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Cognitive Perspectives

Cognitive Perspectives on the Acquisition of Spanish as a Second Language

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1.0 Introduction

The purpose of this chapter is to provide an overview of current research on various cognitive approaches to second language learning in Spanish. The first section discusses several cognitive models, paying attention to a number of dichotomies that have informed the field: product-oriented versus process-oriented approaches, explicit versus implicit knowledge, focus on input versus focus on output, Processing Instruction versus traditional and meaning-based output, and attention to form versus attention to meaning. Where relevant, I analyze how models have dealt with these dichotomies and how empirical studies have provided (or not provided) support for the proposed theoretical tenets. In the second part of this chapter, I discuss research on sentence processing in Spanish-English learners at various levels of proficiency (i.e., advanced second language learners and Spanish-English bilinguals), for this topic reveals basic general cognitive processes that may inform general theoretical approaches with an emphasis on cognition.[1]

2.0 Cognitive Accounts of Second Language Acquisition

Cognitive accounts of second language acquisition all agree that language learning engages the same cognitive systems (perception, memorization, information processing, etc.) that are involved in other kinds of learning. This is often explained by invoking the metaphor that learning a language is seen as essentially no different from learning how to play an instrument or how to ride a bicycle. Where the accounts differ is on whether they focus on the relationship between explicit and implicit knowledge, the relationship between input and implicit knowledge, or the relationship between L2 knowledge and output (Ellis 1994).

In this section, I review cognitive models whose claims have been empirically tested using data from Spanish second language learners. I begin with a discussion of the differ-

ences between product-oriented versus process-oriented approaches to second language acquisition research. Under this rubric, I review several interlanguage studies and Krashen's distinction between *acquisition* and *learning.* Although admittedly Krashen's ideas are innatist in nature, in explaining the contrast between *acquisition* and *learning,* Krashen draws on the constructs of *implicit* and *explicit,* which are cognitive in nature (Ellis 1994). Subsequently, I briefly touch on Andersen's Nativization Model and Pienemann's Processability Theory, ending with a discussion of the contrast between comprehensible input and comprehensible output by presenting the theoretical tenets and pedagogical implications of "input processing" versus "output practice" models of language acquisition.

2.1 Product-Oriented Versus Process-Oriented Approaches

According to Lafford (2000), the early literature on the acquisition of Spanish by second language learners is characterized by a comparison of the differences between native and target languages, inasmuch as it was believed that these differences were responsible for learners' errors. Early research tended to be descriptive, introspective, and pedagogical in nature, with little attention paid to the actual performance of students. With the growing recognition that the grammars learners constructed on their way to acquiring the target language were systematic and ruled-governed, the product-oriented approach to the study of Spanish second language acquisition was replaced by a process-oriented approach, where the object of study became not what learners should be doing (a comparison of L2 products with target language use) but rather how learners constructed their L2 systems. Early morpheme acquisition studies were abandoned and replaced by studies dealing with explanations of the systematic variation in learners' interlanguage. In what follows, I will briefly review a number of research studies that have investigated the acquisition of specific grammatical aspects and lexical meanings by second language learners of Spanish within an interlanguage framework. As will be seen, these studies have sought to explain the evolution of learners' interlanguage by proposing the existence of a number of internal strategies (e.g., Selinker 1972) utilized during the L2 acquisition process.

2.1.1 Interlanguage as a Set of Internal Strategies

Selinker (1972) coined the term *interlanguage* to refer to both the internal mechanism that learners have constructed at a single point in time as well as to the interconnected systems that characterize the learners' progress over time. Early interlanguage theory was concerned, among other things, with the cognitive processes that were responsible for the hypotheses constructed by second language learners about the structural properties of the target language. Partly on the basis of errors found in the speech of language learners, Selinker (1972) identified the following five processes:

1. Language transfer: some rules of the interlanguage may result from the transfer of semantic or grammatical features from the first language.
2. Overgeneralization: some linguistic forms of the interlanguage may be the result of overgeneralization of the rules of the target language.

3. Transfer of training: some linguistic forms of the interlanguage may result from the training process employed to teach the second language.
4. Strategies of second language learning: some linguistic forms of the interlanguage may result from a specific approach to the material to be learned.
5. Strategies of second language communication: some linguistic forms of the interlanguage may result from specific ways in which learners learn to communicate with speakers of the target language.

Examples of studies that have sought to examine different aspects of Spanish interlanguage development are VanPatten (1987), Ryan and Lafford (1992), Guntermann (1992), Andersen (1986), Lafford and Collentine (1989), Lantolf (1988), DeKeyser (1991), and Frantzen (1991). In this section, I will focus on the first three of these studies, for together they provide a comprehensive examination of stages of transitional competence that second-language learners of Spanish exhibit in the development of two formal features of the language: the copulas *ser* and *estar*.[2]

The first in-depth study of the development of the Spanish copulas *ser* and *estar* by second language learners was conducted by VanPatten (1987). Through the analysis of longitudinal data collected from six classroom learners of Spanish, as well as grammaticality judgments and classroom observations, VanPatten found five different stages in the development of Spanish copulas:

1. Absence of copula in learner speech
   **María baja.* "Mary short."
2. Selection of *ser* to perform most copula functions
   **Juan es estudiando.* "John is studying."
   **El libro es aquí.* "The book is here."
   **María es enferma.* "Mary is ill."
3. Appearance of *estar* with present progressive
   Juan está estudiando. "John is studying."
4. Appearance of *estar* with locatives
   El libro está aquí. "The book is here."
5. Appearance of *estar* with adjectives of condition
   María está enferma. "Mary is sick."

VanPatten argues that these transitional stages cannot be explained either by classroom teaching approaches or by sequence of instruction. The *sequence-of-instruction* account, for example, predicts that forms that are taught first are acquired first. Given that the use of the copula *estar* with adjectives of condition was taught from the first days of instruction and was used through the course of instruction, one would expect learners to exhibit a certain degree of mastery of this form at early stages of language development. Likewise, if teaching approaches were responsible for the different stages of development, we would expect the concurrent emergence of both copulas in the interlanguage of these learners, inasmuch as *ser* and *estar* as well as their usage were presented early in the instructional

curriculum. A more likely explanation, offered by VanPatten, is to account for these stages of transitional competence via the interaction of four factors known to be involved in second language acquisition:

1. Simplification—copula omission or overuse of *ser* for both copulas.
2. Communicative value—copulas tend to be omitted because they generally do not add any real information to the message contained in a sentence.
3. Frequency in input—*ser* appears to be overwhelmingly more frequent than *estar* in the readings aimed at first-year students.
4. L1 transfer—*ser* appears in the interlanguage of English-speaking learners for a prolonged period because of the existence of only one copula in English.

In a related study, Ryan and Lafford (1992) sought to examine the extent to which VanPatten's (1987) findings could be generalized to other language learning settings. Analysis of transcriptions from elicited oral interviews revealed that sixteen beginning-level students in a study abroad context acquired the Spanish copulas and their uses in ordered stages, much in the same way as described in VanPatten (1987). The only real difference between the two studies lay in the order of the acquisition of the locative and conditional uses. Whereas VanPatten found that the locative uses of *estar* are learned first, Ryan and Lafford found mastery of *estar* in conditional contexts to precede mastery of *estar* in locative contexts.

Guntermann (1992), also looking at development of *ser* and *estar* over time, found only partial support for the stages of acquisition postulated by VanPatten (1987). Data collected from oral interviews to evaluate the proficiency of nine Peace Corps volunteers in Spanish revealed that the copula omission characteristic of stage I was not brief (as stated in VanPatten 1987), but rather was still present in the language samples of advanced speakers of Spanish. Guntermann attributes this result to learners employing simplification as a means to use the least complex forms and rules to express the most meanings and to expand their ability to use language.

The studies investigating the development of the Spanish copula by second language learners show striking similarities in their results despite their methodological differences and the interlearner and intralearner variability that characterizes second language acquisition research. The convergence of results strongly suggests that the acquisition of *ser* and *estar* involves identifiable stages of development. Although studies such as these undoubtedly contribute some of the best descriptive work in SLA research, there are a number of shortcomings surrounding this type of work.

First, although these studies acknowledge that the first language plays a role during the learning of a second language, they typically do not articulate what this role is. That is, no account is given to explain in what ways the L1 and the L2 contribute to the specific structure of the interlanguage, and nothing is said about the qualitative ways in which the system learners build at a given point in time differs from that of the native speaker.

Second, the typology used to explain the different stages of development observed in the learners' interlanguage is itself more a descriptive statement than an explanation of the processes involved in the development of a second language. To say, for example, that a particular type of linguistic behavior is due to simplification does not really explain why sim-

plification occurs. It may be the case that learners simplify because they have not yet acquired a particular form. Or it may be that learners are unable to access the particular form in the production of specific linguistic utterances. The fact that simplification can reflect the processes of either acquisition or production raises the need to distinguish between what learners "know" at a particular stage in their language development and what they do. One way to address this issue would be to use instruments of data collection whose hypothesized properties allow researchers to tap into these two types of linguistic behavior (e.g., grammaticality judgments versus naturalistic data).

Third, one of the explanations given for the early selection of *ser* over *estar* to perform most copula functions was to suggest that frequency of occurrence in the input could have played a role. That is, learners may have overextended the uses of *ser* simply because it appeared more frequently in the readings of first-year classroom students, making it easier for learners to perceive (see VanPatten 1987). Although it is reasonable to suggest that frequency is linked to the attention and internalization of linguistic forms, the frequency of occurrence of *ser* and *estar* in the readings in question remained unattested.

Fourth, when data is collected by means of a single instrument—as was the case in Ryan and Lafford (1992) and Guntermann (1992)—the variability in learner language produced in different contexts is ignored. To take an example, Schmidt (1980) used free oral production, imitation, written sentence-combining and grammaticality judgments to study second-verb ellipsis (e.g., Peter is eating an apple and Paul an orange). The findings revealed that learners always included the second verb in free oral production but omitted it in other samples of their language in proportion to the degree of monitoring that the tasks allowed.[3] Given this finding, it seems appropriate that studies investigating developmental sequences use two or more instruments to collect data.

Despite these limitations, the discovery that there are testifiable developmental patterns in second language acquisition of a syntactic, lexical, and semantic nature is important, for any theory of second language acquisition will need to account for such developmental patterns.

2.1.2 The Implicit Versus Explicit Contrast in Interlanguage Studies

According to Krashen (1981, 1982), adult second language learners may either "acquire" or "learn" a second language. *Acquisition* is an unconscious process that occurs when learners engage in meaningful interactions in natural communication settings in the second language, with no attention to form. *Learning,* on the other hand, is the conscious process of studying and attending to form and rules; both error detection and error correction are central here in that learning results in "knowing about language." Although Krashen failed to supply a clear definition of conscious and unconscious, he identified *conscious learning* with the ability to provide grammaticality judgments based on rules. In contrast, *unconscious learning* was identified with the ability to provide grammaticality judgments based on "feel." In this respect, then, conscious learning is associated with explicit knowledge whereas unconscious learning is associated with implicit knowledge.

Studies that have sought to examine the explicit/implicit distinction have typically equated learners' explanations of grammatical rules with explicit knowledge and learners'

use of the same grammatical features in production with implicit knowledge.[4] A recent study investigating the explicit/implicit dichotomy is VanPatten and Mandell (1999). Although the study investigated the influence of structure type on how learners judge L2 sentences, it nevertheless examined the question of learners' explicit and implicit knowledge and how this knowledge is represented in the mind of the learner. In this study, a group of sixty-four second language learners of Spanish was shown sentences that contained different types of morphosyntactic errors. Relevant to our discussion are Type I sentences, sentences containing errors for which learners regularly receive explicit instructions and corrective feedback in the L2 classroom, and Type III sentences, sentences containing errors for which learners are neither taught nor for which they receive corrective feedback (i.e., errors that, according to some prevailing theories of linguistic analysis, result because of violations of principles of Universal Grammar).

The learners were asked to provide a judgment (i.e., correct or incorrect), to correct the sentences, and in each case to state whether their judgment was based on largely "feel," "known rule," or "guess." Results showed that subjects' correctly rejected the ungrammatical sentences the majority of the time. In addition, most subjects reported that grammaticality judgments of Type I sentences were based on knowledge of a rule about which they had received instruction, and those of Type III sentences were based on feel. These results showed that learners relied on different sources of information when providing grammaticality judgments. Explicit knowledge of rules was used when subjects were judging sentences containing errors for which they had received explicit classroom instruction, whereas implicit knowledge was used when judging sentences with errors for which no attention to form was available. These findings suggest that explicit rules constitute part of the available knowledge to L2 learners, and tentatively provide some legitimacy of the cognitive distinction between explicit and implicit learning postulated by Krashen.

There are, however, a number of limitations associated with VanPatten and Mandell's (1999) study. Recall that the researchers set out to test whether learners' L2 judgments strategies could be grouped according to the type of structure that the L2 learners were judging. For morphosyntactic structures about which learners regularly receive explicit instruction in the L2 classroom (i.e., Type I sentences), the prediction was that learners would report significantly more use of "known rules." Conversely, for structures that are neither taught nor for which learners receive corrective feedback (i.e., Type III sentences), the hypothesis was that learners would report significantly more use of "feel" than "known rule." However, subjects were not asked to formulate a rule for cases in which they indicated that judgment was based on "known rule." Therefore, one cannot rule out the possibility that learners may have judged a sentence as ungrammatical based on "feel," but remembered having received some type of explicit instruction about the structure, and consequently reported having made the judgment based on "known rule" instead.

Another possibility is that learners may have engaged in the use of other strategies, such as translation, analogy, or semantics, to arrive at a judgment, and somehow equated this to the concept of "known rule." An added problem is that no control group (i.e., native speakers of Spanish) was available to compare the results obtained for the second language learners. This baseline comparison seems necessary in light of the fact that a central assumption in the study is that second language learners rely on "feel," much as native

speakers do, when faced with structures that learners come to learn not because they have received explicit instruction, but because of interactions between Universal Grammar and input data. Although the results obtained in the study point in the right direction, without the native speaker data it is not possible to determine the degree of similarity in the behavior of native speakers and second language learners.

Finally, a glance at the materials reveals that some of the sentences assumed to be impossible in Spanish (e.g., *Yo honestamente no entiendo tu problema* "I honestly don't understand your problem"; *Una flor fea creció en el jardín* "An ugly flower grew in the garden"; *Café no hay para el desayuno* "There is no coffee for breakfast") have varying degrees of acceptability. Some sentences are encountered in everyday conversations, whereas others are marginally acceptable or used only in some highly marked contexts. Given that not all the experimental sentences had the same level of acceptability, the validity of the judgments provided by the second language learners is questionable.

Although the results of VanPatten and Mandell's (1999) study have been compromised by the limitations outlined here, investigations of this nature play a significant role because the relationship between explicit and implicit knowledge continues to be an important issue in the discussion of the role of consciousness and attention in second language acquisition.

2.1.3 Andersen's Nativization Model

Whereas interlanguage theory sought to answer the question of the processes that were responsible for interlanguage construction and the nature of the interlanguage continuum, Andersen's Nativization Model (1979, 1983, 1990) investigated how learners created and restructured their interlanguage system. He distinguished between two processes, *nativization* and *denativization*. Nativization involves assimilation as learners make the input conform to their own internalized view of what constitutes the L2 system. This process results in the type of pidginization characteristic of early language acquisition. On the other hand, denativization consists of accommodation to the external system and results in the kind of depidginization evident in later stages of second language acquisition (McLaughlin 1987; Ellis 1994).

More recently, based on research on the L2 acquisition of English and Spanish, Andersen (1990) has proposed seven operating principles that specify the processes, cognitive principles and communicative strategies that operate during second language acquisition. These are: the One-to-One Principle, the Multifunctionality Principle, the Formal Determinism Principle, the Distributional Bias Principle, the Relevance Principle, the Transfer to Somewhere Principle, and the Relexification Principle. To illustrate how the principles work, an in-depth look at one of the principles, Formal Determinism, is in order. This principle states that "when the form-meaning relationship is clearly and uniformly encoded in the input, the learner will discover it earlier than other form-meaning relationships and will incorporate it more consistently within his interlanguage system" (55). Support for this principle comes from plural subject-verb agreement in Spanish. Andersen observes that the verbal markers *–mos* and *–n* for first and third person respectively are acquired before the first person singular marker*–o*. He explains this by noting that the plural markers in question are invariably used across the entire verbal inflection paradigm, whereas the singular inflection *–o* is restricted to present indicative. According to formal determinism, the

consistency and transparency of these plural markers in Spanish promote their early discovery (see also Andersen 1983, 1984, 1986, and 1990 for further evidence for the principles using Spanish second language acquisition data).

Outside of Andersen's own research, one aspect of the interlanguage of second language learners of Spanish that has found support for the proposed operating principles is the development of the prepositions *por* and *para*.[5] Lafford and Ryan (1995), for example, found that the functions of "purpose" and "beneficiary" (both of which carry the meaning of "goal") associated with *para* surface early in the language of the learners. According to Lafford and Ryan, this can be explained by invoking Andersen's (1989) One-to-One Principle. The principle states that "interlanguage systems should be constructed in such a way that an intended underlying meaning is expressed with one clear invariant surface form (79)." This is illustrated here, since the meanings encoded in the function of "goal" are expressed invariantly by the form *para*. Lafford and Ryan also reported a number of nonnative uses of *por* and *para*. The most common use was "substitution," and was explained as a manifestation of the Naïve Lexical Hypothesis and Andersen's Relexification Principle. The first principle is seen at work in the speech of learners who equated *por* with English "for," as in *El piso tiene tres habitaciones por dormir* "The apartment has three rooms for sleeping." Andersen's Relexifixation Principle states that second language learners use the native language structure with items from the second language. This principle may explain learners' use of *por* + finite verb in place of the English "to" + infinitive verb as exemplified in *por habla español con chicas* "to speak Spanish with girls," even though the particular forms of the verb in Spanish and English do not correspond.

Andersen's operating principles were formulated to explain why certain linguistic forms typically appear in learners' second language production before others. There are, however, several well-known criticisms associated with these principles. First, the principles are not mutually exclusive, and so it becomes difficult to test each one of them separately (see Dulay and Burt 1974 and Larsen-Freeman 1975 on a similar criticism made to Slobin's 1973 list of operating principles). In addition, we do not know the weight to be attached to each principle when they are in conflict (Ellis 1994). Because of this, it is difficult to predict or to explain the emergence of certain linguistic forms in the learners' interlanguage. Given this state of affairs, it seems reasonable to seek out other theories that would enable us to explain, for example, the underlying patterns of behavior evidenced in the development of *por* and *para*, as well as the development of other morpheme types, in second language learners of Spanish.[6]

2.1.4 Pienemann's Processability Theory

In general, Processability Theory claims that fluent language-processing speed can be achieved because different components of the language production device operate automatically and without conscious attention (Johnston 1995). In the case of subject-verb agreement, for example, the appearance of the verb ending crucially rests on information created before the verb is uttered—for example, person and number marking on the subject noun. Subject-verb agreement can only occur if this information is stored and subsequently becomes available when the verb is produced. For adult native speakers of a language, it is assumed that

these processes are highly automated and that there is a special memory buffer—a grammatical buffer—dedicated to the storage of such information, which, because of its task-specific nature, is accessible only to automated plans. The situation for second language learners is quite different. Because L2 learners do not possess automated procedures for the production of the target language, they do not have access to the task-specific grammatical buffer. What the second language learner processor needs to do, then, is to keep the transfer of syntactic information from its storage source to the memory buffer to a minimal level. The more information to be transferred, the less space there will be for other memory-dependent processes, including word access. What this means, then, is that linguistic information such as tense is expected to surface prior to, say, subject-verb agreement.

Following this line of reasoning, Pienemann (1998) proposes five hierarchical procedures, which form the backbone of Processability Theory. *Word/lemma access* is the first procedure and simply involves the access and production of words. This is a prerequisite for *lexical categorization,* in which specific grammatical characteristics such as person, number, and gender are associated with the lexical entry, along with certain semantic information. *Phrasal procedure* is the third procedure and refers to a process that is dependent on an adequate lexical entry for the phrasal head. In essence, this procedure yields agreement within a single phrase, such as a noun, verb, or adjective phrase. Upon completion of the procedures carried out within a single phrase, the role of that phrase within an utterance can be assigned and the phrase can be properly inserted within a sentence frame or structure. The assigning of phrasal function and the storing of sentential information occurs in the *S-procedure,* the fourth procedure. Finally, the *subordinate clause procedure* involves an exchange of grammatical and semantic information between a subordinate clause and the main clause.

According to the model, the development of grammatical structure will occur as learners systematically overcome the constraints identified in processing strategies. These strategies are also involved in L1 production and can only be accessed in the L2 incrementally. Based on the work on L2 German and English, Pienemann and his colleagues have suggested that not all linguistic items are developmental in the sense that acquisition occurs at a particular stage of the learner's development. Some are *variational,* in that the learners may or may not acquire them and can be acquired at any stage of development.

The predictive paradigm established by Pienemann's theory finds support in data from the interlanguage of second language learners of German, Japanese, and Spanish. For Spanish, Johnston (1995) presents preliminary data from language samples gathered from a variety of learners of Spanish in Australia that indicate the existence of the stages for the acquisition of word order outlined in table 8.1 (examples of stage I are not provided in Johnston (1995) given that they are too simplified to be of interest). At stage II, we evidence the use of strictly serial word order for the mapping of semantic roles onto surface forms. Interphrasal procedures such as subject-verb agreement are blocked at this stage. This is precisely what we would expect at the stage of category procedures. At stage III, we note the emergence of phrasal morphemes. Because S-procedures rely on the input from phrasal procedures, the former can only develop after the latter have emerged. Therefore, we do not expect the development of interphrasal operations (such as subject-verb agreement), unless intraphrasal operations have emerged. This is precisely what the data show. Stages IV and

Table 8.1

Examples of the Interlanguage of Spanish L2 Learners

Stage	Language Sample
Stage II	*De universidad llaman Macarthur Institute* "From university they call Macarthur Institute." [canonical word order]
Stage III	*Son simpáticos.* "They are nice." [intraphrasal agreement]
Stage IV	*En Australia se necesitan buenas buenos puntos.* "In Australia good points are needed." [interphrasal agreement]
Stage V	*Les dije que no hablaba español.* "I told them that X did not speak Spanish." [obj-clitic]

Source: Johnston 1995.

V show the development of interphrasal procedures such as subject-verb agreement and clitic placement.

We saw earlier that the identification of stages of development is of little value for theory construction unless a principled explanation for them is given. In this respect, Processability Theory makes an important contribution to second language acquisition research. By proposing hierarchical procedures and processing strategies, it explains why learners pass through the stages of development that they do. In addition, it offers researchers a mechanism to form hypotheses about which structures will be acquired at which stage of development. The result is a model that has both explanatory and descriptive adequacy.

There are, however, a number of criticisms associated with the model. First, the model rests on the assumption that learners overcome the processing constraints specific to a particular stage to move onto the next stage. However, no explanation is given of why or how learners overcome the processing constraints (Larsen-Freeman and Long 1991). An additional problem, noted in Ellis (1994), relates to the notion of acquisition. Pienemann and his colleagues define *acquisition* in terms of "first appearance" of a grammatical feature in production. Although this notion has been accepted for some time now in theories that underscore the importance of processing operations, Pienemann fails to provide quantitative and qualitative criteria to be met by the learner's production, in order to ascertain the operation of a predicted processing strategy. Finally, the model says nothing about how learners come to comprehend grammatical structures, nor does it tell how the comprehension and production mechanisms interact (Ellis 1994).

Before leaving this section, it is important to note some points about the role of instruction in the development of learner language under Pienemann's model. Pienemann and his associates have for some time now maintained that whereas some linguistic features can be taught successfully at various points in the learner's development (e.g., vocabulary), others cannot be affected by instruction because they are internally driven—determined by general constraints on how human beings process information and develop increasingly more complex levels of automation in speech production. In the latter case, Pienemann maintains that learners cannot be made to "leapfrog over stages" unless they are develop-

mentally ready to do so, and he proposes to align teaching objectives with stages of acquisition. This proposal, known as the Teachability Hypothesis (Pienemann 1985), finds support in a number of studies. Pienemann (1998), for example, presents evidence that teaching interventions *can* accelerate the rate at which language is learned and can increase the number of structures a learner can produce only if the learner is "ready" to learn. Although this is an attractive proposal from a pedagogical stance, its main difficulty arises with the fact that, as Lightbown (1985) has pointed out, our current knowledge of natural acquisition sequences is still quite limited to make specific recommendations about whether particular forms can be taught and when.

2.2 The Role of Input and Output

Most researchers would not dispute that input—or exposure to the target language systems via oral and written data—is necessary for language acquisition to take place. Krashen (1982) views this as the single most important factor in second language acquisition, in that it answers the critical question of how languages are acquired. More recently, VanPatten (1991, 1996) has proposed a model of second language acquisition, dubbed "Input Processing," (IP) that focuses on the relationship between input and input processing strategies and their impact on the developing knowledge of the second language learner.[7]

2.2.1 Processing Instruction versus Traditional and Meaning-Based Output

The IP model is an account of intake derivation that occurs in working memory during online comprehension. It rests on four hypotheses about L2 input processing strategies that underpin the competition existing between attention to form and attention to meaning in a system characterized by learners' limited attentional capacity. These hypotheses are provided in table 8.2 (from Lee and VanPatten 1995).

A fundamental claim made in the model is that because processing is more effortful for early-stage learners, obtaining meaning from the input more efficiently involves processing lexical items and ignoring grammatical items (number markers, verb and noun inflections), particularly when the latter are very low in communicative value (i.e., learners can ignore them and still understand the utterance). Accordingly, in the early stages of language acquisition, learners' processing of grammatically encoded information will be limited unless that information has relatively high communicative value.

In some respects, the Input Processing Model, as currently formulated, is somewhat limited. VanPatten refers to the notion that beginning learners simply ignore inflectional items when these are low in communicative value and pay attention to the roots of content words because they are high in communicative value (see, for example, Lee and VanPatten 1995). What remains unclear is exactly how early-stage learners determine what is high and what is low in communicative value in the target language. In other words, when beginning learners encounter the sentence *Nosotros comemos en la playa* "We eat at the beach," what mechanism does the learner draw on to determine that it is the initial *com-* in *comemos,* as opposed to, say, *come-* or even *comem-*, that carries substantive meaning? Also, VanPatten refers to morphological items as having different levels of meaningfulness and claims that limited attentional capacity drives the learner to ignore less meaningful morphology.

Table 8.2
Hypotheses about L2 Input-Processing Strategies

H1. Learners process input for meaning before they process it for form.
- H1a. Learners process content words in the input before anything else.
- H1b. Learners prefer processing lexical items to grammatical items (e.g., morphology) for semantic information.
- H1c. Learners prefer processing more meaningful morphology before less or non-meaningful morphology.

H2. In order for learners to process form that is not meaningful, they must be able to process informational value or communicative content at no or little cost to attention.

H3. Learners tend to process input strings as agent-action-object or subject-verb-object, assigning agent or subject status to the first noun phrase they encounter.

H4. Learners may process phrases and recurring patterns as whole unanalyzed chunks, especially if phonological properties help to delimit these phrases.

Source: Lee and VanPatten 1995:97.

However, the model does not account for how learners determine different degrees of morphological meaningfulness or how the processing mechanism determines what to ignore. If the meaning conveyed in the grammatical form is also encoded lexically, the form is said to be low in communicative value. No account is given, though, of how the processing mechanism identifies this information, which is crucial to later processing of the linguistic input in accordance with the limited resources the processor has available.

VanPatten's Input Processing Model and the principles contained therein have motivated a particular type of focus on form instruction called Processing Instruction. Central to his instructional model is the idea that the key to restructuring the learner's interlanguage system lies in focusing learner attention on structural aspects of the input data, as they become intake. VanPatten maintains that this is not possible with traditional approaches to instruction, which are typically characterized by the presentation of grammatical information plus some form of output practice. Rather than manipulating the learner's output to affect change in the developing system, VanPatten suggests that instruction ought to focus on altering how learners process the input.

Processing Instruction receives support from a number of empirical studies that have found a learning advantage when instruction is aimed at affecting how learners perceive and process input rather than when it is focused on having learners practice the language via output (see, for example, Van Patten and Cadierno 1993; Cadierno 1995; Cheng 1995, 2002; VanPatten 1996, 2000, 2002a). In a recent study, Farley (2001) investigated the relative effects of input-based Processing Instruction versus meaning-based output instruction by looking at the acquisition of the Spanish subjunctive of doubt. The twenty-nine participants in this study were assigned to either a processing-instruction or meaning-based output instruction treatment. Processing Instruction consisted of activities structured in a deliberate attempt to force learners to attend to the targeted forms for meaning. Meaning-based output instruction

consisted of meaning-based output activities similar to those found in traditional approaches to grammar instruction, with the difference that they were not mechanical in nature. Scores on sentence-level tasks involving the interpretation and production of the Spanish subjunctive of doubt revealed that both types of instructions brought about improved performance on the assessment tasks; however, the performance of the meaning-based output group declined over time on the interpretation task, while the Processing Instruction group showed no such decline. Farley interprets this finding as evidence for the superiority of Processing Instruction over other types of instruction. The pedagogical implications of VanPatten's Input Processing Model, however, have been challenged in a number of studies.[8]

2.2.2 Attention to Form versus Attention to Meaning

The development of an input-based acquisition model of the type described coupled with the claim that language acquisition takes place when learners engage in meaningful conversational interactions (Long 1983; Hatch 1992; Pica, Young, and Doughty 1987) raises the question of whether learners can focus on form while attending to the propositional meaning of an utterance. Whereas some researchers have maintained that acquisition is a subconscious process, resulting from sufficient exposure to meaningful and comprehensible input in the target language (see, for example, Krashen 1982), others take the position that formal features of language must be consciously registered by the learner for successful acquisition to occur. Schmidt (1990, 1994), for example, has argued that adult second language requires attention to form in the input. Schmidt does not discard the possibility of incidental or subconscious learning but states that this is possible only when task demands focus the learner's attention on the relevant features of the input (Schmidt 1988).[9] DeKeyser, agreeing with a weaker version of this *focus on form* position, notes that "some kind of focus on form is useful to some extent, for some students, at some point in the learning process" (1998:42).

Given that focus on form requires conscious processing and that conscious processing is in turn effortful, if learners are asked to attend to form while also processing the input for meaning, a negative effect should surface in the comprehension process. To explore this hypothesis, VanPatten (1990) asked Spanish language learners (N = 202) to listen to one of four paragraphs and to perform one of four tasks: Listen to a passage for content only; listen to the passage for content while at the same time noting all instances of the word *inflación*; listen to the passage for content and to note all instances of the definite article *la*; listen to the passage for content and simultaneously noting the verb morpheme *–n*. Comprehension of the passage was assessed by asking the participants to recall the passage in English. It was predicted that if a disruption in attention to content, caused by attention to form, affected comprehension, participants would produce less complete recall protocols, as measured by the raw number of idea units produced. Overall, the results revealed that there was no significant drop in recall scores when participants were asked to listen for content and note a lexical item simultaneously. However, subjects' recall scores decreased significantly when they listened for content while simultaneously noting a grammatical morpheme, indicating that they had difficulty attending to form that did not contribute substantially to the meaning of the input.

Although interesting, the findings could have resulted not from a legitimate difficulty associated with the simultaneous attention to content and form, but from the saliency, or lack thereof, inherent in the different linguistic items that the subjects were asked to attend to. That is, subjects may have experienced a drop in recall scores when listening for content and noting a grammatical morpheme, not because they experienced trouble attending to form per se, but simply because the grammatical morphemes that they were asked to tally were less salient—were significantly shorter, lacked stress, and the like—than the lexical items. Also, detection of the content word may have been facilitated by the fact that the word that the participants were asked to listen for (*inflación*) is an English cognate. In order to argue for a genuine "competition" between meaning and form, the materials need to be closely controlled, so that the sole difference is the aspect being investigated.

An additional limitation deals with the instrument used for data collection. Although the study makes a number of assertions about what second language learners do during real time language processing, the instrument used for data collection is an off-line task. To overcome this limitation, it is necessary to use data collection instruments that have been documented to tap more directly into online language processing. For example, eye tracking would be a more suitable candidate, as much has been written about eye-movement records as well as how eye-movement data can inform research on attention and language processing.

2.2.3 Recasts in L2 Acquisition

The debate on focus on form versus focus on meaning raises the question of whether there is linguistic input that can be utilized in language acquisition, which draws learners' attention to particular forms while at the same time avoids the interruption of the flow of communication (i.e., keeps focus on meaning). One obvious candidate is the use of recasts, defined as the reformulation of a learner's ungrammatical utterance while maintaining a focus on meaning (for a complete review of the role of recasts in language acquisition, see Nicholas, Lightbown, and Spada, 2001).

Ortega and Long (1997) compared the effects of positive evidence (models) and implicit negative evidence (recasts) on the learning of two structures by thirty L2 Spanish speakers. The structures under investigation involved Spanish object topicalization (label used by authors) (*La guitarra la tiene Pepe*/The guitar, Pepe has it) and Spanish adverb placement (*Elena toma a veces café*/Elena drinks sometime coffee). The treatment (models and recasts) and the structures (object topicalization and adverb placement) were crossed and counterbalanced across four groups, so that each group was exposed to both treatment types as well as to both structures. In the recast condition, participants were given the names of six items and a set of six pictures of people. The task was to hear the name of an object, to assign it to one of the six people, and to inform a partner about who had received the object. In the modeling condition, participants heard sentences containing information about who was assigned to each object, and to repeat the information aloud so that a partner could match the objects with the correct people. Comparisons between scores in a pretest and a posttest, each containing a grammaticality judgment task and a picture-description oral

production task, revealed that models and recasts had no learning effect on object topicalization, but that recasts produced a greater effect on the learning of adverb-placement in Spanish than did models. These results provide partial support for the claim that adult second language learners are able to learn from implicit negative feedback. Some caution needs to be taken when interpreting these findings, given that, as the authors rightly point out, the posttest was administered shortly after the treatment session. Therefore, it is not possible to assess the long-term effect of recasts on learning. In addition, it is not clear that the modeling treatment actually engaged learners in the processing of the structures they were producing. That is, it is conceivable that the learners were repeating the structures without paying attention to form or meaning. In this respect, it is possible that the recast condition and the model condition were not truly comparable.

In a recent empirical study, Leeman (2003) examined the role of recasts, negative evidence, and enhanced saliency in the development of the Spanish noun-adjective agreement system. The treatment was provided by the researcher to each of the participants in a one-time experimental sitting, while the two worked together to complete an object placement task and a catalogue shopping task. During the first part of each task, the learner was required to provide directions to the researcher, while the researcher provided the learner with feedback that varied according to the treatment group in which the learner belonged (i.e., recast group, negative evidence group, and enhanced salience group). Examples of each feedback type are provided below:

Recast

NNS: **En la mesa hay una taza rojo.*
"On the table there is a red [incorrect gender ending] cup."

R: *Um hmm, una taza roja. ¿Qué más?*
"Uh, huh, a red cup [correct gender ending]. What else?"

Negative Evidence

NNS: **En la mesa hay una taza rojo.*
"On the table there is a red [incorrect gender ending] cup."

R: *Um hmm, pero tú dijiste una taza rojo. ¿Qué más?*
"Uh, huh. But you said a red [incorrect gender ending] cup. What else?"

Enhanced Saliency and Control Group

NNS: **En la mesa hay una taza rojo.*
"On the table there is a red [incorrect gender ending] cup."
R: *Um hmm, ¿Qué más?*
"Uh huh. What else?"

In the second part of the treatment task, learners were asked to respond based on the researcher's directions. This exposed all learners to positive evidence as well, but for the

enhanced group stress and intonation were used to enhance the salience of the target form (e.g., *La manzana roja está en la mesa* "the RED [correct gender ending emphasized] apple is on the table"). All other groups received unenhanced input. Gains on the development of the Spanish noun-adjective agreement system were assessed via a comparison between pretest scores and two posttest scores—an immediate posttest and a one-week delayed posttest. The findings revealed that negative evidence alone had little or no effect on the development of agreement abilities in L2 Spanish learners, and that recasts and enhanced saliency produced significant gains, when compared to a control group. However, in the delayed posttest, only the enhanced saliency group significantly outperformed the control group on gender agreement scores.

The results of this study make an important contribution with respect to the types of linguistic feedback that best draw learner's attention to particular forms in the input, and at the same time suggests directions for further research. It is important to find out, for example, whether learners actually view statements such as *Tú dijiste X* ("You said X") as a type of negative evidence that informs about the acceptability of an utterance, or whether they simply view it a restatement of what the interlocutor said. In this same vein, the length of the treatment may have been insufficient for negative evidence to influence language development. The fact that the delayed posttest occurred only a week after treatment also needs to be further modified to include longer lapses of time, given that as it stands, the beneficial outcome of enhanced saliency over the other types of feedback can only be framed in the context of largely short-term gains. Finally, given the emerging interest in the role of enhancement in second language acquisition, the exact role that saliency played in the recast treatment group in this study needs to be carefully examined.

2.3 Summary of Findings on Cognitive Issues Discussed

In section 2 we have briefly reviewed cognitive models of language development whose tenets have been tested using Spanish second language acquisition data. Some models, originally proposed to account for L1 acquisition, have subsequently been used in SLA research—as is the case with Andersen's Operating Principles. Others, such as Pienemann's Processability Theory, have developed from work undertaken in SLA research. We saw that some theories generate precise hypotheses that can be systematically tested, whereas others offer researchers a more general picture of how second language acquisition occurs. In part because the study of second language acquisition is a recent field of inquiry, it is not yet possible to construct a comprehensive cognitive theory of SLA. The theories examined above vary greatly not only in scope but also in the type of data for which they try to account. Current work aims at evaluating these different theories by testing the hypotheses that they advance. This type of work eventually leads to the collapse of some cognitive models and the revision of others.

To varying degrees, the theories presented above seek to explain the extent to which individual learners conform to target-language forms (i.e., ultimate level of proficiency that learners reach). For example, Pienemann's model places second language learners in a continuum that reflects the learners' orientation toward the learning task. At one end, learners have a segregative attitude toward target language speakers and the target culture. At the

other, learners have an integrative orientation, which arises when the learner desires to assimilate into the L2 culture or when the learner has an instrumental need to learn the L2. Where learners place on this continuum constrains learning outcomes.

In the next section, we will examine the Competition Model of sentence parsing and an intriguing proposal, put forth by Fernández (1995, 1999), to account for ultimate attainment in L2 learning. Fernández takes the position that language learning is driven by an innate mechanism (i.e., Universal Grammar) that is dedicated to language and operates independently of more general cognitive processes. Fernández proposes that incomplete second language attainment may come about when learners use L1 parsing strategies that are not optimal to develop the underlying grammar of the target language. She reasons that if parsing strategies are inadequate to process incoming language in the L2, learners may be missing input that is crucial to building the linguistic system in the second language. To explore this proposal, it is first necessary to understand exactly how second language learners parse input in their L2. We now turn to a discussion of the Competition Model of sentence parsing by second language learners, as this topic unveils yet another dimension of cognition and second language acquisition.

3.0 Sentence Parsing by Spanish-English Speakers

3.1 The Competition Model

Much of the initial work on sentence processing in Spanish-English speakers is grounded in the Competition Model[10] (Bates and MacWhinney 1982, 1987). The model is primarily concerned with grammatical performance (as opposed to competence) and aims at explaining how speakers determine relationships among elements in a sentence. To capture particular relationships between surface forms and associated functions, which are crucially characterized as one-to-many mappings, (e.g., the function of "agent of an action" can be signaled through different form devices such as word order, case, and agreement), the notion of cue is brought into play. Sentence processing is seen as a competition among various cues, each contributing to a different resolution in sentence interpretation.

Within this framework, languages vary as a function of the presence or absence of the relative strengths of form-function mappings and of specific form types (e.g., rich agreement, overt case assignment). For example, Spanish and English are languages in which the canonical word order is assumed to be subject-verb-object (SVO). Presumably, because word order in English is rigidly of the form SVO, native speakers of English rely primarily on word order to encode the meaning of "agency" in sentences with canonical word order. In English, then, word order is said to be high in cue validity, since it is a reliable cue to sentence meaning. In noncanonical word orders, English speakers are said to display a reliable tendency to choose the second noun in a sentence as the agent, resulting in a marked bias for OSV and VOS interpretations. Spanish, on the other hand, allows for wider word-order permutations than English. Given this, word order in Spanish is said to be low in cue validity; speakers have to rely on other sources of information such as morphological agreement—the strongest cue—and on semantics—the second most influential cue in Spanish—for adequately determining, say, the subject noun phrase in a

sentence. In cases where different sources of information come into conflict, the Competition Model predicts that Spanish speakers will rely primarily on morphological cues at the expense of word order information, whereas English speakers are expected to behave in the opposite fashion.

With this background, we now turn to issues of second language processing from the perspective of the Competition Model. Because processing strategies differ for monolingual English and Spanish speakers, researchers of this persuasion ask how Spanish-English bilinguals perform syntactic processing in each of their languages. As Hernández, Bates, and Ávila (1994) have indicated, there are four possible patterns of behavior that one can logically expect to observe from these speakers when processing language in the monolingual mode. The first one, *differentiation,* is used to describe cases where speakers adopt separate strategies for processing each language, corresponding to the strategies used by monolingual speakers of those languages. *Forward transfer* refers to the use of first language (L1) strategies in processing the second language (L2), and is likely to be evidenced in speakers who are more dominant in their first language than in their second language. The term *backward transfer* denotes cases in which speakers use L2 strategies to process the L1. Finally, *amalgamation* describes situations in which speakers apply to both languages a set of strategies derived from the two languages.

In a study of sentence interpretation strategies, Hernández, Bates, and Ávila (1994) investigated the real-time costs of sentence interpretation in Spanish-English early bilinguals using a reaction-time measure. The study aimed at investigating the saliency of syntactic, semantic and morphological cues on the processing strategies used by early Spanish-English bilinguals (i.e., speakers who reported speaking their second language by age eleven). The participants (N = 100) read sentences on a computer screen, similar to "The pencil is eating the donkey," and were asked to choose which of the two nouns carried out the action of the sentence by pressing a button corresponding to the side of the screen on which the picture of a noun had previously appeared.

Analysis of the *choice data* and the *reaction time data* revealed that, overall, English monolinguals relied on word-order cues to assign the role of agent—followed by agreement and animacy. Spanish monolinguals, on the other hand, used agreement—followed by animacy and word order. For bilinguals tested in English and Spanish, however, agreement was by far the strongest cue to subjecthood in both languages, followed by word order and animacy. For the bilingual participants, this pattern of preference reflects a combined effect of Spanish and English monolingual processing strategies, with Spanish providing stronger cues than English. In general, the results in Hernández, Bates, and Ávila (1994) suggest that Spanish/English bilinguals fall "in between" the monolinguals of both languages, apparently having developed a compromised or amalgamated set of strategies for processing Spanish and English (see also Wulfeck et al. 1986 for similar results).

Why bilinguals use the same strategies for processing two different linguistic systems is a matter of speculation at this point. We know that, based on numerous social and linguistic factors, the bilingual moves along a continuum of language activation that ranges from a monolingual language mode, where the bilingual deactivates one language, although never totally, to a bilingual language mode, where both languages are activated,

although perhaps to differing degrees (Grosjean 2001). It may be possible, then, that the managing of two linguistic systems becomes too costly for the language processing mechanism of these bilinguals and that the bilingual processor seeks ways of optimizing the resources it has available. One feasible way of doing this is by partially merging or amalgamating the processing strategies of the two languages. This *processing trade-off,* although not ideal as a solution from a monolingual perspective, may be the most beneficial in terms of cost-effectiveness from a bilingual perspective (Hernández, Bates, and Ávila 1994).

Clearly, the processing trade-off hypothesis needs further testing. This is particularly so given that the findings reported in Hernández, Bates, and Ávila (1994) could reflect some type of postsyntactic processing of sentences. As stated earlier, in order to study the processes involved during sentence interpretation more directly, Hernández, Bates, and Ávila used a reaction-time measure. However, the time measurement reflected the collective time it took subjects to read a sentence, to make a decision regarding the agent of the sentence and to press a button indicating the decision. Because subjects were not given a time constraint to complete the task, it is possible that they may have made an initial decision regarding the agent role in a sentence but reversed it before pressing the button. Hence, the results could still very well reflect off-line decisions.

To access the workings of the sentence processor properly, it is crucial to tap the processing of sentence structure as it unfolds. What is needed, then, is the use of speedier tasks or more precise or sophisticated measures of online sentence processing that would permit us to investigate more accurately the effects of cue validity and cue conflict on sentence interpretation. We also need to investigate other aspects of sentence processing where the two languages under investigation have been shown to differ in some other respects. If indeed amalgamation is a strategy that the bilingual processor uses to reduce the costs associated with managing two linguistic systems, it should apply also when memory and time constraints require the processor to quickly structure material to preserve it in a limited-capacity memory. Below, we turn to a discussion of sentence processing as it occurs under these constraints, by looking at the strategies that Spanish-English second language learners employ when processing structures that are temporarily ambiguous. As will be shown, amalgamation is a strategy that extends beyond sentence interpretation, into the domain of syntactic analysis or parsing.

3.2 Processing Temporarily Ambiguous Sentence

The first study to investigate explicitly the processing strategies used by Spanish-English learners during the parsing of modifiers (i.e., sentence with the structure NP1-of-NP2-RC) is Fernández (1995) (see also Fernández 1998, 1999, 2000). The study is concerned with the fundamental question of explaining why adult learners seem to be only partially successful at acquiring a second language. Fernández suggests that incomplete second language attainment may come about when learners use L1 parsing strategies that are not optimal to develop the underlying grammar of the target language.

In order to test this proposal, Fernández (1995) examined the responses to ambiguous English sentences by monolingual English speakers, early Spanish-English bilinguals (i.e., native Spanish speakers who had learned English before age ten), and late Spanish-English bilinguals (i.e., native Spanish speakers who had learned English after the age of ten). A questionnaire was used to present subjects (total N = 45) with sentences such as this, where the prepositional phrase in the complex NP was an argument of the first noun[11]:

Roxanne read the review of the play that was written by Dianne's friend.

In sentences of this type, the ambiguity arises because the relative clause ("that was written") can be attached high to "the review" (early closure) or attach low to "the play" (late closure). The sentences in the questionnaire were immediately followed by a question ("What was written by Diane's friend?") that was designed to probe the subject's preferred attachment, and by two possible answers ("the play" and "the review"). Subjects were asked to circle the phrase best suited to answer the question. Fernández (1995, 1999) found that the strongest preference for low attachment was displayed by the English monolinguals (for similar results in English monolingual speakers see Cuetos and Mitchell 1988; Mitchell and Cuetos 1991; Mitchell and Brysbaert 1998), followed by the early bilingual group and then by the late bilingual group. Fernández also reported that language proficiency seemed to be the best predictor of attachment preferences. That is, subjects who rated their Spanish proficiency higher than their English proficiency favored high attachment. Subjects who rated English as their dominant language tended to show a preference for low attachment. Somewhat unexpected was the correlation obtained for subjects who rated both languages equally high (approximately half of the early bilinguals). Seemingly, some preferred high attachment and others preferred low attachment.

On the basis of the findings obtained for the late bilingual group, Fernández (1999) suggested that L2 processing strategies might be hard to learn after puberty. This in turn may be one of the reasons leading to the irregular or incomplete attainment of a second language by adult learners. Fernández reasoned that adult learners might transfer some of their L1 processing strategies when processing L2 input. In cases where the L1 strategies may not be suitable for assigning the appropriate structure to the L2 input, learners may end up with an incomplete (or erroneous) representation of the L2 grammar. Moving briefly to the patterns of behavior that one can expect to observe from second language learners when processing language in the monolingual mode, the data from the late bilinguals suggest that these learners have used their L1 parsing routines when processing L2 input, showing evidence of forward transfer (Fernández 1995, 1999).

Because Fernández (1995, 1999) did not test learners in their two languages, it was not possible to determine whether they would use the same strategies when reading Spanish as they did for English, or whether they would employ a different set of strategies. In order to answer this question, Dussias (1998) investigated the attachment preferences by late Spanish and English learners reading English and Spanish sentences with the structure NP1-of-NP2-RC. Subjects (N = 32) were presented with two questionnaires, one in Spanish and one in English, containing sentences similar to the ones used in Fernández (1995). Each sentence

was followed by a question and two possible answers, and subjects were asked to circle either one of two responses as the correct answer for the question.

The results for the English monolinguals showed a clear preference for low attachment, complying with late closure. This group was found not to differ significantly from the late learners, indicating that these participants too had a general preference for low attachment. Results for the Spanish questionnaire showed that, as expected, the Spanish monolinguals gave answers indicating that they had attached the relative clause to the higher noun considerably more times than to the lower noun. However, most of the late Spanish and English learners preferred, once again, low attachment over high attachment.

Because the questionnaire data could not guarantee that the choices readers make represent actual "first pass" commitments, Dussias (1998) conducted an additional experiment to test the learners' attachment preferences online while reading Spanish sentences. Data were collected using a self-paced reading task. The materials were designed so that some experimental sentences would have a plausible meaning only if readers attached the relative clause low into the structure (e.g., *El perro mordió al cuñado de la maestra que vivió en Chile con su esposo* "The dog bit the brother-in-law of the teacher [fem.] who lived in Chile with her husband") and others would be plausible only if they chose high attachment (e.g., *El perro mordió a la cuñada del maestro que vivió en Chile con su esposo* "The dog bit the sister-in-law of the teacher [masc.] who lived in Chile with her husband").

The results for the control group (i.e., Spanish monolinguals) showed the conventional bias for high attachment (for similar results with Spanish monolingual speakers, see also Cuetos and Mitchell 1988; Carreiras and Clifton 1999). Interestingly, for the late learners of English whose first language was Spanish, the sentences favoring high attachment took significantly longer to read than the one favoring low attachment. This result replicated the questionnaire findings reported above and suggested that, contrary to what would ordinarily be expected, these learners had a genuine preference for low attachment when reading in Spanish, their native language. Results for the late learners of Spanish whose native language was English indicated a trend toward favoring low attachment; however, this preference was not statistically significant.

Taken together, the findings reported in Dussias (1998) support the hypothesis that the cognitive demands placed on the language processor may be responsible for the low attachment preference reported earlier for the late learners, while reading stimuli in Spanish and English. That is, because (1) managing two linguistic systems produces costs for the language system in the form of delays in processing time (for supporting evidence, see, e.g., Grosjean 1985, 1994, 1997; Obler and Albert 1978; Soares and Grosjean 1984; Mägiste 1979), and (2) the parser's tendency is always to adopt the *least-effortful* option (see Fodor 1998), the bilingual parser will naturally choose operations such as *late closure* (i.e., low attachment) that give rise to the most simple and most quickly derived analysis, thereby minimizing processing load. This would explain why a majority of speakers in Dussias (1998) applied late closure when reading English and Spanish.

Put together, the results reported in this section suggest that some second language speakers show evidence of amalgamation and forward transfer during sentence processing, whereas other learners prefer to use only one type of strategy (i.e., late closure) to parse in

their two languages. This may indicate that in addition to amalgamation, the use of a single parsing strategy to process two languages is another resource that the bilingual processor uses to decrease the costs associated with managing two linguistic systems. The findings also offer some preliminary support to the proposal that second language learners do not always process target structures using the same strategies that monolingual speakers do.

4.0 Conclusion

In this chapter I have reviewed current cognitive models of second language acquisition, and in doing so I have presented some of the issues being dealt with by proponents of these models. Constructs such as language transfer, which were characteristics of early interlanguage studies, although redefined over the years, continue to find support in recent research studies. Similarly, cognitive distinctions, such as Krashen's explicit and implicit knowledge, find some legitimacy in Spanish second language acquisition data. The study of these constructs, however, has taken a step back by the interest sparked in recent years in the study of other variables that affect second language acquisition. We saw, for example, that one aspect of second language acquisition currently under intense dispute is the role of output in the acquisition process. Whereas some researchers maintain that production will aid acquisition only when the learner is pushed (Swain 1985, 1993, 1995), VanPatten and his colleagues maintain that production practice may either aid in the development of fluency and accuracy or may act as a focusing device that draws learners' attention to the input as mismatches are observed (VanPatten and Cadierno 1993; VanPatten 2002a). This debate currently occupies a focal position in second language acquisition circles partly because of the implications it carries for classroom instruction. Input-oriented theories advocate an emphasis on classroom activities that first attempt to impact the learner's interlanguage system via a focus on input, and only later give the learner the opportunities to develop productive abilities. Output-oriented models, on the other hand, encourage instruction where the teacher takes a more active role in pushing students from the beginning to produce more extensive and more accurate language samples.

This chapter has also reviewed research studies that address sentence processing by Spanish and English second language learners. This research, which finds its origins in the Competition Model, was primarily concerned with investigating whether second language speakers used the same syntactic and semantic cues as monolingual speakers did during sentence processing. Currently, much of the impetus is being directed at the study of parsing strategies by second language learners, with the goal of explaining (1) whether incomplete second language attainment may come about when learners use L1 parsing strategies that are not suitable for the development of the underlying grammar of the target language, and (2) the effects of second language learning on sentence parsing.

Clearly, there is much ground to be covered yet. We are only at the beginning stages of understanding, for example, the impact that text enhancement has on learners' development of grammatical and lexical knowledge, and its implications for a theory of attention allocation and noticing. Similarly, given that recall tasks are often used in second language research studies to assess the effects of different types of classroom language instructional

approaches on acquisition, further research is needed in which modality (e.g., written versus aural) is treated as a variable that might be responsible for the conflicting results reported in the literature on Spanish SLA (the pioneering work of Leow 1995 and Mecartty 2001 are two cases in point). Finally, few studies have dealt with topics addressing other areas of Spanish second language-related cognitive behavior such as speech perception, lexical access in word recognition, relations between phonological and orthographic/visual representations, sentence processing, discourse comprehension, language production, attention, and capacity theory. The relative lack of research in these directions may owe in part to the fact that the psycholinguistic study of Spanish in native speakers is itself relatively new; only recently have scholars begun to look at contrasting properties of Spanish to help test the generality of the language processing mechanisms that have been proposed and to refine their descriptions. However, as our understanding of Spanish native language processing becomes clearer, so should our future endeavors into the investigation of these aspects of language processing in Spanish-English second language speakers. This new direction of research will contribute not only by deepening our understanding of the processes that govern language processing in speakers of two languages, but it also will allow us to examine under different perspectives and using different sets of data, the validity and generality of current monolingual language processing theories, with the purpose of formulating models capable of accounting for monolingual as well as bilingual behavior.

NOTES

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1. It is important to note that although Cognitive Theory views interaction as playing a role in SLA, given that this topic is covered in chapters 6, 9, and 10 of this volume, our focus here will be primarily the structuring of the individual's cognitive system.

2. See chapter 5 of this volume for further discussion of the acquisition of the Spanish copulas *ser* and *estar*.

3. See also Larsen-Freeman (1975) and LoCoco (1976) for additional discussions on the effect of task on learner language.

4. See DeKeyser (1995) for additional discussion.

5. See chapter 5 of this volume for further discussion of the acquisition of the Spanish prepositions *por* and *para*.

6. One such theory is Myers-Scotton's Matrix Language Model (1993), and, more recently, Myers-Scotton and Jake's 4-M Model (Myers-Scotton and Jake 2000, 2001).

7. See chapter 10 of this volume for further discussion of the impact of various instructional approaches on the acquisition of Spanish as a second language.

8. For additional discussion see Salaberry (1997); Collentine (1998, 2002); Farley (2002); and chapter 3 of this volume; Grove (1999) and chapter 10 of this volume; DeKeyser et al. (2002); see VanPatten (2002b), for a response to DeKeyser et al. (2002).

9. In light of Schmidt's Noticing Hypothesis, Leow (2001) found no significant benefit of written input enhancement over unenhanced input. Overstreet (2002), on the other hand, found

that textual enhancement *and* communicative value of the target item affect comprehension as measured by a free recall task and a form recognition task. For additional discussion on the role of awareness and attention in SLA, see Leow (1997, 1999a, 1999b, 1998, 2000,) and chapter 10 of this volume.

10. See chapter 3 of this volume for further discussion of the Competition Model.

11. Fernández (1995, 1999) also tested sentences where the prepositional phrase (PP) in the complex NP was an adjunct to the first noun (e.g., "The crowd cheered for the singer with the guitarist that was awarded a medal"). However, given that the results for these types of sentences were generally similar to those for sentences where the PP was an argument of the first noun, they will not be discussed here.

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