have”. Ma, ima, and nima together contribute to 20% of all tokens.36

From an adult perspective, 21 3S lexemes (or roughly 60%) refer to the most frequent and largest –a (-am) class, 7 (roughly 20%) to the –i (-im) class, 1 (<1%) to the –jem class, 5 (roughly 15%) to the –em class, and none to the –e class. All this evidence suggests that the 3S form is a quite versatile form

36 Ma and ima are both used in colloquial speech, meaning “He/she has”, and nima is the negative counterpart of the same verb, formed by a cliticized ne, “not”, onto ima—a very rare type of morphological application in Slovenian, with only a few verbs exhibiting it).
found across various verb types and conjugation classes, further exhibiting almost no error in inflection.

Before I turn to the suppliance of PERS/NUM agreement in obligatory contexts and the analysis of the 3S form, I briefly describe the rest of the emergent forms that appear with very low, insignificant proportions in early Slovenian. The first forms are bare verb stems (BVs), incomplete BVs (IBVs), and infinitives (INFs).

The following is a list of these non-adult non-tensed and nonfinite forms from the A1 data:

<table>
<thead>
<tr>
<th>DAT.........(1)give&lt;sub&gt;INF&lt;/sub&gt;</th>
<th>DVIGNT........(1)lift&lt;sub&gt;INF&lt;/sub&gt;</th>
<th>DVIT............(2)unwrap&lt;sub&gt;INF&lt;/sub&gt;</th>
<th>KAK............(1)pooh&lt;sub&gt;IBV&lt;/sub&gt;</th>
<th>LO............(1)phone&lt;sub&gt;1stV&lt;/sub&gt;</th>
<th>PI.............(6)drink</th>
<th>PIT............(2)drink&lt;sub&gt;1stV&lt;/sub&gt;</th>
<th>POKA..........(1)show&lt;sub&gt;IBV&lt;/sub&gt;</th>
<th>PU.............(2)leave&lt;sub&gt;IBV&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAT........ (1)give&lt;sub&gt;INF&lt;/sub&gt;</td>
<td>DVIGNT........ (1)lift&lt;sub&gt;INF&lt;/sub&gt;</td>
<td>DVIT............ (2)unwrap&lt;sub&gt;INF&lt;/sub&gt;</td>
<td>KAK............ (1)pooh&lt;sub&gt;IBV&lt;/sub&gt;</td>
<td>LO............ (1)phone&lt;sub&gt;1stV&lt;/sub&gt;</td>
<td>PI............. (6)drink</td>
<td>PIT............ (2)drink&lt;sub&gt;1stV&lt;/sub&gt;</td>
<td>POKA.......... (1)show&lt;sub&gt;IBV&lt;/sub&gt;</td>
<td>PU............. (2)leave&lt;sub&gt;IBV&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

![Table](chart.png)

**Figure 4.10:** Bare verb stems and infinitives in the Kranjc A1 dataset

The data show that there are only 9 bare stems and root infinitives in the entire A1 dataset. They appear on 8 lemmas and 9 lexemes, yielding 17 tokens. Judging by these low lemma and lexeme tokens, we can conclude that although an RI phenomenon is manifested in early Slovenian grammar, it is a much more marginal phenomenon when compared to early Germanic or Romance (if we add the 17 BV, IBV, and INF tokens to the total number of tokens...
reported above, which excludes the BV, IBV, and INF tokens, these root nonfinites would only bring about 1.5% of all verb tokens).

As mentioned above, the data also contain a very small number of passive past participles (i.e., so-called -n/-t participles), which—just like the active participles—agree with the SUBJ DP and AUXBE. They represent only 0.6% of all tokens and are all bare (i.e., unsupported by AUXBE), but most appear with the correct gender/number inflection (see below).

For many usage-based theorists, one of the main indicators of productivity is the emergence of “true” mini paradigms (MPs)—at least three token types of the same lemma used in contrastive semantic contexts (Bittner et al. 2003; Gagarina, 2003; Katičić, 2003, but cf. Note 13 above). MPs arguably mark a child’s transition from a premorphological to a protomorphological stage or possibly the entrance to a protomorphological stage.

Apart from the verb BE, there are only 7 MPs that appear in the entire A1 dataset. They appear on the verbs ajati, “to sleep” (baby V), dati, “to give”, gledati, “to see/look”, piti, “to drink”, pasti, “to fall”, pomagati, “to help”, and vzeti, “to take”. Most other triplets and quadruplets only contain various gender/number forms of past participles; sometimes there are 4 or 5 lexeme members in a paradigm, but as many as 3 or 4 are active past participles. There is only one “true” MP with various forms across tenses and modalities (e.g., a 3S form, a non-3S present tense form, an imperative, and a participle of the same lemma)—it appears on the verb dati, “to give”.

174
Consider the following MPs:

<table>
<thead>
<tr>
<th>Lemma: aj-a-ti, “to sleep”</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AJA........sleep_3SPresIncPerf [spi; baby V]</td>
<td></td>
</tr>
<tr>
<td>AJAM........sleep_3SPresIncPerf [spim; baby V]</td>
<td></td>
</tr>
<tr>
<td>AJI........sleep_2SImPerf [spi; baby V]</td>
<td></td>
</tr>
<tr>
<td>AJU........slept_3PersPlAcc [spau; baby V]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lemma: d-a-ti, “to give”</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DA........give_1SPresIncPerf</td>
<td></td>
</tr>
<tr>
<td>DAI........give_2SImPerf</td>
<td></td>
</tr>
<tr>
<td>DAU........given_3PersAcc</td>
<td></td>
</tr>
<tr>
<td>DALA........given_3PersDom</td>
<td></td>
</tr>
<tr>
<td>DAM........given_1Pers</td>
<td></td>
</tr>
<tr>
<td>DAT........given_Inf</td>
<td></td>
</tr>
<tr>
<td>DEJ........give_2SImPerf</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lemma: gled-a-ti, “to see/look”</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GEDU........look_3PersAcc [gledu]</td>
<td></td>
</tr>
<tr>
<td>GLEDA........look_3SPresIncPerf</td>
<td></td>
</tr>
<tr>
<td>GLEJ........look_3SImPerf</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lemma: pomag-a-ti, “to help”</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MAGA........help_1SPresIncPerf [pomaga]</td>
<td></td>
</tr>
<tr>
<td>MAGI........help_2SImPerf [pomagi]</td>
<td></td>
</tr>
<tr>
<td>MAGU........help_3PersAcc [pomagu]</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.11**: Mini Paradigms in the Kranjc A1 dataset

Overall, there seem to be limited form–meaning distinction at the earliest stage of development and the inflected forms are generally only various instances of active past participles (from the production point of view, that is).

Let us now turn to the suppliance of person and non-person (number/gender) agreement in obligatory contexts. I examine the suppliance of inflection in the synthetic present tense, the suppliance of AUXBE in participle constructions, and the suppliance of COPBE—three environments that arguably yield
finiteness and require the application of person/number features rather than only number/gender features.

4.4.2 The Suppliance of Subject-Verb Agreement

4.4.2.1 The Present Tense System

Let us first look at the younger groups. The following table reports the suppliance of inflection in the present tense obligatory contexts (OCs) in A1 and B1 datasets:

<table>
<thead>
<tr>
<th></th>
<th>Pres Tense (A1)</th>
<th>Pres Tense (B1)</th>
<th>Pres Tense (A1 + B1)</th>
</tr>
</thead>
<tbody>
<tr>
<td># OCs</td>
<td>187</td>
<td>108</td>
<td>296</td>
</tr>
<tr>
<td># Correct</td>
<td>170</td>
<td>99</td>
<td>269</td>
</tr>
<tr>
<td>% Correct</td>
<td>91</td>
<td>91.7</td>
<td>90.9</td>
</tr>
<tr>
<td>% Error Rate₁</td>
<td>9</td>
<td>8.3</td>
<td>9.1</td>
</tr>
<tr>
<td>% Error Rate₂</td>
<td>3.7</td>
<td>4.6</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Figure 4.12: Suppliance of inflection in the present tense obligatory contexts in the Kranjc A1 dataset and Rus and Rogač B1 dataset

We see that when the present tense system is taken as a whole, the suppliance of inflection is very accurate, reaching more than 91% correct across the young groups when counting 3S=1S as errors and almost 96% correct when excluding such errors. The one-way ANOVA statistical test (with group as the independent

---

37 Error Rate₁ refers to all errors, including those of 3S forms being used unambiguously as 1S forms (3S=1S) when the child is referring to herself (e.g., a child says “Ima” (he/she has) for “Iman” (I have). Error Rate₂ is more conservative, excluding 3S=1S errors (i.e., counting 3S=1S as correct forms, as some researchers have argued; see below). Note also that cases where the entire predicate is missing are not counted. These account for 3%-4% of all errors in each dataset.
valuable and suppliance correct in obligatory contexts as the dependent valuable) shows that when all errors are considered, the two groups do not differ with respect to overt tense/agreement marking in the overall present tense marking with \( F(1,15)=.014; p=.907. \)

Although the error rates across the present tense system are very low in both groups, the behavior of errors is not the same in all PERS/NUM systems. Consider the figure below:

<table>
<thead>
<tr>
<th></th>
<th>Infl</th>
<th># OCs</th>
<th># Correct</th>
<th># Error</th>
<th>% Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1S</td>
<td>36</td>
<td>18</td>
<td>18</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>2S</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>3S</td>
<td>240</td>
<td>237</td>
<td>3</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>1P</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>3P</td>
<td>12</td>
<td>9</td>
<td>3</td>
<td>25.0</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.13**: Suppliance of inflection in the present tense obligatory contexts by person/number in the Kranjc A1 dataset and Rus and Rogač B1 dataset

The first thing that we notice about the data in Figure 4.13 is that there are no (obvious) dual obligatory contexts or recorded dual tokens and that (obvious) plural contexts (and tokens) are extremely rare, with the vast majority of tokens being 3S ones. However, the error rates show quite the opposite behavior: while the 3S system exhibits an error rate of 1.25%, the non-3S systems collectively yield various error rates ranging from 25% to 50% (averaging at 39.6%).
I carried out a paired samples t-test (pair: error rates in the 3S system and error rates in the non-3S systems) with a 95% confidence interval of the difference to compute whether the behavior of the errors in the 3S system is different from that of the non-3S system. The statistical test shows that the difference between two separate systems is statistically significant with $t(12)=-2.384$; 2-tailed $p=.030$ (mean=-1.23; std. deviation=2.14).

It is also interesting to examine the breakdown of errors. Consider the following data:

<table>
<thead>
<tr>
<th>DATASET</th>
<th>ERROR TYPE</th>
<th># ERRORS</th>
<th>% ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 (N=17)</td>
<td>BV</td>
<td>1</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>CONJ CLASS</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td></td>
<td>3S</td>
<td>13</td>
<td>76.5</td>
</tr>
<tr>
<td>B1 (N=9)</td>
<td>3S</td>
<td>9</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Figure 4.14**: Error types in the present tense system in the Kranjc A1 dataset and Rus and Rogač B1 dataset

The data show that 76.5% of all errors in A1 come in the form of 3S errors (either as omission errors in 1S contexts [84.6%] or omission errors in 2S/3P contexts [15.4%]). In B1, every single error involves a 3S form (either as an omission error in 1S contexts [60%] or omission error in 1P/3P contexts [40%]). Collapsed across both younger groups, 85.2% of all errors are 3S errors—88% of them are omission errors used in 1S contexts.

---

38 The three errors recorded in A1 described as “conjugation errors” refer to 3S forms that are correctly inflected as 3S tokens but in wrong conjugation classes.
Let us now turn to the suppliance of verb inflection in the present tense in the older two groups. Consider the data in Figure 4.15 below:

<table>
<thead>
<tr>
<th></th>
<th>Pres Tense (A2)</th>
<th>Pres Tense (B2)</th>
<th>Pres Tense (A2 + B2)</th>
</tr>
</thead>
<tbody>
<tr>
<td># OCs</td>
<td>1,060</td>
<td>177</td>
<td>1,237</td>
</tr>
<tr>
<td># Correct</td>
<td>990</td>
<td>169</td>
<td>1,159</td>
</tr>
<tr>
<td>% Correct</td>
<td>93.4</td>
<td>95.5</td>
<td>93.7</td>
</tr>
<tr>
<td>% Error Rate_1</td>
<td>6.6</td>
<td>4.5</td>
<td>6.3</td>
</tr>
<tr>
<td>% Error Rate_2</td>
<td>3.2</td>
<td>2.2</td>
<td>3</td>
</tr>
</tbody>
</table>

**Figure 4.15:** Suppliance of inflection in the present tense obligatory contexts in the Kranjc A2 dataset and Rusa and Rogač B2 dataset

Similarly to the data reported for the younger children, the suppliance of verb inflection is extremely high when the present tense is taken as a whole system—almost 94% across both groups when counting 3S=1S as errors and almost 97% correct when excluding 3S=1S errors.

The one-way ANOVA statistical test (with group as the independent valuable and suppliance correct in obligatory contexts as the dependent valuable) shows that when counting all errors, the two groups are not statistically different with respect to overt tense/agreement marking in the overall present tense system with $F(1,25)=3.462; p=.075$.\(^{39}\)

\(^{39}\) As we can see, the statistical tests indicate that although the two corpora include different groups of children, recorded in different daycare centers in different parts of Slovenia almost 15 years apart, the overall suppliance of tense/agreement inflection remains very similar for both age groups.
Note how the overall error rate decreases in the older groups, albeit slightly. Since it was established that when the same age groups are compared from both corpora, neither the younger nor the older groups are significantly different in regard to the suppliance of tense/agreement inflection, I carried out a one-way ANOVA with age group as the independent valuable (2x2 groups collapsed) and suppliance correct in obligatory contexts as the dependent variable. The result shows that suppliance in OCs is not statistically dependent on age with $F(1,42)=.165; p=.687$. This is not surprising due to a very high accuracy of the suppliance of inflection in the two younger groups.

Examining the breakdown of the use and suppliance of verb inflection in the two older groups we get the following result:

<table>
<thead>
<tr>
<th>Inf1</th>
<th># OCs</th>
<th># Correct</th>
<th># Error</th>
<th>% Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1S</td>
<td>404</td>
<td>355</td>
<td>49</td>
<td>12.13</td>
</tr>
<tr>
<td>2S</td>
<td>154</td>
<td>146</td>
<td>8</td>
<td>5.19</td>
</tr>
<tr>
<td>3S</td>
<td>547</td>
<td>542</td>
<td>5</td>
<td>0.91</td>
</tr>
<tr>
<td>1D</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>37.50</td>
</tr>
<tr>
<td>2D</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>66.67</td>
</tr>
<tr>
<td>1P</td>
<td>77</td>
<td>72</td>
<td>5</td>
<td>6.49</td>
</tr>
<tr>
<td>2P</td>
<td>9</td>
<td>8</td>
<td>1</td>
<td>11.1</td>
</tr>
<tr>
<td>3P</td>
<td>32</td>
<td>29</td>
<td>3</td>
<td>9.38</td>
</tr>
</tbody>
</table>

Figure 4.16: Suppliance of inflection in the present tense obligatory contexts by person/number in the Kranjc A2 dataset and Rus and Rogač B2 dataset
The data and error distribution in the older groups are strikingly similar to those in the younger groups: there are very limited OCs and tokens in the dual system and many fewer OCs and tokens in the plural than in the singular. Furthermore, most tokens are—again—3S ones, though the ratio between the 3S and non-3S tokens is different in the older groups, with non-3S forms actually having an advantage over the 3S ones. Specifically, in the younger groups, there are only .13 tokens for every 3S token, while there are 1.1 tokens per each 3S token in the older groups.

A paired samples t-test with a 95% confidence interval of the difference shows that the difference between the error rates in the 3S system and the ones in non-3S systems in the older groups is statistically significant with \( t(25) = -3.64 \); 2-tailed \( p = .001 \) (mean = -2.54; std. deviation = 3.55)—a similar result that was obtained for the younger groups.

Examining the breakdown of errors in the older groups, we get the following result:

<table>
<thead>
<tr>
<th>DATASET</th>
<th>ERROR TYPE</th>
<th># ERRORS</th>
<th>% ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2 (N=70)</td>
<td>BV</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>RI</td>
<td>12</td>
<td>17.1</td>
</tr>
<tr>
<td></td>
<td>CONJ CLASS</td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>WRONG INFL</td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>3S</td>
<td>51</td>
<td>72.9</td>
</tr>
<tr>
<td>B2 (N=8)</td>
<td>RI</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>CONJ CLASS</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>3S</td>
<td>6</td>
<td>75</td>
</tr>
</tbody>
</table>

**Figure 4.17**: Error types in the present tense system in the Kranjč A2 dataset and Rus and Rogač B2 dataset
Figure 4.17 shows that besides 3S, wrong inflection, and BV errors, RIs also appear as errors in the older groups. Though this may come as surprising, it might simply be a consequence of much denser data. Another, more probable explanation would be that these RIs are used as adultlike modal structures with missing auxiliaries (e.g., Pticaḥnom jesti INF, or “The bird to eat” may stand for Ptica hoče jesti, “The bird wants to eat”).

Consider a couple of 3S=1S errors from the older groups (with the verbs in bold type in italics):

(1)
(a) Ne da. [holding a piece of candy] not give3SPRES “I’m not giving it (to you)” (Blaž; 2;3)
(b) Jes mam kocke. [pause] Jes ma. [holding pieces of Lego’s] have1SPRES cubesAccPFEM I have3SPRES “I have Lego’s, I do” (Miro; 2;5)
(c) Mamici jest nik. (=Pri mamici imam dežnik) MotherLoc5FEM I umbrellaAccMASC have3SPRES “I have an umbrella at my mother’s” (Nika; 2;7)

In all three utterances in (1) above, the child should have supplied the 1S form rather than the 3S form (note the use of 3S even with the application of 1S subject pronoun and the correct 1S form in the preceding utterance). Though such errors peter out with age, they are still sometimes found in the data coming from children older than 2;5.

To sum up, the 3S system in the older groups exhibits virtually no errors (the error rate is <1%), while the non-3S systems show errors ranging between 6% and 66%, averaging at 21.2%. Although this result does not reflect adultlike
performance yet, it is much better than the result reported for the younger children. Further, roughly 75% of all errors across the older groups involve a 3S in non-3S contexts. Although this is 10% lower than in the younger groups, 3S overgeneralization/underspecification remains the most frequent error even beyond age 2;5.

4.4.2.2 Copula and Auxiliary BE

Let us now turn to the suppliance of COPBE and AUXBE. In the A1 dataset, the verb BE appears in 9 different lexemes that yield 46 tokens. Apart from these, the form ni, “not-be”, brings about 35 tokens (34 ni [3S] and 1 nisi [2S]). The figure below reports the lemmatization result for all tokens of BE from the Kranjc A1 dataset (with the number of tokens and their function listed in brackets after the gloss):

<table>
<thead>
<tr>
<th>Lemma</th>
<th>Function</th>
<th>Tokens</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI ..........</td>
<td>be\textsubscript{COND}</td>
<td>(1 AUXBE)</td>
</tr>
<tr>
<td>BO ..........</td>
<td>be\textsubscript{1SP Fut}</td>
<td>(1 AUXBE, 11 COPBE)</td>
</tr>
<tr>
<td>BOS ..........</td>
<td>be\textsubscript{2SP Fut} [boš]</td>
<td>(1 AUXBE)</td>
</tr>
<tr>
<td>JE ..........</td>
<td>be\textsubscript{3SP Res}</td>
<td>(2 AUXBE, 17 COPBE)</td>
</tr>
<tr>
<td>NI ..........</td>
<td>not-be\textsubscript{1SP Res}</td>
<td>(34 COPBE)</td>
</tr>
<tr>
<td>*NISI .......</td>
<td>not-be\textsubscript{2SP Res} [ni\textsubscript{3SP Res}]</td>
<td>(1 COPBE)</td>
</tr>
<tr>
<td>SEM ..........</td>
<td>be\textsubscript{1SP Res}</td>
<td>(2 AUXBE)</td>
</tr>
<tr>
<td>SI ..........</td>
<td>be\textsubscript{1SP Res}</td>
<td>(1 COPBE)</td>
</tr>
<tr>
<td>SO ..........</td>
<td>be\textsubscript{3SP Res}</td>
<td>(2 AUXBE, 7 COPBE)</td>
</tr>
</tbody>
</table>

Figure 4.18: Tokens of BE in the Kranjc A1 corpus

40 Remember that I argued above that ni may be taken as a (rote-learned) negative particle rather than an adultlike form of the prefix ne that has cliticized to be.
Slovenian *BE* is highly irregular and suppletive with the entire paradigm containing 21 forms. As many as 9 of these (or 42%) are recorded in the earliest utterances. There are no instances of dual tokens, neither in the affirmative nor in the negative. Besides *ni*, the most common forms are *je*, “is” and *bo*, “will be”.

Let us examine the omission of *BE* now. The following figure reports the success of suppliance of COPBE in the Kranjc A1 corpus:

<table>
<thead>
<tr>
<th>CHILD</th>
<th>COPBE OCs</th>
<th>CORRECT</th>
<th>% CORRECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dejan</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gordana</td>
<td>8</td>
<td>5</td>
<td>62.5</td>
</tr>
<tr>
<td>Kaja</td>
<td>1</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Katka</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Katja</td>
<td>74</td>
<td>40</td>
<td>54</td>
</tr>
<tr>
<td>Lenart</td>
<td>51</td>
<td>17</td>
<td>33.3</td>
</tr>
<tr>
<td>Maruša</td>
<td>4</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Pavle</td>
<td>2</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Sara</td>
<td>3</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Tomaž</td>
<td>9</td>
<td>2</td>
<td>22.2</td>
</tr>
<tr>
<td>Vesna</td>
<td>14</td>
<td>5</td>
<td>35.7</td>
</tr>
<tr>
<td>Žiga</td>
<td>2</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>TOTAL/avg.</td>
<td>176</td>
<td>74</td>
<td>42</td>
</tr>
</tbody>
</table>

**Figure 4.19:** Suppliance of COPBE in the Kranjc A1 dataset

The data show that the rate of percentage correct in the COPBE system in the A1 corpus ranges between 0% and 100%, with an average rate of 42% correct across the 12 children whose data contain COPBE OCs. 99% of all COPBE errors are omission errors and every single error of omission refers to the 3S context.
If we add the 96% omission rate in the AUXBE system in constructions with past participles reported above, finite BE (in either COP or AUX function) gets omitted 77% of the time across all BE contexts.

From this quantitative result, we can conclude that finite BE is initially not morphophonologically supplied reliably.\(^{41}\)

For comparison, consider the suppliance of COPBE in the B2 corpus, the older group from the Rus and Rogač data:

<table>
<thead>
<tr>
<th>CHILD</th>
<th>COPBE OCs</th>
<th>CORRECT</th>
<th>% CORRECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex</td>
<td>18</td>
<td>12</td>
<td>66.7</td>
</tr>
<tr>
<td>Anja</td>
<td>12</td>
<td>10</td>
<td>83.3</td>
</tr>
<tr>
<td>Jure</td>
<td>5</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Luka</td>
<td>4</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>Maja</td>
<td>8</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>Miro</td>
<td>7</td>
<td>5</td>
<td>71.4</td>
</tr>
<tr>
<td>Suzi</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Tina</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Tomi</td>
<td>4</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>TOTAL/avg.</td>
<td>65</td>
<td>50</td>
<td>77</td>
</tr>
</tbody>
</table>

Figure 4.20: Suppliance of COPBE in the Rus and Rogač B2 dataset

\(^{41}\) Note, however, that although the average performance in regard to surface morphophonology in the COPBE system is below chance, finiteness-carrying COPBE must be accommodated morphosyntactically somehow. In other words, 42% of correct use is too high to suggest that all such forms are rotes. Further, note that children use as many as 9 different lexemes in a matter of 6 months or so, suggesting that BE is productive at this early stage. Thus, it is safe to conclude that the syntax must represent the copula’s corresponding functional category—FIN in our system—even though inflection is not adultlike morphophonologically. It is not entirely clear why the AUXBE shows much higher error rates than COPBE and I leave this issue aside. However, I would even go as far as to suggest that even 77% omission error in all BE contexts cannot be taken as clear evidence against the emergence/development of the functional category associated with BE when the number of the lexemes of BE in child’s grammar is so high.
Similarly to the result in the younger group, almost all errors of COPBE are those of omission (62 or 95.4%), although they are no longer limited to 3S contexts only. Specifically, the errors in the B2 dataset are those of omission of 2S si (2 or 3.2%), 1P smo (1 or 2.6%), and 3P so (4 or 6.4%). The rest of omission errors (roughly 88%) are omissions in 3S contexts.

An interesting phenomenon in regard to the supplian ce of COPBE is that of variability. That is, while some children’s COPBE marking is 100% correct, some supply it at chance or even below chance. COPBE omission reaches an extreme in the case of two children from the A1 corpus who do not supply a single COPBE in OCs. In sum, there is a lot of variability within and across children.

The AUXBE system in the older groups shows a similar pattern: supplian ce is variable, ranging from 62% to 100% correct, averaging at 86% correct.

4.4.2.3 Overt Finiteness Marking and the Gradualness Effect

The gradualness effect can be observed across the board in the data. For example, it was reported above that the error rates in the COPBE system decrease with age considerably (the average percent correct in the B2 group is 35% higher than in the A1 group). The same result was reported in the AUXBE system: while the children in the A1 group only supply 4 cases of AUXBE correctly (2%), the children in the B2 group supply 87% of all
AUXBEs. Last but not least, a very similar pattern was observed in the context of non-3S present tense forms. Both older groups outperform the younger groups on verb inflection marking when the entire present tense system is considered although there is no statistically significant difference between the age groups. However, we saw that in non-3S contexts, the behavior of 3S errors is significantly different from that of non-3S errors: while the 3S contexts yield error rates between 0.9% and 1.2%, non-3S contexts show variable error rates, ranging from 6% to 66%, averaging at 58% for the younger groups and 23% for the older groups.

The following data summarize the performance on the suppliance of overt inflection in the above-mentioned finiteness-related systems, i.e., non-3S present, COPBE, and AUXBE:

<table>
<thead>
<tr>
<th></th>
<th>YOUNGER (A1+B1)</th>
<th>OLDER (A2+B2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-3S PRES TENSE</td>
<td>39.6</td>
<td>28.3</td>
</tr>
<tr>
<td>COPBE</td>
<td>56.9</td>
<td>20.5</td>
</tr>
<tr>
<td>AUXBE</td>
<td>90.5</td>
<td>14</td>
</tr>
</tbody>
</table>

**Figure 4.21**: The gradualness effect in overt finiteness marking in child Slovenian

We see how pronounced the gradualness effect is throughout the grammatical systems that exhibit overt finiteness marking. When comparing the success rate of the suppliance of overt inflection in the older groups with that of the younger groups, the statistical tests show that all three relationships are statistically significant. Specifically, the one-way ANOVA tests
show that the older groups perform significantly better on COPBE with $F(1,39)=53.495$ (p<.001), significantly better on AUXBE with $F(1,36)=529.865$ (p<.001), and significantly better on non-3S present tense with $F(1,33)=6.904$ (p=.013).

At the same time, we see that the older children still do not perform at a rate of 90%+, an average error rate across the three environments being 19.6%.  

4.4.3 Early 3S as the Complex Bare Verb Form

4.4.3.1 Additional Morphophonological Evidence

The variability biolinguistic model of development relying on the Inflectional Hierarchy Complexity Hypothesis (IHCH) predicts that with respect to the acquisition of verbal morphology the earliest verb forms will be those with no or minimal morphology since children at this stage cannot reliably compute morphology at high(er) syntactic levels. As for child Slovenian, the best candidate for such a “minimal” form is the 3S form, devoid of all tense/person agreement marking, containing

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42 There are a couple of striking differences between the two age groups with respect to inflection. First, in as few as 10 utterances, we find the application of both 1S and 2S present tense verbs in the older children, while these are almost always missing in the younger children, as we saw above. Second, almost all past participles in the older children appear with AUXBE rather than as bare (BPART). Third, some past participles in the older child appear with non-S number marking, including dual. In sum, person agreement marking seems to be much more reliable in older children. Interestingly, though, the AUXBE system in the older groups seems to be more reliable than COPBE and non-3S present tense while AUXs are virtually non-existent in the younger groups. It is hard to say what exactly would contribute to this disparity considering the fact that the AUX forms are morphologically the same as the ones for COPBE and that they arguably occupy the same syntactic position. I leave this issue aside in the present work.
only a thematic vowel that carries the information on the verb’s conjugation class (hence, a complex bare verb; CBV).

This hypothesis is motivated by the robust evidence reported above. First, in both age groups, most verb tokens are 3S verb forms (almost 90% across the younger groups and almost 50% across the older groups)—this is seen also in mini paradigms which never contain any other present tense form but the 3S. Second, the 3S system in both age groups exhibits a negligible error rate (1.25% across the younger groups and <1% across the older groups), while the non-3S systems exhibit error rates of up to 60% (averaging at roughly 40% across the younger groups and 20% across the older groups). Third, most of the errors in both age groups are 3S errors—85% and 75% across the younger and older groups, respectively; roughly only some 15% of these 3S forms are misapplication errors (the rest are all omissions). Fourth, the statistical tests show that the behavior of 3S errors is significantly different from the behavior of errors in the non-3S systems in both age groups. Fifth, in the older groups, substitution errors do not involve only the 3S form but also other forms, although 3S remains to be the most common omission and substitution error across all person/number systems. Last but not least, 3S remains the most frequent error even beyond age 2;5 when the verbal inflectional system is acquired at a rate of 80%-90%.

All this empirical evidence is supported by rigorous lemmatization and frequency counts as well as various statistical
analyses. However, one might argue that this evidence still does not suffice to motivate the hypothesis that 3S is a CBV since the 3S rates are reported merely for child speech and are not compared to some standard thresholds found in child-directed and adult-directed speech.

As such, I turn to an additional morphological piece of evidence based on the comparison of frequency rates of present tense tokens, which speaks in favor of the hypothesis that 3S indeed acts as the initial form that is supplied when children cannot compute the morphology associated with high(er) syntactic branches (i.e., as a default, overgeneralized form).\(^{43}\)

When the verb system is taken as a whole, 3S forms represent 18% of all verbs in the younger groups and 13% in the older groups. Within the present tense system alone, as much as 88% of the forms are 3S across the younger groups and roughly 47% are 3S across the older groups. In child-directed Speech (CDS) 3S represents roughly 9% of all verb tokens in the younger (A2) group and roughly 6% of all tokens in the older (B2) group. Within the present tense system alone, CDS contains roughly 50% of 3S forms in the younger group and 47% in the older group.

\(^{43}\) The frequency rates for Adult-Directed Speech (ADS) were calculated based on the token frequencies found in the one million-word corpus of written texts (http://bos.zrc-sazu.si/gradivo.html), part of a larger project called Frida (www.frida.net). This is the only publicly available lemmatized corpus of Slovenian and although not ideal for our purposes for it is a written corpus, it serves as a rough guide to verb frequencies in ADS. The corpus comprises a collection of works of Slovenian and translated foreign fiction and Slovenian non-fiction (newspapers, magazines).
The following figure illustrates the frequency rates for 3S and non-3S tokens in CDS, ADS, and child speech (CS), calculated over all verb tokens in the present indicative tense:

<table>
<thead>
<tr>
<th>Infl (PRES)</th>
<th>CDS YOUNGER</th>
<th>CDS OLDER</th>
<th>ADS YOUNGER</th>
<th>ADS OLDER</th>
<th>CS YOUNGER</th>
<th>CS OLDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>3S</td>
<td>50.3%</td>
<td>47.4%</td>
<td>53%</td>
<td>88%</td>
<td>46.8%</td>
<td></td>
</tr>
<tr>
<td>NON-3S</td>
<td>49.7%</td>
<td>52.6%</td>
<td>47%</td>
<td>12%</td>
<td>53.2%</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.22:** Frequency rates of 3S and non-3S forms in child, child-directed, and adult-directed speech in Slovenian

The data in Figure 4.22 above show that while the older children’s frequency rates approximate those found in both CDS and ADS, the younger children’s data comprise many more tokens of 3S and many fewer examples of non-3S forms—exactly as predicted by our model. Specifically, the 3S system in younger children shows roughly a 40% higher rate than that found in CDS and ADS, while the non-3S tokens (collectively) show roughly 40% lower rates than those reported for CDS and ADS.

I broke down the token frequencies of the present tense forms in CDS and ADS by PERS/NUM cell so that they could be compared to the previously-computed frequencies of different present tense tokens. The result is shown below (note that this refers to surface forms rather than token frequency in OCs):
The same trend is observed in the majority of the PERS/NUM subsystems. That is, while the older children’s frequency rates resemble those computed for CDS and ADS in most contexts, young children lag behind their older peers and adults a great deal, showing no dual tokens and hardly any plural tokens.44

Given this evidence, it is again safe to conclude that 3S in CS (in the younger groups) behaves very differently than it does in CDS and ADS even in regard to surface token frequency.

Since it has been established that 3S in very young children behaves differently morphophonologically and frequency-wise from 3S in older children, CDS, and ADS, and is arguably analyzed as a CBV rather than a “real”, finite 3S form, then one would expect to find syntactic differences between emergent

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44 Note that these rates refer to distribution only and are not related to the success of application in obligatory contexts.
(early) 3S forms and later, adultlike 3S forms. Let us see if this hypothesis holds.

### 4.4.3.2 Morphosyntactic Evidence

The previous chapter analyzed verb inflection as argument-verb agreement in four different clausal domains (base—lexical—temporal/aspectual—finite/PERS-based), which yielded a syntactic structure of VP—vP—TNSP—FINP—FP. It was suggested that finite clauses must contain a FIN domain above the temporal one (TNS) and that the morphological expression of tense in the TNS domain does not suffice for finiteness nor subject case checking. Clauses with both tense and PERS agreement were argued to be FINPs (or more [i.e., FPs]) when additional functional heads are postulated in structures with fronted participles, focused and topicalized DPs, and pre-verbal pronominal clitics.

Structure was judged in regard to word order, the presence of overt verb inflection, AUXBE/COPBE, the arguments and the case they bear, and adverbials. It was established that NOM-marked SUBJ DPs, pre-verbal/preposed pronominal clitics, AUXBE/COPBE, FIN-related adverbs, and pre-verbal topicalized XPs (e.g., preposed object DPs, topicalized subject DPs) represent the morphophonological material that implies the presence of finiteness-related syntactic positions in Slovenian.\(^{45}\)

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\(^{45}\) As mentioned in the previous chapter, Slovenian is a typical pro-drop system and the presence of NOM-marked SUBJs may serve as a weaker test
The following figure shows the frequency rates of morphophonological 3S forms in the above-mentioned phrase marker positions in both age groups (A1+B1 vs. A2+B2):

<table>
<thead>
<tr>
<th></th>
<th>NOM SUBJ DP</th>
<th>PRE-V PRON CL</th>
<th>FIN ADV</th>
<th>Wh</th>
<th>FP</th>
</tr>
</thead>
<tbody>
<tr>
<td>3S/CBV (YOUNGER)</td>
<td>17.8%</td>
<td>0</td>
<td>0</td>
<td>1.9%</td>
<td>3.8%</td>
</tr>
<tr>
<td>3S/CBV (OLDER)</td>
<td>46.5%</td>
<td>3.8%</td>
<td>0</td>
<td>7.45</td>
<td>14.1%</td>
</tr>
</tbody>
</table>

**Figure 4.24:** Frequency rates of agreement-related syntactic environments of 3S forms in child Slovenian

It was reported above that 3S behaves differently in the younger groups when compared to the older groups in regard to the error rates, error types, and token frequency. It is now also evident that the morphological 3S forms in the younger groups behave differently from the 3S forms in the older groups syntactically. Specifically, the data show that even when the presence of subjects is considered, only 19.2% of all 3S/CBV constructions (i.e., utterances that contain a 3S/CBV form and

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for finiteness, especially if the SUBJ is in the form of a proper name. Further, SUBJ DPs may appear in positions lower than (Spec, FINP), as generally entertained by discontinuity studies, advocating the “no functional categories initially” view. Note also the notation and abbreviations: PRE-V PRON CL: a verb with a pre-verbal pronominal clitic, presumably located above TNSP; FIN ADV: a verb accompanied by a “high” adverb, presumably accommodated in FINP; FP: a verb with some pre-verbal material, generally an object DP, arguably denoting focus or topic above FINP (sometimes even in the presence of overt NOM-marked subject), bringing about a non-neutral reading where the object receives stress.

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46 Note that these morphosyntactic characteristics are independent of each other and two or more can co-occur (i.e., the figures within each age group above are reported cumulatively rather than comparatively). Note also that this refers only to the overtly expressed verb tokens that are supplied correctly in child the data.
any optional material that precedes or follows the verb) contain at least one finiteness-related marker.

In the older groups, however, the proportion of 3S (CBV) forms is as high as 58.6%, when considering the subjects and 22.25% when excluding them.

Overall, this may further suggest that the vast majority of the earliest morphological 3S form represents the minimal, nonfinite, default form (=CBV), while some 12-18 months later, many of these forms become “real”, finite 3S forms, as hypothesized.47

Examining the subjects only, one can see that the older children use almost 3 times more subjects in 3S/CBV constructions than the younger children. The subjects that children use are also qualitatively different when the age groups are compared: 81.4% of all subjects in 3S contexts in the younger groups are proper nouns (in the form of the children’s first names), while the rest (19.6%) are the following subjects: “mummy”, “daddy”, “uncle/man”, “rain”, “puppy”, “chicken”, “moon”, “mouse”, “stick”, and “bag”. Overt subjects appear only with six different verbs across both data sets from the younger children (*delati*, “to work/do”, *imetí*, “to have”, *sijati*, “to shine”, *priti*, “to

---

47 Although many morphological 3S forms are, of course, ambiguous when used with no preceding or following material and only some 23% of the 3S utterances can be proven clearly to be syntactically finite/PERS-related in the older groups (60% if considering the presence of subjects), the trend is pretty transparent. Further, as noted above, these rates are much too high to simply ignore them and take them as evidence for non-adultlike morphosyntax. That is, grammar needs to accommodate these utterances in regard to “high” functional categories and the features associated with them.
come/arrive”, reći, “to say”, and padati, “to fall” [also used with the noun dež, “rain”]). There are no pronominal subjects in 3S/CBV constructions in the younger children. In the older groups, however, 38.8% of the subjects appear as first names and roughly 11% of subjects are pronominal. 50.2% of the subjects are semantically different DPs such as “mouse”, “cake”, “snowman”, “lollypop”, “cream”, “hand”, “clock”, “battery”, “arm/hand”, etc. Overt subjects appear with as many as 24 different verbs.

The data also show that there are no pre-verbal pronominal clitics in the utterances containing 3S/CBV forms in the data from younger children, but are recorded in the older children, albeit with a low frequency. Ga, “him” (accusative, masculine), and jo, “her” (accusative, feminine) are the only clitics used.

Finiteness-related, (or “high”) adverbs are not recorded in neither age group. The most common adverbials that appear in morphological 3S constructions are simple locatives such as tuki/tu, “here” and tam, “there”, followed by frequency adverbs such as včasih, “sometimes” or vedno/zmeri (coll.), “always”.

Last but not least, wh-questions containing morphophonological 3S forms are hardly ever recorded among the very young children but appear in 8% of all 3S utterances in the older children. Interestingly, the presence of wh does not seem to be correlated with subject use, with roughly 35% of wh-constructions containing a subject among the very young children and 45% of the same constructions containing a subject among the older children. Furthermore, the only two verbs that appear in
wh-constructions in the younger children’s data are delati, “to work/do” and imeti, “to have”, while in the older groups, wh appears with 8 verbs in the 3S form.48

All this evidence suggests that there are both quantitative and qualitative differences between the syntactic structure of 3S forms in the older children when compared to those of the younger children.

The examples in (2) below show the morphophonological spell-out of some of the 3S constructions that contain the above-mentioned finiteness-related markers in the older children:

(2)
(a) Tornjak smrdi. [adult: Tovornjak smrdi]
truckSMASCNom stink3SPRES
“The truck stinks.” (Nika; 2;6)
(b) Mene cuka Alen. [neutral reading: Alen me cuka]
meSMASCACC pull3SPRES AlenSMASCNom
“Alen is pulling my hair” (Žiga; 2;2)
(c) Kaj dela miška?
WhatACC do3SPRES mouseSFEMNomDIN
“What does the small mouse do?” (Nika; 2;6)
(d) Kaj ma to?
WhatACC have3SPRES thisSMASCNom
“What does he have?” (Alen; 2;2)
(e) Kaj ta koza dela? [neutral reading: Kaj dela ta
WhatSACC thisSFNM goatSFEMNom do3SPRES koza?]
“What does this goat do/say?” (Iztok; 2;2)

48 Note that since wh-utterances in the 3S system are extremely scarce and used with only two verbs by the very young children, it might be that they are rote-learned (and represented in vP). However, these verb forms must be accommodated morphosyntactically higher among the older children, especially when they appear with subject DPs. In the absence of subjects, though, it is unclear whether such structures are FPs—with a wh-phrase in [Spec, FP] and the verb in FIN—or less, in which case a wh-phrase would be accommodated in any (lower) Specifier position and the verb would not be finite. However, when the subject DP is present, one would have to assume that these utterances are FPs. As noted above, several finiteness criteria are considered in regard to 3S forms, particularly the presence of subjects, topicalized subjects, and preposed objects—all implying the presence of the left periphery.
(f) Ahaha dela koza. [neutral reading: Koza dela ‘...’]

ahahaACC do3SPRES goatSFemNom

“The goat says ‘ahaha’.”

(Iztok; 2;2)

(g) Kemo Roki ma. [neutral reading: Rok ima kremo]

CreamSFemAcc RokSMascNomDirect have3SPRES

“It’s cream that Rok has”

(Rok; 2;2)

(2a)—syntactically presumably a FINP—is a simple utterance containing a NOM-marked SUBJ DP and a 3S verb. (2b), arguably an FP, shows a focused DP in the form of a long (pre-verbal) clitic (mene), followed by a 3S verb and a NOM-marked SUBJ DP. (2c) and (2d), arguably FPs, show a wh-construction with an inverted (interrogative) word order of a 3S verb followed by a NOM-marked SUBJ DP. (2e) is also a wh-question but contains a focused SUBJ DP (ta koza), yielding the contrastive reading of “(and) what does that goat do” (as opposed to “this goat”, for example). The child immediately provides an answer to his question by using a pre-verbal (focused) object DP, followed by a 3S verb and a NOM-marked SUBJ DP—arguably a FP, again (2f). Finally, (2g) contains a focused OBJ DP (kremo), followed by a NOM-marked SUBJ DP and a 3S verb—a marked application of word order—since in adult Slovenian, the SUBJ and the verb positions are reversed.

The lack of sentences such as the ones listed in (2) above in the very young children provides strong evidence for our hypothesis that the majority of earliest 3S forms are indeed CBVs while in the older groups, these are fully-realized finite 3S forms. Further, the examples in (2) above suggest that (older) Slovenian children’s grammatical systems show rich syntactic
structures that can express various contrastive and marked word orders, presumably accommodated in the left periphery above FINP, already at the age of 2;2 or so.49

The last piece of evidence for the variability model resting on the IHCH that I turn to is the idea of “more is less” with respect to morphophonological spell-out. In the present context, this would mean that morphophonology should be supplied more often/reliably at the level of vP (morphophonologically CBV) than at the level of TNSP (morphophonologically past PART), which, in turn, is supplied more reliably than the verbs at the level of FINP (morphologically fully-realized utterances that contain person agreement).

4.4.4 The Inflectional Hierarchy Complexity Hypothesis and the Syntax of Early Slovenian Verbs

4.4.4.1 The Gradedness Effect

The IHCH predicts a graded pattern of the suppliance of inflection where “higher is more difficult”. Specifically, since initially children do not reliably mark person agreement, children’s utterances are predicted to surface mainly as BVs and CBVs (in the case of finite verb constructions) and BPARTs (in

49 If we add the above-reported morphological evidence on subject-verb agreement, we can claim that although morphophonologically even the older children do not exhibit quite adultlike morphophonological performance, the children’s grammatical systems possess a great range of syntactic categories and the related syntactic positions—they do not only accommodate finiteness (person agreement) but also left periphery phenomena such as focus and topic.
the case of compositional constructions in past and future tenses). As the computation of morphophonology is more reliable, children start marking computationally costlier forms in the higher levels of phrase structure more successfully, most notably person agreement, which morphophonologically appears as the presence of AUXBE, COPBE, and overt person agreement inflection on non-3S verbs (all arguably handled in FINP), and later also the forms associated with various domains beyond FINP (e.g., preposed object DPs, topicalized subject DPs, etc., arguably located in the left periphery).

Such a probabilistic morphophonological hierarchical pattern is postulated throughout early development rather than only at the onset of acquisition. That is, in intermediate stages between premorphology and protomorphology, children’s verb forms are predicted to alternate between correct and wrong forms, statistically showing the “more is less” effect (i.e., hence not an all-or-nothing behaviour but rather one of variability).

In order to empirically test the gradedness effect of the IHCH, I performed a meta analysis of the above-reported error rates of various verb forms that are arguably located at various morphosyntactic levels and further computed the error rates for the past participles, not yet reported above. The result is presented in Figure 4.25 below (data collapsed across age groups, 2X2):
<table>
<thead>
<tr>
<th></th>
<th>A1+B1</th>
<th></th>
<th>A2+B2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FIN AUXBE</td>
<td>96</td>
<td>64.5</td>
<td>14</td>
<td>19.4</td>
</tr>
<tr>
<td>FIN COPBE</td>
<td>58</td>
<td>77</td>
<td>23</td>
<td>18.5</td>
</tr>
<tr>
<td>FIN V(non-3S)</td>
<td>39.6</td>
<td>21.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TNS</td>
<td>9.2</td>
<td>5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBV/3S</td>
<td>1.25</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4.25**: Error rates per morphosyntactic level

Let us examine the result for the younger two groups first. The data show that while the CBV inflection only exhibits a 1.25% error rate, participles show a 9.2% error rate, and the finiteness-related verbs cumulatively (i.e. non-3S, COPBE, and AUXBE environments) an error rate of 64.5%. The BE environments (i.e., COPBE and AUXBE) alone show an error rate of 77%.

Based on a paired samples t-test reported above, it was concluded that there is a statistical difference between the error rates in the 3S/CBV system and those of non-3S environments in the two younger groups. Hence, there is also a statistically significant difference in inflection marking between the 3S environments and the BE (COPBE+AUXBE) environments (since the error rates in both the COPBE and AUXBE environments are higher than the one in the non-3S environments).

I additionally performed a paired samples t-test for the errors in the 3S/CBV system vs. the errors in the past participle (TNS) system. The statistical analysis again shows that the difference between the two variables is statistically significant with \( t(12) = -5.118; \) 2-tailed \( p < .001 \) (mean = -18.8; std. deviation = 13.22).
To sum up, CBV/3S inflection marking is statistically more reliable than TNS marking, which, in turn, is significantly more reliable than FIN marking.

Let us turn to the result for the older two groups. The data above show that while the CBV/3S inflection exhibits a 0.91% error rate, past participles show a 4.6% error rate, and the finiteness-related verbs cumulatively an error rate of 19.4%. The BE environments alone show an error rate of 18.5%.

Based on a paired samples t-test reported above, it was established that there is a statistical difference between the error rates in the 3S/CBV system and those of non-3S environments in the older groups. At the same time, there is also a statistically significant difference in inflection marking between the non-3S environments and COPBE. A further paired samples t-test shows that there is also a statistical difference between the behavior of errors in the 3S/CBV system and those of the TNS (participial) system with $t(25)=-3.64$; 2-tailed $p=0.001$ (mean=-2.54; std. deviation=3.55).

To sum up, CBV/3S inflection marking is statistically significantly better than TNS marking, which, in turn, is statistically significantly better than FIN marking.

4.4.4.2 The “Higher” Syntax of Early Slovenian Verbs

It was shown above that the inflectional marking in the verbal domain in child Slovenian is limited in the sense that
overt finite inflection is supplied only on some 15% of the verbs, with COPBE being supplied in roughly 40% of obligatory contexts, and the AUXBE initially almost entirely missing. It was noted that some might take this evidence to suggest that the initial phrase structure may be as impoverished as to contain merely the VP/vP projection. However, it was shown quantitatively and qualitatively that Slovenian children start using productive inflectional morphology very early—generally already at a stage that overlaps with the one of minimal morphological marking.

Specifically, even a couple of months into the emergence of productive CBV (thematic vowel) morphophonology, children productively mark tense morphology (arguably in the form of past participles, correctly inflected for gender and number) and start supplying finiteness-based inflection (i.e., overt inflection on non-3S verbs, overt COPBE, and AUXBE).

Although the error rates in the non-3S and BE systems sometimes reach as much as 50-75%, correctly-inflected participles and CBVs—though arguably nonfinite—involve various dislocation and scrambling operations (e.g., focus, topicalization) that require functional projections above the FINP domain. Specifically, roughly 15% of all morphophonologically nonfinite forms occur with at least one element or feature that implies finiteness (e.g., word order, including long head movement, topicalization, etc.). This rate goes up for roughly 2% if one counts in the presence of NOM-marked subjects. In other words, although surface morphophonology
may still be supplied much less than at chance in certain systems that imply finiteness (e.g., AUXBE, COPBE), children’s grammar must accommodate the structures that require high(er) phrasal projections in the left periphery from very early on.

For example, even though the suppliance of AUXBE is still far from adultlike at age 2;0 or so, with generally some 40-60% of AUXs missing in the investigated datasets, some children produce utterances with fronted (pre-copula) past participles months before their overt finiteness (person agreement) morphophonology is adultlike across the board (i.e., supplied 90%+ of the time in all obligatory contexts).

Consider, for example, the following three utterances from Žiga, whose grammar at age 2;1 shows a 50% suppliance rate on COPBE and AUXBE and 0% on non-3S finite verbs, but shows a 91% suppliance rate on number/gender agreement marking on past participles:

(3)
(a) Vzamu je. [adult: Vzeu ga je]
    taken[PERF,MASC] be[3PL,PF]
    “He’s taken/took [it]” (Žiga; 2;1)
(b) Zlomu je. [adult: Zlomu ga je]
    broken[PERF,MASC] be[3PL,PF]
    “He’s broken/broke it” (Žiga; 2;1)
(c) Strgu sem mal. [adult: Mal sem ga/jo strgu]
    torn[PERF,MASC] be[1PL,PF]
    “I’ve torn/tore it” (Žiga; 2;1)

The examples in (3) all contain preposed active past participles (Long Head Movement [LHM], briefly described and illustrated in the previous chapter, where it was noted that
whatever requirement triggers LHM, the past participle gets accommodated structurally above the FINP domain in the left periphery, with the AUXBE being housed in FIN).\textsuperscript{50}

Most importantly, though, some 36\% of the participle constructions in Žiga’s file at age 2;1 involve preposed participles. That is, even though the child has not mastered PERS-based inflectional morphology across the board at this stage of development, his utterances clearly show operations that in our system would be handled in domains higher than FINP.

I examined the material that co-occurs with the earliest imperatives (IMPs) and past participles (PARTS), i.e., the ones that appear in the Kranjc A1 dataset. The result shows that FIN-based material is almost completely absent in IMP structures. With the exception of a couple of pre-verbal pronominal clitics, the data contain no IMPs accompanied by a NOM-marked subject—be it pronominal or lexical denoting a common noun—no high adverbs, and no other elements that would imply higher syntax.\textsuperscript{51}

\textsuperscript{50} To make our point even stronger, note that the child’s active past participle form carries an incorrect thematic vowel. Specifically, the participle is conjugated as if it belonged to the -a- (largest and most frequent) conjugation class, but carries a correct, adultlike inflection. Examples like this provide strong evidence for our “syntax before morphophonology” hypothesis: though the syntax must accommodate many early structures in very high functional domains (including the left periphery), morphophonological suppliance is not adultlike). In our model, this suggests that Žiga’s grammar must contain the FIN projection where person agreement gets computed, although the child fails to mark such agreement morphophonologically in all cases).

\textsuperscript{51} This piece of evidence may further suggest that the imperatives in our data cannot be analyzed as FIN-based structures, but may still be syntactically TNSPs, as argued in the previous chapter. I leave the exact morphosyntactic analysis of early imperatives for future research, as noted above.
On the other hand, some 89% of PARTs appear as free-standing units, not accompanied by any other element. The rest of them appear with at least one finiteness-related element such as a NOM-marked subject DP (which is either pronominal or semantically a common noun), a wh-word, or appear in a position higher than FINP (e.g., in constructions with LHM or other marked word orders with preposed participles). In sum, some 11% of PARTs imply higher syntactic structure than VP/vP (in our system higher than TNSP)—a piece of data that cannot be simply considered noise in the data or cannot merely indicate rote-learned forms.

To conclude, the quantitative and qualitative data on finiteness-denoting elements show that initial omitted finiteness marking should not be taken as evidence for incomplete or impoverished syntactic structure (i.e., functional categories, formal features and the operations on them). Syntax is present from the onset of development, but morphophonological marking is graded as per the IHCH.

### 4.5 Summary and Conclusion

The chapter first examined the earliest verbs produced by Slovenian children. Various lemmatization and frequency counts showed that most of the first recorded verbs come in the form of the third singular present tense form, the imperative form carrying the second person singular inflection, and the active past participle form. At the onset of development, roughly 85% of
all verbs appear without an overt person inflection even though they may carry the conjugation class inflection (Complex Bare Verbs) and the number/gender inflection (active past participles). Highly suppletive and irregular BE (as a copula and auxiliary verb) also appear, albeit very rarely.

The lemmatization results further demonstrated that there is little form-meaning distinction at the earliest stage of development and that productive inflection is generally found only on (active) past participles. At the same time, it was shown that there are no (obvious) obligatory dual contexts and no recorded dual tokens in the data. The data contain obligatory plural contexts and plural tokens, but these appear with a very low frequency. It was reported that in the present tense—the only synthetic tense in Slovenian—the majority of verb tokens are 3S forms (almost 90% across the younger two groups and almost 50% across the older two groups).

However, an in-depth subject-verb agreement analysis demonstrated that the error rates show quite the opposite behavior: while the 3S system exhibits a negligible error rate—1.25% in the younger groups and less than 1% in the older groups—the non-3S person/number systems show statistically much higher error rates ranging from 25% to 50%, averaging at 40% in the younger groups, and ranging from 5% to 67%, averaging at 20% in the older groups.

Various ANOVA and paired samples t-tests demonstrated that not only is the behavior or 3S errors significantly different
from the behavior of non-3S errors, but that in regard to error 
types, 3S behaves significantly differently than non-3S errors: 
3S occurs as an error type 85% of the time in the younger groups 
and 75% of the time in the older groups. The error analysis 
further showed that in the older groups (beyond age 2;5) 3S is no 
longer the only substitution or omission error although it 
remains the most common error across all person/number systems.

Further frequency counts and statistical analyses 
demonstrated that the 3S vs. non-3S ratio in the child data is 
disproportionate when compared to the same ratio in child-
directed and adult-directed speech (CDS and ADS, respectively). 
Specifically, the 3S system in younger children shows a 40% 
higher rate than that found in CDS or ADS, while non-3S tokens 
(combined) show roughly a 40% lower rate than that reported for 
CDS or ADS. Importantly, the older children’s frequency rates 
were shown to resemble those computed for CDS and ADS in most 
person/number contexts.

The syntactic analysis further indicated that there are 
both quantitative and qualitative differences between the 
syntactic structure of 3S forms in the younger children when 
compared to that of the older children. Specifically, it was 
reported that the 3S form in the younger children is very rarely 
accompanied by a NOM-marked subject DP (either pronominal or 
lexical denoting a common noun), a scrambled object DP, or a 
pronominal (object) clitic. It was further reported that there 
are almost no instances of 3S structures in *wh*-questions or in
structures that require left periphery phrasal categories and no 3S structures that appear with FIN-related (high) adverbs. In the older children’s data, however, 3S appears almost 7 times more often in finiteness-related environments.

The chapter showed that all above-mentioned quantitative and qualitative results can be accommodated by a variability model of morphosyntactic development resting on the Inflectional Hierarchy Complexity Hypothesis (IHCH), motivated conceptually and empirically in the previous three chapters.

Specifically, such a model predicts that the earliest verb forms are those with no or minimal morphophonology since children at this stage still cannot compute much morphology at high(er) morphosyntactic levels. It further predicts that due to computational bottlenecks with respect to the operation Merge, the morphophonological spell-out of (UG-given) formal features is probabilistically more costly at higher branches of phrase markers; that is, the overt production of linguistic forms dependent upon higher categories is predicted to be probabilistically, not categorically, more challenging for the children. Last but not least, the variability model suggests that this state of affairs is not present only initially at the onset of morphosyntactic production but persists throughout early development, although it is much less pronounced (as computational resources have presumably increased).

The chapter confirmed all these predictions empirically. First, as for child Slovenian, the best candidate for a “minimal”
form was argued to be the 3S form, devoid of all tense/agreement marking, containing only a thematic vowel that carries the information on the verb’s conjugation class (hence, a Complex Bare Verb; CBV). Second, various analyses showed that in regard to the suppliance of verb inflection, performance seemed to be variable—while in a given child one person-related system (e.g., AUXBE) showed 100% suppliance, some other person-related system (e.g., non-3S finite verb inflection) exhibited suppliance below chance. However, the overall result showed that the success rate of inflection marking varied statistically significantly by the height of the morphosyntactic category. That is, it was shown statistically that morphophonology was indeed supplied more reliably at the level of vP (morphologically arguably CBVs) than the level of TNSP (morphologically arguably past participles), which in turn was supplied more reliably than the forms at the level of FINP (morphologically fully-realized sentences that contain overt person agreement). Such a graded pattern of suppliance was observed within and across individual children.

The chapter also reported that the gradualness effect was observed across the board in the data—both quantitatively and qualitatively. Quantitatively, it was shown that the error rates in older children drop in all the contexts that were studied, i.e., COPBE, AUXBE, 3S present, non-3S present, and active past participles. It was also demonstrated that both the present tense verbs as well as the past participles in the older children
appear with non-S number marking, including dual, which is not found in the younger children at all.

It was shown throughout the chapter that initially inflectional marking in the verbal domain is quite limited, which some might take to suggest that the phrase structure may be as impoverished as to contain merely the VP or vP projection. However, the chapter showed quantitatively and qualitatively that Slovenian children start using productive inflectional morphology very early, generally already at a stage that overlaps with that of minimal morphological marking. Specifically, even a couple of months into the emergence of productive CBV (conjugation class) morphology, children productively mark tense morphology (in the form of past participles that carry number and gender agreement) and start marking person-based inflection. That is, although Slovenian children’s initial grammar mainly contains verb forms that have been traditionally considered “nonfinite” (in our system, [-PERS] agreement forms), some of these forms (particularly active past participles and occasionally 3S forms) appear accompanied by NOM-marked subjects, preposed objects (including clitics), topicalized subjects, and appear in contexts that are generally accommodated in the left periphery above the FINP domain. Older children show even more structures that entail functional layers above the FINP, particularly those that involve dislocation (scrambling), most notably focused and topicalized constructions. These appear across tenses and moods.
All this evidence was argued to be accommodated by the hypothesis motivated in Chapters 2 and 3 above, arguing that initial morphosyntactic computation should be seen as intact in the sense that it must contain a combinatory operation such as Merge, must perform complex gender and number agreement computation—and sometimes even person-based agreement computation—and hence must contain the categories that play a role in such agreement relationships (in various layers of a phrase marker). In other words, Person may not be morphophonologically computed reliably in initial stages as it requires more computation than say, aspect or tense, but grammar must somehow compute and accommodate person agreement relationships (and contain Person features/categories) even though a child (or group of children) may exhibit only some 15% of structures that require such computation.

In sum, development mirrors the pattern predicted by the variability model, which rests on the IHCH, the gradualness effect, and the hypothesis that initial morphosyntax is adultlike.

Drawing from elicited production data, the following chapter provides further empirical support for this hypothesis, particularly for the hypothesis that initial 3S is, in fact, a CBV, and that person-agreement computation is much more challenging than gender/number-agreement computation.
Chapter 5: The Person-Lacking Complex Bare Verb and the Inflectional Hierarchy Complexity Hypothesis: Evidence from Elicited Production

5.1 Introduction

Based on the evidence from elicited production data, this chapter provides further support for the model that rests on the Inflectional Hierarchy Complexity Hypothesis (IHCH), motivated theoretically and empirically based on existing evidence in Chapters 2 and 3 and further supported empirically based on child Slovenian naturalistic production data in Chapter 4.

In this chapter, I describe and analyze two datasets of experimental data (C1 and C2). These comprise experimental data from groups B1 (younger) and B2 (older), respectively (from the Rus and Rogač corpus).

Though much smaller in size than the above-reported naturalistic production data, experimental data elucidate some important aspects of the model motivated in this dissertation, particularly in regard to the hypothesis that the initial 3S form is the basic, initial form that gets overgeneralized most frequently in non-3S present tense environments and computed most successfully among all present tense forms, and the hypothesis that a Person feature shows extremely varied and unreliable
morphophonological spell-out at the onset of development due to the fact that it is computed very high in the phrase marker—arguably in the FINP domain above TNSP. That is, experimental data—just like the naturalistic production data reported and analyzed above—show that finite (person) agreement seems to be marked less reliably (and possibly acquired later) than gender and number agreement, which seems to be computed more successfully (and possibly produced earlier).

The general purpose of the elicitation study was threefold. First, in order to test productivity with respect to early verb morphology, naturalistic production data may not be adequate enough since there may not be a sufficient number of obligatory contexts for a given inflection or morphosyntactic environment. Second, productivity is probably better measured with novel linguistic material, which may show more robustly how children may operate on formal rules of verb affixation (see for example, Berko, 1958; Brown, 1973; Maratsos, 2000; Stavrakaki and Clahsen, 2008). Third but not least, the data analyzed here shed more light on various types of morphophonological errors reviewed in Chapter 2, namely those of overgeneralization, substitution, and defaulting to the most natural/common conjugation class.¹

¹ As noted in the previous chapter, the Inflectional Hierarchy Complexity Hypothesis remains silent on phonological and phonotactic properties of specific conjugation classes/types as it is a morphosyntactic model. The idea here is to investigate how much data the IHCH can account for and see if our hypothesis has to be supplemented with other hypotheses. However, the IHCH correctly predicts defaulting to the 3S/CBV form in cases where morphophonology associated with high(er) functional categories is required.
The chapter is organized as follows: Section 5.2 describes the subjects, materials, and methods used in this part of the investigation. Section 5.3 describes the results of the analyses carried out on the elicited production data. Section 5.4 provides a summary of results and discussion. Section 5.5 concludes the Chapter.

5.2 Subjects, Materials, and Methods

The children whose data are reported here were tested on nonce verbs during the regular recording sessions, reported and analyzed in the previous chapter.\(^2\)

In each of the two groups, between 6 and 8 children were chosen randomly to participate in the experiment, but in some cases data could only be elicited from 3 or 4 children. The younger children were generally pulled out from the rest of the group in pairs, whereas the older children were pulled out individually.\(^3\)

In each condition, the children were shown a picture of a man, two men, or three men, performing an action from Berko’s (1958) “Wug series”, namely those for “ricking”, “nazzing”,

\(^2\) The experiments were carried out in four sessions in the B1 group (on 4/14/06, 5/12/06, 5/18/06, and 5/26) and in six sessions in the B2 group (on 2/2/06, 3/7/06, 3/9/06, 4/21/06, 5/5/06, and 5/8/06).

\(^3\) The younger children (aged 1;7-1;11 at the time of the experiments) had to be pulled out in pairs since they felt very uncomfortable being separated from the rest of the group. Note also that the experiments were carried out a few months after the initial recording in each group began so that the children could get used to the researcher’s presence and could feel comfortable being videotaped.
“zibbing”, “motting”, “loodging”, and “bodding”. These images have been successfully used in nonce verb elicitation for over 50 years (see Rater & Menn, 2000).

The cue given to the child can be found in (1) below (R=Researcher; C=Child), where the example refers to the third person dual contexts (the English nonce verb to rick is used in the glosses for illustrative purpose):

(1)
Poglej ga možaka. A veš, kaj dela?
look$_{IMP2S}$ him$_{SAACC}$ man$_{SAACC}$ Q$_{CL}$ know$_{2SPRES}$ what work$_{3SPRES}$
‘Look at the man. Do you know what he’s doing?’

Glej! Premka.

Look$_{IMP2S}$ rick$_{3SPRES}$
‘Look! He’s ricking’ (lit.: ‘He ricks’).

A znaš rečt premka?
Q$_{CL}$ can$_{2SPRES}$ say$_{INF}$ rick$_{1SPRES}$
‘Can you say he’s ricking?’ [child repeats]

...in glej, zdej sta pa dva. Kaj delata?
...and look$_{IMP2S}$ now be$_{3DPRES}$ CL two$_{SNUM}$ what work$_{3DPRES}$
‘...and now there are two of them. What are they doing?’

Most children would giggle and repeat the target verb before they were even asked a question “Can you say...”? The children’s confirmation was required to control for phonotactic constraints (see Thornton, 1996; Crain & Thornton, 2000).

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4 PREMKATI, BLINKATI, GAMITI, BISETI, FITI, and HOSETI were used for rick, naz, zib, mot, loodge, and bod, respectively. The images are available on the CHILDES (MacWhinney, 2000) website at http://childes.psy.cmu.edu/topics/.

5 That is, if the child did not produce any answer after a couple of trials, she was excluded from the study. In the younger group, two children did not provide any answers at all and were discarded from the
The same cue was given to the children for (third person) plural contexts except that three men were depicted on the pictures. In the past tense contexts, the same materials were used but the final cue was “Yesterday he/they did the same. What did he/they do yesterday?” The conditions that were tested were thus 3DPRES, 3PPRES, SPAST (PART), DFAST (PART), and PPAST (PART).\(^6\)

The children’s responses were recorded and transcribed for each child although in the case of the younger children both children tested would sometimes provide an answer to the cue simultaneously. Whenever this occurred, all answers were counted as if they were uttered separately. If the child provided the same answer consecutively after another child, the answer was discarded and no error was reported.\(^7\) If the child did not offer any answer at all, N/A (“no answer”) was marked down and was discarded from the count.\(^8\)

\(^6\) 1S and 2S conditions were not tested as the material was in the form of pictures prompting the children to use 3\(^{rd}\) person contexts. Note also that when vocalized, every single 3S utterance (i.e., direct repetition after the caretaker) was correctly inflected (with the verb class morphophonology), although not necessarily so when a non-3S was required (see below).

\(^7\) The audio information in the data makes it easy to differentiate between simultaneous and consecutive answers.

\(^8\) The errors only occurred in the younger group, though. The older children always provided an answer, albeit with an incorrect inflection. It is hard to say whether a lack of the vocalization of the answer implies the lack of knowledge or whether the child might have not responded because she was not focused or was distracted by another child. For the purposes here, which is to investigate finiteness marking on early verbs, one cannot conclude anything from any utterance that does not include the verb, so all silent responses were discarded from the data.
Verbs from all 5 conjugation classes were elicited in the experiment: 2 from the -am conjugation class and 1 verb from each of the other 4 classes. Nonce verbs resembled real verbs used in adult language (in being partial or full rhymes; see below).

The following figure lists all the verbs used in the study. All 9 conjugated forms in the present tense are given together with a similar-sounding “real” verb used in adult Slovenian:

<table>
<thead>
<tr>
<th>Class</th>
<th>-am</th>
<th>-im</th>
<th>-jem</th>
<th>-em</th>
<th>-m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonce Verb</td>
<td>premkati</td>
<td>blinkati</td>
<td>gamiti</td>
<td>fiti</td>
<td>biseti</td>
</tr>
<tr>
<td>Real Verb</td>
<td>plezati (to climb)</td>
<td>vaditi (to rehearse)</td>
<td>piti (to drink)</td>
<td>pisati (to write)</td>
<td>hoteti (to want)</td>
</tr>
<tr>
<td>1S</td>
<td>premkam</td>
<td>blinkam</td>
<td>gamim</td>
<td>fijem</td>
<td>bišem(^{10})</td>
</tr>
<tr>
<td>2S</td>
<td>premkaš</td>
<td>blinkaš</td>
<td>gamiš</td>
<td>fiješ</td>
<td>bišeš</td>
</tr>
<tr>
<td>3S</td>
<td>premka</td>
<td>blinka</td>
<td>gami</td>
<td>fije</td>
<td>biše</td>
</tr>
<tr>
<td>1D</td>
<td>premkava</td>
<td>blinkava</td>
<td>gamiva</td>
<td>fijeva</td>
<td>biševa</td>
</tr>
<tr>
<td>2D/3D</td>
<td>premkata</td>
<td>blinkata</td>
<td>gamita</td>
<td>fijeta</td>
<td>bišeta</td>
</tr>
<tr>
<td>1P</td>
<td>premkamo</td>
<td>blinkamo</td>
<td>gamimo</td>
<td>fijemo</td>
<td>bišemo</td>
</tr>
<tr>
<td>2P</td>
<td>premkate</td>
<td>blinkate</td>
<td>gamite</td>
<td>fijete</td>
<td>bišete</td>
</tr>
<tr>
<td>3P</td>
<td>premkajo</td>
<td>blinkajo</td>
<td>gamijo</td>
<td>fijejo</td>
<td>bišejo</td>
</tr>
</tbody>
</table>

**Figure 5.1:** Nonce verbs used in the elicitation study

---

\(^9\) Two examples of -am verbs were used in the experiment to test whether a greater resemblance to a real verb will impact performance. The first verb (premkati) resembles real verbs like dremkati/dremati, “to nap” or premzati, “to brake (informal)”, which have almost identical roots, whereas blinkati does not resemble closely any real verb in the root. Note that the IHCH does not discriminate verb forms in terms of their verb classes/types, as noted above, but we wanted to see if verb class morphophonology will impact overall performance in any significant way.

\(^{10}\) The verb could be conjugated with the alveolar /s/ sound rather than the palato-alveolar /ʃ/ (e.g., bisem—bise—biseva, etc.; see below).
Before they were used in the experiment, all nonce verbs were judged by 13 adult native speakers of Slovenianian (4 were linguists and 9 had other educational backgrounds). The native speakers were given the infinitival form and were asked to conjugate the verb in the present tense and to compute the past participle forms “without thinking about them”. The subject pronouns and a real verb (plezati, “to climb”) were given as examples. The task was written and the adults were required to submit the answers through email.\(^\text{11}\)

In all but one case the native speakers’ judgments were identical in regard to the inflection. Premkati, gamiti, fiti, and hoseti were all conjugated in the same fashion by both linguists and “non-linguists”. Biseti, however, showed a 70% vs. 30% split, with the /s/ in the verb root having an advantage over the /š/ form. One “non-linguist” in the group that preferred /s/ to /ʃ/ answered all the forms with the complex root bis-a instead of bis-e, having conjugated it as if it belonged to the –am conjugation class. All other 12 participants computed the right inflection on the verb, but provided either form of the root.\(^\text{12}\)

Let us now look at the children’s performance. Section 5.3.1 reports the results from the younger group (Group B1),

\(^{11}\) I understand that this might make the results rather non-comparable with the child data, by virtue of being written in an untimed context rather than spoken. However, everyone was instructed specifically not to think about the verb forms and provide the very first answer that came to their mind.

\(^{12}\) I take these results to indicate that adult Slovenian speakers have a good intuition about computing inflection in the case of nonce verbs.
while section 5.3.2 offers the results from the older children (Group B2).

5.3 Results

5.3.1 The Younger Group

Figures 5.2 and 5.3 below report the results for the verbs PREMKATI and BLINKATI, which both belong to the –am conjugation class (note that throughout this section the target form is given in segmented form below the person/number features, while the numbers in the first column refer to the children who participated in the study):

<table>
<thead>
<tr>
<th>PREMKATI</th>
<th>d pres premk-a-ta</th>
<th>p pres premk-a-jo</th>
<th>s past premk-a-l-Ø</th>
<th>d past premk-a-l-a</th>
<th>p past premk-a-l-(i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 premka</td>
<td>premka-jo premka-l</td>
<td>premkala premkal 14</td>
<td>premkala premkal 14</td>
<td>premka premka premkalo premkal 14</td>
<td></td>
</tr>
<tr>
<td>2 premka</td>
<td>premka-jo premka-l</td>
<td>premkala premkal 14</td>
<td>premkala premkal 14</td>
<td>premka premka premkalo premkal 14</td>
<td></td>
</tr>
<tr>
<td>3 premkata</td>
<td>premkajo premkal</td>
<td>premkala premkal 14</td>
<td>premkala premkal 14</td>
<td>premkalo premkalo premkalo premkalo</td>
<td></td>
</tr>
<tr>
<td>4 premka</td>
<td>NA premka premka</td>
<td>premkala premkal 14</td>
<td>premkala premkal 14</td>
<td>premkalo premkalo premkalo premkalo</td>
<td></td>
</tr>
<tr>
<td>5 premka</td>
<td>premka premka premka</td>
<td>premkalo premkalo premkalo premkalo premkalo premkalo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total # Errs (%)</td>
<td>3/4 (75%)</td>
<td>3/4 (75%)</td>
<td>1/4 (25%)</td>
<td>2/3 (66.6%)</td>
<td>2/5 (40%)</td>
</tr>
</tbody>
</table>

Figure 5.2: Nonce verb elicitation result for PREMKATI (Group B1)

13 Due to a small number of responses, I do not report any statistical analysis but rather concentrate on the information about percent correct and error type in each number/gender or number/person condition and the qualitative aspect of the data.

14 Note that participle-final /l/ in the singular form is pronounced /u/ in spoken language, so premkau and premkal are identical phonologically. Here I use the –l form orthographically in the singular number. In the plural form, however, the final ending is either /l/ or /i/ in spoken language.

15 The child used the stem del- from the verb delati, “to do”. Hence, this answer was discarded from the data.
The results show that only one child computed the correct
3DPRES form of either verb (25% performance rate on PREMKATI and
BLINKATI). 3PPRES was computed with the same success: 25% of the
children computed the inflection on PREMKATI and BLINKATI.
Singular past participles were supplied correctly 75% of the time
on PREMKATI, but less on BLINKATI (60% correct). Dual past
participles were more challenging for the children, with a 66.6%
error rate on both verbs. Plural past participles were less
challenging: 45% of the children inflected the form correctly
across both verbs. However, the higher overall success rate on
this form comes from the verb PREMKATI rather than BLINKATI—60%
of the children provided the correct answer on the former, while
50% did so on the latter.

We also see that not only is 3S the most commonly supplied
form (it appears in 60% of all answers, none of which requires
the 3S form), it is also the most commonly misapplied/misused

---

16 The child omitted /l/ from the stem, but inflected the verb in the
3S/CBV form.
form. In fact, it is the only misapplied form since every single error comes in the form of 3S.

The average error rate across all conditions is 56.3% on PREMKATI and 61.3% on BLINKATI. The average error rate across person-related conditions (i.e., 3DPRES, 3PPRES), however, is 75% on PREMKATI and BLINKATI. The average error rate on gender/number conditions is 43.9% on PREMKATI and 52.2% on BLINKATI.

The results suggest that person-related (finite) conditions are more challenging for the children to spell out morphophonologically than nonfinite (gender/number) conditions.

Let us turn to the results for a nonce verb belonging to the -im class, namely GAMITI:

<table>
<thead>
<tr>
<th>GAMITI</th>
<th>d pres</th>
<th>p pres</th>
<th>s past</th>
<th>d past</th>
<th>p past</th>
</tr>
</thead>
<tbody>
<tr>
<td>-im</td>
<td>gam-i-ta</td>
<td>gam-i-jo</td>
<td>gam-i-l-Ø</td>
<td>gam-i-l-a</td>
<td>gam-i-l-(i)</td>
</tr>
<tr>
<td>1</td>
<td>gamita</td>
<td>gami</td>
<td>gamila</td>
<td>gamila</td>
<td>gami</td>
</tr>
<tr>
<td>2</td>
<td>gami</td>
<td>gami</td>
<td>gamil</td>
<td>gami</td>
<td>gami</td>
</tr>
<tr>
<td>3</td>
<td>gama(^{17})</td>
<td>gamijo</td>
<td>gami</td>
<td>gami</td>
<td>gami</td>
</tr>
<tr>
<td>4</td>
<td>NA</td>
<td>NA</td>
<td>Bonbone je jedel(^{18})</td>
<td>NA</td>
<td>gamil</td>
</tr>
<tr>
<td>5</td>
<td>gami</td>
<td>gami</td>
<td>gami</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Total # Errs (%)**

<table>
<thead>
<tr>
<th></th>
<th>3/4</th>
<th>3/4</th>
<th>2/4</th>
<th>2/3</th>
<th>2/4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(75%)</td>
<td>(75%)</td>
<td>(50%)</td>
<td>(66.6%)</td>
<td>(50%)</td>
</tr>
</tbody>
</table>

**Figure 5.4:** Nonce verb elicitation results for GAMITI (Group B1)

The results show that the error rates in the -im condition are very similar to the ones for -am verbs. The average error

\(^{17}\) The child used the 3S form but conjugated as if it belonged to the -am class. I counted this as an incorrect form.

\(^{18}\) The child responded with Jedel je bombone, “He has eaten/ate candy”, which was discarded from the count.
rate across all conditions is 63.2%, the average error rate across person-related conditions is 75%, and the average error rate on nonfinite (participle) conditions is 55.3%. Just like in the case of the two -am verbs reported above, the results for GAMITI suggest that person-related (finite) conditions are more challenging for the children to spell-out morphophonologically than participle (gender/number) conditions.

3S is—again—the most commonly spelled out form with a suppliance rate of 52%. It is also the most commonly misused form (91.6% of all errors are in the form of 3S).

Let us now turn to the results for the least common conjugation classes, namely -jem, -em, and -m verbs. Since the younger group had significant challenges conjugating the verbs belonging to the three least common verb classes I report the error rates for all three verbs (BADITI, FITI, HOSETI) together (by providing the averages across all children). The result is shown in Figure 5.5 below:

<table>
<thead>
<tr>
<th></th>
<th>d pres</th>
<th>p pres</th>
<th>s past</th>
<th>d past</th>
<th>p past</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bis-e-ta</td>
<td>bis-e-jo</td>
<td>fij-e-jo</td>
<td>f-i-1-Ø</td>
<td>fi-l-Ø</td>
</tr>
<tr>
<td>BISETI</td>
<td>fij-e-ta</td>
<td>hoes-e-joe</td>
<td>hoes-e-jo</td>
<td>hoes-e-1-Ø</td>
<td>hoes-e-1-Ø</td>
</tr>
<tr>
<td>-em</td>
<td>80%</td>
<td>80%</td>
<td>60%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>FITI</td>
<td>100%</td>
<td>100%</td>
<td>80%</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>-jem</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>HOSETI</td>
<td>-m</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>NA</td>
</tr>
<tr>
<td>Total</td>
<td>93.3%</td>
<td>93.3%</td>
<td>80%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Figure 5.5:** Nonce verb elicitation results for BISETI, FITI, and HOSETI (Group B1)
You will remember from the previous chapter that the only two verb conjugation classes recorded in the naturalistic production data from the younger groups were the –am and –im ones. It was not clear, however, whether such an outcome is a result of the lack of the –am/-im obligatory contexts or whether young children simply find it hard to compute the correct inflection in the case of conjugation classes that are smallest in size and least frequent in the input. The experimental data show that the success rate on the computation of the non-am/im verbs among the very young children is lower than on the most common/largest conjugation classes, but very little could be speculated about this point since dual and plural past participles for FITI and HOSETI could not even be elicited (i.e., there was no child who would provide an answer for these conditions; see below for a discussion on this aspect of the data).

Examining the error types and their frequencies in the non-am/-em conditions, we get the following result:

<table>
<thead>
<tr>
<th></th>
<th>d pres</th>
<th>p pres</th>
<th>s past</th>
<th>d past</th>
<th>p past</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bis-e-ta</td>
<td>bis-e-jo</td>
<td>bis-e-l-Ø</td>
<td>bis-e-l-a</td>
<td>bis-e-l-(i)</td>
</tr>
<tr>
<td>BISETI</td>
<td>3S (100%)</td>
<td>3S (75%)</td>
<td>3S (75%)</td>
<td>3S (100%)</td>
<td>3S (100%)</td>
</tr>
<tr>
<td>–em</td>
<td>fij-e-ta</td>
<td>fij-e-jo</td>
<td>fi-l-Ø</td>
<td>fi-l-a</td>
<td>fi-l-(i)</td>
</tr>
<tr>
<td>FITI</td>
<td>3S (100%)</td>
<td>3S (100%)</td>
<td>3S (100%)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>–jem</td>
<td>hos-e-ta</td>
<td>hos-e-jo</td>
<td>hos-e-l-Ø</td>
<td>hos-e-la</td>
<td></td>
</tr>
<tr>
<td>HOSETI</td>
<td>3S (75%)</td>
<td>3S (100%)</td>
<td>hose (50%)</td>
<td>hose (50%)</td>
<td></td>
</tr>
<tr>
<td>–m</td>
<td>hosa (25%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.6:** Error types on nonce verb elicitation for BISETI, FITI, and HOSETI (Group B1)
The data show that 3S is the most commonly supplied form also in the -em/-jem/-m conditions—just like in the case of am/-im verbs reported above. The data show no wrong-form errors and the errors of defaulting to the most frequent and largest class (e.g., hosa- instead of hose-) are very rare. Further, there seems to be little distinction between the spell-out of person-related and participle forms only among the verbs that belong to the least frequent/smallest conjugation classes, with both types of forms being computed very unreliably, although our elicited data from nonce participles are extremely scarce.

Before turning to the results for the older children, let us review the findings of the analysis of elicited production data from very young children. It was shown that overall results suggest that verb forms in person/number (finite) conditions get supplied less reliably than the ones in gender/number (nonfinite) conditions. Specifically, the morphophonological spell-out of dual and plural present tense forms seems to be much more challenging for young children than participle forms, as predicted by the Inflectional Hierarchy Complexity Hypothesis. This difference, however, is less pronounced on -jem/-em/-m verbs (i.e., those belonging to least frequent/smallest conjugation classes), where the participles seem to be equally challenging (which, as we noted above, cannot be conclusive since the elicited data in the case of participles are very limited). As further predicted by the IHCH, the most common errors are those of omission (3S≈CBV), while wrong-form errors are hardly ever
attested. Sometimes a 3S≈CBV form with the -a- thematic vowel surfaces in non-am conditions (i.e., defaulting to the most frequent conjugation class), but such errors are rare.

I take these results, which mirror the ones from the analyses of naturalistic production data reported above, to suggest that 3S is the most basic, initial form that seems to be computationally more accessible than other tense- and person-related verb forms.

5.3.2 The Older Group

Let us review the results for the two -am verbs first, namely PREMKATI and BLINKATI. Figure 5.7 reports the findings for the former verb, while Figure 5.8 reports the result for the latter verb (note that the target forms are given in full, unsegmented form below the person/number features):

<table>
<thead>
<tr>
<th>PREMKATI -am</th>
<th>d pres premkata</th>
<th>p pres premkajo</th>
<th>s past premkal</th>
<th>d past premkala</th>
<th>p past premkal(i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>brem</td>
<td>premkata</td>
<td>premkol¹⁹</td>
<td>premkala</td>
<td>premkali</td>
</tr>
<tr>
<td>2</td>
<td>premkata</td>
<td>premkajo</td>
<td>premkal</td>
<td>premkala</td>
<td>bremkata</td>
</tr>
<tr>
<td>3</td>
<td>premkata</td>
<td>premkajo</td>
<td>premkal</td>
<td>premkala</td>
<td>premkal</td>
</tr>
<tr>
<td>4</td>
<td>premka</td>
<td>premkajo</td>
<td>NA</td>
<td>NA</td>
<td>premkal</td>
</tr>
<tr>
<td>Total # Errs (%)</td>
<td>2/4 (50%)</td>
<td>1/4 (25%)</td>
<td>0/3 (0%)</td>
<td>1/3 (33.3%)</td>
<td>1/4 (25%)</td>
</tr>
</tbody>
</table>

Figure 5.7: Nonce verb elicitation result for PREMKATI (Group B2)

¹⁹ Premkol sounds an acceptable (dialectical) form and was counted as the correct form.
The results show that two children (50%) computed the correct 3DPRES form of either verb. 3PPRES was computed with greater success than 3DPRES: 75% of the children computed the inflection correctly on both verbs. Singular past participles were correctly spelled out 100% of the time (note that one child provided the correct, adultlike inflection on BLINKATI but changed the verb, which serves as an additional piece of evidence for the successful morphophonological spell-out of the -l forms despite various phonological and phonotactics challenges that children go through at this early stage of development; see Note 21). Dual past participles were more challenging for the children than singular past participles. Spell-out on plural past participles mirrors the result obtained in the singular past

20 The child inflected the verb correctly even though she slightly altered the stem, having substituted the liquid with an alveolar sound. I counted this form as correct.

21 The verb is inflected correctly but with an altered stem, i.e., kegljati, “to bowl”. The child chose this form probably because of the resemblance of the action illustrated on the card to that of bowling: a man maneuvering a ball with spikes was used here. I discarded this answer from the data although the verb carries adultlike participle inflection.
participle condition: PREMKATI shows a 25% error rate while BLINKATI shows no errors at all.

The average error rate across all conditions in the case of PREMKATI is 26.6%, but the average error rate across person-related conditions is higher (37.5%)—a similar result obtained above among the younger children (though with lower error rates among the older children). The average error rate on nonfinite (participle) conditions is very low—19.4%.

BLINKATI shows a similar error pattern: the average error rate across all conditions is 25%, across participle (gender/number) conditions 16.6%, and across person/number conditions 37.5%.

That is, just like the result for the very young children, the results for the older children suggest that person-related (finite) conditions are more challenging to spell out morphophonologically than participle (gender/number) conditions, although the error rates are much lower (with some systems showing almost no or no errors).

Interestingly, the analysis of the morphophonological spell-out reveals that the suppliance of 3S diminishes greatly, as reported in the previous chapter for the naturalistic production data. Specifically, 3S is supplied only 3 times out of 34 given responses (8.8%). Further, the error analysis reveals that the errors among the older children are no longer only 3S omissions, but come also as other types of omission and even commission (wrong-form) errors, which was—again—shown for the
naturalistic production data above. Specifically, in the case of PREMKATI, only 1 misapplied form (20%) comes in the 3S form, while in the case of BLINKATI, 2 errors (22.2) are 3S errors. Other types of errors include the use of bare verb (a root without a thematic vowel), the use of a supine form (i.e., a nonfinite form, similar to the infinitive), an incomplete root, and even the use of dual in the plural condition. In sum, the errors in the -am condition in the older group seem to be much more diverse than those in the same condition among the younger children. At the same time, 3S=CBV seems to decline as an error type with age.

Let us now turn to the older group’s performance on the verb GAMITI, the -im verb:

<table>
<thead>
<tr>
<th>GAMITI -im</th>
<th>d pres gamita</th>
<th>p pres gamijo</th>
<th>s past gamil</th>
<th>d past gamila</th>
<th>p past gamili</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>gami</td>
<td>NA</td>
<td>NA</td>
<td>gami</td>
<td>NA</td>
</tr>
<tr>
<td>2</td>
<td>game</td>
<td>gamal</td>
<td>gama</td>
<td>gamila</td>
<td>gami</td>
</tr>
<tr>
<td>3</td>
<td>gamita</td>
<td>gamijo</td>
<td>gamil</td>
<td>gamila</td>
<td>gamil</td>
</tr>
<tr>
<td>4</td>
<td>gamita</td>
<td>gamijo</td>
<td>gamil</td>
<td>gamila</td>
<td>NA</td>
</tr>
<tr>
<td>5</td>
<td>gamita</td>
<td>gamijo</td>
<td>Gamo na nos dajal(^{22})</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

| Total # Errs (%) | 2/5 (40%) | 2/5 (40%) | 0/3 (0%) | 1/4 (25%) | 0/2 (0%) |

**Figure 5.9:** Nonce verb elicitation result for GAMITI (Group B2)

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\(^{22}\) The child used Gamo na nos daju (gama\textsubscript{Acc} on nose\textsubscript{Acc} put\textsubscript{SM\&PAST(PAR)}1) or “(he) put the gama on the nose”. Although this answer is not adultlike (and was discarded), it is interesting to observe how the child coined her own noun (gama) from the verb gamiti, neither of which exists in adult language (note, however, that the child correctly inflected the verb dati, “to put” in the masculine singular form of the past participle).
The results show that the error rates for the -im verb are comparable to those in the -am verbs across all conditions. The most challenging forms seem to be the present tense (person-related) forms, which were also the most difficult forms for almost every single condition among the younger children, as reported above.

There are 5 errors in the -im condition in the older group: 2 (40%) are wrong-form errors (interestingly, both are dual present forms used in the plural present or dual past participle condition), 1 (20%) is a 3S error (gami), 1 3S form is conjugated as if it were an -em verb (game), and 1 3S is an error of defaulting to the largest -a- class with an altered stem (gamka).

Similarly to our findings in the case of -am verbs reported above, the older children’s errors in the -im condition are much more varied than the younger children’s errors in the same condition. Specifically, the 3S≈CBV errors seem to diminish considerably with age not only in the -am condition but also in the -im condition. At the same time, commission errors appear alongside omission errors (i.e., 3S is not supplied significantly more than non-3S forms, be it finite or nonfinite—the same result reported above for the naturalistic production data).

Finally, let us turn to the older children’s performance on the three least frequent/smallest conjugation classes.

Consider the figure below:
Table 5.10: Nonce verb elicitation result for BISETI, FITI, and HOSETI (Group B2)

<table>
<thead>
<tr>
<th>BISETI: -em</th>
<th>d pres biseja</th>
<th>p pres bisejo</th>
<th>s past bisel</th>
<th>d past bisela</th>
<th>p past bisel(i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>biseta</td>
<td>pisejo&lt;sup&gt;23&lt;/sup&gt;</td>
<td>bisel</td>
<td>bisela</td>
<td>bisel</td>
</tr>
<tr>
<td>2</td>
<td>bise</td>
<td>bisejo</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>3</td>
<td>NA</td>
<td>brimkaja&lt;sup&gt;24&lt;/sup&gt;</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>4</td>
<td>NA</td>
<td>NA</td>
<td>blinka</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Total # Errs (%)</td>
<td>1/2 (50%)</td>
<td>1/3 (33.3%)</td>
<td>1/2 (50%)</td>
<td>0/1 (0%)</td>
<td>0/1 (0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FITI: -jem</th>
<th>d pres fijeta</th>
<th>p pres fijejo</th>
<th>s past fila</th>
<th>d past filala</th>
<th>p past filal(i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>fijeta</td>
<td>NA</td>
<td>fi</td>
<td>fila</td>
<td>fili</td>
</tr>
<tr>
<td>2</td>
<td>NA</td>
<td>fije</td>
<td>fijal&lt;sup&gt;25&lt;/sup&gt;</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>3</td>
<td>fije</td>
<td>fijejo</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>4</td>
<td>NA</td>
<td>NA</td>
<td>fijel</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Total # Errs (%)</td>
<td>1/2 (50%)</td>
<td>1/2 (50%)</td>
<td>1/3 (33.3%)</td>
<td>0/1 (0%)</td>
<td>0/1 (0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOSETI: -m</th>
<th>d pres hoseta</th>
<th>p pres hosemo</th>
<th>s past hosel</th>
<th>d past hosela</th>
<th>p past hosel(i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>hose</td>
<td>NA</td>
<td>hosel</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>2</td>
<td>hose</td>
<td>hose</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Total # Errs (%)</td>
<td>2/2 (100%)</td>
<td>1/1 (100%)</td>
<td>1/2 (50%)</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Figure 5.10:** Nonce verb elicitation result for BISETI, FITI, and HOSETI (Group B2)

While 10 children provided some of the answers in the non-am/-im conditions, only one provided the answers to every cue. Dual and plural present tense (person-related) forms were very challenging for the children: the average error rates in these conditions were 41.65%, 50%, and 100% for BISETI, FITI, and HOSETI, respectively. Participle (gender/number) contexts show

<sup>23</sup> The child altered the stem-initial plosive by substituting a voiceless plosive for a voiced one. This counted as the correct answer since the rest of the stem and the inflection are both adultlike.

<sup>24</sup> The child recalled from memory the -am verb tested earlier (blinkati), though she changed the liquid with an alveolar in the stem. This counted as the wrong form.

<sup>25</sup> Fijal counted as the correct answer since it resembles an imperfective form with a stem-vowel change (common in adult Slovenian, as reviewed in Chapter 3 above).
lower average error rates: 16.6%, 11.1%, and 50% for BISETI, FITI, and HOSETI, respectively.

There are 10 errors recorded in the data in the non-am/-im conditions in the older group: 7 of them (70%) are 3S≈CBV errors with the correct thematic vowel (bise, fije, hose), 1 form (10%) is a 3S form with an altered (-a-) thematic vowel (blinka), 1 (10%) is a wrong form with an altered stem and conjugated as if it belonged to -am verbs (brimkajo), and 1 (10%) is an incomplete stem (fi).

Note that, just like in the case of younger children, the data from the participle conditions are very limited—no answers were elicited from the verb HOSETI, while only one child provided an answer for the verbs BISETI and FITI.

The findings from the analysis of the elicited data coming from the older group are similar to those reported for the very young children. Nonce -am and -im verbs show the best performance in the participle conditions, with error rates ranging from 0 to 50% and averaging at 14.8%. Nonce -am and -im verbs show a much lower performance on person-related forms (i.e., dual and plural present tense verbs), with error rates ranging from 25% to 50% and averaging at 38.3%. The performance on -jem, -em, and -m conditions shows a similar pattern: participle forms seem to be computed with more success than present tense forms, although the data from participles belonging to least frequent and smallest verb classes are limited and very little can be speculated about these conditions).
The most common errors across all person/number and number/gender conditions are 3S≈CBV (omission) errors and wrong-form errors, including those of altered stems. Crucially, however, 3S is no longer the only error type at an older age, but appears alongside commission errors. This suggests that our conclusion from the naturalistic data, namely that 3S peters out as an error type in the older children, holds also for the elicited production data.

5.4 Summary of Results and Discussion

The analysis of the elicited production data from child Slovenian shows that the error rates on past participle conditions is much lower than the average error rates in present tense conditions (this finding was reported for both age groups and with generally lower error rates in the older group). In other words, this result suggests that person-related (finite) conditions are more challenging for young children to spell out/supply morphophonologically than the forms that are not person-related, i.e., tense- and aspect-related forms, as correctly predicted and accounted for by the Inflectional Hierarchy Complexity Hypothesis (IHCH) and reported for the naturalistic production data in Chapter 4 above.

Second, it was demonstrated that the suppliance of 3S diminishes with age. While 3S was reported to be the only error type supplied by the young children, the older children showed
both omission (3S) and wrong-form (commission) errors—the same finding that was reported above for the naturalistic production data.

Third but not least, it was shown that the challenge to compute and mark person-related forms morphophonologically seems to persist even at age 2;5 and beyond, also reported above for the naturalistic production data.

The overall results suggest that the elicited production data show that the development of verbal inflection and the errors that arise in such a process proceed robustly along the lines predicted by the IHCH. Though very similar to the naturalistic production data reported in the previous chapter, elicitation data, however, elucidate another aspect of children’s morphosyntactic and morphophonological development: while children compute participles at much higher success rates than person-based (present tense) forms in almost all conditions, they sometimes still struggle with gender/number inflection on participles that belong to the least common/smallest verb conjugation classes. It was argued that this may be a consequence of very limited data coming from the past participles that belong to the smallest and least frequent conjugation classes (and as such, the results could not be taken at face value). However, if it turns out that the subtle difference in the spell-out of past participles between naturalistic production and elicited data do exist, the IHCH should be supplemented by some other account that could
discriminate among various types of verb classes (at the same morphosyntactic level). Specifically, it might turn out that verb frequency and distribution may play at least some role in the process of the development of verb inflection (possibly in the sense of Freudenthal et al., 2004, 2006, 2009). Crucially, though, since young children can easily compute the gender/number inflection on nonce -am and -im verbs it cannot be the case that frequency contributes to the acquisition of inflection to some major degree.  

The elicited production data also shed some light on persistent debate from the literature, reviewed in Chapters 2 and 3 above, namely whether Person is the only finiteness-related feature that may be computationally challenging for young children. As shown in the previous chapter and replicated here, young Slovenian children do not seem to find the computation of Number particularly challenging since past participles that carry number inflection seem to be computed at adultlike or near-adultlike success rates. In sharp contrast, the person-based inflection seems to be extremely challenging for the Slovenian children, as already reported in the previous chapter based on the evidence from naturalistic production data.

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26 That is, it is not entirely clear how much role frequency plays in the case of less/least common verb classes, if any. Since the number of participants and responses are limited in our elicitation study, it might be simply an effect of data dispersion. In other words, the IHCH model is not an all-or-nothing one and the “more is less” effect is a probabilistic hierarchical pattern manifested throughout early development. More elicitation data on nonce verbs might have yielded a “cleaner” IHCH result (see also a general discussion in Chapter 6).
Last but not least, it would be an exaggeration to say that all that is at stake in language development is children’s morphosyntax since children (particularly those that belonged to the two A groups in our study) are still learning various phonological and phonotactic constraints of the target system, making many substitution and overgeneralization errors. It might turn out that children are more competent at (comfortable with) computing -am verbs, which are the most frequent in the input, but are still learning and organizing the conjugation pieces of less frequent verb classes. The learning of the phonological pieces of inflection is not an instantaneous process, with the entire conjugation system being acquired at around age 3;0-3;5 in early Slavic, and possibly even later in early Germanic, as reviewed in Chapter 2 above.

5.5 Conclusion

Based on the evidence from experimental data, the chapter provided further support for the variability model that rests on the Inflectional Hierarchy Hypothesis (IHCH), motivated theoretically and empirically in the previous chapters.

The experimental data replicated the results obtained from the naturalistic production data. First, 3S seems to be the most basic form that gets spelled out when children cannot compute morphophonology in high(er) morphosyntactic heads. That is, initial 3S—arguably a CBV—is the form that gets overgeneralized.
most frequently in non-3S present tense environments and—as we saw from the elicitation results—occasionally even in participle environments. At the same time, 3S≈CBV occurs as the most frequent substitution error in the majority of person/number and even number/gender contexts in the younger children, while in the older children, it diminishes greatly. Hence, the elicitation data further confirm the hypothesis that the initial 3S becomes a finite form when children can reliably compute person-based agreement.

Second, the experimental data also confirm that person-based agreement seems to be marked less reliably and acquired later than gender and number agreement, which seems to be computed more successfully and produced earlier—as predicted and shown above for the naturalistic production data.

Third, while the older children considerably outperform the younger peers in all person/number and number/gender conditions, they still struggle with person-based forms at age 2;5 and beyond.
Chapter 6: Summary with Discussion and Conclusion

6.1 A Variability Model of Morphosyntactic Development: Summary of Hypotheses and Results

6.1.1 Rationale and Research Questions

The dissertation opened by arguing that very few formal acquisition studies to date have addressed explicitly what kind of omission and commission (substitution) errors in the domain of verb morphosyntax and morphophonology appear in children’s grammars and particularly whether such errors are unpredictable (i.e., random) or whether there exist any deterministic/all-or-nothing patterns in the children’s production data. Further, it was argued that it has not been entirely clear whether partial or missing morphophonological material in children’s speech implicates a lack of knowledge of syntax (i.e., categories, formal features, and the operations on them). Last but not least, it was argued that despite a large body of literature on the acquisition of verb morphosyntax and morphophonology it has not been clear why exactly morphophonology is omitted the way it is.

The dissertation investigated the above-mentioned research questions from a morphosyntactic and morphophonological perspectives. Specifically, it concentrated on the questions of (i) what contexts show the omission or substitution of functional morphophonology (e.g., aspect, tense, agreement), (ii) whether the morphophonological forms of certain verbal (functional)
categories are more likely to be omitted and/or substituted than others, or whether the omissions and/or substitutions are arbitrary (random), (iii) what the underlying syntactic representation of partial, incomplete, or lacking morphophonological forms is, and (iv) what mechanism(s) or operations are responsible for the observed omission or substitution of functional morphemes.

After an in-depth review of the quantitative and qualitative data from the existing formal linguistic and psycholinguistic literature on the acquisition of verb inflection, it was argued that the cumulative empirical evidence suggests that a model of early verbal inflection is necessarily multifaceted and much more complex than generally thought (if there could be such a model in the first place). Such a model would have to account for at least the following four types of robust (but quite diverse) developmental phenomena.

First, a model should predict that early syntax is adultlike with respect to some basic computation that operates on discrete formal features, resulting in early adultlike verb placement and word order in general.

Second, a model should predict variability and optionality in regard to the suppliance of functional verb morphophonology in specific systems. Related to this, a model should somehow predict a morpheme order (gradedness) effect (i.e., evidence that children seem to mark the morphophonology associated with aspect [and possibly tense] significantly better than person/number
agreement, which in turn, is marked significantly better than agreement in highest, discourse-related domains).

Third, a model should predict the gradualness effect in regard to the suppliance of functional morphophonology. That is, the success of the suppliance should be statistically better in older children than in younger children across all systems (regardless of whether better performance is a consequence of more knowledge or more efficient computation, or both).

Fourth, a model should predict an early preference for computationally least complex verb forms, i.e., those with no or minimal morphophonology such as bare verb stems, complex bare verbs, and bare participles/perfectives.

It was argued that it seems that none of the formal acquisition studies to date has been able to account for this cumulative evidence. Conceptually, it was suggested that this is mainly due to the fact that most studies have focuses on a single inflection (e.g., tense, aspect) and/or domain (e.g., syntax, phonology), and have been generally formulated in a single theoretical paradigm (e.g., generativism, constructivism), assuming a single learning psychology (e.g., innatist, emergentist). Hence, it was proposed that in order to approach the issue of morphosyntactic learnability more holistically and to develop a model that could capture a cluster of robust (but diverse) developmental phenomena, one should combine the evidence from various linguistic traditions, frameworks, and models.
As a possible solution, it was proposed that the biolinguistic acquisition approach in the Chomskian tradition be enhanced by supplementing the evidence from UG-based studies with that from usage-based accounts and further informed by neuropsychological and neuroscience research into the processing and production of the morphosyntactic categories in question. This suggestion was tied to Chomsky’s (2005) hypothesis on the three factors of language, stating that the three variables that enter into language are innate language faculty (phrase structure, the combinatory operation Merge, phrase structure computation), experience (exposure to linguistic input), and computational efficiency (yielding the computational complexity [hierarchy] effect, i.e., the gradedness effect).

6.1.2 The Model of Morphosyntax and Morphophonology

The architecture of grammar in this dissertation was assumed to be that of UG-given phrase structure that contains the operation Merge (Adger, 2003, 2007a,b; Chomsky, 2000b et seq.), formulated in a phase-based Probe-Goal model, framed in a strict derivational system (e.g., Dobashi, 2003, 2004; Epstein & Seely, 2002, 2006). The model postulated an intimate link between the morphosyntactic computation and morphophonological spell-out with an Agree-based valuation-driven system where nouns enter the derivation lexically valued for NUM/GEND and unvalued for Case, and finite verbs enter the derivation unvalued for PERS/NUM and
valued for tense (T) and finiteness (FIN). It was proposed that unvalued elements are re-merged (i.e., they move, if possible/needed) in order to get their formal features valued (irrespective of the interpretability of the Probe’s FF; Bošković, to appear; Pesetsky & Torrego, 2004, 2007). The study assumed a Minimalist-Distributed Morphology model that is compatible with the Minimalist Program syntactic model proposed here (e.g., Embick & Noyer, 2007).

Verb inflection was analyzed in three clausal domains: that of verb’s conjugation class (base—lexical), that of number/gender [-PERS] agreement (temporal—aspectual), and that of subject-verb [+PERS] agreement (finite/PERS-related). The analysis focused on the functional categories of V, v, TNS, and FIN, leaving aside (the details of) the peripheral domain (FP). Based on various morphosyntactic, acquisition, and neurocognitive studies that purport theoretical, developmental, and processing differences between Tense and Agreement, the chapter proposed a clause structure of VP-\(\pi\)P-TNSP-FINP(-FP).

Drawing from the analyses by Bianchi (2003, 2006, to appear) and Adger (2007a), the semantic locus of FIN was postulated to be that of traditional finiteness. It was hypothesized that finite clauses must project a FIN domain above the temporal one (TNS). Specifically, it was established that the morphophonological expression of tense in the TNS domain does not suffice for finiteness nor SUBJ (NOM) case checking. Finite verbs in affirmative clauses and auxiliary and copula BE were
postulated to implicate the FINP domain, while NUM/GEND (-PERS) carrying (past) participles were argued to be accommodated in the TNSP domain. It was noted, however, that in marked constructions with fronted participles (e.g., in case of Long Head Movement), the participles may end up in the FP domain. Further, in other marked word orders with finite verbs (e.g., with preposed objects, including long clitics, or topicalized/focused NOM-marked subjects), structure was analyzed as FINP.

Non-adult verb forms that may resemble adultlike forms but contain only a thematic vowel (e.g., 3S) were posited to be vPs. Non-adult BPARTs (and possibly bare perfectives, which appear in place of BPARTs in some languages) were taken to be TNSPs. Root infinitives and verb stems were argued to be accommodated in VP. Besides general word order, morphosyntactic structure was argued to be judged by the presence of arguments and the case they bear, the presence (suppliance) of morphophonological verb inflection, adverbs, and (long) clitics, and the information on the target forms from the detailed transcripts.

6.1.3 The Inflectional Hierarchy Complexity Hypothesis

The study drew on and further developed the arguments in UG approaches and supplemented them with a specific line of research into the processing of inflectional morphology, putting forth the Inflectional Hierarchy Complexity Hypothesis (IHCH).
The idea for the IHCH was borrowed from Izvorski & Ullman’s (1999) and Pancheva & Ullman’s (2001) Hierarchy Complexity Hypothesis, which proposes computational complexity with respect to the concatenation operation Merge. HCH and its similar instantiations (e.g., Friedmann, 2001, 2002; Friedmann & Grodzinsky, 1994, 1997, 2000; Gavarró & Martinez-Ferreiro, 2007; Wenzlaff & Clahsen, 2004) have been originally proposed for agrammatic interior aphasics and other impaired populations with brain damage (mainly) to Broca’s area.

The IHCH in this study hypothesized that children morphophonologically spell out morphosyntactic features with less success at higher branches of phrase structure due to computational bottlenecks. In other words, it was suggested that the higher the category in a phrase structure is, the more computation the morphosyntactic component must perform in order to cyclically spell-out (morphophonologically) the corresponding feature bundles. This proposal led to a morphosyntactic hierarchy of difficulty (in production) of bare verb > aspect/tense > person agreement > complementizer, where the categories to the left were predicted to be spelled out significantly better than those to the right. Morphophonologically, this yielded the following hierarchy: bare verb/complex bare verb > participle, tensed verb (verb carrying tense and/or aspect) > finite verb (verb carrying person agreement) > focused and topicalized elements and (certain) pronominal clitics. Crucially, this state
of affairs was postulated to be probabilistic and one of variability where “the higher is significantly more difficult.”

The study also hypothesized that such structure-building effects are still present even after the inflection has been more or less acquired beyond age 2;5 (when it is supplied very reliably, i.e., 80%-90% of the time).

6.1.4 First Verbal Forms and Omission and Substitution Errors of Verbal Morphology in Early Slovenian

The first research question focused on the inflectional marking in the verbal domain and the types of omission and substitution errors that appear in early Slovenian.

Various lemmatization and frequency counts of naturalistic production data showed that most of the first verbs in child Slovenian come in the form of the third singular present tense (3S) form, the imperative form carrying the second person singular inflection, and the bare past participle (BPART) form. It was shown that at the onset of development, roughly 85% of all verbs appear without an overt (non-imperative) inflection even though they may carry the conjugation class inflection (arguably, CBVs) and the number/gender inflection (BPARTs). Highly suppletive and irregular BE (auxiliary or copula) also appears in the data, albeit rarely.

An in-depth analysis of subject-verb (person/number) and subject-participle (gender/number) agreement showed that
children’s morphophonological spell-out is not adultlike at all, particularly in the finite systems (i.e., person agreement-carrying auxiliaries, copula verbs, and non-3S present tense verbs). It was further demonstrated that past participles carry near-adultlike number/gender agreement, even though they initially almost never appear with the finiteness-marking auxiliary BE. Further, it was shown that early CBVs (i.e., 3S forms that function as nonfinite forms; see below) show no thematic vowel (conjugation class) errors.

An in-depth error analysis demonstrated that 3S is the most common error in the speech of young Slovenian children: it occurs as an error type 85% of the time in the younger groups and 75% of the time in the older groups. Besides 3S—which is an omission error—a couple of other types of omission errors were reported to occur (namely, bare verb, incomplete stem, or infinitive), but were shown to be extremely rare (less than 10% combined). Commission (wrong form) errors were also reported to be extremely rare among very young children, with plural sometimes occurring instead of dual forms.

Further error analyses demonstrated that not only is the behavior or 3S errors significantly different from the behavior of non-3S errors, but that in the older groups (i.e., among the children aged 2;5+) 3S is no longer the only error since it appears alongside substitution errors (dual for plural or vice versa). Nevertheless, 3S was shown to remain as the most common error across all person/number systems.
Interestingly, it was demonstrated statistically that while the 3S system (arguably, a CBV system) exhibits a negligible error rate—1.25% in the younger groups and less than 1% in the older groups—the non-3S person/number systems show statistically much higher error rates, ranging from 25% to 50%, averaging at 40% in the younger groups, and ranging from 5% to 67%, averaging at 20% in the older groups.

6.1.5 The Syntax of Early Slovenian

Once it was established what kind of errors young Slovenian children make and in what contexts, the dissertation focused on the second research question, namely the early (morpho)syntax of the constructions that appear with missing or incomplete morphophonology.

It was argued that although initially inflectional marking in the verbal domain is limited—which some might take to suggest that the phrase structure may be as impoverished as to contain merely the VP or VP projection—quantitative and qualitative evidence suggests that Slovenian children start using productive inflectional morphophonology very early, generally at a stage that overlaps with the one of minimal morphological marking. Specifically, even a couple of months into the emergence of productive CBV (conjugation class) morphology, children were shown to mark productively tense morphology (in the form of past participles that carry number/gender agreement) and start
spelling out person-based inflection. That is, although it was shown that Slovenian children’s initial grammar mainly contains verb forms that have been traditionally considered "nonfinite" (in our system, [-PERS] agreement forms), some of these forms (particularly active past participles and occasionally also 3S and non-3S present tense verbs) were shown to appear accompanied by NOM-marked subjects, preposed objects, and topicalized/focused subjects, or appear in contexts that are generally accommodated in the left periphery above the FINP domain (e.g., the Long Head Movement in the case of preposed active past participles or constructions with preposed objects). The structures implicating peripheral morphosyntax appear across tenses and moods in about 15% of all utterances, which—we argued—was too high to be taken as rotes.

That is, it was argued that a lack of morphophonological marking cannot implicate a lack of syntax (e.g., functional categories, formal features) and that initial morphosyntactic computation should be seen as intact in the sense that it must contain a combinatory operation such as Merge, must perform complex number and gender agreement computation—and sometimes even person-based agreement computation—and hence must contain the categories that play a role in such agreement relationships (in various layers of morphosyntactic structure). Specifically, Person may not be morphophonologically computed reliably in initial stages as it requires more computation than say, aspect or tense, but grammar must somehow compute and accommodate person
agreement relationships (and contain Person features/categories) even though a child (or group of children) may exhibit only some 15% of structures that require such computation.

The syntactic analysis further indicated that there are both quantitative and qualitative differences between the syntactic structure of 3S forms in the younger children when compared to that of the older children. Specifically, it was reported that the 3S form in the younger children is very rarely accompanied by a NOM-marked subject (either pronominal or lexical denoting a common noun), a scrambled/preposed object, or a pronominal (object) clitic. It was further reported that there are almost no instances of 3S structures in wh-questions or in structures that require left periphery phrasal categories and no 3S structures that appear with FIN-related (high) adverbs. In the older children’s data, however, 3S appears almost 7 times more often in finiteness-related environments. It was argued that all this evidence suggests that 3S is indeed a nonfinite default form, which gets spelled out when children cannot compute and spell out morphophonological forms that are dependent on higher functional categories.

6.1.6 The Inflectional Hierarchy Complexity Hypothesis and Early Slovenian Morphophonology

The third research question focused on the morphophonological marking/suppliance at various morphosyntactic
levels of phrase structure, trying to shed more light on the morpheme order (gradedness) effect. In order to do that, the study put to test the Inflectional Hierarchy Complexity Hypothesis (IHCH), motivated and developed in Chapters 2 and 3.

Based on naturalistic production data, the dissertation demonstrated quantitatively and qualitatively that the success of morphophonological spell-out at various phrasal levels varies considerably. Specifically, Slovenian children initially show error-free morphophonology on and preference for the forms that morphophonologically resemble 3S forms (CBVs) and bare past participles (BPARTs), showing a robust order of CBVs > BPARTs > finite (person-marked) verbs in initial stages of development. This structurally corresponds to a morphosyntactic hierarchy of vP-TNSP-FINP-(FP), where the categories to the left are morphophonologically supplied earlier and with significantly better success than those to the right, as predicted by the IHCH.

Further frequency counts and statistical analyses demonstrated that the 3S vs. non-3S ratio in the child data is disproportionate when compared to the same ratio in child-directed (CDS) and adult-directed (ADS) speech. While the older children’s frequency rates resemble those computed for CDS and ADS in most person/number contexts, the younger children lag behind their older peers and adults considerably.

This evidence, together with above-mentioned differences between the behavior of 3S and non-3S errors as well as the application of 3S and non-3S forms, was taken to confirm the
hypothesis that 3S is indeed the initial, computationally most basic form that gets supplied first, is most frequently overgeneralized across various person/number contexts, yet when supplied, it shows no or almost no errors of application.

Further, naturalistic production data showed great variability across and within children, a stage-like/gradualness effect, and a graded morpheme order-type of hierarchy (which is crucially a probabilistic rather than an absolute one).

Though much smaller in size than the naturalistic production data, the experimental data used in this study elucidated some important aspects of early morphophonology, most of which were identical to those obtained from the analyses of the naturalistic production data, further validating the results reported previously. Based on nonce verbs, it was shown that person-marked verbs (i.e., non-3S present tense forms) are marked less reliably by young Slovenian children than number/gender agreement-carrying verbs (i.e., past participles). Further, the elicited production data analysis showed that 3S≈CBV does seem to be the initial, most basic form that gets spelled out when children cannot compute morphology in high(er) functional categories: it gets overgeneralized most frequently in non-3S present tense environments and occasionally even in (past) participle environments. At the same time, it appears as the most frequent substitution error in the majority of person/number and sometimes even number/gender conditions in the younger children, while in the older children, it diminishes greatly. Last, while
the older children considerably outperform the younger peers in all person/number and number/gender conditions, they still struggle with person-based forms at age 2;5 and beyond, as already reported for the naturalistic production data.

Interestingly though, while the Person feature was shown to be the most “vulnerable” at the onset of development, Slovenian children sometimes still found it challenging to compute number/gender features on a couple of nonce participles that belong the three least frequent and smallest verb conjugation classes.

6.2 Evaluation of the Inflectional Hierarchy Complexity Hypothesis: General Discussion

The present study argued that a UG-based variability model which hypothesizes that the initial syntax is adultlike regarding the availability of phrase structure and some basic combinatorial operation operating on adultlike formal features such as PERS/NUM/GEND and yielding adultlike verb placement and word order in general, explains the robust developmental phenomena reviewed in the introductory chapter when supplemented by a more probabilistic inflectional hierarchy complexity hypothesis.

First, our model predicts and accounts for the early knowledge of morphosyntax. Since young Slovenian children were shown to be able to perform complex gender and number agreement relationships—and sometimes even person-based agreement
computation—early grammars must contain the discrete categories that play a role in such agreement relationships (in various layers of a phrase marker).

Second, our model predicts and explains variability and optionality: the naturalistic production and experimental data showed that the suppliance of verb inflection seems to be variable and sometimes appears to be supplied merely at chance (or even less successfully), yielding the well-known “now-you-hear-it-now-you-don’t” pattern. However, overall results (within and across children) show that the success rate of inflection marking varies significantly by the height of the morphosyntactic category—exactly as predicted by the IHCH. That is, it was shown that morphophonology is indeed supplied statistically more reliably at the level of vP (morphophonologically CBV) than the level of TNSP (morphophonologically past participles and tense/aspect-marked verbs), which, in turn, is supplied significantly better than at the level of FINP (morphophonologically fully-realized person-agreement carrying verbs, auxiliary BE, and copula BE).

Third, our model also predicts and accounts for the early preference for what appears to be morphophonologically a 3S form, which carries no overt tense or person inflection, but contains only a thematic vowel with the information on the verb’s conjugation class—arguably a non-tensed and nonfinite complex bare verb (CBV), which gets spelled out morphophonologically when children cannot compute the morphophonology in the high(er)
functional categories. 3S exhibits the highest token frequency yet the lowest error rate. Further, it also shows the highest substitution rate and yields the largest disproportion between the application in child speech and child-directed/adult speech. Last but not least, it diminishes with age when CBVs arguably become finite. More generally, the data confirmed the prediction that children’s earliest verbs are computationally least costly and appear as verbs that have been termed default/unmarked, even though these may at first resemble adultlike tensed forms with zero or minimal morphophonology. The CBV is not only the most basic and computationally least costly form, but is also the one with the lowest error rate, masking the overall error rates in the verbal system as a whole.

Fourth, our model predicts and accounts for a gradualness effect in regard to the suppliance of functional morphophonology. The gradualness effect was observed across the board in the data, both quantitatively and qualitatively. Quantitatively, it was shown that the error rates in older children drop in all the contexts that were examined, i.e., copula and auxiliary BE, 3S, non-3S present tense, and active past participles.

Fifth, the model also predicts the morpheme order (the gradedness effect), i.e., the evidence that children seem to be significantly more sensitive and mark morphophonologically significantly more reliably the morphophonology associated with the lexical domain(s) than aspect/tense than person agreement than agreement in discourse-related domain(s). It was shown that
the IHCH accounts for a graded probabilistic morphophonological hierarchy manifested throughout early development.

In sum, the variability model which rests on the IHCH and the hypothesis that early syntax is adultlike was hypothesized and shown to account for the most robust phenomena reported in the literature on early verb morphosyntax and morphophonology, namely telegraphic speech (in at least certain systems in initial stages of development), optionality and variability (the gradedness effect and high error rates limited to select morphosyntactic systems), the morpheme order effect (i.e., the hierarchy of difficulty, either computationally or learning-wise), and the gradualness effect (at least in regard to surface morphophonology).

Note that the model proposed here shows an advantage over all strong and weak continuity and discontinuity models reviewed in Chapter 2, where it was argued that most of the acquisition accounts to date suffer from formal insufficiency, developmental incompatibility, or both—particularly with respect to the quantifiability, explicitness, and variability requirements. In other words, most formal acquisition models motivated in the literature have failed to confirm and validate child language data, to state explicitly why the data appear the way they do, and to capture the variability and optionality observed in the data. Even the Truncation models, which fare much better than the discontinuity “no-functional-categories-initially” or full continuity Omission and Underspecification models were shown to
suffer from developmental incompatibility as their proposed acquisition mechanisms fail to account for the gradedness of morphophonological suppliance within and across individual children and within and across languages.

6.3 Open Questions for Future Research

The dissertation put forth various proposals and arguments in regard to early morphosyntactic and morphophonological development. Below I spell out and elaborate on some that I consider most important for future research. Though all are intimately connected, they belong to various disciplines—another reason for a call for a greater interdisciplinary approach in the study of language acquisition.

The IHCH relies on the morphosyntactic analysis motivated in Bianchi (2003, 2006, to appear) and Adger (2007a) of finite verbs projecting FINP and subject-verb (person) agreement and NOM case checking being handled in the FINP domain. That is, although it was argued that PERS is the feature that seems to implicate finiteness, I left open a possibility that other formal features may also contribute to finiteness. Since crosslinguistically agreement inflections generally appear as portmanteau morphs, it is not entirely clear whether PERS alone contributes to finiteness, as seems to be the case at least for the well-studied (Indo-European) languages or whether there are any other features that need to be treated similarly in computational terms. For
example, some of the accounts reviewed in Chapter 2 (e.g., Hoekstra & Hyams, 1998; Hoekstra et al., 1999) propose that such a feature may be NUM rather than PERS. Our data indeed show that initially dual and to a great extent also plural verbs in the present tense system are almost non-existent (however, it was also shown that there are hardly any obligatory dual contexts in the data). Since NUM cannot be teased apart from PERS in Slovenian, it is not clear whether these two features should enjoy the same treatment. The major piece of evidence that would speak against such a position, however, is the fact that Slovenian children seem to be able to compute complex number/gender agreement on past participles where dual and plural are required. It may further turn out that the hypothesis that the hypothesis that PERS is the feature that contributes to finiteness is on the right track but that such a feature is not unitary. In other words, theoretical linguistics must shed more light in regard to whether PERS is unitary, binary, or multivalent and whether it is indeed the feature (or one of the features) that gets computed high(er) in the FINP domain.

The dissertation showed that one of the prevailing hypotheses in generative acquisition circles, namely that of “early root infinitives,” must be reconsidered since infinitives are neither universal nor do they universally appear in early grammars, as had been pointed out previously (e.g., Dye, 2005; Pye, 2009). Various crosslinguistic acquisition accounts have shown that the earliest nonfinite forms (i.e., those lacking
tense and person agreement) appear as bare verb stems (English, Inuktitut, K’iche’, Navajo, Quechua), complex bare verbs, i.e., bare verbs carrying a thematic vowel (Catalan, Czech, Italian, Polish, Spanish, Slovenian), or infinitives (Dutch, German, Icelandic, Swedish). A major question posed in the literature has been why a certain language prefers one form over the other. The IHCH motivated in this dissertation suggested that the earliest forms are those with zero or minimal morphology, computed at lower branches of phrase structure and initially accessed/produced with more success than tense- and person agreement-marked forms due to computational bottlenecks. However, the hypothesis did not discriminate among verb forms that would be captured morphosyntactically in the same domain (e.g., vP). The field of morphosyntactic acquisition should shed more light on the early nonfinite/default forms, particularly in less-studied languages and particularly in those systems that do not have a morphological infinitival form (e.g., indigenous languages of Central and Latin America such as Nahuatl [Jordan, 2010] or Mayan languages [Pye, 2001, 2002, 2009], or Eskimo-Aleut languages such as Inuktitut [Crago & Allen, 2001; Swift, 2004]). At the same time, the field of morphophonological acquisition should investigate why one form is chosen to be the default form.

Some child languages (e.g., German), however, opt for two forms, namely the infinitive and sometimes—though much less frequently—the bare verb stem. Early Spanish and Catalan show the 3S and—much less often—the infinitive. Further research must
address why exactly this is the case. It sounds plausible to me that distributional facts (e.g., sentence position, consistency) may play some role in this process (see for example, Freudenthal, et al., 2004, 2006, 2009).

Most crucially, though, there is a dire need to entertain this issue “with a more open mind” since early root nonfinites may not always come in the forms that are considered nonfinite in adult grammar. This dissertation showed that the earliest nonfinite form can be one that resembles an adultlike finite form (e.g., 3S) morphophonologically. Future morphosyntactic and morphological acquisition accounts must hence examine what these adultlike forms might be (particularly in less studied languages) before a more general crosslinguistic acquisition model is possible.

One verb form that was left aside in the current dissertation is the early imperative. Although every single imperative carried the (correct) second person singular inflection in our data, over 80% of them were occurrences of the verbs gledati, “to look” and dati, “to give”. It was hence concluded that early imperatives show little productivity of inflection, although it could be the case that (at least) 20% of them are adultlike representations accommodated morphosyntactically in the left periphery where the information on clause type is captured (as generally assumed by formal syntactic literature). The accounts of early and adult imperatives in the literature are contradicting and there has
been no consensus on what exactly the morphosyntactic representation of these forms is. Since imperatives are very frequent in child Slovenian, further (particularly experimental) data should shed more light on the acquisition of these forms. If it turns out that imperatives are TNSPs rather than merely vPs, for example, the IHCH must be revised in order to accommodate these forms, under the condition that it can be shown that the earliest imperative forms are fully productive (morphologically and syntactically, similarly to past participles) and are not merely rotes.

Importantly, the model proposed in the current dissertation is not an all-inclusive one and should not be seen as a competitor to phonological acquisition accounts (e.g., Demuth’s [1996, 2001] Metrical Model or various usage-based (frequency-based) models, but as a necessary supplement to them. That is, although the model proposed in the current dissertation correctly predicts and accounts for the most documented (crosslinguistic) developmental phenomena of verb morphology, it does not put forth an explicit learning mechanism regarding verb inflection. As a morphosyntactic and morphophonological model, it does not say much about early phonological constraints and remains silent on other phenomena that have appeared in the literature, such as the role of frequency and distributional properties. For example, it remains to be seen how a certain verb form gets chosen as the default form. At the same time, computational psycholinguistic and neurolinguistic models need to address how early nonfinite
forms become finite in the course of development (Yang, 2002, 2004).

To sum up, the acquisition of verbal inflection is a global research area that encompasses various disciplines and goes much beyond the scope of the current dissertation. Specifically, researchers working in the area of phonotactic acquisition can shed light on the role of stress in the prosodic organization of young children's utterances and researchers working in usage-based accounts can inform our understanding in regard to the role of distributional properties in the input. Crucially though, the results and conclusions from other areas of research can help us to rule out the proposed constraints on the phonological spell-out of various functional categories as merely morphosyntactic.

6.4 Conclusion

The dissertation investigated the acquisition of verb inflection systematically and comprehensively. The theoretical model that was motivated and proposed in the study was developed based on the hypotheses and analyses that have appeared in formal (generative), psycholinguistic, and neurocognitive literature for various languages and populations. The proposed model was then tested and validated on the basis of child Slovenian data.

I hope to have shown that the research in question should not be formulated as a tension between UG-based and usage-based models, contra many accounts in the literature. That is, the
issue of morphosyntactic and morphophonological acquisition is necessarily multifaceted and much more complex than the mainstream debates between internally-driven and externally-driven approaches have framed it. In other words, investigating early language production goes much beyond proposing a formal model of syntax, or—at the other extreme—claiming that such learning is item-based (from scratch), and/or on the basis of only frequency and distributional properties in the input.

I argued and showed that modeling the knowledge of early morphosyntax and morphophonology requires serious and rigorous collaboration of syntax, morphology, and phonology, which all interact with domain-general computational (processing) processes that are not only descriptive statements or epiphenomena but happen in a real biological space (i.e., they have a neurobiological basis).

I believe that Chomsky’s (2005) account of the three contributing factors that arguably enter into language and its growth is on the right track, but it needs to be taken seriously and tested rigorously in developmental accounts. That is, acquisition models should aim at teasing apart the genetic properties of the language faculty from the linguistic properties learned through experience more explicitly. At the same time, both types of properties should be studied more explicitly in relation to domain-general computational (processing) resources.
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