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John Archibald

Second Language Phonology

SECOND LANGUAGE PHONOLOGY

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To John G. 1957 - 1995

Someone who should have had a book dedicated to him while he was alive.

With equal passion I have sought knowledge. I have wished to understand the hearts of men. I have wished to know why the stars shine. And I have tried to apprehend the Pythagorean power by which number holds sway above the flux.

Bertrand Russell

And gladly wolde he lerne and gladly teche.

Geoffrey Chaucer

Steal me a car and a bottle of Teacher's, A few dozen downers, I'll go out in style...

Tom Robinson

You are missed.

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Somewhat less directly, I would like to acknowledge my debt to the New Sounds conferences. Allan James and Jonathan Leather regularly organize a stimulating workshop on the acquisition of second language speech which I have had the pleasure of attending twice. The first time was shortly after the completion of my doctoral dissertation in which I first attempted to combine my interests in theoretical phonology and second language acquisition. The journey to Amsterdam for New Sounds 92 was an eye-opener. There I was in a room full of people from around the globe who were all interested in similar intellectual issues. The papers and discussion were truly delightful (as was the

^{1.} Parts of Chapter One appeared in O'Grady and Dobrovolsky, eds. *Contemporary Linguistic Analysis* (thanks to Addison-Wesley Publishers). Some of the work described in Chapter Six has appeared in Archibald (1993) (thanks to Kluwer Academic Publishers) and Archibald (1997) (thanks to the journal *Linguistics*), and will appear in a forthcoming chapter in Hannah and Young-Scholten, eds. (thanks to John Benjamins). Some of the work described in Chapter Seven will appear in Flynn, Martohardjono, and O'Neil, eds. (thanks to Lawrence Erlbaum and Associates).

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The discovery that there are other people like you (if I may be so bold as to include myself in their category) is probably one of the most profound human experiences. I hope this book will be of interest to the New Sounds community, and perhaps beyond.

JA Calgary, Alberta January 1998 -35°

Introduction

In this book I seek to explore a variety of aspects of second language speech. The field provides interesting interactions with a number of disciplines. Learners have to acquire mental representations pertaining to the new sound system. As a result we are looking at the interaction of linguistic and psychological theory. In addition, we must also address aspects of psycholinguistic theory as second language learners must engage in both production and perception. They must perceive the L2 linguistic input (perhaps filtered through their L1 competence) in order to set up a mental representation of the new sound system. They must also access lexical entries when actually producing words and string them together to produce sentences.



As a result, there are many different perspectives that may be taken in analyzing second language speech.

In this book, I have chosen to focus on contributions to the field made by (primarily) generative linguists looking at the sounds and sound systems of second language learners. It is, therefore, a restricted view of the broad field, but one that I feel has made important contributions to our understanding of the nature of the representation of phonological knowledge by non-native speakers.

I begin the book by providing an overview of second language acquisition research (Chapter One) in order to place the study of L2 speech in context. I then give an outline of traditional approaches to investigating interlanguage phonology (Chapter Two). Chapter Three consists of a discussion of relevant aspects of a learning theory that must be included in a treatment of how people learn sound systems. Chapters Four, Five and Six focus on particular aspects of the mental representation of phonological competence; segments, syllables, and stress, respectively. Chapter Seven deals with issues related to the mechanisms that govern the changing of interlanguage grammars over time. Chapter Eight is a summary of the issues raised throughout the text.

I conceive of the book as something that can be used in conjunction with the primary literature to serve as a textbook for senior undergraduate or introductory graduate seminars in second language phonology. A certain amount of background in phonological theory is assumed, though I have tried to present relevant background (or at least references) where necessary. In places, the text is selective in its coverage, choosing to present the details of a few studies rather than presenting an encyclopedic overview of a larger number of studies.

Without further ado, then, let us turn to a discussion of the acquisition of second language phonology.

Chapter 1 Overview of Second Language Acquisition Research

1.0 Introduction

The field of second language acquisition (SLA) research investigates how people attain proficiency in a language which is not their mother tongue. So, whether we are looking at someone learning to read Greek in university, or someone becoming fluent in a fifth language in their forties, or a child acquiring a new language after moving to a new country, we refer to it as second language acquisition. The interesting phenomenon of children simultaneously acquiring two languages is generally investigated in the field known as bilingualism (which may be thought of as a sub-discipline of SLA research). In this chapter, we will primarily be concerned with second language acquisition in adults.

Over the years, the study of second language acquisition has been undertaken from a variety of different perspectives. In the 1950s and 60s the primary objective was pedagogic. Researchers were interested in trying to improve the way in which second languages were taught. Hence, they were interested in discovering how those languages were learned. From the 1970s on, the focus shifted from the teacher to the learner.

The reason for this has something to do with what was going on in linguistics, psychology, and first language acquisition research. All three of these areas shifted focus from the external to the internal in the 1960s. Linguistics became concerned with the mental grammar of the speaker, not just the description of the linguistic structures of a given language. Psychology shifted from behaviourism (which denied the importance of mental representations) to cognitive psychology. And research on first language acquisition focussed on children's internal grammars. In general, linguistics became more concerned with what the properties of Language were, as opposed to the characteristics of individual languages. These source fields are also crucial to the study of SLA. Linguistics gives us a sophisticated and accurate description of what learners are trying to

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learn (the second language), and what they already know (the first language). Psychology can provide us with a learning theory to account for how people acquire knowledge. And the field of first language acquisition (which has been around longer than the field of second language acquisition) offers various findings that can be productively applied to SLA. For example, we know that children who are acquiring their first language (L1) have grammars that are systematic and that their utterances are not just bad imitations of the adult target. As we will see, second language learners too are developing a grammar that is systematic even if it is not nativelike.

1.1 The Study of Second Language Acquisition

In the case of first language acquisition, we may ascribe the difference between child and adult grammars to either cognitive or biological immaturity in the child. In the case of second language learning by adults, however, we cannot say that the learners are either cognitively or biologically immature. Rather, they are subject to an influence that is absent from the child's situation: the first language itself. Let us diagram the situation as follows:

L1 -----> Interlanguage Grammar <----- L2

Figure 1.1 Influences on an Interlanguage Grammar.

This diagram illustrates the fact that second language learners have a systematic interlanguage (IL) grammar—so-called because it is influenced by both the first and the second language and has features of each (Selinker, 1972).

1.1.1 The Role of the First Language

One of the most easily recognizable traits of a second language learner's speech is that it bears a certain resemblance to the first language. Thus, someone whose first language is French is likely to sound different from someone whose first language is German when they both speak English. Consider in this regard the following typical pronunciation of the English word *have* by speakers of French and German.

English Target	French Speaker	German Speaker
have [hæv]	[æv]	[hæf]

Figure 1.2 Phonological transfer

The form produced by the French speakers reflects the fact that French lacks the phoneme /h/ while the pronunciation associated with German speakers can be traced to the fact that German includes a rule of Syllable Final Obstruent Devoicing (which changes the [v] to a [f]). The term transfer is used to describe the process whereby a feature or rule from a learner's first language is carried over to the IL grammar. Other examples can be seen in the Figure 1.3:

L1	L2	Example	Comment
Spanish	English	I espeak Espanish.	Spanish does not allow s + consonant
English	French	[tü] (you)=> [tu]	sequences word- initially. English does not have the front, rounded vowel [ü]. The English speaker substitutes the [u] sound.
Quebec French	English	Over dere.	The [ð] sound is replaced by [d].
European French	English	Over zere.	The [ð] sound is replaced by [z].

Figure 1.3 More phonological transfer.

1.1.2 The Role of the L2

The first language is not the only influence on the interlanguage grammar, since some properties of the IL can be traced to aspects of the L2. In the case of a German speaker who is learning English, for example, the IL grammar will contain some features of both German and English. Consider how a German speaker learning Canadian English might pronounce the word *eyes*.

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Target form	Result of Final Obstruent Devoicing	bstruent Result of Canadian g Vowel Raising	
/ayz/	[ays]	[ʌys]	

Figure 1.4 One possible pronunciation of the English word eyes by a Germanspeaking learner

Here, the learner first applies the rule of Syllable Final Obstruent Devoicing (transferred from German), changing /ayz/ to [ays]. But the learner also has acquired some knowledge of the target language—in this case, the rule of Canadian Vowel Raising, which states that [ay] becomes [Ay] before a voiceless consonant in the same word. Thanks to application of the Syllable Final Obstruent Devoicing Rule, the input form now ends in a voiceless consonant ([s]) which triggers Canadian Raising. This example serves to show us something about the nature of an interlanguage: it contains features of both the L1 and the L2.

1.2 The Nature of an Interlanguage

The dual nature of IL grammars is captured in Major's (1987) Ontogeny Model of second language acquisition. According to this model, there are two types of error in an IL grammar: transfer errors and developmental errors (see also Corder, 1967). As we have seen, the former type of error reflects transfer from the L1. In contrast, developmental errors involve the same sort of mistakes that children make in acquiring their L1. For example, children learning English as a first language sometimes produce forms like *goed* and *breaked*, apparently overgeneralizing the regular rule for past tense formation. A similar developmental error is observed in second language learners, who also overgeneralize rules as they acquire a grammar.

It is not always straightforward, however, to tell developmental errors from transfer errors. If we took the example of a German speaker devoicing final obstruents in English, it is a process found both in the German and in children acquiring English as an L1. Broadly speaking, Major classifies any errors which are not directly traceable to the L1 as developmental errors.

It is possible that the processes of transfer and overgeneralization in L2 learning are the result of a single cognitive strategy that could be informally stated as "use what you know." This predicts that the kind of errors made by second language learners will be dependent on their level of proficiency. Beginning learners may have nothing to draw on but their L1. However, more

advanced learners have acquired a certain amount of knowledge about the L2 and this knowledge becomes a potential source of errors. This is illustrated in Table 1.5.

Table 1.5 Error patterns in L2 acquisition

Level of Proficiency	Transfer Errors	Developmental Errors
Beginner	High	Low
Intermediate	Medium	High
Advanced	Low	Low

Graphically, the predictions of the Ontogeny Model are illustrated in Figure 1.6. The number of transfer errors should decrease over time while the number of developmental errors should initially be small, but then should increase before finally decreasing.



Figure 1.6 Error patterns predicted by the Ontogeny Model

The IL grammar, then, is influenced by both the L1 and the L2, though the proportion of influence is dependent on the learner's level of overall proficiency. Note that advanced learners have low numbers of both transfer and developmental errors. Not all learners, however, reach this advanced stage. It is common in second language acquisition for learners to reach a plateau in their development. For example, even after many years of exposure to English, a second language learner may still produce sentences like *I don't know what should I do* (meaning 'I don't know what I should do') in spite of hearing the grammatical version from native speakers and perhaps being corrected. When the interlanguage grammar stops changing, it is said to have *fossilized*.

Second language learners can exhibit non-nativelike characteristics in any linguistic domain, as can be seen in Figure 1.7.

L1	Example	Error Type	Comment
Spanish	My wife is <u>embar-</u> <u>rassed</u> . (Meaning "pregnant")	Lexical	Spanish "embarasado" = pregnant
Various	I live in a two bed- room <u>department</u> .	Lexical	Sometimes the wrong word can be chosen.
Various	I <u>didn't took</u> the car.	Morphological	English doesn't mark the past tense on both modal and main verbs.
Various	She <u>get ups</u> late.	Morphological	The speaker adds the agreement marker to the parti- cle not the verb.
French	He <u>drinks fre-</u> <u>quently</u> beer.	Syntactic	French places the main verb before the adverb.
Various E.g. Turkish, Arabic	There's the man that I saw <u>him</u> .	Syntactic	Some languages al- low pronouns in this position in a relative clause.

Figure 1.7	Types of Errors	Found in th	he Acquisition	of English.
	-) /			

1.2.1 Variation in performance

An important goal of L2 research is to integrate the study of competence (linguistic knowledge) and performance (actual language use in particular situations). One of the characteristics of the output of second language learners is that it is quite variable. For example, a learner might well produce the sentence in (1):

(1) I didn't like that movie so I told her I no want to go dere.

In the preceding (hypothetical) example, the learner is inconsistent, getting one of the two negatives right and correctly pronouncing one of the interdental fricatives. The question that intrigues researchers has to do with what causes this sort of variation. We usually think of knowledge as fairly stable within an individual. So, for example, if you make a mistake while speaking in your native language,

you tend not to question your competence in that language, but rather to assume that you made some kind of performance error. So how do we account for learners who behave as if they know how to negate a verb or pronounce $[\delta]$ on some occasions, but not others? Do they have the knowledge or don't they?

It is difficult to answer this question, in part because of considerations involving error frequency. If a second language learner gets something wrong ten percent of the time, is it the same (in terms of competence) as getting it wrong sixty percent of the time? We would probably say that a non-native speaker who gets the English past tense correct ten percent of the time doesn't know it, and that someone who gets it right ninety percent of the time does. But what of someone who gets it right somewhere between those two scores? This is a complex research question. The (admittedly simplistic) view adopted in this chapter is that variation falls into the realm of linguistic performance.

Linguistic performance clearly involves the interaction of a number of cognitive systems and has much in common with other skills. A crucial notion for the study of how skills develop involves the distinction between controlled and automatic processing (Hulstijn, 1989). When acquiring a new skill (e.g. playing golf) we begin by having to devote a lot of conscious or controlled processing to the activity. Feet apart, head down, elbow straight, white shoes, etc. Once we become proficient, we "just" hit the ball; the activity has become automatic.

We need to shift processing from controlled to automatic because, as humans, we have a fixed processing capacity. We can't consciously process everything at once. Shifting some material into automatic processing frees up space for more controlled processing. Consider an example from reading. When we first learn how to read, we devote much of our cognitive processing to determining what the written symbols stand for. When we are focussing on decoding the letters, we do not have the processing capacity to deal with things like reading for prejudice or bias. After a time, though, letter recognition happens automatically in our first language and learners can devote more of their cognitive capacity to higher level skills.

That native speakers do this kind of thing automatically can be seen by the difficulty we have in proofreading. It is hard to suppress the information we're getting from the context since the mind tries to make sense of what it's reading. Conversely, when we are forced by exceptional circumstances to devote a lot of energy to decoding the print (e.g. a bad photocopy or fax), our higher-level processing slows down; we can't focus as much on the message when we are focussing on the form.

All this is relevant to second language acquisition in that it can help explain the variable performance of L2 learners. When learners are focussing on the form of the L2 utterance, they may be able to produce it accurately. However, when there are extra demands, such as trying to communicate a complex thought or carry on a conversation in a noisy room, errors may occur. This suggests that the learner has a mental representation of the form in question (say a negated verb or a $[\delta]$) but can have difficulty implementing or accessing it under certain conditions.

1.3 Interlanguage Grammars

Let us turn now to a discussion of the specifics of what is acquired when learning the phonology, morphology, and syntax of a second language. The general question we are trying to answer here is "what is the structure of an interlanguage?". Second language learners are acquiring grammars, and those grammars involve mental representations. Therefore we can investigate the nature of those representations within the various subdomains of linguistic theory. The focus of this book is, of course, on phonology, but we present an overview of the other disciplines to give the reader a broader perspective. We will also attempt to draw the links between the areas of inquiry in order to show how similar structural principles apply to all levels.

We begin with an overview of L2 phonology.

1.3.1 L2 Phonology

Let us consider what is to be acquired in the domain of phonology. Broadly speaking, we can distinguish between segmental and prosodic phonology. Segmental phonology has to do with the characteristics of phonological segments, like consonants (C) and vowels (V). Prosodic phonology, on the other hand, has to do with phonological phenomena that affect more than a single segment (e.g. syllables and stress).

1.3.1.1 Segmental Phonology

Languages vary in their segmental inventory in that they choose a subset of the sounds found in human languages. There is thus a good chance that a second language learner will have to learn to produce and perceive some new sounds when acquiring a second language.

One of the most obvious characteristics of adult second language speech is that it is 'accented' as the result of phonological and phonetic transfer from the native language. This is why native speakers of English can usually distinguish French-accented English from German-accented English. Consider the examples in Figure 1.8.

English Target	Quebec French Speaker	German Speaker
'the' [ðə]	[də]	[Zə]

Figure 1.8 French- and German-accented English.

As both French and German lack the interdental fricative [ð], native speakers of those languages substitute a sound from their L1 where English has that sound. Generally, the learners substitute a sound that shares some features with the target sound. In the above example, the French speaker substituted a voiced dental (coronal) stop, while the German speaker substituted a voiced alveolar (coronal) fricative for the English voiced, inter-dental (coronal) fricative. Particularly at a beginning level of proficiency, L2 learners pronounce words using their L1 phonological system.

A similar phenomenon can be seen in the phonology of loan words. When a language borrows a word from another language, it makes the word fit into its own phonological system. For example, when English borrowed the word <u>pterodactyl</u> from Greek, it reduced the onset cluster [pt], which is wellformed in Greek but not English. However, no such change was made in the word <u>helicopter</u> (also from Greek) since (with [p] syllabified as a coda) it already complied with the phonological pattern of English.

L2 learners also have to acquire the stress patterns of the language they are trying to learn. Consider an example from Polish. Polish is a language in which word-level stress is assigned to the penultimate syllable (regardless of syllable weight). These metrical principles transfer and result in one of the characteristics of a Polish accent in English: the tendency to place stress on the penultimate syllable regardless of syllable weight. In English heavy syllables tend to attract stress (e.g. aróma, agénda). The following examples illustrate a non-native stress pattern in which the second to last syllable is always stressed.

(2)	English Target	Non-Native Form
	astónish	astónish
	maintáin	máintain
	cábinet	cabínet

The principles which determine stress placement in a word (or sentence) are complex, and we will return to them in greater detail in Chapter Six.

1.3.2 L2 Morphology

We turn now to an overview of some of the issues in L2 morphology. In the 1970's, a number of studies collected data on the accuracy of second language learners on a variety of morphemes (see Zobl and Liceras (1994) for a summary). This research drew on previous studies in the field of first language acquisition that had attempted to determine the order of acquisition of morphemes in L1 development (Cazden, 1972). The following developmental sequence was found:

- 1. -ing The present participle affix (e.g. she is working.)
- 2. Plural -s (e.g. bottles)
- 3. Irregular past (e.g. she *taught* French.)
- 4. Possessive -s (e.g. a child's toy.)
- 5. Copula be (e.g. I am happy.)
- 6. Articles (e.g. a, the).
- 7. Regular past (e.g. she walked quickly.)
- 8. 3rd person -s (e.g. she walks quickly.)
- 9. Auxiliary be (e.g. She is working.)

Research on second language acquisition focussed on whether the developmental sequence in L2 learning was the same as for L1 learning. The following order was found:

- 1. -*ing*
- 2. Copula be
- 3. Articles
- 4. Auxiliary be
- 5. Plural -s
- 6. Irregular past
- 7. Regular past
- 8. 3rd person -s
- 9. Possessive -s

There are many similarities but there are also some differences. For example, note that auxiliary and copula *be* are acquired at a relatively earlier point in L2 than in L1, and that the possessive morpheme -'s is acquired later in L2 than in L1. Children acquire *be* as a main verb before they acquire *be* as an auxiliary verb. So, children start by producing sentences that are simpler in that they have only a copula verb (e.g. *He is hungry*) before they produce sentences that include an auxiliary plus a main verb (e.g. *He was working*). In addition, note that

children acquire the three -s morphemes in the order plural, possessive, third person in their first language. Segmentally, these morphemes have the same realization, so we can't say that the order reflects phonological complexity. The order might be explained by noting that plural is a word-level phenomenon (e.g. dogs), possessive is a phrase-level phenomenon (e.g. [the king of England]'s horse, not *[the king]'s of England horse), and third person marking involves a relation between the verb and a phrase (the subject) elsewhere in the sentence (e.g. [That man] usually thinks too much). Like the pattern noted for the development of copula and auxiliary be, children seem to be acquiring structures in order of complexity. In contrast, adults acquire the plural quite early, but then seem to get both the possessive and the third person marking quite late -perhaps for reasons involving processing. (When concentrating on getting the words right, we do not always have the processing capacity to produce wellformed higher-level structures.) Interestingly, adults do not seem to find interphrasal morphology more difficult than phrasal morphology. This may be because the adults have already acquired the grammar for their first language and that grammar most likely has both phrase-level and inter-phrasal morphological phenomena. In contrast, children have to set up hierarchical structure of a grammar for the first time, and could conceivably be building the structure from the bottom up (words -> phrases -> sentences).

When we look at the prosodic hierarchy in Chapter Four, we will see that a similar argument might be made for aspects of phonological acquisition. Children and adults can simplify complex sequences of sounds in different ways. For example, a child learning English may produce the initial sequence of the word 'play' by deleting the [1] sound while an adult learning English as a second language may insert an epenthetic vowel and produce a form that sounds something like [pəley]. The child has yet to build the kind of hierarchical representation necessary to produce either a branching onset (or an unfooted syllable) while the adult, having already done this in the L1, is able to construct the more complex representation.

By comparing work in such diverse fields as morphology and phonology, we may come to better understand the common principles that guide the acquisition of new representational systems. Let us now turn to a discussion of L2 syntax.

1.3.3 L2 Syntax

L2 learners also have to acquire the syntax of their new language. In this section, we will look at two facets of syntactic structure: the null subject parameter and verb movement.

1.3.3.1 Null Subjects

Universal Grammar includes universal principles (that account for what all natural languages have in common) as well as parameters (that account for cross-linguistic variation). Parameters are like linguistic switches (often binary) that can be set to a particular value as a result of the linguistic input. One of the first parameters to be discussed in the generative literature was the Null Subject (or pronoun-drop) Parameter. Essentially, this parameter is designed to account for the contrast between languages like French and English, which require overt grammatical subjects (e.g. *He speaks French/*Speaks French*), and languages like Spanish and Italian, which allow subjects to be omitted (e.g. Spanish *El habla español/Habla español*, '[S/he] speaks Spanish').

The Null Subject Parameter: The subject of a finite clause {may/may not} not be null.

Languages that allow null subjects tend to have other grammatical traits associated with them. For one, they tend to allow declarative sentences with the word order Verb + Subject as well as Subject + Verb, as shown in the Spanish examples in (3) and (4):

 (3) Juan llegó. John arrived.
 (4) Llegó Juan arrived John.

Secondly, they tend to allow sentences like the following, in which a complementizer (here que, 'that') is immediately followed by the trace of a moved WH word, as shown in (5).

(5) Quién dijo usted que <u>t</u> llegó? who said you that arrived? 'Who did you say that arrived?'

As shown in (6), such sentences are unacceptable in English.

(6) *Who did you say [CP that [S t arrived]?
(D-structure = you did say that who arrived)

In other words, languages like English ([-null subject]) do not allow *that*-trace sequences, whereas languages like Spanish ([+null subject]) do.

Studies on L2 learners of English show that Spanish speakers are more likely to judge subjectless English sentences to be grammatical than are French speakers (see White, 1989). This is consistent with the assumption that L1 parameter settings are transferred into the IL grammar, at least in the early stages. Learning a second language can be seen as involving the resetting of parameters that have different values in the L1 and the L2.

Moreover, when Spanish subjects are given a task that requires them to change a declarative sentence into a question, they are more likely to produce a sentence that contains a *that*-trace sequence than are French subjects. For example, if Spanish subjects are given a sentence like *Joshua believed that <u>his fa-ther</u> would be late* and have to form a question asking about the underlined element, they are more likely than French subjects to produce a sentence like *Who did Joshua believe that t would be late*? This points toward the possibility that the admissibility of null subjects and the acceptability of *that*-trace sequences are somehow both related to the Null Subject Parameter (i.e., speakers of null subject languages are more likely to permit *that*-trace sequences).

However, there are complications. Remember that the study just described had the Spanish and French speakers form new sentences. Another study had both French and Spanish subjects judge the grammaticality of English sentences with a *that*-trace violation. Both groups were quite able to reject those sentences as ungrammatical. For some reason, there is a stronger L1 influence when learners have to form new sentences themselves. This kind of production/perception asymmetry is seen in phonology as well. As we will see in Chapter Six, Archibald (1993) demonstrated that adult second language learners of English were much more accurate in their perception of English stress than in their production of correct stress placement.

1.3.3.2 Verb Movement

Another difference between French and English involves the setting of the Verb Movement Parameter.

The Verb Movement Parameter V {raises/does not raise} to Infl.

Verb movement takes a verb from within the VP and moves it up to Infl. Simplifying slightly, let us say that English does not allow verb movement but French does. Thus, in French the verb raises to Infl past a preverbal adverb, but in English it does not. This difference can be seen in the sentences in (7), in which movement of the verb over the adverb separating it from the Infl position gives a bad result in English but a good result in French.

- (7) a. *Marie watches often television.
 - b. Marie regarde souvent la télévision.

Figure 1.9 graphically depicts verb movement.



Figure 1.9 Verb movement

Studies have shown that French speakers learning English initially assume that English allows verb raising (White, 1991). In order to learn English they have to reset the value of their verb raising parameter.

Throughout the book, we will see a variety of examples that show how a parameter-setting approach to language is also relevant to phonology. Learners may transfer their L1 phonological parameter settings (not just syntax) with respect to such diverse aspects as allowable phonotactic sequences, and stress patterns. The research in syntax clearly shows us how factors such as the type of evidence (either positive or negative) that is available to the learner concerning the erroneous parameter setting are important. We will discuss this issue in more detail later in the book.

1.3.4 Summary

We have presented this overview to give the reader a broader view of the whole field of second language acquisition, even though this book focusses solely on phonology. An interlanguage grammar, then, consists of representations of knowledge in the linguistic subdomains of phonology, morphology and syntax. By looking to linguistic theory, we have seen that an explicit treatment of second language learning must involve a sophisticated model of what is being acquired. Whether we are talking about phonology, morphology, or syntax, we note that the learner is involved in acquiring hierarchical representations and setting linguistic parameters. At times, the structures from the first language may transfer into the second language (particularly at beginning levels of proficiency). The learner, however, then follows a developmental path that is influenced by other

factors. At times we see children and adults behaving in a similar fashion when it comes to the acquisition of language (for example, on input-driven aspects), whereas at other times we see children and adults behaving differently (e.g. morpheme orders). For both children and adults, we often see production/ perception asymmetries that would have to be accounted for in a full psycholinguistically-responsible model of second language acquisition, but which we will not address in depth in this book. Finally, we have seen that adult production is characterized by a certain amount of variability within an individual.

We turn now to a discussion of some of the factors that have been proposed to account for variation across individuals.

1.4 Factors Affecting SLA

It has been claimed that there is much more variation in the grammars of people learning second languages than in the grammars of people learning first languages (though the literature investigating variation in children's grammars is growing rapidly). It seems less controversial to note that there is considerably more variation in the final state that adult learners reach when compared with the final state that children reach in their linguistic competence. This brings us to the question of what factors might help to account for that variation.

1.4.1 Individual Differences

Learners vary in ways other than their age. Broadly speaking, the research under this heading asks the question, "if learners have a particular quality x, does this make them better at second language acquisition?" For example, we might look at the effect of inhibition, left-handedness, or some other individual trait on L2 ability. As intuitively appealing as this avenue is, it is one that must be taken carefully. In particular, there are three points on which we must be explicit:

- (i) how we define and measure x.
- (ii) what it means to be better.
- (iii) what aspect of communicative competence we are referring to.

Consider in this regard a trait like empathy. It has been argued that people who are empathetic are better language learners. This is an intuitively appealing notion. People who are empathetic can imagine what it feels like to be in someone else's shoes and they can look at things from another perspective. By the same token, second language learning certainly involves looking at things from a different perspective. But in SLA research, we need to find a more precise way to evaluate this hypothesis.

There are tests that claim to measure a person's empathy, but is this notion really a well-defined construct? Is one simply empathetic or not, or are there degrees of empathy? If there are degrees, do we see a correlation between degree of empathy and degree of success? And what does it mean for empathetic learners to be better than people who aren't empathetic? Do they make fewer errors? Less serious errors? Should we expect people with greater empathy to be better at everything in the L2? Or maybe just at phonology and sociolinguistic competence? On what basis could we make a prediction? These are not simple issues. We raise them not to argue that research in individual variation is misguided, but to show some of the complex areas that need to be addressed before we can hope to establish a causal connection between a particular personality trait and success at second language learning.

We can distinguish between two kinds of factors in terms of which individuals can vary: affective factors and cognitive factors. First we will look at the role of affect.

1.4.2 Affective factors

Affective factors have to do with the emotional side of learning a second language. Clearly there is a great deal at stake emotionally when learning a second language, and it is possible that emotions affect how successful a second language learner is. Affective factors that have been studied include empathy, anxiety, inhibition, and risk-taking. In this section we will look at one such factor: motivation.

Learners can vary with respect to the amount or type of motivation they have to learn a second language. If someone is highly motivated to learn, will that person do better at learning? In order to answer this question, we need to say a bit more about what it means to be motivated.

Traditionally, two types of motivation have been proposed: instrumental and integrative (Gardner and Lambert, 1972). Instrumental motivation involves wanting to learn the L2 for a specific goal or reason. For example, someone might need to pass a language requirement in order to get a graduate degree, or a job with a government agency. Integrative motivation, on the other hand, involves wanting to learn the L2 in order to learn more about a particular culture or fit into it better. For instance, someone might want to learn Japanese in order to learn more about a fascinating culture.

Studies have shown that the degree of integrative motivation correlates with the degree of success in language learning (Gardner, Day, and MacIntyre, 1992). That is to say, subjects who score highly on tests of integrative

motivation do better on certain language tests than comparable subjects who score poorly on the same tests. However, subjects with instrumental rather than integrative motivation can also do well if their level of motivation is high. One study found that subjects who were offered a cash reward if they obtained a certain score on a language test performed much the same as subjects with high integrative motivation. All this seems to suggest that degree of motivation is a better predictor of future learning success than is type of motivation.

1.4.3 Cognitive Factors

While affective factors have something to do with the emotional side of learning, cognitive factors involve the mechanics of how an individual learns something. Different people seem to learn via different cognitive styles and different learning strategies. We will first address cognitive style.

As individuals, we tend to tackle mental tasks using a particular 'cognitive style'. In contrast with an affective factor like motivation, which may vary from domain to domain (e.g. someone might be more motivated to learn French cooking than to learn the French language), cognitive style is a stable trait across domains.

The study of cognitive style often focusses on a contrast between field dependence and field independence. Learners who are field independent are not distracted by irrelevant background information when trying to learn something. These are people who can see the trees without being distracted by the forest. On the other hand, learners who are field dependent tend to see the forest but may miss the characteristics of individual trees. Of course, this is not to say that, overall, one trait is good and the other is bad. Field dependent learners probably are able to synthesize the overall picture better than field independent learners, but field independent learners are probably better able to pick out relevant facts Naiman et al., 1978).

In terms of second language acquisition, it seems that field independent learners do better on language tests that focus on analytic tasks such as providing the correct grammatical form in a given sentence, as shown in (8):

(8) Yesterday, we ____ the kids to the zoo. (take)

In contrast, field dependent learners tend to do better on tasks that involve synthesizing their knowledge. For example, they may demonstrate broader communicative competence in that they are more concerned with getting the message across than with the grammatical accuracy of the strings they use to form their message. Ultimately, the proficient L2 learner needs to be concerned with both accuracy and fluency. Broadly speaking, accuracy has to do with whether the learner has the correct representation of a particular linguistic structure (i.e. it involves *knowledge*). Fluency, on the other hand, has to do with the rapid retrieval or processing of those representations (i.e. it involves *skills*). Someone who is not fluent may well have accurate representations, but take considerable time and energy to retrieve them. Different learners, though, are probably going to have a natural affinity to emphasize either accuracy or fluency, depending perhaps on their individual cognitive style.

While cognitive styles appear to be relatively stable traits in an individual, there are elements of learning that we have some control over. Each of us has certain learning strategies that we can employ to try to fill gaps in our linguistic knowledge. These strategies can be contrasted with communication strategies, which are designed to keep communication happening in spite of gaps in knowledge—as when someone uses a paraphrase to describe an object for which he or she has no vocabulary item (e.g. *Could you pass me the tool you use for hitting nails?*). In contrast, a learning strategy is used to discover something new about the L2.

Many different learning strategies have been proposed. For example, using the strategy of directed attention, learners may decide in advance to focus on particular aspects of a task and to ignore others. So, when reading a text or listening to a lecture, they might decide to focus only on the main points. Another strategy involves repetition: to retain a lexical item or to improve the pronunciation of a sequence of sounds, the learner may repeat a word or phrase over and over. A third strategy makes use of clarification requests (to the teacher, a peer, or the others in a conversation) about something that is not understood (e.g., How come *stood* doesn't rhyme with *food*? What's a *liege*?). Under this view, learners have a variety of strategies at their disposal and have to discover which ones work best for them.

1.4.4 Age

One of the obvious ways that language learners vary is in their age. People start learning second languages at different points in their lives. Could the age of onset of L2 learning cause different levels of final proficiency? Usually, the assumption is that children are somehow better, or more naturally disposed to learning second languages. This question is usually considered within the context of what has come to be known as the *critical period hypothesis*. This hypothesis maintains that there is a period when language acquisition takes place naturally, or effortlessly, and that after that period something happens that makes language acquisition difficult, or at least, different. Much of the early re-

search on this question was predicated on the *assumption* that children were somehow better than adults at second language learning.

1.4.4.1 Critical Periods

There is considerable evidence that critical periods exist in many biological domains. Imprinting in birds is probably one of the best-known examples. It is only for a limited time that the animal can become attached to its mother. Once a certain amount of time has passed, it's too late. Another example, comes from birds learning songs. In order for the white-crowned sparrow to be able to produce the adult song, it must hear that song in the first 10-50 days of its life. If the bird is exposed to the song only in the first 10 days, or after 100 days there is no learning¹. Laboratory experiments on kittens, too, show evidence of a critical period. Kittens raised in an environment which has only horizontal lines, do not develop the necessary physical receptors to perceive vertical lines. Even if they are moved to an environment with vertical lines after a certain amount of time, it is too late. Clearly the environment can play a major part in the development of the organism; there are critical periods for development. The question remains, though, *is there a critical period for the development of language*?

1.4.4.1.1 *Critical Periods and First Language Acquisition*. Often people assume a *biological* critical period, or a biological reason for this supposed change in behaviour. Lenneberg (1967) drew on the work of Penfield (1965) to propose a critical period for first language acquisition. Lenneberg notes that:

... the capacities for speech production and related aspects of language acquisition develop according to a built-in biological schedule... language development thus runs a definite course on a definite schedule; a critical period extends from about age 2 to age 12, the beginning and end of *resonance*.

One of the most common ways of explaining this critical period was to look at the research on *brain lateralization*. We have known for some time that the brain is divided into two easily distinguishable hemispheres; the left hemisphere (LH) and the right hemisphere (RH). And while they are distinct, they are not completely isolated in that they are joined by a bundle of fibres known as the *corpus callosum*. Neurological and neurolinguistic research has shown that different activities are processed in different parts of the brain. In other words, neural activity is *localized*. Most people process much of language in the left hemisphere.

Penfield (1965) reported that children who suffered LH damage before the age of 10 or 12 were able to recover their speech ability while older children

^{1.} If the bird hears the song in the first 50-100 days, there is partial learning.

suffered permanent language loss. He noted that children with RH damage suffered minimal language disorder. His explanation was that younger children were able to transfer the language ability from the LH to the RH in the event of damage, whereas older children (and adults) were not. This characteristic of the brain is often referred to as *plasticity*; the younger brain is plastic in that it can adapt to damage. So, the argument is that as the brain matures, something happens to it which gradually decreases its ability to transfer its functions from one hemisphere to the other.

Several people argued that what happened to the brain that caused this change was that it became more *lateralized*. Lenneberg (1967) agreed with Penfield (1965: 392) that lateralization was complete by puberty:

After that [puberty], the speech centre cannot be transferred to the cortex of the lesser side [the RH] and set up all over again. This 'nondominant' area that might have been used for speech is now occupied with the business of perception.

1.4.4.1.2 Critical Periods and Second Language Acquisition. Scovel (1969) attempted to apply these findings to second language acquisition. He also wrote a book on the subject in 1988 which we will discuss later. Scovel noted, as had many other researchers, that children appear to be able to acquire nativelike pronunciation in the second language while most adults do not. His claim was that the fact that both lateralization of the brain and the ability to acquire an accent-free L2 were limited by the onset of puberty was too great a coincidence to ignore. He argued that the difficulty adults had in mastering a second sound system was caused by the completion of lateralization. Studies now are looking very closely at *what* is acquired in order to assess the abilities of adults. Studies have ranged from Voice Onset Time to Subjacency. In spite of the breadth of coverage this question has received, the conclusions to be drawn are still controversial (see Patkowski, 1990; Johnson & Newport, 1991; Flynn & Manuel, 1991).

In order to make sense of these conflicting results and interpretations, Long (1990) distinguishes between the *Whether* question and the *Where* question. The *whether* question is concerned with such issues as whether adults have an initial advantage over children in early learning and *whether* children's ultimate attainment outstrips adults', as opposed to *where* (e.g. phonology) that the differences appear.

1.4.5 Criticisms of the Biological Critical Period

Lenneberg claimed that lateralization is a slow process that begins around age two and is completed around puberty. However, Krashen (1973) re-examined Lenneberg's data and found that all of the children who recovered their language actually suffered their cerebral trauma before the age of *five*. He, then, claimed that lateralization was complete by age five, not by puberty. The implications of this for second language learning are that if lateralization is complete by age five, and children from five to puberty can still acquire nativelike speech, then lateralization cannot be responsible for the critical period, or accented speech. Scovel (1981) responded to this by noting that we must be careful to distinguish between *emergence* of lateralization, and *completion* of lateralization. If lateralization is not *complete* until puberty, we can still use it as the basis of the critical period hypothesis.

In addition to the age of completion of lateralization, there are also other problems associated with this construct. Segalowitz (1983) states unequivocally that lateralization does not increase with age. He studied children from ages two to seven and found *no increase in lateralization*. Other studies (Molfese et al. 1975) have shown LH dominance in newborn speech perception. And there is even some evidence for lateralization before birth. All of this implies that the view of lateralization as a maturational process seems to have problems. Segalowitz (1983) also claims that lateralization and plasticity are not related:

We must not think of lateralization as meaning that part of the brain is 'used up' or 'filled' just because it is specialized for some activity.

In addition to these problems, lateralization may not be quite as unassailable as some researchers believe. Several studies have shown that *cognitive strategies* can influence lateralization. Learners being taught in different styles utilize different styles in analytic tasks. Analytic tasks presented in a traditional style tend to be processed in the LH, while analytic tasks presented in a conversational style tend to be processed in the RH.

All of this forces us to address the question of whether we should be concentrating so much time on the relevance of lateralization to language learning. Scovel (1982) quotes Jacobs (1977):

It must always be remembered that things easy to measure are not necessarily important and those not measurable may be very important.