The morphosyntax interface

Kamil Ud Deen

15.1 Introduction

This chapter investigates the acquisition of morphology in child language, and considers various possible explanations for the empirical facts. The discussion revolves around the morphosyntax interface, a term used to refer to the confluence of two areas of language, morphology and syntax, and the processes involved in linking these two. A morpheme is the smallest unit of meaning in language, and the study of morphemes is referred to as morphology. Morphemes include regular words (e.g. girl, eat, beautiful, etc.), but also smaller units of language such as prefixes (e.g. un-, re-), suffixes (e.g. -s, -ed, -ing), etc. The way in which these morphemes are ordered depends on a variety of different factors, including properties of the sound system, properties of the morphemes themselves, as well as properties of the grammatical system. This latter system is referred to as syntax – the abstract set of principles that govern the ordering and interpretation of morphemes in a sentence. The morphosyntax interface, therefore, is the locus of interaction of these two areas of language.

Many linguistic phenomena arise out of this interface of morphology and syntax, including the familiar passive construction, questions and inflection. The focus of this chapter is inflectional morphology – a classic example of a linguistic phenomenon that is both syntactic and morphological in nature (see Behrens Ch. 12). Inflection is a variation in the form of a word that is conditioned by a particular grammatical context. For example, the verb eat occurs in a variety of different forms, including eats, eating, ate. The choice of which of these forms a speaker uses is determined by the context in which the word occurs – eats occurs in a habitual or historical present context; eating occurs after an auxiliary verb in the present progressive context, etc. These different forms represent different inflectional forms of the verb. Languages vary as to which kinds of inflection they exhibit, but typical examples of inflection are agreement on the verb for person (e.g. a verb in
English often has -s attached to the end when the subject of the sentence is third person, singular), number (e.g. the noun in English has -s attached when indicating that the referent is plural), case (e.g. nominative, accusative, genitive pronouns in English), tense, modality, aspect, etc.

The morphosyntax interface is an important area of research in the study of child language because children exhibit (i) interesting patterns in the acquisition of inflectional morphology, and (ii) significant cross-linguistic similarities in the nature of those patterns. In particular, this chapter asks the question of whether the patterns in the acquisition of morphology have as their source (i) a lack of knowledge of inflectional morphology, (ii) a lack of syntactic knowledge, or (iii) problems with the conversion of a syntactic representation into a string of morphemes.

The chapter begins with a discussion of the architecture of the morphosyntax interface (Section 15.2). This section begins with an overview of the theoretical framework in which the ensuing discussion is couched (for readers who are not familiar with the theory), and is followed by a description of how the morphosyntax interface is organized. Section 15.3 then describes the major findings in the acquisition of inflectional morphology, stating five important generalizations. Section 15.4 describes the Root Infinitive phenomenon. These two sections establish the empirical facts which then serve as the background for section 15.5, in which we discuss several recent theories, categorized into those that propose a deficit in (i) inflectional knowledge, (ii) the process of converting a syntactic representation into a morphological string, and (iii) the underlying syntactic representation.

15.2 The morphosyntax interface

15.2.1 The generative approach to language

This chapter assumes a model of language that was first proposed by Noam Chomsky (1957). The details of this model have changed over the last fifty years, but the basic approach remains unchanged. Simplifying the model somewhat, the idea is that all sentences in a language are generated by a computational system that is comprised of a finite set of principles operating on a set of lexical items. These lexical items are manipulated by the finite set of principles within a highly constrained hierarchical structure, which takes the form of a binary branching tree. The hierarchical structure associated with the sentence ‘The girl chased the mouse’ is shown in (1).

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(1)
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The words in the sentence are arranged in pre-specified positions in the terminal nodes of the syntactic tree in (1), which are labelled according to the function that they perform. Terminal nodes are the locations on the tree which do not branch any further. So the determiner the (sometimes also referred to as an article) occurs within a node labelled det, the noun girl occurs within a node labelled N, the verb chased occurs within a node labelled V, etc. These various nodes are grouped into phrases, which take as their label the major element within that phrase. So the girl constitutes a phrase which takes the label Noun Phrase (the noun being the major element within that phrase). The rest of the words are categorized in a similar fashion.

The top node on the tree in (1) is labelled S because it represents the entire Sentence. In the 1980s, this label was changed from S to Inflectional Phrase (IP), in recognition of the fact that in a wide variety of languages the highest positions of the tree are typically reserved for inflectional kinds of elements. This top node branches downwards in a binary fashion, with the next two nodes down labelled NP and VP. This division represents a basic division in any sentence: that of subject and predicate. The NP stands for the subject noun phrase, and the VP stands for the verbal predicate. Finally, the grammatical object (the mouse) occurs deeper within the VP, within another NP.¹

This formalism has several important characteristics. First, all nodes that are labelled alike are assumed to function alike. For example, NPs should be interchangeable, and in fact this is largely true (e.g. ‘The mouse chased the girl’, where the object NP has been switched with the subject NP, is a grammatical sentence). Second, the overall structure has a ‘nested’ characteristic. That is, each binary branching node is nested within another binary branching node, except for the very top node. This creates a series of hierarchically embedded structures that are basically of the same type. Note that the VP consists of not only the verb, but also the NP that corresponds to the grammatical object. This captures the intuition that the predicate is more than just the verb, but is affected by the properties of the object. Thus this nested structure allows for groupings of words into linguistically meaningful units. We will return to this characteristic in our discussion of syntactic accounts of child language in section 15.5.3.

And finally, this model has a finite set of principles, which together with the stipulated structure have the capacity to generate an infinite set of sentences. This generative capacity is appealing because it provides a mechanism to explain how children are able to acquire the ability to understand and produce an infinite set of sentences without having to learn each and every one of them.

¹ The structure described here is obviously Anglo-centric. While the structures for other languages differ from that outlined here, the basic tenets of this framework remain constant (e.g. binary branching, phrasing).
15.2.2 The interface

It is generally accepted that in producing a grammatical sentence, the particular morphemes we produce, both their form and relative order, are a reflection of this underlying syntactic representation of the sentence. The idea is that a speaker creates a syntactic representation of a sentence, translates that into a series of lexical and morphological items (often referred to as ‘linearization’), and then actually physically pronounces them. The listener, who does not have access to the underlying intended syntactic representation, perceives the lexical and morphological items, takes note of their form and order, and decodes them into a syntactic representation. The morphosyntax interface (MI) refers to this interaction of syntax with morphology. Minimally, the MI includes the following three components:

I. syntax
II. conversion algorithm
III. morphology

Each of these areas are studied extensively in adult language, especially I and III. The conversion algorithm II receives somewhat less attention, although it is assumed in virtually every theory of syntax and/or morphology. The precise mechanisms of the conversion from syntax to morphology (and vice versa in comprehension) are not very well understood, but there are several formal descriptions of how morphology links up with syntax.

Within the generativist approach to language acquisition one well-known formalization is Baker’s (1988) Mirror Principle, which holds that the overt order of a string of morphemes is either a direct reflection of the underlying architecture of a syntactic tree, or its exact mirror image. Thus if one observes a string of morphemes as in (2a), one can assume (by the Mirror Principle) that the underlying structure of that sentence is as in (2b), or its exact mirror image (2c).

(2) a. Observed order of morphemes: A – B – C

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  A
 / \  
/   \ 
B     C
```

b. AP
   / \  
   A   BP
   / \  / \  
  B   CP CP

c. CP
   / \  
   C   BP
   / \  / \  
  B   A AP
```

The underlying assumption to this approach is that the conversion algorithm is a simple reader of the terminal nodes of the tree. So in the case of (2b), the tree is read from left to right, top to bottom, while in (2c), the tree is read from right to left, bottom to top. This produces a linearized string of abstract categories, each of which is then matched to appropriate items in
the lexicon. An example from English is ‘I chase mice’, which would be represented as the structure in (2b), where I would be A, chase would be B and mice would be C. On this approach, the properly functioning MI involves the output of a syntactic component, the correct conversion algorithm, and appropriate access to a full lexicon. If any one of these components is deficient in any manner (as may be the case with children), then the process may produce non-adult-like utterances.

Now, if a child produces an utterance that is morphologically unadult-like (e.g. a typical young child utterance missing 3rd person singular -s in English, such as ‘Mummy eat cookies today’), it is not immediately clear where the source of that error lies: it could conceivably be any one of the three components to the morphosyntax interface in (I–III), or indeed some other domain entirely. Hyams (1989a) refers to this as the Domain Problem: when the child produces an error, it is not immediately clear which domain of language is responsible for that error. As such, over the last several years, various theories have been put forward to explain essentially the same set of facts, each appealing to a different domain. We shall discuss several of these theories below, but first we must establish what those basic empirical facts are.

### 15.3 Some properties of the acquisition of morphology

Over the last few decades, several important generalizations have emerged from the study of morphology in child language. While there are exceptional cases, the generalizations presented here are good rules-of-thumb that might guide a researcher’s first analysis of child data. Following these five generalizations, we discuss the phenomenon known as Root Infinitives (also known as Optional Infinitives).

#### 15.3.1 Five generalizations

15.3.1.1 Generalization 1. Inflection acquired before age 5

Typically developing children are remarkably good at acquiring inflection. Over the last few decades, children acquiring a wide range of languages have been found to exhibit high degrees of control (about 80 per cent

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2 This kind of direct linking between syntax and morphology is widely assumed in the literature. For example, Pollock’s (1989) split-INFL hypothesis was based upon the observation that negation occurs in a different relative order with finite verbs versus non-finite verbs. This was used as evidence that the syntactic position to which finite verbs move to in the syntax is different from that of non-finite verbs. The details of this proposal are beyond the scope of this chapter, but the reader is referred to Pollock’s original paper, as well as Haegeman (1991) and Carnie (2006) for an overview.

3 An obvious candidate is phonology. There have been several influential proposals that seek to explain the omission of inflectional elements (including grammatical subjects) as phonological processes, e.g. Gerken (1991), Gerken and McIntosh (1993) and Demuth (2007). I do not discuss these here because they do not directly relate to the morphosyntax interface.
correct in obligatory contexts) over inflectional morphology by about age 5 or earlier. This is a remarkable feat when one considers that children are rarely (if ever) explicitly taught the form, meaning or context of inflectional morphemes. Nevertheless, children come to know the inflectional systems of their language at a very early age.

In fact, if a child uses target inflectional morphemes in less than 50 per cent of obligatory contexts at an age when the inflectional morphology would typically be acquired, this is often taken by speech pathologists as an initial indication that the child has a language disorder. For example, Rice and Wexler (1996b), using data from thirty-seven American children aged 4;4 to 5;8 diagnosed with specific language impairment (SLI) (see Tomblin Ch. 23 and Leonard Ch. 24,) and forty age-matched normal children, find that the unimpaired children used third person singular -s, past tense -ed, and the auxiliaries be and do in over 80 per cent of obligatory contexts, while the SLI children produced all four of these morphemes in less than 50 per cent of obligatory contexts.

15.3.1.2 Generalization 2. Early acquisition in inflectionally rich languages

A somewhat counterintuitive finding is that children acquiring languages that have a rich inventory of inflectional morphemes seem to acquire that system significantly earlier than children acquiring languages relatively meagre in inflection, such as English. For example, Guasti (1993/94) investigated the speech of three children (aged 1;8–2;7) acquiring Italian, and reported that the children began producing agreement before the age of 2, and the rate of error never rose above 3 per cent. Furthermore, omission of inflection was very rare, although avoidance of certain forms (e.g. plural) was attested. Guasti concluded that the agreement system is in place from very early on, perhaps even as young as 2 years of age. Similarly, Ud Deen (2004) reports that children acquiring Swahili (a Bantu language spoken in Eastern Africa with a very rich set of inflectional morphemes) converge on the correct agreement system before age 3, producing less than 2 per cent errors and omitting agreement less than 20 per cent of the time. Results such as these have been found in a wide variety of languages, including Spanish (Grinstead 2000), Catalan (Grinstead 2000), Sesotho (Demuth 1992) and German (Poeppel & Wexler 1993), and stand in contrast to the acquisition of inflections in morphologically poorer languages such as English, in which children often do not acquire the agreement system of their language until approximately age 4 years (Brown 1973, see Phillips 1995 for a review).

15.3.1.3 Generalization 3. Regular inflectional systems are easier

Inflectional systems that are regular and that contain very few exceptions are acquired earlier and with fewer errors than those that have exceptions. One way to measure whether children have acquired the inflectional
system of a language is whether they commit errors in production (errors of commission). Committing errors in production is a special kind of error (the other kind being an error of omission, see Generalization 5). Examples of such errors are the use of a first person agreement marker in a third person context, or the use of singular morphology in a plural context (or vice versa). It has generally been found that children acquiring languages with systematic and regular inflectional systems produce far fewer errors of this sort than children acquiring languages with irregular or unpredictable inflectional systems.

A good example of this is the difference between Italian and Brazilian Portuguese (BP). Italian has a very regular system of verb agreement, shown in (3a) below. As discussed above, Italian children acquire agreement very early and with few errors. However, BP has a rather unusual inflectional paradigm, shown in (3b).

(3) a. Italian  b. Brazilian Portuguese

<table>
<thead>
<tr>
<th>Person/Number</th>
<th>Italian</th>
<th>Brazilian Portuguese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st sg</td>
<td>(io) scriv - o</td>
<td>Eu es'crev - o</td>
</tr>
<tr>
<td>2nd sg</td>
<td>(tu) scriv - i</td>
<td>Você es'crev - e</td>
</tr>
<tr>
<td>3rd sg</td>
<td>(lui/lei) scriv - e</td>
<td>Ele es'crev - e</td>
</tr>
<tr>
<td>1st pl</td>
<td>(noi) scriv - iamo</td>
<td>A gente es'crev - e</td>
</tr>
<tr>
<td>2nd pl</td>
<td>(voi) scriv - ete</td>
<td>Nós escre'v - emos</td>
</tr>
<tr>
<td>3rd pl</td>
<td>(Loro) scriv - ono</td>
<td>Vocês es'crev - em</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eles es'crev - em</td>
</tr>
</tbody>
</table>

In Italian, each person/number has a distinct morpheme associated with it, and no single morpheme refers to more than one person/number. This is a regular, unmarked agreement system. Compare this to the BP system, which is significantly different. Notice that the only morpheme in BP that uniquely corresponds to a single person/number the way all six do in Italian is first person singular. The remaining morphemes are either conflations of multiple person/number references, or are complicated in some other way. The morpheme -e is used with second person singular, third person singular and first person plural subjects. So -e seems to occur in all three persons, and in both the singular and plural. Furthermore, -em occurs when the subject is either second or third person, plural. And finally, there are two (seemingly non-distinct) forms for first person plural: -e and -emos. Thus the BP agreement system is significantly less regular and predictable than that of Italian.

Rubino and Pine (1998) investigated the acquisition of inflection in one child acquiring BP. They found that while errors in the singular are relatively low (2.1 per cent), errors in agreement with plural subjects occurred at a rate of 28 per cent. The researchers argue that this high rate of error shows that children do not acquire inflection as easily and as rapidly as is usually thought, and that children acquire agreement on verbs in a piecemeal fashion. However, the plural is exactly where most of the irregularity of the BP agreement system occurs, and so it is not surprising that
agreement errors would arise in the plural. When faced with a system that has unexpected irregularities, the child simply tries to regularize the system, resulting in error. Such errors are very common in other domains of child language involving exceptional morphology. Consider overgeneralization in English verb morphology: children often go through a stage during which they sometimes produce past tense verbs such as *goed, runned* and *eated* (see Behrens Ch. 12, Section 12.2.2). In this case, children have acquired the past tense rule of English (add -ed to the verb stem) and have not learned that this generalization only applies to certain verbs. Children must learn these cases one by one through positive exposure to each example. Similarly, in BP the child has learned the regular pattern but has not learned the irregular portions of the agreement paradigm. We shall return to BP in our discussion in section 15.3.1.5.

### 15.3.1.4 Generalization 4. Grammatical subjects often omitted

Languages can be classified into those that allow null subjects (e.g. Italian, Spanish, Japanese, Swahili) and those that require an overt subject (e.g. English, French) with finite verbs.

(4) English Italian
a. Overt subject: I ate the cake Io ho mangiato la torta
b. Null subject: * I ate the cake Ho mangiato la torta

A feature of child English is that grammatical subjects are omitted at very high rates. Valian (1991) reports that five English-speaking children (mean age: 2;0) produced null subjects in approximately 31 per cent of non-imitative, non-imperative utterances. In a group of older children (mean age: 2;5), that proportion dropped to 11 per cent. Thus as the children matured and they began to acquire the inflectional system of their language, a higher percentage of subjects occurred. How are subjects related to inflection? Grammatical subjects are related to inflection and the MI in a very real sense: the grammatical case required by subjects is referred to either as nominative case or ergative case (depending on the kind of language in question). Considering nominative case, within generative frameworks of language, it is widely assumed to be assigned by some inflectional category such as tense or agreement (which one depends on the language and particular theory). But because subjects require case assignment, they are very closely related to this inflectional category. That grammatical subjects and inflectional morphology develop in child language together in real time is therefore not a coincidence. Subjects are inflectional in nature.

### 15.3.1.5 Generalization 5. Errors of omission predominate, errors of commission are rare

When children do make errors, they overwhelmingly make errors of omission, as shown in (5). Such errors include the omission of inflectional
elements (e.g. 5d–f), but also the omission of the ‘carrier’ of inflection, (e.g. the copula verb in 5b and the auxiliary verb in 5c), as well as other elements that are thought to be related to inflection, such as determiners (5a).

(5) Errors of omission – very common
a. Paula play ball
   target: Paula plays with the ball
   Determiner Omission (Radford 1990)

b. I in the kitchen
   Copula Omission (Becker 2000)

c. baby talking
   Auxiliary Omission (Radford 1990)

d. He bite me
   Agreement Omission (Brown 1973)

e. Ø – qet – il – e
   Agreement Omission,
   target: ke – qet – il – e
   ‘I finished’
   1sg–finish–PAST–IND
   Sesotho (Demuth 1992)

f. alafu a – Ø – rud – i
   Tense Omission, Swahili (Ud Deen 2005)
   target: alafu a – li – rud – i
   then 3sg–PAST–return–IND
   ‘Then he returned.’

Such errors are widely reported in the literature for a number of languages, including German (Poeppel & Wexler 1993), Inuktitut (Swift & Allen 2002), Japanese (Clancy 1985), Kaluli (Schieffelin 1985), Quechua (Courtney 1998), Polish (Smoczyńska 1985), Sesotho (Demuth 1992), Siswati (Kunene 1979), Swahili (Ud Deen 2002, 2005), Turkish (Aksu-Koc & Slobin 1985) and Zulu (Suzman 1991). Not only are errors of omission attested in a wide range of languages, within each language omission often occurs at high rates. For example, Sano and Hyams (1994) report that in the speech of three children acquiring English (data available on CHILDES, MacWhinney 2000), at certain stages over 70 per cent of third person singular verbs were missing the obligatory -s. They investigated the speech of Eve (age 1;6–1;10), Adam (2;3–3;0) and Nina (2;4–2;5), and found the rate of omission of -s in third person singular contexts was 78, 81 and 75 per cent, respectively.

Ud Deen (2005) reports similar results in the acquisition of Swahili. The Swahili verb is inflected minimally for subject agreement (SA), tense (T) and mood, as shown in (6), and children at early stages omit subject agreement and tense at high rates (see Table 15.1).

(6) Swahili minimal verbal complex: SA – T – V – Mood
   Example: ni – li – anguk– a
   1sg – PAST – fall – IND
   ‘I fell.’

*IND = indicative mood.*
So the omission of inflectional morphology is crosslinguistically common and occurs at high rates. Errors of commission (also known as errors of substitution), while not unheard of, are much less common. An example of an error of substitution is an agreement error such as ‘I eats dinner’, in which third person agreement incorrectly occurs in a first person context. In an analysis of the speech of ten English speaking children (age range 1;6–4;1), Harris and Wexler (1996) identified 1,724 verbs that occurred in the first person singular context, of which only 3 occurred with the incorrect third person singular -s suffix – a remarkably low error rate of 0.17 per cent. Similarly, Ud Deen (2004) investigated the speech of two children (age 2;10–3;0 and 1;8–2;1) acquiring Swahili, and found that the rate of errors of agreement were extremely low. The older child produced a total of 3 agreement errors out of 224 verbal utterances (an error rate of 1.3 per cent), and the younger child produced 1 error out of 197 verbal utterances (an error rate of 0.5 per cent). Table 15.2 (adapted from Sano & Hyams 1994) shows the rate of errors in agreement in a number of children acquiring various of languages.

In calculating error rates, it is important to ensure that a fine-grained analysis is performed so that the contexts in which errors are more prevalent can be identified. Consider the hypothetical data set in Table 15.3, in which the rate of error has been calculated for each file. The overall error rate for this corpus is 1.05 per cent (31/2, 945). Such a low error rate confirms Generalization 5, and fits well with the rest of the data presented in Table 15.2. However, this error rate masks an apparent spike in errors in file 2, where the error rate is more than 5 per cent.
Furthermore, it is possible that upon closer examination of file 2, one might discover that a large number of errors occur only in certain contexts or with certain morphology or with certain lexical items – facts that would be lost if a file-by-file analysis were not performed. In fact, this is what is found by Rubino and Pine (1998) in their study of the Brazilian Portuguese child discussed in section 15.3.1.3. They found that while the overall rate of error in subject–verb agreement was in line with other languages (44/1,464 = 3.01 per cent), the rate of error was significantly higher in the plural (14/50 = 28 per cent) than in the singular (30/1,414 = 2 per cent). Because there are many more examples of singular verbs than plural verbs, when the data are aggregated across all contexts, it gives the impression of a very low error rate.

However, the unusually high error rate reported for BP is not due to the low frequency of plurals in BP, as Rubino and Pine suggest. As Ud Deen (2004) points out, their argument predicts that because plurals are generally rarer in child speech and child-directed speech than singular verbs, children crosslinguistically should do worse on plural agreement. But in the speech of two Swahili children studied by Ud Deen, the rate of error in the singular was very low (0.5–1.47 per cent), and there were no errors in the plural. Deen argues that the elevated rate of errors in BP is essentially because of the irregular nature of the agreement paradigm (see (3b)). Thus the elevated rate of errors that Rubino and Pine report is due essentially to Generalization 3 and not to an exception to Generalization 5.

15.4 Root Infinitives

A Root Infinitive (RI) is a verb that is marked with overt non-finite morphology and that occurs in a root (main) clause. Examples of RIs from a variety of languages are provided in (7).

\(\text{(7) a. Thorsten das hab-en} \quad \text{German} \\
\text{Thorsten that have-INF} \\
\text{‘Thorsten has that.’} \)

\(\text{b. Papa schoen wass-en} \quad \text{Dutch} \\
\text{daddy shoes wash-INF} \\
\text{‘Daddy washes (the) shoes.’} \)
The verbs here are not just missing inflection, but are overtly marked as infinitives. In adult language, this is generally ungrammatical (although non-finite verbs do occur in certain root clauses). For example, the appropriate form of the verb in (7a) in adult German would be the finite hat, not haben. This could be taken as a potential exception to Generalization 5 above – that is, use of the infinitive in finite connects could be construed as an error of commission. However, as we will see, this is not the case.

One of the most striking facts about RIs is that the occurrence of the morphological infinitive is not a morphological error. Rather, by positioning the infinitival verb in a position reserved for non-finite verbs, children exhibit knowledge that the form they are using is indeed a non-finite form. Take German as an example. In adult German main clauses, finite (inflected) verbs occur in the second position (8a), while infinitives occur at the end of the sentence (8b). The boxes indicate the different forms of the verb used in different contexts.

(8) a. Ich [sehe] viele Leute Finite German Verb
   I see.1sg many people Verb in second position (V2)
   ‘I see many people.’

   b. Ich möchte [viele Leute seh-en] Non-finite German Verb
   I want [many people see-INF] Verb in final position
   ‘I want to see many people.’

Following most generative approaches, in German finite main clauses the verb must move leftward from its final position to the second position in the clause structure. The first movement is to I(nflection) Phrase (referred to as S in (1)), and then a second movement to a position referred to as C (omplementizer). The first position in the clause structure is usually filled by the subject of the sentence, although any other element (e.g. the grammatical object, negation, an adverb) may also be in first position. This is referred to as the V(erb)-2 phenomenon. In non-finite sentences, however, the verb does not move leftward to C, and so it remains in sentence-final position, as in (8b). The details of how and why this happens are not relevant for our purposes, only that finite verbs occur in the second position of the sentence, while non-finite verbs occur in the final position of the sentence. Thus finiteness predicts the position of the verb in German.

In an analysis of RIs in child German, Poeppel and Wexler (1993) found that, with few exceptions, inflected verbs occurred in the (correct) second position (197/208) while uninflected verbs (RIs) occurred in the (correct) sentence-final position (37/45). That is, the use of infinitival morphology is
not an error in the sense that the child simply lacks knowledge of the inflectional system. Rather, the fact that children produce verbs in positions that conform to the underlying syntactic requirements shows that children possess an understanding of the syntactic requirements of German. This kind of form–position contingency has been found in other languages, including Dutch (Wijnen 1997) and French (Pierce 1989).

Table 15.4 lists some of the languages in which children have been reported to produce RIs, and languages in which children rarely produce RIs.

Why children produce infinitives in inappropriate contexts in some languages and not others is still unclear: to date there is no satisfactory explanation. One obvious solution is that the default verb form (if there is one) varies across languages, but this solution runs into problems once a wide range of languages is considered.

15.5 The source of the omission and RIs

So far we have seen that children crosslinguistically acquire inflection by age 5 (earlier in morphologically rich languages). Initially children may omit inflections and in some languages produce root infinitives. Both these phenomena have the potential to inform us about the acquisition of the MI since they both involve morphological elements that are closely

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5 There are several additional arguments to support the conclusion that RIs are reflective of knowledge of the syntactic requirements of the adult language. For example, RIs in child language tend to occur with null subjects, while finite verbs tend to occur with overt subjects. This is because the absence of case features on a non-finite verb results in the failure to license an overt subject. See Ud Deen (2005) for summary of the languages in which this empirical result has been reported. Additionally, RIs tend to occur in modal contexts (e.g. Wijnen, 1997) – a property common to adult infinitives too.

6 In French, the form–position contingency relates to the position of the verb with respect to negation. Inflected verbs in adult French occur to the left of negation (see 2a–b). Children exhibit the same form–position contingency here too: when RIs occur, they occur to the right of negation pas, but when the verb is inflected, it consistently occurs to the left of negation.

7 One additional question is whether children acquiring English actually use RIs. Several researchers have argued that the bare verb used by young English-speaking children is the English equivalent of the RI (e.g. Wexler 1994), and has the same underlying cause as the RI in other languages.
tied to the underlying syntax. What could the source of these errors be? There are at least three possibilities, listed in (9).

(9) a. Deficits in morphological knowledge  
    b. Deficits in syntax–morphology conversion  
    c. Deficits in syntactic knowledge.

The first (9a) refers simply to a lack of knowledge of the morphological properties of a language. A child that has not learned, for example, the full agreement paradigm in the target language may not know which morpheme to produce in a certain context, and thus may omit morphology. We will refer to this process as morphological learning – learning the properties of the various inflectional paradigms in the target language.

The second (9b) is a problem with converting the syntactic representation into a morphological string. Assuming that morphological learning has taken place, it is possible that the very algorithm for producing the appropriate string of morphemes is somehow impeded, resulting in the absence of the target morpheme. There are two ways that this could occur: (i) the algorithm itself is incorrect, or (ii) processing resources to execute the conversion are insufficient, resulting in omission of inflection.

The third (9c) is a child syntactic component that is somehow different from that of the adult. If the underlying syntactic representation that feeds into the conversion algorithm is somehow non-adult-like, then the output will be similarly deviant from the adult norm. There are many classes of theories within this category, including what I refer to as Structural Divergence theories and Underspecification theories.

15.5.1 Morphological learning

The first possible source for the omission of inflection in child language is that the child has simply not learned the full morphological paradigm yet, and so is not in a position to produce the appropriate morpheme. There are several reasons why such an explanation may be attractive. First, we know that the morphological form of inflection must be learned by children on the basis of exposure. That is, no theory of child language posits language-specific morphemes (e.g. -ed) as innately specified. Second, we know that the acquisition of inflection is difficult for second-language learners, and the intuition is that this is because of the difficulty in learning morphological paradigms (think of all the memorizing involved in learning the verb conjugations in a language like French).

While such an explanation may account for some of the errors children produce, it faces serious problems. First, and perhaps most serious, if the child has not learned the morphological paradigm of inflection, then we would expect a higher rate of errors of commission. For example, if the child only knows first and third person morphology in the Italian verbal paradigm, then we might expect the child to use a high rate of first or third
person morphology in second person contexts. However, as we saw earlier, the rate of errors of commission is uniformly low across all three persons. Second, if morphological learning is the underlying problem, we expect children learning morphologically rich languages (like Italian and Swahili) to acquire their morphology later than children learning languages that are morphologically meagre - the more there is to learn, the longer it should take to learn. But this is clearly not the case, as we saw in Generalization 2. And finally, a lack of morphological learning cannot account for the RI facts - despite infinitival morphology in root clauses, children nevertheless adhere to the syntactic properties of infinitives, and when verbs are fully inflected, they consistently occur in the correct position. This shows that children have knowledge of the properties of the various inflectional forms. In sum, while the absence of morphological knowledge may account for some of the acquisition facts, few researchers take this approach seriously.

15.5.2 Morphosyntax conversion

A second possibility is that the delay in the acquisition of inflectional morphology occurs because of a lack in ability to faithfully render the syntactic representation into a string of morphological items. How might this happen? Recall that this is by far the least studied aspect of the MI and so relatively little is known about how it actually operates. To date, there have been no proposals that propose a breakdown in the conversion algorithm itself. There are several logical reasons for this. First, why is it that a child has a different conversion algorithm? Other than the fact that inflection is delayed, there are no logical or empirical reasons to suggest that this process is any different from the adult. Second, how could a child learn that a particular conversion algorithm is incorrect? What kinds of evidence would inform the child that the conversion algorithm (and no other aspect of the MI) requires revision? There is nothing known about how this mechanism works, and so little can be said about how and why a child could fix a problem in the conversion algorithm.

The process of conversion is undoubtedly a resource-demanding process, involving at least the following four steps: (i) reading of the output of the syntactic component, (ii) matching of terminal syntactic nodes to items in the lexicon, (iii) retrieval of those items from the lexicon and (iv) assembly into a string of morphemes. The resources required to quickly and accurately execute this conversion in real time during speech is undoubtedly substantial. And so it is possible that the processing demands are so rigorous that an immature processor (such as that of a 3-year-old child) is simply not powerful enough to cope (see Behrens Ch. 12, Section 12.5, for additional perspectives on the processing approach to morphology).

There have been several proposals in the literature that suggest reduced processing power as the source of a variety of child errors (e.g. L. Bloom 1970, P. Bloom 1990a, O’Grady 2005, Valian 1991). Perhaps the most
well-known proposal is that of Paul Bloom (1990a), who argued that the omission of overt grammatical subjects in child English (and presumably other languages) is due to reduced processing capacity. Bloom argued that the immature processor is not able to cope with the production of a full sentence, and so the least communicatively important portions of a sentence – grammatical subjects – are omitted by children. Subjects are considered less important for communicative purposes because often the subject is old information, and so may be omitted without any real loss in meaning.

Bloom’s specific proposal is that the longer a sentence, the greater the pressure exerted on the processor – the more items to process in a single utterance the more resource-demanding that particular utterance is. He therefore predicts that when an utterance contains more words, the child is more likely to omit a subject. Bloom calculated the average length of utterances containing overt subjects and those without subjects, and found a correlation. For example, in the speech of one child, he found the mean length of VP with past tense verbs when the sentences include a subject was 2.432 (n = 44), and when the subject was null 2.833 (n = 36, a statistically significant difference). He concludes that this correlation arises because of limits on processing capacity, and that as the child matures, this processing bottleneck opens up, reducing the rate of omission of subjects.

Bloom’s proposal is innovative in that it presents an articulated theory of how processing limitations result in morphosyntactic effects in child language. Can such an approach account for the delay in acquisition of inflectional morphology and/or the RI phenomenon? On first blush, this approach holds promise. It fits well with Generalization 1 (children acquire inflectional morphology before age 5 years), since at young ages, the child’s immature processor is not capable of coping with the pressures of producing inflectional morphology in real time. But by age 5, the child’s processor is powerful enough such that no omission is necessary. Second, this approach is consistent with Generalization 5. The production of any morphology, even incorrect morphology, requires processing resources. So, logically, limitations on processing capacity should lead to limits on the amount of inflection produced, not to the incorrect use of inflection (that is, errors in commission).

However, limits on processing resources should apply to all children. Thus children crosslinguistically would be expected to exhibit equal difficulty with the acquisition of morphology, in contrast to Generalization 2 (morphologically rich languages are acquired earlier than morphologically poor languages). Furthermore, the correlation between sentence length and the presence/absence of inflection in languages other than English does not hold. For example, Ud Deen (2005) investigated whether the omission of subject agreement and the omission of tense in child Swahili

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8 While this particular approach is now generally considered somewhat simplistic (see Hyams & Wexler 1993 for specific criticisms), it serves to illustrate the logic of this approach.
is correlated to utterance length, and found no statistically significant correlation for either. Thus Bloom’s explanation applies selectively to grammatical subjects in English, which is inconsistent with the idea that the delay in inflection stems from a general property of development in the child’s processing capacity. In general, approaches that propose problems with processing capacity tend to predict much larger deficits in inflection than are actually observed. We turn now to theories that suggest deficiencies in the syntactic component of the MI result in the delay in the acquisition of inflectional morphology, as well as the occurrence of RIs.

15.5.3 Syntax

15.5.3.1 Structural divergence

Considering Baker’s Mirror Principle, on the face of it, the significant rate of omission of inflection might suggest that children’s underlying syntactic competence is severely deficient. Models that posit gross discontinuities in the syntactic component of the child grammar and the adult grammar have been largely refuted on empirical and theoretical grounds, but it is instructive to review the arguments.

We saw earlier that English children produce bare verbs at high rates. To account for this phenomenon, Radford (1986) argues that children go through a stage in which they do not have any syntactic structure above the VP, as in (10). This area of the syntactic tree (above the VP) is often referred to as functional structure. He argues that the use of such bare structures is not unique to child language, since adults sometimes produce them. For example, in sentences such as ‘I consider [John smart]’, the second clause ‘John smart’ (referred to as a small clause) is analysed as having no functional structure, and consists of essentially the same structure as in (10). Radford points to various similarities between adult small clauses and child speech in that both (i) show an absence of verbal agreement, (ii) show an absence of copula verbs, (iii) allow non-nominative subjects, e.g. ‘I consider him /*he smart’. Radford argues that children go through this small-clause stage at an early age, and then leave this stage as the child’s grammar matures. All children are predicted to go through a small clause stage, since this stage occurs because of an immature linguistic system. Thus Radford’s Small Clause Hypothesis (SCH) is an example of a proposal in which the child syntactic component is argued to be substantially different from the adult syntactic component.

(10) Child syntactic structure

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   VP
    |
   NP
     |
    V  N
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The morphosyntax interface
The SCH, in its time, was influential: it accounted for a wide set of facts in an elegant manner. However, there are problems, one of which is that child speech is rarely devoid of *all* inflectional material. As pointed out earlier, young children produce bare verbs at a rate as high as 80 per cent. But that means 20 per cent of child utterances include the appropriate inflectional morphology. It would be difficult to explain this if there was no functional structure available, as the SCH holds. A second problem is that children acquiring morphologically rich languages do not appear to go through anything like the small clause stage that Radford hypothesized. Italian children, for example, almost never produce bare verbs – in fact, they produce large amounts of inflectional morphology at early ages, as described earlier. Thus the theory that inflectional categories are completely absent in child language at early stages is not supported by the empirical data.

15.5.3.2 Truncation

Partly in response to the problems with the small clause hypothesis, Rizzi (1994) put forward a theory that accounts for the optionality of inflection in child language and that has a mechanism to deal with observed crosslinguistic variation. Rizzi argues that for every adult sentence, the top node of the syntactic tree is specified as a Complementizer Phrase (CP for short). The CP is typically the position that introduces words such as *that* and *for* in complex sentences such as 'I think that John is happy.' Such words are referred to as complementizers, and hence the label CP. The CP position is also associated with wh-questions. Notice that question words such as *who, what, which,* etc. (the so-called wh-question words) typically occur at the beginning of a sentence. However, they are often interpreted in some other position. Consider the sentence ‘What did John eat?’ The question word *what* is interpreted as the object of the verb *eat.* This suggests that at some level, this word originates in that object position. However, because it is pronounced at the front of the sentence, it must move from that object position to a position that is structurally higher. This movement is shown in (12).9

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9 The [e] in (12b) signifies the now-empty position from which the wh-word moved. Notice that the auxiliary verb *did* is necessary in question formation of this type, and it in fact undergoes movement as well: from the base form of ‘John did eat what’ to ‘What did John [e] eat [e].’ The auxiliary verb is unlabelled in this tree for reasons of clarity, but see Haegeman (1991) for a clear description of how wh-question formation works within this framework.
Rizzi argued that for every sentence that an adult produces, the top node of the structure is always a CP (whether a question or not, whether a complementizer occurs or not). He refers to this as an axiom of language, and something that is obligatory for all adult speakers. Children, on the other hand, have not set this axiom yet, and so they may specify any node as the top node of the tree. This means that the child utterance need only project up to, say, the VP, and nothing above that is ever projected. Thus a sentence in which the top node is a VP is in fact a grammatical sentence for children. Rizzi refers to this as the Truncation Hypothesis because everything above the node that is specified as the top node is truncated (i.e. never projected). Crucial to the Truncation Hypothesis is that any node may be specified as the top node of the tree. In some utterances, it may be a CP (just like an adult), but in other utterances it may be a VP, or any other node. However, once a particular node is specified as the top node of the tree, everything below that node must be fully projected. For example, it is not possible for the child to specify CP as the top node of the tree, and then omit the IP from projection. So the tree in (13a) is permissible, but the tree in (13b) is not, because it has an intervening projection missing.

The benefits of this system are numerous (see Guasti 2002 for a thorough and more technical overview of Truncation and its merits). First, because the specification of the top node of the tree is variable, the child may sometimes specify the top node as either CP, IP, VP or NP (that is, the object of the verb). If the top node is specified as VP or NP, inflection will be omitted by the child. Thus the Truncation Hypothesis has a mechanism to

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10 The reasons need not concern us, but the argument is essentially one of parsimony: a system that varies from utterance to utterance in terms of what the top node is, is inherently more difficult to learn and less parsimonious.
account for the optionality of inflection. Second, Truncation is compatible with many of the generalizations listed in section 15.3.1. Because the mechanism that correctly specifies the top node as CP matures before age 5, omission of inflection should cease well before age 5years (Generalization 1). Furthermore, grammatical subjects occur within the IP projection, and thus are vulnerable to Truncation (Generalization 4). Moreover, because Truncation results in the omission of IP, errors of omission are expected. However, when the top node of the tree is specified either as IP or CP, then inflection should occur correctly. Thus errors of substitution are expected to be rare, and the accuracy of inflection such as agreement is expected to be very high (Generalization 5).

Truncation is a neat and elegant hypothesis that enjoys good support in the field. However, there is a significant body of evidence that does not comport with the hypothesis. For example, Ud Deen (2005) shows that while Truncation does predict some of the acquisition facts in child Swahili, there are clause types which clearly defy the system proposed by Rizzi. In particular, the logic of the Truncation Hypothesis is that the projection of the tree occurs up to (and including) the phrase that is specified as the top node of the tree – no intermediate phrase may be omitted. In Swahili, this hypothesis may be tested very precisely because, unlike most European languages, Swahili exhibits multiple inflectional affixes that correspond exactly to the underlying syntactic structure. Consider (6), repeated as (14) below. The structure of the example is provided in (15).

\[ (14) \text{ Swahili minimal verbal complex: SA} - \text{T} - \text{V} - \text{Mood} \]

Example: ni – li – anguk– a

\[ 1sg - \text{past} - \text{fall} - \text{IND} \]

‘I fell.’

\[ (15) \]

The Truncation Hypothesis makes the following predictions with respect to the Swahili clause. If the root is specified as VP, children should produce verbs that occur without any inflection whatsoever (e.g. anguk from the example in (14)). If the root is specified as MoodP, children should produce verbs with mood, but no additional inflection (e.g. anguka). If the root is

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\[ ^{11} \text{AgrP} = \text{Agreement Phrase, and corresponds to Subject Agreement; TP = Tense Phrase. The order verb–mood occurs because the verb moves leftward (much as in German) out of the VP and adjoins to Mood.} \]

\[ \text{See Ngonyani (1996) for evidence of this verb movement.} \]
specified as TP, children should omit subject agreement, and nothing else (e.g. lianguka). And if the root is specified as AgrP, children should produce adult-like utterances with nothing omitted (e.g. nilianguka). Deen finds that children as young as 2 do indeed produce most of these clause types, but never the first one (root = VP): Swahili children never omit Mood. This is unpredicted under Truncation. More importantly, however, Swahili children produce large rates of utterances in which the tense morpheme is missing, but all other inflection remains intact. This is schematized in (16):

(16) SA – Ø – V – Mood
   Example: ni – anguk – a
   1sg – fall – IND
   ‘I fell.’

Such tenseless clauses are utterly unattested in adult speech, and are judged as categorically ungrammatical by native Swahili speakers (and thus are very unlikely to be a product of what the children hear). Such utterances (which at early stages make up approximately 20 per cent of children’s verbal utterances) are problematic for the Truncation Hypothesis since an intermediate projection (TP) appears to be omitted, while a higher projection (AgrP) occurs. While these facts are problematic for Truncation, they need not necessarily be seen as contradicting Truncation. Rather, a more sensible conclusion might be that while Truncation holds in child language, it is not the only process that leads to omission: perhaps processes independent of truncation (e.g. phonological processes) result in the omission of TP.

15.6 Conclusion

In this chapter we reviewed some of the major findings of the acquisition of inflection over the last decades from a formal grammar perspective. We discussed five broad generalizations that hold across a wide range of languages. The focus was on two of these generalizations: children in a wide range of languages omit inflection at high rates, and children in some languages produce Root Infinitives – root clause non-finite verbs. We discussed three possible sources for these two facts: morphological learning, processing factors and syntax. Within each approach, we considered various recent theories, concluding that while each theory fares well in some respect, no single theory is perfect.

So what does this mean for the study of child language and, more broadly, for linguistic theory? First, the empirical findings point very clearly to significant competence on the part of the child. While child language differs in significant ways from the target language, these differences in no way suggest anything like a global absence of knowledge in any aspect of language. Rather, a more informed view of child language is that it is
by-and-large consistent with the adult language, and that any discrepancies arise out of relatively restricted divergence from the adult grammar.

Second, no single theory is sufficient to account for the entire gamut of child data. A realistic view of child language is one that considers different theories, and finds a way to integrate them into a single, encompassing model (e.g. MacWhinney 2004a). However, to move forward in understanding the nature of the human child and the mechanisms that go into acquiring language, we need more sophisticated understanding of (i) each component of the MI and (ii) the acquisition of each area of the MI. This will require crosslinguistic data. Crosslinguistic data have become more available over the last few decades (in part because of the CHILDES project, MacWhinney 2000), but the number of languages on which we have data sets and meaningful interpretations of those data is not sufficient. That being said, data by itself is only useful if meaningful analyses can be conducted on it.

If we are able to disentangle the Domain Problem in the acquisition of inflection, it will inform us not only of the source of the delay in inflectional morphology, but also of how the three components of the MI fit together. Thus child language and the study of the MI hold the potential for great discovery within developmental psycholinguistics, as well as theoretical linguistics and cognitive science more broadly.

Suggestions for further reading


