### Table 5d. Spanish-speaking learners of ESL (n = 46); Word and Reading Span: transitive, bad cue

<table>
<thead>
<tr>
<th></th>
<th>MVRR Acc</th>
<th>RR TransB</th>
<th>MV TransB</th>
<th>End TransB</th>
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</thead>
<tbody>
<tr>
<td>L1 Word Span</td>
<td>0.09</td>
<td>-0.11</td>
<td>0.09</td>
<td>0.34* (sic)</td>
</tr>
<tr>
<td>L2 Word Span</td>
<td>0.38**</td>
<td>-0.37**</td>
<td>-0.08</td>
<td>0.20</td>
</tr>
<tr>
<td>L1 Reading Span</td>
<td>0.15</td>
<td>0.00</td>
<td>0.31*</td>
<td>0.18</td>
</tr>
<tr>
<td>L2 Reading Span</td>
<td>0.06</td>
<td>0.14</td>
<td>0.36*</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*p < .05; ** p < .01

### Table 6a. English speakers (n = 22); Word and Reading Span: optionally transitive, bad cue

<table>
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<tr>
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<th>MV OptB</th>
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</tr>
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<tbody>
<tr>
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<td>-0.34</td>
<td>-0.20</td>
</tr>
<tr>
<td>L1 Reading Span</td>
<td>0.05</td>
<td>-0.39</td>
<td>-0.27</td>
<td>-0.18</td>
</tr>
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</table>

### Table 6b. Chinese-speaking learners of ESL (n = 30); Word and Reading Span: optionally transitive, bad cue

<table>
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<tr>
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<th>MV OptB</th>
<th>End OptB</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 Word Span</td>
<td>0.37*</td>
<td>-0.22</td>
<td>-0.08</td>
<td>0.01</td>
</tr>
<tr>
<td>L2 Word Span</td>
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<td>-0.10</td>
<td>0.02</td>
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<tr>
<td>L1 Reading Span</td>
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<td>-0.12</td>
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</tr>
<tr>
<td>L2 Reading Span</td>
<td>-0.17</td>
<td>-0.03</td>
<td>-0.06</td>
<td>0.03</td>
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</table>

### Table 6c. Japanese-speaking learners of ESL (n = 28); Word and Reading Span: optionally transitive, bad cue

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<th>MV OptB</th>
<th>End OptB</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 Word Span</td>
<td>0.08</td>
<td>-0.09</td>
<td>-0.17</td>
<td>0.14</td>
</tr>
<tr>
<td>L2 Word Span</td>
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<td>-0.24</td>
<td>-0.30</td>
<td>-0.09</td>
</tr>
<tr>
<td>L1 Reading Span</td>
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<td>-0.33*</td>
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<td>-0.18</td>
</tr>
<tr>
<td>L2 Reading Span</td>
<td>0.32</td>
<td>0.01</td>
<td>-0.26</td>
<td>-0.08</td>
</tr>
</tbody>
</table>

### Table 6d. Spanish-speaking learners of ESL (n = 46); Word and Reading Span: optionally transitive, bad cue

<table>
<thead>
<tr>
<th></th>
<th>MVRR Acc</th>
<th>RR OptB</th>
<th>MV OptB</th>
<th>End OptB</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 Word Span</td>
<td>0.09</td>
<td>-0.21</td>
<td>-0.05</td>
<td>0.08</td>
</tr>
<tr>
<td>L2 Word Span</td>
<td>0.38**</td>
<td>-0.27*</td>
<td>-0.14</td>
<td>-0.23</td>
</tr>
<tr>
<td>L1 Reading Span</td>
<td>0.15</td>
<td>-0.04</td>
<td>0.31*</td>
<td>0.07</td>
</tr>
<tr>
<td>L2 Reading Span</td>
<td>0.06</td>
<td>0.11</td>
<td>0.30*</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*p ≤ .05; ** p ≤ .01

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**Formalism and functionalism working together?**

Exploring roles for complementary contributions in the domain of child null arguments

Shanley E. M. Allen  
Boston University

Explanations of child subject and object omission have been proposed from the perspectives of underlying grammatical knowledge, processing and production capabilities, and discourse-pragmatics. Although each approach has independently had good success in describing and explaining a significant proportion of null arguments in child speech, they have interacted very little with each other. In this chapter, I elucidate ways in which each of the perspectives could inform work in the other, filling remaining gaps and answering open questions. I particularly focus on potential contributions of the discourse-pragmatics approach, since it has received the least exposure in general literature. Areas of potential interaction include explaining the differential omission of subjects and objects, explaining the differential omission of subjects in finite and non-finite clauses, explaining the differential omission of subjects in transitive and intransitive clauses, identifying topics for a topic-drop analysis, explaining optionality in terms of which arguments are omitted, exploring continuity between omitted subjects in child language and pronounal arguments in adult language, resolving whether children’s understanding of discourse dynamics is adult-like, and exploring continuity across language types in mechanisms and explanations for argument omission.

For the past 50 years, the field of child language development has been organized around two competing theories of how children learn. One theory, essentially arising out of work by Piaget and Vygotsky, holds that language is learned largely through both consciously and unconsciously understanding and adjusting to the dynamics of interaction with the surrounding environment (e.g., Elman, Bates, Johnson, Karmiloff-Smith, Parisi, & Plunkett 1996; Gopnik & Meltzoff 1997; Snow 1989; Tomasello 2001). The other, deriving from work by Chomsky, posits that language is an innate and independent faculty of the mind essentially untouched by the environment to which
children are exposed (e.g., Hornstein & Lightfoot 1981; Chomsky 1986; Crain 1994; Crain & Pietroski 2002). These theories each have different underlying assumptions, different questions of interest, and different types of evidence deemed appropriate to answer those questions. Proponents of these different approaches have generally failed to interact even when studying the same phenomena, thus remaining largely unaware of the details of work undertaken within other approaches, yet all too often discounting the validity of that work (a division also typical of linguistics as a whole (Newmeyer 1986, 1998)). Achievement of a unified understanding of those phenomena has been impeded by this lack of interaction.

Virtually no work has explored whether this division is a necessary one. Are the assumptions held by functionalists and formalists so divergent that no interface between the two is conceivable? Are the methods used so different that those followed in one perspective cannot withstand the rigorous expectations of proponents of the other? Are these different ways of looking at child language mutually exclusive rather than merely a matter of preference of research focus? Are there two questions that could interest functionalists and formalists alike, through which each could learn from the other? The differences are admittedly large, but surely not so large that there is no common ground at all.

In this chapter, I explore these questions in one domain—argument realization—which has played a central role in advancing our understanding of language development. Children are well known to omit arguments in their speech significantly more frequently than their adult counterparts, whether they are learning non-null-subject or null-subject languages. Research from a number of different theoretical perspectives has described the characteristics of early null arguments, has explored why the forms of arguments produced by children differ in systematic ways from those in their target language, and has attempted to explain how children's non-target-like production moves towards that of the target. The major focus of research has taken a formalist competence-based grammatical perspective, resulting in substantial evidence supporting the claim that children have an early non-target-like grammar that allows null arguments. Children then move towards the target as maturation or an external trigger cause their grammar to become adult-like (e.g., Hyams 1986, 1992; Radford 1990; Hyams & Waxler 1993; Rizzi 1993/1994; Waxler 1998). Two distinct lines of research have flourished from the formalist perspective. The performance-based approach has assumed that children have adult-like grammars, but cannot produce all the required elements of an utterance due to limited processing resources or immature production capabilities at the earliest stages of production. They then develop gradually towards the target as their processing and production capabilities increase (e.g., Bloom 1990; Valian 1991; Gerken 1991). More recently, the discourse-pragmatic approach has centered around whether children follow the same pattern as adults do in assessing hearer knowledge to determine which arguments to omit. Children seem remarkably adult-like in their sensitivity to a variety of discourse-pragmatic factors at quite young ages, and there is some evidence that they develop in this capability over the preschool period (e.g., Clancy 1993, 1997, 2003; Allen 2000; Allen & Schroeder 2003; Serratrice 2005).

Although these approaches have independently had good success in describing and explaining a significant proportion of null arguments in child speech, they have interacted very little with each other. In particular, the role of discourse-pragmatics in determining argument omission is typically mentioned only in passing or not at all in literature on argument realization from other perspectives. For example, the chapter entitled "Null subjects in early languages" in the most recent generative-focused textbook on language acquisition (Guasti 2002), dedicates 3 1/2 pages out of 35 to the performance-based position on null subjects, but does not mention the discourse-pragmatic perspective at all. Another recent text (O'Grady 1997) dedicates 3 of 19 pages in the chapter entitled "Subject drop" to the performance-based position, but only 6 lines to the discourse-pragmatic position, not even including it in the list of "theories of the subject drop stage" (p. 81). When literature from the grammatical and processing/production perspectives does mention the role of pragmatic knowledge in determining argument omission, it does so largely in passing. In Hyams and Waxler (1993), for example, the discourse-pragmatic account is raised and dismissed in just over 2 pages of a 35-page article. After reviewing the basic claims of the account, Hyams and Waxler state that "since we have no insight into the child's perception of a situation aside from what can be inferred from her language, the Principle of Informativeness has no predictive or explanatory value" (p. 427). This assertion ignores the large functionalist literature on the factors that contribute to "informativeness" in adult language and, by extension, the factors that could be relevant for child language (e.g., Givón 1983; Chafe 1987; Du Bois 1987; Ariel 1990; Fretheim & Gundel 1996). Hyams and Waxler's own attempt to test the claim of the Principle of Informativeness, which they ultimately reject, is based on a superficial analysis that treats all pronoun and missing arguments as "specific" (i.e., "information that is assumed in discourse" or "presupposed" (p. 427)) without actually checking the degree of specificity of any individual argument in the data set they use. The topic drop analysis that they then propose (adhering to pragmatics in the linguistic rather than psychological sense) also leaves unexplored any concrete pragmatic definition of what a topic is, instead focusing only on the syntactic properties of a topic.

In some ways, it is not surprising that literature from the grammatical and performance-based perspectives have largely ignored or treated superficially the notion that discourse-pragmatics may play a significant role in the omission of subjects and objects in child language. First, detailed research from the discourse-pragmatics perspective has only been published in the last decade beginning with Clancy (1993), and thus may not yet have gained much general exposure. Second, most work from this perspective has focused on null-subject languages such as Korean (Clancy 1993, 1997, 2003), Inuktitut (Allen 2000; Skarabets & Allen 2002; Allen & Schroeder 2003), Japanese (Guerriero et al. 2001), Spanish (Paradís & Navarro 2003), Hindi (Narasimhan, Budwig, & Murty 2005) and Italian (Serratrice 2002, 2005), exploring whether children are sensitive to the same discourse-pragmatic factors as adults in de-
terminating which arguments to omit. However, research from both the grammatical and performance-based perspectives has concentrated on non-null-subject languages with a specific interest in explaining why children's early productions are substantially different from those of adults. Although children learning null-subject languages also produce significantly more null subjects and/or objects than their counterpart adults at early ages (e.g., Kayama 2003 for Japanese; Grinstead 2004 for Spanish and Catalan; Skarabela and Allen (under review) for Inuktitut), this has not typically been a focus of research from the discourse-pragmatic perspective.

In this chapter, then, my goal is to identify ways in which research from each of these perspectives may inform research in the others. I take the position that these three perspectives are largely complementary rather than competing in terms of the information they provide about the use of null arguments, and that we will come closest to a full understanding of the phenomenon by looking at all three perspectives together rather than at each in isolation. A useful analogy here is that of medical drugs. For many diseases, one “magic bullet” drug proves an effective cure. For many others, however, the most effective treatment is a cocktail of different drugs, as shown in recent advances in HIV and AIDS research. Even in physics which is the prototypical science with strong theory, the current state of the art requires two non-overlapping and even incompatible theories – general relativity to explain gravity and quantum field theory for everything else. I suggest, then, that language development can be most effectively understood by taking a “cocktail” approach rather than a “magic bullet” approach. To this end, the chapter begins with an overview of the data and central questions in research on child null arguments and of attempts to answer these questions from the grammatical, performance-based, and discourse-pragmatic perspectives. I then focus in more detail on the ways in which the theories could fruitfully interact and the ways in which each theory might be able to fill gaps remaining in the others, with several illustrative examples. Finally, I suggest that explicitly considering all three theories together may facilitate discovery of one underlying theory that motivates the others. Throughout the discussion, I propose several directions for additional research to further pursue the interplay between theories.

This chapter may seem strange in a volume dedicated to the “mother” of research in second language acquisition from a generative perspective, since it neither deals with second language acquisition nor takes a purely generative approach. Although that is not the direction my career has taken, there is a clear tie to Lydia White nonetheless. Lydia is the person who first sparked my interest in argument realization in child language, a topic which has driven a significant part of my research for the past decade. She is also one of the first who taught me how to identify the claims of a theory, make predictions on the basis of them, and test them in actual data. While the theories I’ve investigated aren’t the ones Lydia would have chosen, the principles guiding my work have their basis in her training. I am both lucky and proud to have had Lydia for my doctoral advisor.

1. Background

Children at the early stages of language development frequently omit arguments (subjects and objects) in their utterances, regardless of whether the adult language permits this. This occurs from the two-word stage to about age 4½, with a peak for English-speaking children sometime before 2½. Adult English does not normally permit omitted arguments, but as seen in the examples from early in the development of English, children produce utterances with omitted subjects (1a), omitted objects (1b), or both (1c) (data from Bloom 1970, 1973).

(1) a. No like celery. (Kathryn 1;10, telling her mother that she doesn’t like celery)
    b. Mommy, you wiping. (Allison 1;8, wanting her mother to wipe a doll)
    c. Spill. (Allison 1;10, noting that her mother has spilled some juice)

Adult languages can be divided into two main categories with respect to argument realization. Non-null-subject languages uniformly require overt arguments (e.g., English). Null-subject languages, on the other hand, permit omitted subjects and often omitted objects when licensed by either verbal agreement (e.g., Spanish) or certain discourse conditions (e.g., Japanese). However, children at the relevant stage of development omit arguments as described above, regardless of the category of the adult (target) language that the child is developing. Crosslinguistically, subjects tend to be omitted more frequently than objects. Studies of the null argument phenomenon have been carried out in many languages, including those that require overt arguments (e.g., English: L. Bloom 1970; Hyams 1986; P. Bloom 1990; Valian 1991; Wang, Lillo-Martin, Best, & Levitt 1992; Danish: Hamann & Plunkett 1998; Russian: Bar Shalom & Snyder 1997), and those that permit omitted subjects (and sometimes objects) either when they are licensed by verbal agreement (e.g., Catalan: Grinstead 2000, 2004; Hebrew: Berman & Uziel-Karl 2000; Italian: Valian 1991; Serratrice 2005; Inuktitut: Allen 2000; Skarabela & Allen 2002; Allen & Schröder 2003; Spanish: Grinstead 2000, 2004; Paradis & Navarro 2003), or when they are licensed by certain discourse conditions, either relatively narrowly (e.g., Dutch: de Haan & Tuinman 1988; Krämer 1995; German: Hamann 1996) or relatively freely (e.g., Chinese: Wang et al. 1992; Hindi: Narasimhan, Budwig, & Murty 2005; Japanese: Mazuka, Lust, Wakayama, & Snyder 1986; Hirakawa 1993; Korean: Clancy 1993, 1997, 2003; Mauritian Creole: Adone 1994).

Research on child null arguments has focused on three main questions: (1) under what conditions do null arguments occur, (2) why do children omit arguments in their speech significantly more frequently or in different contexts than is allowed in the target, and (3) how does the child pattern of argument realization develop towards the target norm. This research has been conducted from the perspective of three different theoretical approaches, which can be broadly classified as competence-based or grammatical, performance-based focusing on processing and production, and discourse-pragmatic. Each of these is briefly elaborated next, in order to establish the current state of knowledge in the field.
2. Grammatical approach

The grammatical approach to argument omission focuses on the child’s developing grammatical system, with the assumption that the existence of null arguments reflects a property of the child’s internal grammar that distinguishes it from the grammars of the adults in the child’s environment. That is, from the child’s perspective, utterances with omitted arguments are systematically acceptable, and not simply a speech error stemming from performance limitations. The research under this approach aims to characterize the developing child grammatical system both in terms of how it differs from the adult system and how it develops into the adult system. It is concerned almost exclusively with understanding why null subjects are allowed in child grammar. Less consideration has traditionally been given to the question of when null subjects occur once the option is available.

The grammatical approach takes as its foundation the Principles and Parameters view of language variation (e.g., Chomsky 1981; Pinker 1994), under which there is a common grammatical system underlying all languages, with languages differing structurally only in the settings of a relatively small number of parameters. Under this view, the structure of any adult language can be specified by enumerating its parameter settings and providing its lexicon (vocabulary), and thus the task faced by a child acquiring a language is in large part to learn the parameter settings for the language being acquired. Given the widespread assumption that children are aware of and largely adhere to the requirements of complex syntactic structure from the earliest possibility of testing, two avenues of exploration are open as to why a particular aspect of child syntax differs from that of adults: a given parameter is not properly set, or some aspect of underlying syntax is universally different in the child system than in the adult system.

The first influential grammatical account of null subjects in child language, put forth by Hyams (1986), pursued the parameter-setting line of investigation. Hyams proposed that children who omit subjects have not yet set the null subject parameter to the value appropriate for the target language, and are therefore speaking a language in which null subjects are a grammatical option. In essence, children start out “speaking Italian” and later converge on the proper parameter setting of the adult language in their environment. This parallel between adult null-subject languages and omission of arguments by children acquiring non-null-subject languages also fits well with the fact that subjects are omitted far more frequently than objects in child language. Subsequent research showed that this original proposal and later related ones were empirically inadequate in several ways (e.g., Valian 1991; Hyams 1992; Wang et al. 1992; Weissenborn 1992), and the field is now in general agreement that parameter setting is not the source of this variation between child and adult language. However, these accounts led to a veritable industry of fruitful research, and they serve as a straightforward illustration of the basic approach to null arguments from a grammatical perspective: children have a sophisticated grammatical system that differs minimally from the system underlying adult languages, but allows the option of null subjects even when the adult language in the environment does not.

More recent accounts assume that it is the child’s underlying grammatical system (the non-parameterized part) that is non-adult-like in some way, allowing for omission of subjects as a grammatical option. In addition, the null subject stage of child grammars seems to be contemporaneous with a stage in which children sometimes use non-finite verbs but in a very systematic way, prompting an effort on the part of most researchers to tie the two phenomena together. A common view of both phenomena is that they stem from the same root cause, some deficiency in the child’s mental representation of the syntactic structure of the sentence. There are several well-known current approaches in this vein, differing primarily in how much structure is missing from the child representations, and what it is that allows such structures in the child’s grammar.

Radford (1990), Rizzi (1993/1994), and Vainikka (1993/1994) all take the view that the upper functional structure of syntactic representations are (sometimes) missing: that children are able to produce sentences whose structure consists only of a VP (verb phrase), without the functional, inflectional and complementizer structure found in adult languages. Radford views this as an all-or-nothing phenomenon, with children first lacking functional categories and then later having them. Vainikka views the course of acquisition as staged in a more articulated and orderly way so that children begin with simple VPs, then gradually build up their structural repertoire (progressing through TP, AgrP, and CP stages) until reaching the adult level. Rizzi’s view is that children have all of the stages Vainikka proposed available simultaneously, picking arbitrarily at what point to truncate their representation, while adults always have structures that reach all the way to CP. These “missing structure” approaches also fit well with the empirical observation that children learning non-null-subject languages rarely use null subjects in questions with a fronted WH-element, subordinate clauses, or matrix clauses with a fronted XP other than the subject (Valian 1991; Haegeman 1996), all sentence types for which the upper levels of functional structure are required. A slightly different approach is outlined in Waxler (1998). At its most basic, Waxler’s proposal is that only a small part of the functional structure is (sometimes) missing in child syntactic representations (specifically, either TP or AgrP or both), as opposed to the proposals outlined above under which the entire upper functional structure is missing. The differences between the approaches with respect to the availability of null subjects in child language (for children acquiring a non-null subject language) are subtle, but under all of these approaches null subjects are allowed due to one or more of the following factors: (a) there is no place in the structure for the subject, (b) the subject can be omitted with a non-finite verb, (c) the subject can be left out through a grammatical but over-applied process of “topic drop.”

Another well-established empirical fact is that null subjects are most common in child utterances in which the verb is non-finite, although a non-negligible proportion occur when the verb is finite. Thus, some analyses have developed separate explanations for these two types of utterances – with a finite verb and with a non-finite verb. Rizzi (1993/1994) has proposed that the two types of utterances differ in their truncation site: the minimal truncation site for non-finite utterances is VP, whereas the
minimal truncation site for finite utterances is IP. Bromberg and Wexler (1995) rather propose a two-process approach, with unrelated explanations for the finite and nonfinite utterances. Null subjects in non-finite clauses are taken to be a natural extension of two facts: that adult languages (even those that do not otherwise allow null subjects) allow null subjects with infinitives (e.g. “Mary asked to leave”), and that child language allows infinitives in main clauses. This reflects essentially adult-like use of the grammar, with the only child-specific aspect being the availability of non-finite verbs in main clause contexts. Null subjects in finite clauses, in contrast, come about through an over-applied process of topic drop, whereby a subject that is established as a topic in the discourse context can be omitted (e.g. Hyams & Wexler 1993; Bromberg & Wexler 1995; Roepfer & Rohrbacher 1995). Although topic drop is a grammatical option in adult non-subject languages, it is restricted to very specialized contexts. Children have yet to fully grasp the contexts in which topic drop is licensed, with the result that they omit arguments too frequently. Proposals differ with respect to what grounding this over-applied topic drop has in the discourse. For Wexler (1998), this is taken to be simply the adult option applied in the wrong discourse contexts. For Rizzi (1993/1994) and Bromberg and Wexler (1995), children omit subjects of finite verbs only when they are in a particular position in the syntactic structure where topics are normally housed; the relevance to actual discourse is minimal.

The grammatical approach is particularly strong in carefully delineating the syntactic contexts of subject omission, elucidating the relationship between subject omission and other grammatical facts about early child language (e.g. non-target-like use of non-finite verbs), and distinguishing between child and adult grammars. However, research from this perspective has not made very serious attempts to establish that the category of omissions attributed to (perhaps over-applied) topic drop actually shares the characteristics of grammatical adult topic drop (whether in the target language specifically or more generally). Further, research within the grammatical approach has not proposed a plausible explanation for why some arguments and not others are omitted in the predicted contexts (e.g. subject of non-finite verb); most current accounts appeal to some form of optionality in the grammar, but are less clear about when exactly the available option is exercised. Third, the omission of objects has largely been ignored, although objects are omitted in as many as 9% of cases (Bloom 1990). Finally, no differentiation is made between subjects of transitive verbs and subjects of intransitive verbs with respect to the availability of the mechanism for subject omission, even though research outside this approach has shown that subjects of transitive verbs are omitted far more often (e.g. Bloom 1990; Clancy 2003; Allen & Schröder 2003).

3. Performance approach

Performance-based accounts of child argument omission assume that the child has a target-like grammar from the earliest stages of language learning, but has difficulty in producing all that s/he is capable of due to processing limitations. As such, children’s productions do not adequately reflect their internal knowledge. The research under this approach has two main goals. First, it seeks to enumerate through quantitative tests the ways in which the observed patterns in the data are consistent with performance limitations. Second, it explores several possible explanations for these limitations, including memory, prosodic, and processing factors.

Research based on this approach has considered performance limitations from several different angles. The most common, first put forth by L. Bloom (1970), claims that sentence length and complexity provide a bottleneck to children’s early productions. In a database of all the utterances containing the verb make produced by one English-speaking 22-month-old child, L. Bloom found that the subject was only produced in the utterance when some other crucial element was omitted (e.g. verb, object, adverbial phrase). In addition, subjects were omitted more often in negative than affirmative utterances, which she attributed to the increased complexity added to the utterance by the negative element. Finally, subjects were omitted more often in utterances with recently learned verbs than with familiar verbs, again suggesting an effect of the higher processing load associated with producing unfamiliar words. A study of deaf children learning home sign confirms this Feldman, Goldin-Meadow and Gleitman (1978) showed that the more elements home-signers produced in an utterance, the less likely they produced an overt subject.

P. Bloom (1990) further refined this idea, showing in data from two English-speaking children aged 1:6 to 2:7 that the mean length of the VP is greater for subjectless sentences than for sentences with overt (pronominal or lexical) subjects. Assuming that null subjects exert less of a processing load than overt subjects (and pronouns less than lexical NPs), and given children’s limited and finite processing resources, a “heavier” subject will require a shorter VP. He also found that VP length decreased with the “size” of the subject, so that VPs following null subjects were the longest, those following pronouns were shorter, and those following lexical NPs were the shortest. Valian (1991) replicated this finding in data from 10 English-speaking children with MLUs from 1.5 to 3.0.

Although an account based on length or complexity of sentences can explain argument omissions overall, it cannot explain the observed asymmetry between subject and object omission (e.g., P. Bloom’s data showed that 55% of subjects were omitted, compared to only 9% of objects). In response, a number of researchers have appealed to the idea that memory and processing constraints make it easier to elaborate a structure rightward rather than leftward (e.g., Bever 1970; L. Bloom 1970; Fodor, Bever, & Garrett 1974; Pinker 1984), so that the processing load would be heavier at the beginning of the sentence where the subject is in English. Consistent with this idea, P. Bloom’s (1990) data show a greater number of pronouns in subject than in object position, and a shorter length of overt non-pronoun subjects compared to overt non-pronoun objects. Additionally, Valian (1986) shows that NPs consisting of 3 elements (determiner, adjective, and noun) occur only in object position for children below MLU 3.5. Mazuka, Lust, Wakayama and Snyder (1986) make a similar claim about
for by processing constraints, and as such has no explanation for the observed grammatical facts in the data, such as that null subjects in English occur primarily with non-finite verbs, and do not occur in WH-questions or subordinate clauses. In fact, since finite verbs are grammatically more complex than non-finite ones by virtue of requiring an additional morpheme, and since sentences with material in CP are more complex than those without, the processing account makes the opposite prediction from the grammatical account about subject realization in these instances. Further, the performance-based account does not have an explanation for why arguments are not always omitted in the contexts vulnerable to performance constraints (e.g., subjects in sentences with long VPs, arguments in contexts of weak stress), or why some arguments in other contexts are omitted (e.g., subjects in sentences with short VPs, objects in contexts of strong stress).

4. Discourse-pragmatics approach

The discourse-pragmatics approach is concerned with explaining when argument omission occurs, supposing that children are responding to the dynamics of information flow in discourse to reduce the potential uncertainty of the listener. Two main claims are salient. First, children tend to omit arguments when the referent of the argument is clear from the discourse or situational context, and refrain from doing so when the referent is in doubt. Several discourse-pragmatic factors determine what is "clear" and "in doubt," as discussed later. Second, syntactic patterning of omissions results directly from discourse factors. Arguments new to the discourse typically appear in S (subject of intransitive verb) and O (object of transitive verb) positions, but rarely in A (subject of transitive verb) position. Because new arguments are not typically omitted, more omissions occur in A position than in S or O.

Research on discourse-pragmatic factors in child speech dates from the seminal work of Greenfield and Smith (1976), who investigated which word a given child chose to realize from a multi-word target utterance at the one-word stage. The child's choice tended to be the most informative element in the target utterance – that component of the target utterance that was most uncertain or least presupposable. The omitted elements, in contrast, could be relatively more easily determined from the surrounding linguistic and situational context. This study analyzed all parts of speech including verbs and prepositions, but it is clearly relevant to the narrower domain of argument realization and to slightly later stages of development.

Since then, many child language researchers have looked at discourse-pragmatic factors specifically in relation to argument realization, using as a starting point factors which have been shown to influence argument realization in adult speech (e.g., Clancy 1980; Givón 1983; Chafe 1987; Du Bois 1987; Ariel 1990; Fretheim & Gundel 1996). Some research from the discourse-pragmatics perspective (e.g., Guerreiro, Cooper, Oshima-Takane, & Kuriyama 2001; Campbell, Brooks, & Tomasello 2000) and many discussions from other perspectives (e.g., Bloom 1990; Valian 1991; Hyams & Wexler...
1993) have focused exclusively on whether an argument is newly introduced to the discourse or not (i.e., new vs. given), finding or asserting that children tend to overtly realize new arguments more often than given ones (but see Hamann & Plunkett 1998 for a different view).

Other studies have investigated the effect on argument realization of discourse-pragmatic factors other than newness, in naturalistic spontaneous speech data from children learning Korean (Clancy 1993, 1997, 2003), Inuktitut (Allen 2000; Allen & Schröder 2003), Italian (Serratrice 2002, 2005), Hindi (Narasimhan et al. 2005), and Spanish/English (Paradis & Navarro 2003). Note that all of these languages except English allow null arguments in various formats: Inuktitut licenses both null subjects and objects through verbal agreement, Italian and Spanish license null subjects through English agreement, and Korean and Hindi license null subjects and objects through the discourse.

Clancy, Allen, and Serratrice investigated the effect on argument realization of several factors including newness (argument not used in recent discourse), contrast (argument explicitly contrasted with another argument), absence (referent not present in physical context), disambiguation (argument easily confusable with others in discourse or physical context), query (argument under query or answer to query), activation (referent not salient in the hearer’s consciousness), and person (argument is third rather than first/second person) (note that not all factors were investigated by all three researchers). They categorized each argument according to its informativeness, with each factor having two potential values: uninformative (i.e., already clear from the discourse or situational context) and informative (i.e., not clear from the context). All found that arguments which were informative with respect to a given factor were realized overtly more often than arguments which were not (some studies assessed statistical significance, while others did not). Narasimhan et al. (2005) collapsed several of these factors together into one indicator, pragmatic prominence, and found similar results. Paradis and Navarro (2003) explored similar factors in overt arguments only, produced by two monolingual Spanish-speaking children and one bilingual Spanish/English child. They found that only a small proportion of these overt arguments were not informative for any of the factors. Both Allen (2000) and Serratrice (2002) investigated the factors together in a logistic regression model, showing that the predictors, as a set, distinguished reliably between overt and omitted arguments. Four factors contributed significantly to the effectiveness of both models: contrast, absence, disambiguation, and person.

Skarabela and Allen (2002, under review) further investigated the effect of one feature of social interaction: attention. They hypothesized that children would be more likely to omit an argument if both the speaker and hearer were attending to its referent while aware of each other’s attention, and that they would be less likely to omit an argument otherwise. Indeed, a full 96% of the arguments with joint attention were omitted, whereas only 79% of those without joint attention were. The results become stronger when both newness and attention are taken into account: arguments which are both given and jointly attended to (i.e., which are uninformative for both factors) are omitted in 97% of cases; arguments which are both new and not jointly attended to (i.e., which are informative for both factors) are omitted in only 36% of cases.

Each of these studies shows a strong predictive relationship between the informativeness value of an argument and the form in which that argument is realized. However, this relationship is probabilistic rather than absolute. Although the strictest theoretical prediction would be that 100% of informative arguments and 0% of uninformative arguments would be realized overtly, this pattern does not hold. Allen (in press) investigated the incremental effect of informativeness factors in her original Inuktitut data set. She looked only at third person arguments since first and second person arguments are always omitted except in cases of extreme emphasis, and only at the four informativeness factors which were significant in the logistic regression model in Allen (2000): newness, absence, contrast, and disambiguation in physical context. She found a clear incremental effect: only 18% of arguments with no informativeness factors are overt, as opposed to 29% with one factor, 57% with two factors, and a full 86% with three factors (no argument was informative for four factors).

All of these studies taken together illustrate that the first claim of the discourse-pragmatic approach is well substantiated. There is a strong and statistically significant relationship between the informativeness of an argument and whether or not it is omitted in child speech.

The second claim of the discourse-pragmatic approach focuses on the place of syntactic role in argument omission, based on Du Bois’s (1987) Preferred Argument Structure (PAS). The role constraints of PAS, substantiated in a large number of adult languages (e.g., Du Bois 1987; Du Bois, Kumpf, & Ashby 2003), state that the placement of either lexical or new arguments in the A role (subject of transitive verb) is dispreferred. Research with child data from six different languages – Korean (Clancy 2003), Inuktitut (Allen & Schröder 2003), Japanese (Guerreiro et al. 2001), English (Guerreiro et al. 2001), Hindi (Narasimhan et al. 2005), and Venezuelan Spanish (Bentivoglio 1996) – confirms the expected pattern: A position contains many more given and omitted arguments than either S (subject of intransitive verb) or O (object of transitive verb) positions. No direct causal link between newness, argument form, and syntactic role has yet been proven, but the correlational evidence strongly suggests such a link.

The discourse-pragmatics approach is particularly strong in accounting for when arguments are omitted in child language: the degree of informativeness of an argument strongly influences the form in which it is realized. This link between argument form and degree of informativeness has direct ramifications for the syntactic distribution of null arguments: new arguments rarely appear in A position, and therefore overt arguments are unlikely to appear in A position either. Asymmetries in argument form are thus predicted between A and S, and between subject and object. Grammar is taken to be involved in argument omission only because informative and uninformative arguments distribute in the sentence according to syntactic roles. However, two substantial questions remain. First, very little research has focused on why null arguments are allowed at all in non-null-subject languages, given that almost all of the research from this perspective has been done in null-subject languages. It is not clear why children
5. Interplay between approaches

As already discussed in the introduction to this chapter, the research concerning argument omission conducted within the approaches outlined above has generally been pursued either disregarding the other approaches, or actively arguing that one approach is a complete alternative to the others. This is essentially the "magic bullet" idea discussed earlier—that one approach is sufficient for a full explanation of the phenomenon. The "cocktail" idea has not yet been explored systematically, however, and this should be done. It makes intuitive sense that at least some role in determining when and why arguments are omitted must be played by each of cognitive processing limitations, attention to the hearer's knowledge within the discourse context, and underlying grammatical competence. I suspect that the areas of tension between these theories have relatively little to do with any fundamental incompatibility between them, and much more to do with the methods of analysis and the interpretation of the results preferred by each, and with the lack of any direct comparison of the same data from several viewpoints. In this section, I flesh out my claim that the three theories complement each other and lead to a fuller understanding of argument omission together than any one does alone.

Beyond illustrating the complementary interaction between theories, it would be ideal to show that they actually converge into, or derive from, one unified theory. Although establishing a unified theory is well beyond the scope of this chapter, exploring complementarity between existing theories and investigating areas of seemingly coincidental convergence between theories is a useful step in this direction.

In the next paragraphs, I bring the three theories of child argument omission into closer contact to show that they do complement each other in many respects. I identify several patterns in the data that one theory does not explain (well), but another theory does. Indeed, bringing the theories together has much to offer in resolving some of the important questions about child null arguments that have been left outstanding under the "magic bullet" view. I also note some areas in which work under one approach has uncovered patterns in the data that have not been identified in the other approaches—complementarity on a slightly larger scale. Finally, I discuss one pattern which all three approaches explain well, and explore how this could be included in the view of complementarity. Throughout the section, it is evident that there are many directions for further research to make the interaction between the three approaches more fruitful.

Perhaps the biggest unanswered question in each of the three approaches is that of optionality. Each theory has strong and clear predictions about which arguments will be omitted, but none of these predictions is upheld 100% of the time. Thus, application of the criteria for omission seems to be optional rather than obligatory, juxtaposing the three theories could help to explain the optionality in each. For example, the grammatical approach predicts that subjects of non-finite verbs will be omitted. However, it does not explain why some subjects of non-finite verbs are overt. In general, the grammatical approach does not make predictions about frequency, only about possibility, and insofar as there are more null subjects than one would expect from simple speech errors, the predictions of the grammatical approach are satisfied. The grammatical approach explains optionality of omission by saying that the structural differences between child and adult grammars that allow for child omission are sometimes in effect and other times not. This explanation may be true, but it seems inelegant and ad hoc. Either of the two other approaches might be able to explain the optionality more satisfactorily. The performance-based approach would predict that only those subjects of non-finite verbs that are also subjects of long VPs or that are also positioned in weak prosodic contexts would be omitted. The discourse-pragmatic approach would predict that only those subjects of non-finite verbs that are also accessible from the discourse or situational context would be omitted. An explanation involving all three theories might predict that omission would occur for all subjects of non-finite verbs that have long VPs or are in weak prosodic contexts, and that are accessible from the discourse or situational context. Conversely, omission would never occur for subjects of finite verbs that have short VPs or are in strong prosodic contexts, and that are not accessible from the discourse or situational context. Subjects which have one or two of these features but not all three would be omitted some of the time, and comparative research could further investigate which of the factors is the strongest predictor. Applying one approach in the contexts left open by another is likely to deepen our understanding of the seeming optionality of argument realization in these contexts.

A clear gap in the discourse-pragmatic approach that other approaches could fill derives from the well-substantiated observation that young children omit arguments at a significantly higher rate than do their caregivers. The discourse-pragmatic approach, while predicting which arguments will be realized most fully (i.e., lexical NPs) and which more lightly (i.e., pronoun or omission), has no explanation for why arguments are omitted rather than pronominalized in a language like English which does not typically permit argument omission. Both the grammatical and performance-based approaches could complement the discourse-pragmatic approach here—children omit uninformative arguments either because that option is possible in their (non-adult-like) grammar, or because those arguments are vulnerable to processing constraints.

One of the deficiencies of the grammatical approach that could be addressed by the others is that it provides virtually no explanation for the notion "topic" even though it claims that children omit topics when they are in subject-of-finite-verb and object contexts. In fact, it assumes that children overapply topic drop because their sensitivity to discourse dynamics is underdeveloped, so they take much more for granted.
as uninformative, recoverable, or given than adults do (e.g., Maratsos 1974; Hyams & Wexler 1993; Schaeffer 1997, 2000; Wexler 1998). The factors investigated under the discourse-pragmatic approach provide an excellent characterization of what a topic is in discourse. Therefore, child data coded for both finiteness and discourse-pragmatic factors can reveal whether omitted subjects in the context of finite verbs, as well as omitted objects, indeed share the discourse-pragmatic characteristics of topics, and whether they differ reliably from the subjects in the context of non-finite verbs (which should not uniformly show topic properties). Assuming that the omitted arguments are shown to be topics, the discourse-pragmatic approach can help to identify which factors contribute more than others to the apparent over-application of topic drop by children. Integration of these two approaches can also help resolve whether children's sense of discourse dynamics is adult-like or not.

The discourse-pragmatic approach would also prove useful in resolving an apparent conflict identified by Hyams and Wexler (1993) between the grammatical and performance-based approaches. Hyams and Wexler observe that the grammatical approach predicts a strong continuity in non-null-subject languages between the use of null subjects by the young child and the use of pronouns by the adult. Specifically, young children will use null subjects where adults would use pronouns (assuming the topic-drop analysis that Hyams & Wexler propose in this article). However, the processing approach predicts no such continuity, in that subjects are dropped on the basis of processing resources and not any discourse- or meaning-based properties. Neither approach has the tools to characterize the discourse properties of the arguments in question. In contrast, longitudinal data from young children and their caregivers that is coded for a set of discourse-pragmatic factors could easily reveal whether there is indeed continuity between early null subjects and later pronouns.

Thus far, I have mentioned several areas in which one approach either explicitly or implicitly acknowledges a gap in its explanation of null arguments, which another approach is able to fill. Another way in which theories can be complementary is by one uncovering patterns in the data that other theories missed, because of the particular predictions of a given theory. For example, there is a clear asymmetry in omissions between subjects of transitive verbs (A) and subjects of intransitive verbs (S), with the former being omitted much more. This pattern has been identified and explained within two of the approaches, but not the third. Based on the distribution of uninformative referents (or topics), which have been shown to occur much more often as A than as S, the discourse-pragmatic approach predicts that argument omission would likewise be more common for A than for S. The performance-based approach also predicts A to be more commonly omitted than S, as A by definition occurs in more complex sentences (sentences with transitive verbs and objects) than those in which S occurs (sentences with intransitive verbs and no objects). These predictions caused researchers working within these two approaches to look for, and find, this A/S asymmetry. However, no prediction relevant to the A/S asymmetry derives from the grammatical approach because no structural differences between these two types of subjects are claimed, so this asymmetry remained undetected. (Note that the grammatical approach does assume different structural positions for the subjects of the two different types of intransitive verbs — unergative and unaccusative. This leads to the prediction that these two types of subjects might be omitted differentially, but this has not yet been investigated.)

An opposite pattern is found for another asymmetry in the data, between subjects of finite and non-finite verbs (the latter are omitted more frequently). Structural differences in the relationship between subjects and finite vs. non-finite verbs caused proponents of the grammatical perspective to look for and extensively explore a related omission asymmetry. Because finiteness is not a relevant factor within either of the other approaches, this asymmetry has remained unidentified there. Thus, the grammatical approach complements the other two approaches in identifying a previously unobserved pattern. It is too early to know what the ultimate result will be here. If further research shows no explanation for this asymmetry from the other two approaches, then this will be a true case of complementarity in which one approach provides part of the picture that the others can't. Alternatively, consideration of the discourse context may reveal that non-finite verbs are disproportionately used when the subject is the discourse topic, and analysis of the sentence composition may show that utterances with non-finite verbs are disproportionately long or complex. In this case, the grammatical theory will have provided the impetus for new discoveries in the other two theories, and we can follow up to determine whether these facts are related or independent of each other.

The different theories have also uncovered different patterns in the argument omission data because they have studied languages of different typologies: research within the discourse-pragmatic perspective has focused on null-subject languages where adult omission is licensed by discourse conditions or agreement (e.g., Italian, Korean), whereas research within the other two perspectives has focused on non-null-subject languages where adult omission is not licensed (e.g., English, German). This difference is again a result of theoretically-motivated differences in predictions. The grammatical and processing approaches are interested in finding out how and why children are different from adults in order to better characterize the initial state of child cognitive abilities and understand development. Therefore, they focus on areas of language where there is a clear difference between children and adults. The discourse-pragmatic approach, in contrast, is interested in characterizing children's knowledge of discourse and pragmatics, and therefore doesn't need to study phenomena where children perform noticeably differently from adults. This distinction has led to claims that child argument omission operates differently in null-subject and non-null-subject languages. Valian (1991) has claimed on the basis of differing frequencies of subject omission in child Italian and English that child subject omission is caused by the grammatical process of prodrop in Italian (and other null-subject languages), and by performance constraints in English (and other non-null-subject languages). Hyams and Wexler (1993) propose that a grammatical account holds for both language types, but that the mechanism of licensing omitted arguments across the two language types (agreement for Italian, discourse topic for English) causes the difference in fre-
frequency of omission. Later versions of the grammatical approach would presumably also predict that there is a difference across language types, with agreement permitting subject omission in Italian, and lack of structural position for subjects permitting subject omission in English. The discourse-pragmatic account predicts that the same discourse-pragmatic factors underlying argument omission in null-subject languages and pronoun use by adults in non-null-subject languages should also be at play for argument omission by children learning non-null-subject languages, but this has not been tested. This is another case, then, in which the different approaches complement each other in uncovering patterns that hadn’t been found in other approaches because of the limits of their predictions, and in which each can spur the other to further productive research.

Finally, I turn to a different way of assessing complementarity, as seen through a pattern in the data for which each of the three theories has a convincing explanation. It is well known that subjects are omitted far more frequently than objects, and this is a pattern predicted by each of the theories. According to the performance-based perspective, it occurs either because processing resources are fewer at the beginning of the sentence where the subject is located, or because the subject more often carries weak prosodic stress than does the object. The grammatical approach rather claims that subjects are omitted more often than objects because of differences in structure. Subjects appear higher up in the hierarchical structure than objects – typically in the Specifier of either IP or CP, and also require checking at either TP or AgrP or both. If those elements of the structure are absent, then subjects have no place to appear. Objects typically appear very low in the hierarchy except when they are topics, in which case they would also appear in Specifier of CP. Under the discourse-pragmatic approach, argument omission is completely based on informativeness. Since objects are more often informative than subjects, they are omitted less often.

At first glance, these three theories seem to be competing rather than complementary, because they independently converge on the same results for different reasons. Another interpretation, however, is that their convergence is not accidental. One of the three explanations may really be the unifying theory that drives the other two, or all may be driven by a fourth underlying unifying theory. Further investigating and resolving this convergence by looking at all three approaches together, then, could be an important step towards uncovering the unified theory in the domain of null arguments. One hypothesis for this unified theory is that subjects have evolved to be most commonly found crosslinguistically in a vulnerable position (either due to grammar or processing) exactly because they carry the least information value of any major element in the sentence. Then discourse-pragmatics would be the underlying cause of the structure of grammar and the methods of processing. This view is forcefully put forth in Du Bois’s (1987) work on Preferred Argument Structure.

The A/S asymmetry discussed earlier may also provide some evidence for discourse-pragmatics as a unifying theory. Recall that the discourse-pragmatic approach explains the asymmetry by appealing to informativeness: subjects in A position tend to be much less informative than those in S position, and so are omitted more frequently. The performance-based approach rather appeals to children’s difficulty in processing more complex (or longer) sentences: subjects in A position are omitted more often because they are part of longer or more complex sentences which must include an object; subjects in S position are part of intransitive sentences which include no object. Interestingly, as noted by Hyams and Wexler (1993), adult speakers of null-subject languages such as Italian also omit more subjects in A than in S position. Since processing resources are unlikely to be constrained in adults, processing limitation cannot be a valid explanation in itself for the A/S asymmetry in children. But it could nonetheless be true that subjects of transitive verbs have evolved to be most commonly found in a vulnerable position for processing because they carry the least information load in the sentence. It is obviously too soon to know whether all the various patterns evident in child argument omission support this view or not, but it is an interesting direction for future research.

6. Conclusion

The ideas outlined in this chapter illuminate some ways to address the obvious existing gaps in our understanding of argument omission in language development. The three major approaches to explaining early argument omission are explicitly compared with the goal of showing how a fuller understanding of argument omission can be achieved by appealing to knowledge from a number of different perspectives (a “cocktail” view) rather than focusing on one perspective as the answer to all (interesting) questions (a “magic bullet” view). Each of the approaches outlined here has made significant contributions individually, but viewing the data only from the narrower perspective that each approach provides individually has tended to obscure relevant patterns or explain certain facts in an ad hoc manner. Child language research has now advanced enough in each domain that there is both an opportunity and a need for synthesis and comparison.

Further research along these lines will contribute to the literature in language acquisition by adding significantly to our understanding of the complex patterns of early argument omission. In addition, it will further our understanding of the relationship between functionalist and formalist approaches to linguistics, and how they can complement each other productively. I have focused on one formalist (grammatical) and two functionalist (performance-based, discourse-pragmatic) approaches here because they are the three dominant voices in the existing argument omission literature. However, they also embody some of the most important foundational differences between approaches to language acquisition research today – a nativist approach focusing on innate knowledge of language structure, an empiricist approach focusing on mental capacities for language processing and production, and a usage-based approach focusing on the function of language in actual conversation. Each of these perspectives brings unique and important insights to understanding child language acquisition.
development, and a richer and deeper model of acquisition will result from taking all of them into account.

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References

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