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Volume 4

Fred R. Eckman (ed.)

Confluence

CONFLUENCE
LINGUISTICS, L2 ACQUISITION
AND SPEECH PATHOLOGY

edited by

FRED R. ECKMAN
University of Wisconsin, Milwaukee

JOHN BENJAMINS PUBLISHING COMPANY
AMSTERDAM/PHILADELPHIA

1993

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Interactions between L2 Acquisition and Linguistic Theory

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Introduction

This paper focuses both on the implications of linguistic theory for second language (L2) learning and the implications of L2 learning for linguistic theory. Development of a full understanding of the L2 learning process and of an explanatory theory of linguistics are intimately related. If linguistic theory is to characterize how language learning is possible in the human organism, then it must make reference to L2 learning. Traditionally, this language learning process has often been ignored by theoretical linguistics (although see recent discussion in Chomsky 1988a,b); this has resulted in the development of a theory of language and language learning which, in spite of its claims, is non-explanatory for the language learning process in general.²

At the same time, if a full understanding of second language learning is to be attained, then this must take place within a framework that makes reference to the abstract generalizations provided by theoretical linguistics. Failure to do so could result in the development of theories of L2 acquisition that themselves will prove non-explanatory and which will keep the field forever outside central domains of theoretical linguistics and related areas of cognitive science. It will also lead to the development of non-unified theories of language acquisition in general.

Within recent years significant advances have been made in theoretical linguistics, especially with regard to the theory of principles and parameters within a theory of Universal Grammar (UG); important advances have also been made in the study of the L2 learning process. We are, thus, now in a position to investigate and attempt to understand the relationship between

these two domains in a more meaningful manner. More precisely, we can now examine to what extent theoretical linguistics can inform the study of adult L2 acquisition and how evidence gleaned from this study can constrain theories of language and the mind.

Focus of this paper

In this paper, I argue that there exists a very direct and important relationship between linguistic theory, specifically a theory of UG, and adult L2 learning. Specifically, in spite of the differences that we know to exist between the adult L2 learner and the child L1 learner, namely advanced cognitive development, and knowledge of at least one language, the adult solves certain aspects of the language acquisition problem in a manner comparable to that for the child L1 learner. Specifically, the adult L2 acquisition process is constrained by a set of language principles isolated in L1 acquisition. This means that the adult is sensitive to many of the same dimensions of language organization that the child L1 learner is and that establishing these dimensions is necessary in terms of working out other aspects of the new target grammar. These dimensions of language grammar are given to us by a theory of UG and they are not limited by L1 instantiations of UG alone.³

Thus, in this paper I will argue, consistent with a theory of UG that the basic biologically driven foundations for language learning observed in child L1 acquisition also hold in adult L2 learning. This means that UG as a theory of language significantly constrains L2 learning. I will also argue that the study of L2 learning can significantly constrain the formation of formal theories of language.⁴

Background

Universal Grammar

The most explicit theory of the human competence for language and its acquisition has been proposed by Chomsky. As suggested in (1), this theory of UG attempts to discover and define the fundamental principles and parameters of all possible natural languages. Principles determine proper-

ties of language common to all languages; parameters specify a finite number of principled ways languages differ from each other.

As a theory of the human mind, UG determines what is biologically programmed for language in the child at birth. As such, it represents a formalization of the "language faculty" as an identifiable system of the mind/brain (Chomsky 1988c).

(1) Universal Grammar and the Initial State:

The initial state of the language faculty consists of a collection of subsystems, or modules as they are called, each of which is based on certain very general principles. Each of these principles admits of a certain very limited possibility of variation. We may think of the system as a complex network, associated with a switch box that contains a finite number of switches. The network is invariant, but each switch can be in one of two positions, on or off. Unless the switches are set, nothing happens. But when the switches are set in one of the permissible ways, the system functions, yielding the entire array of interpretations for linguistic expressions. A slight change in switch settings can yield complex and varied phenomenal consequences as its effects filter through the network...To acquire a language, the child's mind must determine how the switches are set.... (Chomsky, 1988c:68).

Research within a UG paradigm attempts to discover the principles and parameters which capture the essential properties of all existing and possible natural languages. Although, *apriori* there might be an infinite number of different rule systems possible for a natural language, this work seeks to discover a finite set of principles and parameters which can characterize all possible language variation.

The principles and parameters theory proposes a very strong theory of L1 acquisition. As we have seen, the child is innately or biologically programmed to attend to certain aspects of possible language variation in the language data to which she is exposed, i.e., to certain dimensions of language variation, viz., a finite set of parameters. She sets the value of these dimensions of language organization when she is exposed to the relevant language data, and on the basis of doing so, a number of different facts of language organization can be derived deductively.

To briefly summarize, the essential claim of the theory of UG is that it constrains the language learner's hypotheses about which dimensions of language variation are significant in possible grammars for a language. It constrains these hypotheses by providing restricted, preferably binary, possible values for dimensions of variation, and as a result of choosing a particular value, UG provides multiple deductive consequences for grammar

construction. Note that this theory says nothing about proficiency levels to be attained, a point which will be returned to later in this paper.

Two general ways to conceptualize a theory of UG for adult L2 acquisition

Given UG as an account of at least the L1 process, there are several ways in which one might want to consider the role of this theory in the adult L2 acquisition process. I will consider two current proposals here (See Flynn & Manuel, 1991; Flynn, Martohardjono & O'Neil, in preparation, for an extended discussion of other possibilities); these two possibilities differ both theoretically and empirically.

Possibility one: Fixed UG

Under the first approach, which will be called a **FIXED UG**, UG plays little or no role in the adult L2 acquisition process. Within this context, while UG in its entirety may inform and constrain child L1 acquisition, it is unavailable to the adult in this form. That is, while the child at the initial state may have available to her the entire set of options provided by a theory of UG, the adult L2 learner will either not have any of these options or only a very limited set available. Consider two representative scenarios: Schachter (1988, 1990) and Clahsen and Muysken (1989). In the case of Schachter, as outlined in 2, if some instantiation of a parameter is necessary for the acquisition of a new target L2 and it is not incorporated in the learner's L1 (i.e., not chosen), then this value will not be available to the adult.⁵ With respect to UG, if the adult L2 learner only has available to her an L1 instantiated UG, then this suggests that the adult L2 acquisition is not constrained by UG in the same manner as is child L1 acquisition.

(2) Window of Opportunity Hypothesis (Schachter 1988):

If there occur windows of opportunity associated with the maturation of the principles of UG, and if exposure to the second language does not occur until all such opportunities have passed, then all that remains as part of the knowledge state of an adult native speaker of a language is a language-specific instantiation of UG, that of the first language. UG in its entirety will not be available as a knowledge source for the adult acquisition of a second language. **Only a language-specific instantiation of it will**

be (Schachter, 1988:13). (Emphasis mine) If, however, it turns out that in the acquisition of the target some instantiation of principle P is necessary and P is not incorporated into the learner's L1, the learner will have no language-internal knowledge to guide him/her in the development of P. Therefore, completeness with regard to the acquisition of the target language will not be possible (13-14).

As shown in (3), Clahsen and Muysken (1989) similarly argue that only an L1 instantiated UG is available to the adult L2 learner.

(3) Clahsen and Muysken's Position (1989):

According to our view, the observed differences between L1 and L2 learning can be explained by assuming that child L1 acquisition falls under the parameter theory of language development, whereas the acquisition strategies used by adults in L2 development may be defined in terms of principles of information processing and general problem solving (1989:23). The basic difference, in our view, between child and adult language development is that children have direct access to UG, whereas adults only have access to UG as it is mediated through their mature L1 grammar. Thus, if German- or French-speaking adults are asked to give a grammaticality judgement of an English test sentence, **they can only fall back on UG principles in so far as these have instantiations in the speakers' own language** (1989: 26). (Emphasis mine) While both Schachter's and Clahsen and Muysken's approaches appeal to a theory of UG, they do so in a manner that focusses on UG outcomes based on the L1 acquisition process alone; the essential language faculty hypothesized for L1 acquisition is non-operative in the same form for the adult L2 learner.

Within these perspectives, UG as it is available to a child L1 learner does not constrain the adult L2 learner's hypotheses by providing restricted binary options about which dimensions of language are significant in possible grammars. These choices are restricted by UG only in the sense that the L1 has chosen certain UG options and not others. The primitives within this system are not really principles and parameters of UG but principles and parameters of a particular L1 grammar. Thus, by definition within this approach, L2 grammar construction will differ significantly from L1 grammar construction.

Possibility two: Dynamic UG

A second alternative perspective, which is very different from those considered above, takes as primitives all the principles and parameters delineated

by a theory of UG in the L2 acquisition process. In general, such a position claims essentially that UG rather than the learner's L1 restricts the options available to the adult L2 learner. Within this framework, a parameter-setting model can be applied to the adult L2 acquisition in that, as in child L1 acquisition, principles and parameters of UG constrain the language learner's hypotheses about which dimensions of language variation are significant in possible grammars for language. Recall that UG, as outlined in (1), constrains these hypotheses by providing restricted (preferably binary) possible values for these dimensions of variation, and it provides multiple deductive consequences for grammar construction. Within this context, in contrast to Schachter's and Clahsen & Muysken's positions, the adult L2 learner is able to assign new values to parameters where the L1 and the L2 do not match. And, they do so in a manner evidenced in child L1 acquisition.

Initial development of this approach builds upon two already observed phenomena in the literature (see discussion in Flynn 1983; 1987): 1) Developmentally, many observed patterns of acquisition in adult L2 acquisition correspond to those chronicled for child L1 acquisition and, 2) the acquisition of a new target language is not primarily driven by the properties of the L1 grammar.

This approach incorporates the role of the L1 in the adult L2 acquisition process although in a manner that differs in certain critical ways from that envisaged within the FIXED approach. The DYNAMIC approach acknowledges that the adult L2 learner does not start with a clean slate i.e., the learner does not start at an initial state zero (S_0) with all parameters unset. It also argues that UG in its entirety is still available to the adult in contrast to the FIXED approach. UG continues to provide the adult with the full range of restricted binary options about dimensions of language variation in all possible languages, not just about those in the learner's L1. UG does not have a critical period wherein after a certain period of time it becomes unavailable or is altered in some way in the adult L2 acquisition process. The DYNAMIC position argues that the learner is able to assign new values to parameters where they differ between the L1 and the L2. And, the L2 learner accomplishes this in a manner comparable to that observed in child L1 acquisition. However, where the L1 and L2 match in parametric values, the adult learner can access this value and use it to guide her in the acquisition of the new target language. That is, there is no duplication of structure with respect to parametric values. In this case, learners

do not assign the same value twice to a parameter as there is no need to do so. In the case in which the L1 and L2 differ in parametric values, the learner must and does assign a new value to the parameter. While in both cases, the developmental trajectory is sanctioned by a theory of UG, the two patterns may differ. Where the L1 and L2 match in parameter settings, acquisition is "facilitated;" where they do not match, acquisition is "disrupted" when compared to the case in which the L1 and L2 match (see discussion in Flynn 1987; Flynn 1988a).

Such a model does not deny that ostensible differences exist between child L1 and adult L2 acquisition. However, the DYNAMIC approach does not assume UG to be a proficiency model as is often argued (e.g., Bley-Vroman 1990). That is, the principal role of UG is to constrain the learner's hypothesis space. Explanations of child L1 and adult L2 acquisition differences need to be explained in terms of the complex interactions of the biologically endowed faculty for language and other extra-linguistic factors as argued elsewhere (Flynn and Manuel 1991; Flynn and Martohardjono 1990, 1991).

In short, the DYNAMIC approach assumes that the adult L2 learner, as the child L1 learner, constructs a grammar of the new target language constrained by principles and parameters of UG. Within this context, parameter-resetting or "new assignment" is possible.

General Empirical Predictions of the FIXED and DYNAMIC Models

Predictions for both the FIXED and DYNAMIC versions vary considerably: The FIXED model would predict no evidence of grammar construction in the manner observed in child L1 acquisition as all that is available to the adult L2 learner is an L1 instantiated UG along with more general problem solving strategies. Within this framework, rules that have already been learned in some sense are available to the learner but the ability to construct new rules under the constraint of a theory of UG is not. To accomplish this new learning, the learner would have to apply structure independent learning strategies to the acquisition of structures not licensed by a grammatical principle that matches in both the L1 and the L2. For example, a Japanese speaker would have to learn that English, in contrast to Japanese, is a head-initial language through some general problem solving strategy — however this might be accomplished. In addition, we would

predict that errors made by learners acquiring new structures would also reflect a lack of the application of structure dependent hypotheses. Moreover, the acquisition of new structures would not match that for the L1 acquisition of these same forms. In short, L2 acquisition of structures not licensed by a grammatical principle that matches in both the L1 and the L2 should reflect some general problem solving strategy rather than being guided by principles and parameters of a theory of UG.

Alternatively, if the task of the adult L2 learner were to construct a theory of grammar for the new target language, and if the structures to be acquired were found to contrast with the grammar of the new target language, the DYNAMIC model would argue that the adult L2 learner could access those principles and parameters not available to her from the L1 in the construction of the L2 grammar. Within this context, the adult as does the child constructs a theory of grammar for the new target language under the constraint of principles and parameters of UG. In acquisition, we would expect to find evidence that L2 learners' hypotheses are structure dependent and that the nature of these constraints is provided by a theory of UG not by the L1 instantiations alone. Errors would systematically reflect the role of grammatical principles in acquisition and developmental patterns should correspond to those observed in child L1 acquisition in some fundamental way.

In order to test these general hypotheses, a sample set of empirical L2 acquisition data will be considered in order to see how explanatory each version is.

Experimental Data

In this section of the paper, a small set of results from two experimental studies will be summarized. To anticipate, results indicate that the adult L2 learner solves problems of complex sentence formation in a manner evidenced in L1 acquisition. At the same time, the results indicate a subtle interaction of the learner's L1 knowledge base in this acquisition process. These results are argued to provide important evidence for the direct role of a biologically specified program for language, essentially a parameter-setting model of UG in the adult L2 acquisition process.

Hypotheses

The general hypotheses to be tested in this paper are the following: If the adult L2 learner has no direct access to UG and only has access to an L1 instantiated UG as dictated by the FIXED approach, we would expect 1) no evidence to suggest that the learners are constructing a theory of grammar and, 2) errors made by the learners to reflect this lack of structural analysis.

If on the other hand, the adult L2 learner has direct access to UG and not just the L1 grammar, we might expect regardless of the match or mismatch of grammatical properties between the L1 and the L2 1) evidence that adult L2 learners are constructing a theory of grammar; specifically, the hypotheses entertained by the learners are constrained by a theory of UG and, 2) errors made by the learners would reflect structure dependent analyses.

Research Design

To test these general hypotheses, the L2 acquisition of English by adult Japanese speakers was empirically investigated. The basic facts about Japanese are well known as shown in 8. English is an SVO language and Japanese is an SOV language. In addition, English is a head-initial language — heads precede their complements and Japanese is a head-final language — complements precede their heads (Kuno, 1973).

(4) BASIC LINGUISTIC FACTS:

a. WORD ORDER:

ENGLISH: SVO

The doctor criticized the professor.

JAPANESE: SOV

Isha- wa kyoju- o hihanashita.

Doctor-topic professor-acc. criticized.

"The doctor criticized the professor".

b. HEAD-DIRECTION

ENGLISH: HEAD-INITIAL

The doctor who criticized the professor entered the room.

JAPANESE: HEAD-FINAL

Kyoju- o hihanshita isha- wa heya-ni haitta.
 Professor-acc. criticized doctor-topic room-loc entered
 "The doctor who criticized the professor entered the room".

Results to be reported here derive from two larger studies investigating several other first language groups at several stages of English development (Flynn 1987; Flynn, Lardiere, and Babyonyshev 1989). The focus of this paper is on the Japanese speakers alone.

Prior to the actual experimental testing, these learners were placed into an ESL proficiency level group based on their results from the listening comprehension and grammar test from the Placement Test from the University of Michigan. Results from each of these sub-tests were identical for each speaker allowing us to make an ESL placement based on the combined score.

The subjects used for Study 1 are shown in (5) as well as those from study 2.

(5) JAPANESE SUBJECTS:

STUDY 1 (Flynn 1987):

OVERALL ESL LEVEL PLACEMENT

	#	SCORE (0-50)
LOW	7	20.0
MID	25	31.0
HIGH	21	42.0

STUDY 2 (Flynn, Lardiere, and Babyonyshev 1989):

	#	SCORE (0-50)
LOW	1	15.0
MID	5	31.0
HIGH	20	44.0

This paper will focus on the results of the High ESL proficiency group from each study; although the results for all three groups will be reported for Study 1.⁶ Speakers from Test 1 were tested on the acquisition of complex subordinate sentence structures. Speakers from Test 2 were tested on coordinate sentence structures.⁷

Experimental Task

These learners were tested in their elicited imitation of sentences shown in (6). In an elicited imitation task, a learner is given a series of randomized sentences which she is then asked to repeat one by one after the experimenter. The basic assumption underlying such a task is that the learner must both comprehend and structurally analyze the sentence in order to provide an imitation. The actual utterance given by the learner thus provides us with some measure of the level of the learner's developing linguistic competence (see discussion in Flynn 1986; Lust, Chien and Flynn 1987).

Experimental Sentences

The learners were tested on essentially two types of sentences: coordinate and subordinate sentences. The coordinate sentence types tested involved both null and pronoun anaphors, a null anaphor in (6a) and a pronoun anaphor in (6b). In addition, both of these sentences involved forward anaphora structures. That is, the antecedent preceded the anaphors in both of the sentences. The subordinate sentences in (6c) and (10d) involved pre-posed adverbial subordinate clauses. In addition, the sentence in (6d) involved forward pronoun anaphora. Both of the pre-posed sentence structures, as already noted above, are very productive structures in Japanese.

(6) EXAMPLES OF STIMULUS SENTENCES: Coordinate Clauses:

a. TYPE I: Forward null anaphora

The doctor criticized the professor and entered the room.

b. TYPE II: Forward pronoun anaphora

The boss informed the lawyer and he studied the notebook.

Subordinate Clauses:

c. TYPE III: Pre-posed subordinate clause

When the man dropped the television the doctor called the child.

d. TYPE IV: Pre-posed subordinate clause/forward pronoun anaphora

When the professor opened the package, he answered the man.

The sentences were equalized in terms of number of syllables; they were also designed to be pragmatically neutral. In addition, all speakers

were familiar with the lexical items before testing as well as with the experimental tasks.

Results

Results on amount correct for these sentences are shown in (7) and (8).

(7) COORDINATE CLAUSE RESULTS: (SENTENCES 6A AND B)

MEAN AMOUNT CORRECT
(SCORE RANGE: 0-3)

	TYPE I: NULL	TYPE II: PRONOUN
HIGH	.55	.65

(8) SUBORDINATE CLAUSES:(SENTENCES 6C AND D) MEAN AMOUNT CORRECT (SCORE RANGE 0-3)

	TYPE III: NO ANAPHORA	TYPE IV: PRONOUN
LOW	.00	.00
MID	.24	.16
HIGH	.38	.95
OVERALL	.21	.37

Subsequent analyses of the errors made by the speakers in imitation of these sentences indicate the speakers converted coordinate sentences in (6) to subordinate structures. The per cent of this error is shown in (9). Examples are given in (10). Many of these conversions, especially for the null anaphora structures, were to post-posed infinitival clauses (Null: 43% of errors; Pronoun: 19% of errors). It is important to note that speakers converted coordinate sentences to subordinate sentences only when they involved anaphora. Results of other coordinate sentences not involving anaphora did not exemplify this high rate of conversion to subordination (see Flynn, Lardiere, and Babyonyshev 1989).

(9) ERROR ANALYSES CONVERSION OF COORDINATE SENTENCES TO SUBORDINATE SENTENCES % OF ALL ERRORS

	TYPE I: NULL	TYPE II: PRONOUN
HIGH	62%	53%

(10) EXAMPLES OF ERRORS:

- a. STIMULUS: The owner introduced the actor and prepared the breakfast.
RESPONSE: The owner introduced the actor to prepare the breakfast.
- b. STIMULUS: The student criticized the engineer and he dropped the plans.
RESPONSE: The student criticize the engineer to drop the plans.

In addition, the speakers converted the subordinate sentence structures (Types III and IV) to coordinate sentence structures with identical NPs in subject position to a high degree. It is important to note that the speakers convert sentences with pre-posed clauses and forward anaphora (Type IV sentences) to coordinate sentences much more than they do subordinate sentences that do not involve forward anaphora (Type III sentences). In fact this accounted for the highest single error category for these Type IV sentence structures. This is shown in (11). Examples of the errors are shown in (12).

(11) ERROR ANALYSES:

CONVERSION OF SUBORDINATE SENTENCES TO COORDINATE SENTENCES

% OF ALL ERRORS

	TYPE III: NO ANAPHORA	TYPE IV: PRONOUN
LOW	19%	2%
MID	33%	34%
HIGH	35%	45%
OVERALL	32%	27%

(12) EXAMPLES OF ERRORS:

- a. STIMULUS: When the worker called the owner when the engineer finished the plans.
RESPONSE: Worker called the owner and worker finished the plans.
- b. STIMULUS: When the doctor received the results, he called the gentleman.
RESPONSE: The doctor received the results and the doctor called the gentleman.

Results Considered within a FIXED Approach

Overall, in contrast to our predictions for the FIXED approach, we did not find evidence for the application of general problem solving strategies in the acquisition of the structures tested. In addition, the results of the error analyses given in 9-12 above are not predicted by such a model. First, the FIXED approach would have predicted errors to be astructural, perhaps primarily lexical consistent with the fact that the adult L2 learners may, for example, attempt to translate item by item from the L1 to the L2 or apply some other general inductive problem solving strategy. Second, such an approach does not predict the systematic conversion of coordinate structures to subordinate ones or the conversion of subordinate to coordinate structures. These results, as will be discussed in more detail below, suggest the development of a unified theory of grammar for English and the fact that L2 learners are sensitive to specific grammatical configurations. Under the FIXED approach, the learner would not entertain any general theory of grammar for the new target language. In short, predictions for the FIXED approach remain unsupported.

Results Considered within a DYNAMIC Approach

The results reported in this paper force us to abandon a FIXED approach as an explanatory model of the adult L2 acquisition process and to consider a DYNAMIC approach explanation for the results.

First, the DYNAMIC approach predicted evidence that adult L2 learners could access principles and parameters not available in the L1 grammar. Recall that Japanese is principally a head-final language and English is principally a head-initial language yet evidence emerged which strongly suggests the fact that adult Japanese speakers are able to assign a new parametric value to the head-direction parameter in the acquisition of English and are not forced to acquire head-initial structures through some other nonlinguistic means.

Second, the results, along with the error analyses, also indicated that the learners were constructing a theory of English grammar. The learners demonstrated distinct sensitivities to particular structural configurations. For example, the learners did not treat all of the sentence structures comparably. They did not make the same errors on all structures which would

have been predicted by a general problem solving approach to L2 acquisition. In the case at hand, the speakers distinguished between coordinate and subordinate structures; they also distinguished between sentences with no anaphora and those with anaphora, and they distinguished between null and pronoun anaphora. To summarize:

1. Empirical evidence that the adult learners are working out the grammar of English thus suggesting the continued role of UG in its entirety in the adult L2 acquisition process.
2. Results indicate the role of systematic, constrained hypotheses operative in the adult L2 acquisition process. This is evident when we consider the relationship evidenced in the data between coordination and subordination in the learner's hypotheses.

Thus, the DYNAMIC approach does provide us with the right set of predictions for the data reported here. Let us consider in more detail how such a model accounts for these data.

Detailed Account of the Data within a DYNAMIC Framework

More specifically, the DYNAMIC approach understands Japanese speakers' emerging grammars in terms of "resetting" of certain parametric values responsible for differences between the two languages within a theory of Universal Grammar.

First, I argue that the results reported here reflect the interdependence of L2 learners theories of anaphora and sentence configurations such as c-command — a complex structural relation that holds between constituents and one that plays an important role in a number of areas of syntax and semantics, namely in the proper description of anaphora relations.

Specifically, adult L2 learners develop theories of anaphora in close coherence with the preferred head-complement structure for the language they are learning — in this case, English as a head-initial language as shown in (4). L2 learners as do children learning L1s want and need to calibrate anaphora direction with the head-direction of the target language they are learning (see review in Lust 1986). To do this, they need such a structural configuration to help them set up their incipient hypotheses about anaphora as anaphora in the adult grammar crucially relies upon abstract structural configurations. In the case described in this paper, adult Japanese speakers

want sentences in English to reflect a head-initial configuration; that is, they want complements to follow their heads and they want the anaphora direction to be in a forward direction. They want the antecedents to precede the anaphors in accordance with the head-initial configuration of English.

Since Japanese is a head-final language, these learners must revise their hypotheses about head-complementation in order to cohere with the structural facts about English. The results isolated here provide important new evidence with respect to attempts to insuring an anaphoric interpretation that is structurally consistent with their emerging theories of the head-complement structure of English.

When coordinate structures involve forward anaphora as in 16a&b, the Japanese learners converted these sentences to post-posed subordinate infinitival structures in closer accord with the head-initial configuration of English. That is, the main clause serves as a head followed by a complement in accord with the head-initial structure of English. At the same time, the learners want the anaphora to be structurally bound. Thus, they convert these structures to control-like configurations as exemplified in the infinitival clauses. In so doing, L2 learners ensure establishing the correct dominance relations necessary to interpret the anaphora in these sentences.

At the same time, and here the argumentation becomes a bit more subtle, when subordinate sentences such as in 6c&d do not involve anaphora, and when they do not involve true complements but adjuncts such as adverbial subordinate clauses, and when this entire structural configuration does not match the head-initial configuration of English, although they do match Japanese extensionally, these learners must and do make the following changes in accord with their developing theory of English grammar. First, they convert these adjunct clauses to a coordinate sentence structure — one in which neither sentence is an adjunct to the other. Such a conversion seems to be a syntactically necessary operation prior to the learner's ability to deal with one clause later as a complement.

Second, these coordinate sentences also involve a primitive form of bound anaphora. That is, the learners give us two identical NPs in subject position of each clause. The second NP can be reduced which would result in an antecedent preceding a null anaphor, essentially a forward anaphora relation.

Results from sentence (6d) (pre-posed clause and forward pronoun anaphora) provide additional evidence that learner's hypotheses about

anaphora and head-complement configurations are tightly linked. When subordinate adjunct clauses involve forward anaphora and a structure that is in disaccord with the preferred head-complement structure for the L2 they are learning, learners also reduce these structures to coordinate sentences that involve forward anaphora. These results suggest that forward anaphora alone is not sufficient for these learners. They need forward anaphora in a true head-complement configuration in order to successfully process these sentences.

To conclude, results indicate a very complex picture for adult L2 acquisition, one that in many ways reflects deep deductive processes of learning evidenced in child L1 learning. Regardless of the L1 extensional facts available to a learner, if they do not cohere at deep levels of grammar construction with the L2, the learner will reconstruct a grammar of the new target language in accord with the underlying properties of the target L2 grammar. Within such a context, predictions made by FIXED type L2 acquisition theories will continue to fail to yield and capture the correct insights involved in the adult L2 acquisition process.

Within this context, linguistic theory plays a significant role for L2 acquisition. It specifies which dimensions of language variation learners will attend to and it provides the set of hypotheses learners will entertain about the target language grammar. It is important to notice what a theory of UG does not do, however; it does not explain lack of completeness or differences that emerge between children and adults in terms of attained proficiency. As discussed above, such explanations must derive from an understanding of the biologically endowed faculty for language in interaction with other domains of cognition (Flynn & Manuel, 1991; Flynn, Mártohardjono & O'Neil, in preparation).

L2 Acquisition as a Constraint on Linguistic Theory

Within this context, a DYNAMIC model of adult L2 acquisition can constrain a theory of grammar by providing evidence about which dimensions of language are subject to variation precisely because L2 learning involves experience and acquisition demands isolating anew those properties of the L2 grammar that might be in variation with the L1. In addition, as recently argued by Chomsky (1988a,b), studies of adult L2 acquisition are unique in that they inform linguistic theory concerning the nature of

end-states and steady-states. Essentially, adult L2 acquisition results challenge traditional formulations of steady states as static entities (Chomsky, 1988a,b).

L2 acquisition results also provide evidence for the distinction between variant and invariant principles and provide evidence with respect to the psychological reality of such a distinction. In addition, results of L2 acquisition contribute to a full elucidation of concepts concerning development especially with respect to such debates of continuity vs. maturation. Given the uniqueness of the adult with respect to advanced cognitive development and linguistic experience, the study of the adult L2 acquisition process can inform linguistic theory in ways not provided by the study of L1 acquisition alone.

Conclusion

To conclude, given the current rapid rate of progress in both linguistic theory and adult L2 acquisition, continued investigation will make more precise the exact nature of the interplay between these two domains and in this way contribute to the entire domain of cognitive science and elevate the study of L2 acquisition to the empirical and theoretical status it rightfully deserves.

Notes

1. The author wishes to thank the editor of this volume and the participants at the conference for their insightful comments, suggestions and questions concerning the issues raised in this paper. The author would also like to thank one anonymous reviewer for useful comments for revision.
2. While it might be logically possible that theoretical linguistics has little or nothing to say about L2 learning, *a priori* one cannot simply assume this position as is often done.
3. This does not rule out the subtle role of the L1 in L2 acquisition as we will see later in this paper.
4. In this paper, the term "second language learning" is meant to refer to both naturalistic L2 learning and classroom foreign language learning. Both enterprises are concerned with individuals who come to "know" or master a new target language. Thus, for the purposes of this paper, we will treat them synonymously (see related discussion in Rutherford 1987).

In addition, this paper is primarily concerned with the adult L2 learning process essentially because most recent investigations of L2 acquisition have focused on this population. While I would like to believe that the conclusions reached here with respect to adults also extend to child L2 learning, without more empirical evidence, generalizations of this form are premature.

5. Schachter's proposal actually consists of two contingent parts: one, the postulation of a critical period for parameter settings, and two, the nature of the acquisition process after the critical period stage. This paper focusses on the second part of Schachter's claims. For a more detailed discussion of part two, see Flynn and Manuel (1991) and Flynn, Martohardjono and O'Neil (in preparation) and Martohardjono and Gair (this volume).
6. The data from Study 2 for the Low and Mid proficiency groups, while matching the trends isolated for the High group is yet too scant to be reliably reported. An extended set of results with more speakers at these two levels will be reported in Flynn, Lardiere and Babyonshev (in preparation).
7. The profiles of the Japanese speakers in both Study 1 and 2 were comparable. For the purposes of this paper, speakers at the High level were from the same socio-economic backgrounds (all were graduate students or professionals); the number of years of ESL study matched, and most importantly, both groups were comparable in terms of their ESL proficiency levels as measured by the Michigan Test. This comparability between the two groups allows us to assume that each group tested is representative of their group. This in turn allows us to combine the results from the two studies.
8. This difference in the amount of conversion of the null and pronoun anaphor to infinitival sentence structures suggests that the speakers distinguish the two types of anaphors in these structures at some level. For a more extended discussion see Flynn, Lardiere and Babyonshev (1989).
9. The low percent of conversion to coordination at the Low level for Type IV sentences reflects the fact in contrast to the errors made on the Type III sentences that the speakers were unable to maintain the requisite two clause structure necessary for such an error to be tabulated. For an extended discussion of this result see Flynn and Manuel (1991).
10. More technically, we can understand c-command in the following way: "X c-commands Y iff the first branching node dominating X dominates Y, and X does not dominate Y, nor Y dominate X." For more detailed discussion see e.g. Chomsky (1986).
11. One anonymous reviewer argued that there is an alternative explanation for the results presented in this paper. However, the reviewer failed to develop such an explanation in any way. thus, in the face of no such counterproposal, I am unable to address the questions this reviewer might have had.

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