

# BILINGUALISM ACROSS THE LIFESPAN

*Aspects of acquisition, maturity, and loss*

*Edited by*

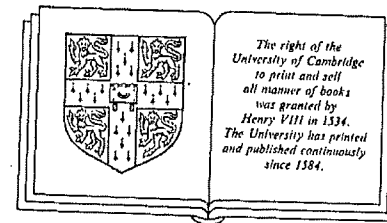
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*This book is dedicated to all who value diversity  
Among them Carlos Yorio, in memoriam*

## 7. Spanish, Japanese and Chinese speakers' acquisition of English relative clauses: new evidence for the head-direction parameter<sup>1</sup>

SUZANNE FLYNN

Consistent with the general theme of this book, my purpose in this paper is to discuss system interaction in bilingualism. While many of the chapters focus on the normal and abnormal interaction of different aspects of language in speakers who have learned two or more languages simultaneously, I focus on the adult learner's acquisition of a second language, or sequential bilingualism in traditional terms. Within this context, I consider the relative contributions of past first language (L1) experience and processes independent of this in second language (L2) learning. I argue that the parameter-setting model of Universal Grammar (UG) hypothesized for L1 acquisition provides an explanatory framework within which to integrate these two components. In addition, I argue that this work can clarify our understanding of questions and issues related to normal and abnormal bilingual processing in much the same manner that investigations of this sort inform theories of L1 acquisition. In adult L2 learning we are dealing with sophisticated learners whose pragmatic and general cognitive abilities are for the most part fully developed. In both child L1 acquisition and in the simultaneous acquisition of two languages, we are often working with individuals who are at immature stages both in terms of their language abilities and in terms of their general pragmatic and cognitive development. If, in investigations of adult L2 learning, developmental patterns emerge that are also found in L1 acquisition, then these patterns cannot be attributed to impairments or deficits in general cognitive abilities alone, but might be argued to follow from properties that characterize the language faculty itself, as an independent domain of human cognition. In addition, if we find differences in these patterns among various L1 language groups learning a common L2, then these results could be argued to follow from the interaction of specific properties of the L1 and the L2 in the learning of the target language. Documenting these sets of patterns very precisely can provide new evidence with which to resolve issues surrounding current debates about

domain specificity and properties of general cognition in language learning. They can also contribute essentially to our understanding of the interplay of these two components in functional bilinguals by allowing us, for example, to determine which aspects of a successful bilingual's language abilities are facilitated by general learning strategies and which are not. Finally, they can aid in our understanding of how, within this context, properties of two or more systems of language might interact at some level.

In this paper I will report results of an empirical study that demonstrate the importance of the role of the head-initial/head-final parameter in adult L2 acquisition of English. Original support for this model derived from an investigation of the head-direction parameter in adult L2 acquisition of null and pronoun anaphora in adverbial adjunct clauses. This paper extends this work to an investigation of bound variables in English restrictive relative clause structures (RRCs). In this paper, I will first summarize the results from previous studies; I will then report the new set of supporting data for the developing parameter-setting model of L2 acquisition.

### Background

The general parameter-setting model of language and language acquisition assumed in this paper is a familiar one. Chomsky (1975, 1980, 1981, 1982, 1986a,b) has proposed this model in order to account for both the diversity of languages and for the rapid and uniform development of language among children on the basis of a fixed set of principles. As such, it is both a theory of the properties of grammars and a theory of the biological endowment for language with which all individuals are uniformly and uniquely endowed. As a theory of a domain specific faculty of human cognition, UG "provides a sensory system for the preliminary analysis of linguistic data and a schematism that determines quite narrowly a certain class of grammars" (Chomsky, 1975:12). Essentially, the mediation of UG in language learning restricts the infinite number of false leads that could be provided by random induction from unguided experience of surface data (Lust, 1986).

As a theory of grammars, UG attempts to provide "a system of principles, conditions, and rules that are elements or properties of all human languages, not merely by accident, but by necessity" (Chomsky, 1975:29). These rules and principles specified by UG should rule out an infinite set of grammars that do not conform to these fundamental properties. UG specifies those aspects of rules and principles that are uniformly attained in language but underdetermined by evidence. In addition, a number of these principles are associated with parameters. Parameters specify dimensions of structural variation across all languages. The values of these parameters are fixed by

experience gained in the language learning process. Setting the parameters in one way or another will have a set of deductive consequences for the rest of the grammar. One such parameter is the head-initial/head-final parameter of X-bar theory (Stowell, 1981). Languages, in general, can be shown to differ with respect to the placement of a head (for example a noun in a noun phrase construction, and a verb in a verb phrase construction), in relation to its complements. In English, complements follow their heads such that we have noun-complement, verb-complement, etc. whereas in Japanese, complements precede their heads yielding complement-noun, complement-verb type structures. Setting the parameter in one way gets you English; setting the parameter in another way gets you Japanese.

In acquisition, the principles of UG initially constrain the range of possibilities logically allowed for language thereby restricting the possibilities for language learning. Setting the parameters of a language limits these possibilities even more.

### UG and L2 acquisition

UG as a theory of acquisition characterizes L1 learning and does not make explicit predictions about L2 acquisition. However, if principles of UG do in fact characterize a language faculty that is biologically determined and that is necessary for the acquisition of an L1, then it seems quite reasonable to assume that principles of UG also play a role in L2 acquisition. Operating on just this assumption, I have attempted to construct a model of L2 learning that is consistent with a UG formulation of language and language learning. That is, one that accounts for L2 acquisition in terms of principles and parameters isolated in the L1 acquisition process (Flynn 1981, 1983a,b, 1984, 1985, 1987a, 1987b; Flynn and Espinal, 1985).

In this parameter-setting model, L2 learners are argued to use principles of syntactic organization isolated in L1 acquisition in the construction of the L2 grammar. Where principles involve parameters, L2 learners from the early stages of acquisition recognize differences in the values of these parameters between the L1 and the L2. In the cases in which the L1 and the L2 values differ, L2 acquisition is disrupted as learners must and do assign new values to cohere with the L2 grammar. Where the L1 and the L2 match, L2 learners can use this value in the construction of the L2 grammar. That is to say, L2 learners will not duplicate structures already available to them from their L1s. If these hypotheses are correct, we would expect two distinct patterns of acquisition. In the first case, the pattern corresponds to an early acquisition stage in English in which the learner is working out the basic structural configuration of the L1. In the second case, in which the L1 and the L2 match

in head-direction, the developmental pattern should correspond to a later L1 stage of acquisition – one in which the learners have already established the basic structural configuration of the language and are now at a point at which they attempt to integrate this structure with the working out of the sentence level properties of the L2.

There are two important features of this model for L2 learning. First, L2 learners are claimed to use structural principles isolated in L1 acquisition in their construction of the L2 grammar. This aspect of the proposed model allows us to account for similarities between L1 and L2 acquisition that have been observed in the literature – a component of L2 learning captured by the Creative Construction (CC) model of Dulay and Burt (1974). Second, within this model, the L1 experience is important to the extent that it determines whether or not assignment of a new value for a structural parameter of language is necessary or not. That is, a match or mismatch in values of parameters associated with principles of UG determines whether or not L2 learners must assign a new value to principles to cohere with the L2. This aspect of the model allows us to account for the role of the L1 experience in L2 acquisition without invoking an astructural model of language transfer – an aspect of L2 learning captured by traditional Contrastive Analysis (CA) models of L2 acquisition (Fries, 1945; Lado, 1957).

### The directionality principle in L1 acquisition

Empirical evidence in support of this model derived from several studies that investigated the role of the directionality principle in the adult L2 acquisition of English anaphora. This principle of directionality has been found to significantly characterize L1 acquisition. Evidence strongly suggests that young children are sensitive to their L1's structural configuration as determined by the head-initial/head-final parameter. For example, when young children learning English as their L1 produce subordinate clauses, they consistently place these clauses at the end of their main clause (Clark and Clark, 1977). It has been subsequently argued that children use this sensitivity to the head direction of their L1s to constrain their hypotheses about grammatical anaphora (see the discussion in Lust, 1986).<sup>2</sup> Children learning English show an early preference for forward over backward anaphora – a preference referred to as the forward directionality preference (see C. S. Chomsky, 1969; Goodluck, 1978, 1981; Lust, 1981, 1986; Lust, Solan, Flynn, Cross and Schuetz, 1986; Solan, 1977, 1978, 1983; Tavakolian, 1977). Children whose L1 is head-final prefer backward anaphora over forward anaphora. That is, in tests of elicited production, these children imitate sentences with backward anaphora correctly significantly more often than they do sentences with

forward anaphora. In addition, analyses of natural speech samples for these children also indicate significantly more backward anaphora structures than forward anaphora structures (for Japanese see Lust, Wakayama, Hiraide, Snyder, and Bergmann, 1982; for Chinese see Lust and Chien, 1984; for Sinhalese, see Lust, de Abrew and Gair, forthcoming). These data from several languages provide important evidence that children's sensitivities to the configuration of their L1s significantly constrain their early development of critical aspects of grammatical anaphora.

In summary, the head-initial/head-final parameter is linguistically significant in grammars of natural languages and an important principle in the L1 acquisition of anaphora.

### Summary of present investigations

In order to test the efficacy of the directionality principle in adult L2 acquisition, three groups of adults learning English as a second language (ESL) were tested: Spanish, Japanese and Chinese. These groups differ in terms of the match/mismatch in head direction to English, a head-initial language (see sentence 1). Spanish is head-initial, as shown in sentence 2 while Japanese and Chinese are head-final, as shown in sentences 3 and 4. In addition, Chinese was chosen not only because it is a head-final language but also because it matches English and Spanish in word order; it is SVO (Huang, 1982). Using Chinese speakers in this design allowed us to determine whether the effects isolated between the Spanish and Japanese speakers were due to differences in head direction alone or were principally due to differences in word order between the L1 and the L2. Results, as will be discussed below, confirm earlier reported findings with respect to the independence of word order and head direction (see an extended discussion in Flynn and Espinal, 1985).

#### English

- (1) (The child [who is eating rice]) is crying.

#### Spanish

- (2) (El niño [que come arroz]) llora.  
"The child who eats rice cries."

#### Japanese

- (3) ([Gohan-o tabete-iru] ko-ga) naite-imasu.  
"Rice-object-eating is child-subject-crying is."

#### Chinese

- (4) ([Na-ge zhen zai chi fan de] xiao hai zi) zai ku.  
That is eating rice-relative clause-little child is crying."

These speakers were tested in both their production and comprehension of complex sentences such as those exemplified in 5 and 6. These sentences differed in terms of pre- and post-posing of an adverbial subordinate clause,

post-posed in 5, and pre-posed in 6. In addition, one half of the sentences involved a pronoun in *subject* position of the subordinate clause and one half did not involve any anaphor.<sup>3</sup>

The lexical items used in all the stimulus sentences in all tests were randomly chosen from a single list. In addition, attempts were made to keep all sentences pragmatically neutral in order that their meaning could not be astructurally determined.

- (5) a The boss informed the owner when the worker entered the office.  
b The man answered the boss when he installed the television.  
(6) a When the actor finished the book, the woman called the professor.  
b When he delivered the message, the actor questioned the lawyer.

Results of the elicited imitation test with these three groups of learners revealed two important findings. Firstly, results for the Spanish speakers (L1 = L2 in head direction) indicated a significant preference for sentences such as in 5b in which the antecedent preceded the pronoun. Results of amount correct demonstrated that these sentences were significantly easier to imitate than sentences such as in 6b in which the pronoun preceded the antecedent. The nature of the errors also supported this finding. For example, there were significantly more anaphora errors made on sentences with backwards anaphora than on sentences with forward anaphora. Sentences in 5a and 6a, without anaphora, did not show any significant differences in imitation, either overall or at any level. The learners imitated these sentences with equal ease.

Secondly, as hypothesized, the patterns for the Japanese and the Chinese speakers (L1 ≠ L2 in head direction) did not match the Spanish L2 learners. Specifically, there was no preference in imitation of sentences in 5b or 6b with either forward or backward anaphora. However, at the advanced level, Chinese and Japanese speakers indicated a preference for sentences which did not involve any pronoun anaphora but which did involve post-posed clauses. Japanese and Chinese speakers found sentences in 5a to be significantly easier to imitate than sentences in 6a. These results suggested that the Japanese and Chinese speakers did not simply perform worse than the Spanish speakers because of a mismatch in the head direction between the L1 and the L2 (Contrastive Analysis could have predicted this), but rather, that the Japanese and Chinese learners were attempting to organize the L2 around the head-initial configuration of English. At the advanced level, these results strongly suggest that these speakers had assigned a new value to the head-initial parameter in order that it match the L2 value. The preference for these post-posed sentence structures indicated that the Japanese and Chinese speakers were now attempting to construct the L2 grammar around the reset value of this head parameter. The nature of the errors for these two language

groups additionally isolated head direction as a source of difficulty for the L2 learners and strongly suggested that L2 learners were sensitive to the head-initial structure of English.

From this initial set of results and others, I have argued for the relevance of a parameter setting model of UG and for the psychological reality of the specific principle investigated, the head-initial/head-final parameter and for its role in the directionality principle in L2 learning.

### Focus of this paper

Given these results, a number of interesting predictions follow. For example, if sensitivity to the head-direction configuration is a general principle of acquisition, then one would expect to see its effects across several different types of constructions which involve head-complement configurations. Thus, in this paper I have extended this original work to investigate the role of the head-direction parameter in the acquisition of restrictive relative clauses (RRCs) in English. RRCs, in contrast to the original sentence structures tested, involve bound variables and the embedding of a subordinate clause under an NP (noun phrase) rather than an S (sentence), as with adjunct clauses. If the head-direction principle is general and characterizes acquisition in general, and if my claims about the L2 acquisition are correct, then we would expect, in a test with the same three groups of ESL learners, significant differences to emerge between the case in which the L1 and L2 match in head-direction (Spanish speakers learning English), and the case in which they do not (Japanese and Chinese speakers learning English).

### Experimental design

The essential design of these studies tested the same three groups of adults learning English as a second language (Spanish, Japanese, and Chinese speakers) in their elicited production of four types of RRCs.

In the elicited production task, a learner is presented with a randomized set of sentence batteries. The experimenter gives orally, one at a time, a sentence from these batteries to the learner, who is then asked to repeat each sentence as presented. The basic assumption underlying the use of this task is that the active repetition of a stimulus sentence reflects input of the sentence to the learner's comprehension and productive systems, and the grammatical structure of the stimulus sentence is relevant to this processing. (For an extended discussion see Flynn, 1987a; Lust, Chin and Flynn, 1988.)

The four sentence types tested are shown in sentences 7-10. The sentences in 7 involved S (subject)/S (subject) relatives; the sentences in 8 involved

Table 7.1. *English as a second language proficiency level placement scores* (score range 0-50)

n = number of subjects tested  
M = mean score.

Group	Low		Mid		High		Overall	
	n	M	n	M	n	M	n	M
Spanish	16	17.9	21	31.3	14	41.7	51	30.3
Japanese	7	20.3	25	30.8	21	42.5	53	31.2
Chinese	11	14.3	20	31.0	29	43.8	60	29.7
Overall	34	17.5	66	31.0	64	42.7	164	30.4

S/O (object) relatives; the sentences in 9 involved O/S relatives, and the sentences in 10 involved O/O relatives.<sup>4</sup> Each learner was presented with three tokens of each stimulus item. These sentences were administered in random order to each speaker for repetition.

#### Samples of stimulus sentences

- S/S  
(7) The student who called the gentleman answered the policeman.  
S/O  
(8) The policeman who the student called greeted the businessman.  
O/S  
(9) The boss introduced the gentleman who questioned the lawyer.  
O/O  
(10) The diplomat questioned the gentleman who the student called.

Learners' knowledge of the lexical items used in the stimulus sentences was controlled. Prior to testing, each learner was given a bilingual list of all the words that were used in the stimulus sentences. That is to say, each speaker had a list of the words used in the stimulus sentences written in both their L1 (Spanish, Chinese, or Japanese) and the target L2 (English). Testing did not begin until each learner had demonstrated 100 percent understanding of the lexical items in English.

In addition, as in previous studies, all speakers were placed into one of three levels of English as a second language (ESL) ability, as established by a standardized ESL test, The Placement Test from the University of Michigan as shown in Table 7.1.<sup>5</sup>

### Predictions for study

From the general hypotheses formulated concerning the role of the head-direction parameter in adult L2 acquisition of RRCs, the following set of predictions were generated for this study:

1 Imitation of sentences 7–10 should be significantly facilitated for the Spanish speakers but disrupted for the Japanese and Chinese speakers even when the three groups are equalized in basic ESL level as measured by the standardized test.

We would expect this result because these RRC sentences all involve embedding which in turn represents some form of head-complementation structure. Since the Spanish speakers' L1 head-direction is initial, this head-complement organization in English follows their L1. This structural configuration should be available to these learners to consult in the development of the L2 grammar. On the other hand, the L1 for the Japanese and Chinese speakers' is head-final. As a result, I hypothesize that these speakers must revise principles of head-complementation when learning English. That is, Japanese and Chinese speakers must, as I argue, assign a new value to the head-direction parameter when acquiring English. Thus, the Japanese and Chinese speakers' acquisition of these sentences, as for adverbial clauses, should be significantly hindered by their need to assign a new value to this principle of organization for acquisition of this particular L2.

2 Errors made by the Spanish, Japanese and Chinese speakers should differ qualitatively. Japanese and Chinese learners should show critical difficulty with head-complement relations in this complex sentence formation. Spanish speakers should show less difficulty with this aspect of these structures.

3 If sensitivity to head direction is a general principle of acquisition, we should see evidence that these learners are working out the head-initial properties of English. Errors should be consistent with those found with children at early stages of the L1 acquisition of English.

### Results

The results confirm my predictions. First, there were important overall differences between the Spanish and Japanese and Spanish and Chinese results but not between the Japanese and Chinese speakers in their production of each of the relative clause structures tested. These results hold even though these speakers were all equalized in ESL level.

Results summarized in Tables 7.2 to 7.5 show that the Spanish speakers imitated the sentence types tested significantly more successfully than the Japanese or Chinese speakers. The means for successful imitation for each group are shown in Table 7.2.<sup>6</sup>

Thus, the first prediction, facilitation in production of English embedding under an NP by ESL learners with a head-initial language and disruption of this production by ESL learners with a head-final language, was, in general confirmed.

Table 7.2. Mean amount correct for each developmental level  
(Score range 0–3)

Language Group	SS	SO	OS	OO	Overall
<i>Spanish</i>					
Low	.63	.69	.38	.75	.61
Mid	2.19	1.33	1.00	1.76	1.57
High	2.57	1.93	1.50	2.20	2.05
Overall	1.80	1.32	.96	1.51	1.40
<i>Japanese</i>					
Low	.14	.00	.29	.14	.14
Mid	.64	.16	.20	.12	.28
High	1.28	.48	.90	.67	.83
Overall	.69	.21	.46	.31	.41
<i>Chinese</i>					
Low	.00	.09	.09	.09	.07
Mid	.55	.60	.55	.65	.59
High	1.27	1.66	1.14	1.69	1.44
Overall	.61	.78	.59	.81	.70

SS: Subject-Subject relatives

SO: Subject-Object relatives

OS: Object-Subject relatives

OO: Object-Object relatives

Table 7.3. Lexical errors

% of error (% of response)

Language group	Spanish	Japanese	Chinese
Low	23% (18%)	3% (2%)	5% (5%)
Mid	31% (15%)	11% (10%)	16% (13%)
High	47% (15%)	23% (17%)	30% (15%)
Overall	34% (16%)	12% (10%)	17% (11%)

The second prediction was also confirmed. Analysis of the errors confirmed a qualitative difference in the nature of the errors made by the two groups.

First of all, the errors that differentiated the three groups of ESL learners and accounted for the exceptional difficulty in the Japanese and Chinese groups were not lexical errors. In spite of the fact that the lexicons of Spanish and English are much more similar than for English, Japanese and Chinese, a greater number of lexical errors were made by Spanish speakers than by Japanese and Chinese speakers. This is shown in Table 7.3. An example of this sort of error is shown in 11.

- (11) Stimulus: The policeman questioned the man who carried the baby.  
Response: The *gentleman* questioned the man who carried the baby.

Table 7.4. *Conversion to coordination*  
% of two clause errors

Language group	Spanish	Japanese	Chinese
Low	20%	29%	16%
Mid	6%	13%	12%
High	3%	9%	7%
Overall	10%	17%	12%

Table 7.5. *One clause repetitions*  
% of error (% of response)

Language group	Spanish	Japanese	Chinese
Low	30% (24%)	83% (79%)	66% (65%)
Mid	31% (14%)	45% (41%)	32% (26%)
High	20% (7%)	23% (18%)	25% (13%)
Overall	28% (15%)	43% (37%)	38% (27%)

In addition, errors which differentiated the two sets of learners and accounted for the lower success rate in the Japanese and Chinese speakers were primarily structural errors. For example, there are significantly more one clause repetitions for the Japanese and Chinese speakers than for the Spanish speakers. This is shown in Table 7.4 and exemplified in 12.

- (12) Stimulus: The policeman questioned the man who carried the baby.  
Response: a The policeman questioned the man.  
Or: b Who carried the baby.

Also, of the two clause structural errors, there was a greater conversion of these sentence structures to coordinate sentence structures for the Japanese and Chinese speakers at the intermediate and advanced levels (where control of the two clause structure is evident) than for the Spanish speakers. This is shown in Table 7.5. Examples of this error are shown in 13.<sup>7</sup>

- (13) Stimulus: The policeman questioned the man who carried the baby.  
Response: a The policeman questioned the man and carried the baby.  
b The policeman questioned the man and *the policeman* carried the baby.

A closer examination of the types of coordinate conversions made by the Japanese and Chinese speakers indicate that they all involved redundancy in the *subject*. For example, the RRCs were converted to coordinate sentences in which a redundant subject had been reduced as in 13a or to a coordinate sentence structure in which *subject* deletion would be possible. This is shown

in 13b. This redundancy reduction is all in a forward direction. That is to say, the controller antecedes the deletion site. This pattern coheres with what young children learning English will do in early acquisition of English syntax (Lust, 1981) thus confirming our third prediction specified above. This conversion is especially noteworthy in that in order to do this, the meaning of the original sentence was changed, thus suggesting the primacy of structure over semantics in computing these sentences. In addition, these patterns exemplified by the Japanese and Chinese speakers correspond to English developmental patterns. Moreover, they suggest that these two groups of speakers are attempting to work out the properties of English and are not simply translating from their L1s. If they were simply matching the L1 to the L2, we would have expected patterns which matched L1 acquisition of these structures. That is, we would have expected the Japanese and Chinese speakers to convert the RRCs to coordinate sentence structures in which redundancy reduction goes backwards, i.e. deletion site to precede the controller (see discussion in Lust and Mangione, 1983).

Other forms of error also confirm a qualitative difference in the nature of the imitation between the head-initial speakers and the head-final speakers. The examples of imitation shown in sentences 14–16 indicate that the Japanese and Chinese speakers had particular difficulty establishing a head-complement and a head-anaphor relation which is required by the relative.

- (14) Stimulus: The policeman questioned the man who carried the baby.  
Japanese response: Who question the man who question the baby.  
(15) Spanish response: The policeman questioning the man who carried the baby.  
(16) Stimulus: The lawyer who criticized the worker called the policeman.  
Chinese response: The lawyer who criticized the woman the lawyer called the policeman.

Consider the Japanese response in 14: Who question the man who question the baby. This reflects a structure that is not a head-complement structure but a series of juxtaposed questions. On the other hand, the Spanish error shown in 15 still involves a head-complement structure, the man who carried the baby, but errs in misrepresenting the tense of the main clause. In 16, the Chinese response does involve a head-complement structure, the lawyer who criticized the woman, but this complex NP is not embedded in the main clause; it is merely juxtaposed to another full sentence. This again suggests specific difficulty on the part of the Chinese ESL learner with the head-complementation structure, i.e. the embedding of English syntax.



### Conclusions and discussion

The results summarized thus emerge in both L1 and L2 acquisition. How can we understand them? Given the controls exercised in the experimental studies, the results cannot be explained in terms of a lack of knowledge of the lexicon, task, or different ESL abilities.

We have basically three sets of learners at the same level of English ability yet two distinct patterns of acquisition emerge. At the most general level, these results suggest that adult L2 learners, like child L1 learners, are constrained in their mapping from the primary language data to the adult grammar. At a more specific level, these results suggest that adults are sensitive to differences in head-direction configurations between the L1 and the L2 and are constrained by a comparable set of linguistic principles observed in L1 learning in the acquisition of these structures. Where there is a match in parametric values for head-direction between the L1 and the L2, acquisition is facilitated; such a finding suggests that there is no need to assign a new value to the parameter set to match the L1 grammar. Where there isn't a match, a new value must be assigned to the parameter in question.

These data, along with others referred to in this chapter, provide important additional support for the parameter-setting model proposed by Flynn (1987a). This model, as briefly outlined above, allows one to account for both the role of the L1 experience in L2 acquisition and the role of principles independent of this experience. In this paper I have shown how Spanish, Japanese and Chinese speakers use the principle of head-direction isolated in L1 acquisition in adult L2 acquisition. I have also demonstrated the role of the L1 experience in this model.

In terms of system interaction in bilinguals, there are several ways in which these findings are relevant. First, these results isolate an important principle necessary to the acquisition of the L1 as well as the L2. This finding alone suggests that in the simultaneous acquisition of two languages we would expect to find that learners at early stages of acquisition establish the basic structural configuration as determined by the head-initial/head-final parameter for the languages they are learning. Second, given the two distinct patterns of acquisition exemplified in this paper, which I argue suggest that learners do not replicate structures where values of parameters match, we might also expect a similar process to hold in the simultaneous acquisition of two languages. That is, we might expect two distinct patterns of acquisition in the bilingual situation, one in which the two first languages matched in head-direction and one in which they did not. In the case in which they matched, we would expect that once the parameter is set for one language, it is also set for the second language. Problems for the learner in this case would

have to do with keeping the lexicons distinct for each of these two languages. In the second case, learners would have to establish two distinct grammatical systems as well as two distinct lexical systems. That is to say (in contrast to the case in which the two languages' parameters match), once the value of a parameter is set for one language, it is not automatically set for the other language to be learned. In this case we might expect a slower rate of progress in acquisition for both languages when compared to the case in which both of the languages to be learned matched in parametric values. While these claims are highly speculative, they are empirically testable. Their confirmation could demonstrate one important way in which the study of L1 acquisition, adult L2 acquisition and simultaneous bilingual acquisition can be brought together.

### Notes

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- 2 Lust argues that children are sensitive to the Principal Branching Direction of their L1s. For a discussion of the correspondence between Principal Branching Direction and the head-initial/head-final parameter, see Flynn, 1987a; Flynn and Espinal, 1985.
- 3 In addition, all speakers were tested on adverbial adjunct clauses that involved null anaphors in *subject* position and on sentences that involved pre-posed clauses and a pronoun anaphor in *subject* position of the subordinate clause. For a complete discussion see Flynn, 1987a.
- 4 The first grammatical position refers to the grammatical function of the relativized NP in the main clause. The second grammatical position refers to the grammatical function of the NP in the subordinate clause.
- 5 The listening comprehension and the grammar sections of this test were used for placement (score range 0-50). See Flynn, 1987a for a detailed discussion of the derivation of these scores.
- 6 For the Spanish speakers there is an interaction of type that I will not pursue in this paper. I will, thus, summarize the four types of RRCs tested.
- 7 One reviewer suggested that the errors made by the Japanese and Chinese speakers might indicate lexical rather than structural problems with these sentences. If this were the case, we would have expected the errors to be random, i.e., to occur at many different places in the sentences as in the case with the Spanish speakers and not to emerge at just those points in the grammar that a head and a complement are instantiated.

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