

## **2 English Language Acquisition by Speakers of Asian Languages**

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The specialist in second language acquisition and bilingualism must at the same time be a generalist. In understanding the process of becoming bilingual, the researcher must have a wide array of knowledge ranging from linguistics and cognitive psychology, on the one hand, to the theory and measurement of human diversity, on the other. The natural rhythm of research fads tends to emphasize certain aspects of the second language learner more than others at any particular point in time, but ultimately a theory of second language acquisition will be no less ambitious than a theory of culture, language, thought, individual differences, and the result of the interactions of all their factorial combinations. It boggles the mind to imagine what the end result of our research endeavor would look like.

Although this paper addresses, specifically, the acquisition of English by native speakers of various Asian languages, an understanding of some more general questions related to second language acquisition is a prerequisite to this endeavor. The questions that I have isolated for review are the following:

1. How do the structures of the native language and the target language constrain second language acquisition?
2. What cognitive variables account for the pattern of second language acquisition?
3. How does the interactional nature of language influence its acquisition?
4. Are there differences in second language acquisition at different ages, and if so, in what ways are they different?
5. How does bilingualism relate to individual differences in cognitive functioning?

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A most striking fact is the scarcity of empirical studies involving the Asian-American population; a review would fill no more than five pages. Thus, before even beginning this review, one conclusion to this paper is that there is not enough research on Asian-Americans. Aside from the practical benefits to be derived from such research, the theoretical enrichment to be derived through a comparative analysis of Asian second language acquisition with the more commonly studied Hispanic population is maximal, as these two groups differ in important respects.

### **HOW DO THE STRUCTURES OF THE NATIVE LANGUAGE AND THE TARGET LANGUAGE CONSTRAIN SECOND LANGUAGE ACQUISITION?**

The burst of enthusiasm for and the subsequent decline in popularity of the Derivational Theory of Complexity as a model of both adult language processing and child language development is well documented (e.g., Miller & McKean, 1964; Fodor & Garrett, 1966; Brown & Herrnstein, 1975). Most introductory courses in psycholinguistics perhaps mention the Derivational Theory of Complexity in passing, most likely as an example of how intelligent researchers were led down the garden path of transformational grammar. In my course on the psychology of language, I actually spend several weeks on the Derivational Theory of Complexity. There is, I think, a valuable lesson to be taught through mourning the death of the theory.

In modeling human behavior, one usually takes a position somewhere between a descriptive and a normative approach. In a typical normative approach, one takes a theory, generally developed outside the field of psychology, and tests whether human behavior might conform to the predicted parameters of the model. Edwards, Lindman, & Phillips (1965) used exactly this approach in studying human decision-making processes based on the normative Bayesian model. The virtue of a normative model, among others, is that it is subject to empirical disproof. It also provides a point of reference in evaluating human performance such that one might conclude, as Edwards et al. did, that humans are relatively conservative decision makers. A descriptive account of human behavior, as its name might suggest, attempts to build a model based on the actual observed processes. Tversky & Kahneman (1974), for example, have proposed a number of strategies used by people in decision making that reflect processing parameters. A descriptive account, although the individual strategies might be rejected, is not subject to empirical disproof as a whole. The danger, of course, is that descriptive model building can be undisciplined and wasteful. The Derivational Theory of Complexity was a normative model that predicted sentence complexity, and psychologists, who were until then using

metrics of sentence complexity such as length or word frequency, welcome the visitor. It gave a focus to the field. The fact that I lament the death of the Derivational Theory of Complexity is unrelated to the fact that transformational grammar appealed to me personally.

As a normative theory, Contrastive Analysis has had varying success in the study of second language acquisition. Like the Derivational Theory of Complexity, Contrastive Analysis came to be rejected as an adequate model of the entire process. And, like the Derivational Theory of Complexity, it served and continues to serve as a good reference point from which to begin empirical investigation. Those of us who enjoy testing models with specific predictions miss Contrastive Analysis, since there are at present no alternative models of comparable power and specificity.

I have reviewed elsewhere the literature on second language acquisition and the progression from contrastive analysis to current methods of analysis (Hakuta & Cancino, 1977; also McLaughlin, 1978). I will briefly review here the evidence for the relative contributions of the native language and the target language with respect to the areas of phonology, morphology/semantics, and syntax (see Glossary). Then, in a concluding section, I will argue that the present trend in data collection will lead to nothing more than a scoreboard of whether the native language or the target language is more important, and suggest one theoretical thrust that may integrate second language acquisition research with other endeavors in first language acquisition and linguistics.

### Phonology

It is the consensus of second language teachers that phonology is the level at which Contrastive Analysis enjoys the best predictive success. It is an area, however, where very little systematic research can be found. Most predictions in this area are quite specific. For example, Williams (1974) investigated the location of the voice onset time boundary for the English and Spanish voiced and unvoiced labials /b/ and /p/ among Puerto Rican children and adolescents learning English. She was able to demonstrate a gradual shift from the location of the Spanish boundary to the location of the English boundary in both the perception and production of the sound.

Miyakawa et al. (1975\*) were able to show that, while native English speaking adults perceive the /r/-/l/ distinction categorically, native speakers of Japanese cannot perceive this difference. Furthermore, they showed that the Japanese participants performed as well as the English subjects in perceiving a difference when the acoustic parameter th-

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\*Asterisks following publication dates indicate studies involving Asian-Americans.

distinguishes the two sounds was presented in isolation as a nonspeech sound, arguing that the phenomenon is speech-specific.

Studies such as these suggest that a detailed comparison of specific phonemes based on a contrastive table of various languages, such as that provided by the Los Angeles Public School System (n.d.), would yield interesting results.

There is, I think, an additional benefit to be derived from such phonological studies in constructing reliable measures of individual differences in second language development. The correlations between such a measure and other measures of social and individual differences would be revealing.

Although both of the above studies suggest a clear role for native language influence in the area of phonology, we should be cautious in making generalizations until further studies are conducted. In a study of syllable structure among Korean, Cantonese, and Portuguese adults learning English, Tarone (1976\*) demonstrated that, while a large number of errors were attributable to the native language syllable structure, a substantial number of errors were shared by the learners and could be attributable to a universal preference for the open (CV) syllable. Tarone's study, incidentally, was conducted with two speakers from each language group. It is a highly commendable study in both design and spirit, and the results need to be replicated and elaborated.

### **Morphology/Semantics**

Several studies have dealt with this topic, mostly stimulated by the reports in first language acquisition research of a relatively invariant order in the acquisition of various grammatical morphemes (see Glossary) (Brown, 1973; de Villiers & de Villiers, 1973). A prime question of interest to second language researchers has been whether second language learners show the same order of acquisition for these sets of morphemes (e.g., Dulay & Burt, 1973; 1974a,b\*; Hakuta, 1974\*; Krashen, Madden, & Bailey, 1975\*; Gillis, 1975\*; Rosansky, 1976; Cancino, 1976; Larsen-Freeman, 1975\*). The participants for these studies came from a variety of native language backgrounds, as well as age groups. A rough summary is that these studies did find a common order of development for these morphemes across the various learners, but that this order differed from that found in first language learners. There were also language-specific differences. For example, the five-year old Japanese girl I studied (Hakuta, 1974a\*) had difficulty with articles. This is consistent with a study by Fathman (1975\*), who administered a morphology test comparing Spanish and Korean children. Although Fathman interprets her data as yielding no difference between the

two groups of children in their relative difficulty ordering of the morphemes, a close inspection of the data shows a very large discrepancy in the children's production of articles, with Korean children performing poorly.

That studies of participants from such divergent backgrounds found a similar order of emergence or difficulty of the morphemes suggests that in the acquisition of morphology, especially as measured by the order in which they emerge, characteristics of the target language (in this case English) account for a large proportion of the variance. Native language, however, does seem to exert its force in specific morphemes, such as articles.

It appears that future research should attempt to answer two questions. First, why are certain structures easier to acquire than others, and second, why are specific structures difficult for learners from a particular language background? I think that a pursuit of a specific structure that presents particular difficulties to the learner of a given language background would be extremely worthwhile. For example, why do native speakers of most Asian languages have trouble with articles?

Incidentally, an interesting pattern of evidence emerges here. The difficulty with articles does not manifest itself across all contexts. Huebner (1978\*) reports that a native speaker of Hmong omitted articles only in the sentence-initial position. In a current study of Korean children learning English in New York City, Helen Kang and I have found that most omissions of articles occur in the sentence-initial position across several different types of tasks. Thus, there is no categorical difficulty with articles, but with articles in specific locations. It is possible, as Huebner concludes, that the difficulty with sentence-initial articles is a result of topic-prominent second language L<sub>2</sub> learners transferring the unmarked nature of topics. Intensive analysis of the variation in the use of a particular, high-frequency form appears more beneficial than considering the use of a large number of forms over all contexts.

### Syntax

It is surprising how few researchers have reported difficulty with word order among learners of English from non-subject-verb-object (SVO) languages. However, inquiry on other matters of syntax, such as interrogatives, complementizers, relative clauses, and passives, has yielded results similar to investigations with first language learners (e.g., Ervin Tripp, 1974; Gass & Ard, 1980; Ravem, 1968). In the linear arrangement of constituents, it appears that the difficulties concern the correspondence of the particular structures to the human information-processing parameters, a problem shared across all learners. Thus, a sentence such as "The pig that the cow licked kicked the horse" is more difficult than "The cow licked the pig that kicked the horse," regardless of the learner's background.

There are, however, some matters of syntax that seem specific to the native language of the learner. Spanish speakers have a tendency to use the preverbal negator *no*, a native language structure. Native speakers of Japanese (Hakuta, 1976\*; Gillis & Weber, 1976\*) do not show use of such structures, and the only anomaly (Milon, 1974\*) can be attributed to a child's exposure to a variety of English that uses such forms. However, Japanese speakers do not show evidence of their native language in English negation either. Although Japanese has post-verbal negation, none of the children in Milon's study produced utterances such as "He went-no to the store." Rather, their pattern of development of negation resembles that of first language learners of English.

Perhaps the most promising avenue of inquiry into acquisition of syntax among bilingual speakers is the choice of particular forms in expressing a particular preposition. There is some evidence that speakers vary their choice of forms depending on whether the structure is compatible with one in their native language. Schachter (1974), for example, has provided some convincing evidence of such avoidance by looking at relative-clause constructions in the English compositions of adult learners. Using contrastive analysis, Schachter predicted positive transfer of such constructions for one group (Spanish and Arabic), and negative transfer for the other (Japanese and Chinese). Surprisingly, the negative transfer group made fewer errors than the positive transfer group, which might suggest that there was no interference. This seemingly counter-intuitive result, however, can be accounted for by the simple fact that the group for which positive transfer was predicted produced twice as many relative clause constructions as the group for which negative transfer was predicted. The negative-transfer group made fewer errors because they were avoiding such construction. Recently, Kleinmann (1976) found that groups of adult Arabic and Spanish speakers learning English avoided producing a variety of constructions (passives, infinitive complements, direct-object pronouns, and present progressives) for which contrastive analysis predicted difficulties. I (Hakuta, 1976) compared relative clause constructions in the spontaneous speech of a child, Uguisu, with those of the child Marta in Cancino's study (1976) and found that, as predicted by contrastive analysis, Marta produced more relative clauses.

### **Focus on the Search for Psychologically Relevant Grammatical Categories**

The "game" of language acquisition research can be described as the search for an appropriate level of description of the learner's system of rules. The player can lose in at least two ways: either the forms produced by learners are not predicted by the description, or the description predicts occurrences

of forms never produced. At the level of word classes, for example, it would be inappropriate to describe a learner as having the form class called nouns if in fact he or she were only restricting it to concrete nouns, or the form class called verbs when only action-related verbs constituted the class. Similarly, at the level of word combinations, given an utterance *The boy swatted the fly*, we could describe it at any number of different levels:

1. [BOY] + [FLY]
2. [+HUMAN, +ANIMATE NOUN] + [+ACTION VERB] + [-HUMAN, +ANIMATE NOUN]
3. [AGENT] + [ACTION] + [PATIENT]
4. [SUBJECT] + [VERB] + [OBJECT]
5. [WORD] + [WORD] + [WORD]

Which of these levels should be chosen as the appropriate description is primarily an empirical question. Level (1) would fail if our learner produced the utterance *The man killed the frog*. The system is more productive than it claims. Level (2) fails given the utterance *The fly ate the saccharin*; (3) given the utterance *The fly received a swat*; and (4) if our learner showed evidence of *Swat the boy the fly* or *The boy the fly swat* being within his or her range of possible utterances. These are cases where the description is shown to be underdetermined by the data. The descriptive categories are too narrow. On the other hand, (5) would account for all three-word combinations in the language, but clearly it is too general and fails to capture the system's salient characteristics. Level (4) fails if only agents with actional verbs appeared in sentence-initial position, and utterances such as *The sirloin satisfied Peter*, would motivate the more general description in (4), were never produced. In such cases, the description is overdetermined by the data.

The reason for laboring this reasoning is to motivate the basic point of this section: Both first and second language acquisition research share the basic question of determining the primitives upon which the system is built. What is the appropriate scope of the linguistic categories upon which rules operate? How does the learner get there? Might the categories differ with respect to the native language of the L<sub>2</sub> learner?

One need not go through the entire exercise of demonstrating that the descriptions of adult language knowledge, the most elegant and parsimonious description of syntactic categories is indeed quite abstract and is best stated independently of semantic considerations. In English, the semantic distinction between process and state cuts across both verbs and

adjectives, and linguistic rules operate on the syntactic classes independent of the semantics involved. Witness pairs of sentences such as *Sam resembles Mary/Sam is similar to Mary* and *The dragon is kicking Martha/The dragon is being violent to Martha*. Similarly, while it is a statistical generalization that the subject of a sentence tends to be the agent of the verb, that is hardly always the case. The subject of a sentence appears to be independent of any particular semantic role. It is a puzzle how the learner enters this seemingly semantically obscure system.

Short of taking a radical nativistic view, there are several possible solutions to this problem. In one approach, the learner would begin by taking advantage of the correlation between syntactic and semantic categories; most subjects tend to be agents, most nouns things, most verbs actions, and so forth. Then at some point, there is a reorganization of the semantic categories into broader syntactic classes. This view, taken by Bowerman (1973) and de Villiers & de Villiers (1978) among others, is perhaps the closest to much of the data from early word combinations, yet in general the task of specifying how the reorganization might take place is open for future research.

Maratsos and Chalkley (in press) argue that the learner takes advantage of the fact that the privileges of occurrence of form classes are correlated across different syntactic constructions. Adjectives and verbs can be differentiated by taking note of the different syntactic contexts in which they occur. In addition, categories such as "subject" are seen as reifications of nouns that can enter into the semantic relationship expressed in the argument structure of different classes of verbs. Depending on the verb, the first noun-phrase (NP) argument can be agentive, experiencer, and so forth.

Second language acquisition research has largely ignored the basic question of how the learner enters the system. It has taken what I will call *the post-reorganizational view*. That is, the syntactic categories at the end state of the descriptions above are taken as given for the second language learner. Under the post-reorganizational view, the learner already has the syntactic categories, waiting for the second language input to be plugged into them and to form hypotheses as to how they interrelate into particular syntactic structures such as negation, interrogatives, and so forth. Questions concerning the nature of language transfer have been mainly directed at this latter level (see Hakuta & Cancino, 1977).

One reason why the post-reorganizational view has been so prevalent in L<sub>2</sub> research is that semantic constraints in the first language L<sub>1</sub> categories have been considered to be tied in with cognitive development. The view that cognitive development is not a consideration in L<sub>2</sub> acquisition is implicit in attempts to account for differences in the patterns of L<sub>1</sub> and L<sub>2</sub> learners on precisely these grounds. Dulay & Burt (1974b), for example, in



accounting for the different difficulty ordering for grammatical morphemes in first and second language learners, write: "It seems intuitive that children who are acquiring their first language have to deal with both semantic and syntactic information. However, six, seven, and eight-year old children learning a second language need not struggle with semantic concepts they have already acquired, such as concepts of immediate past, possession, or progressive action" (p. 74).

Excluding semantic considerations from an analysis of L<sub>2</sub> acquisition for cognitive reasons is simplistic. As Schlesinger (1974) points out, cognition does not equal the semantics of a language. The relationship is complex and interactive; the cognitive categories from which languages draw are not uniform across languages. For example, while many languages observe the distinction between alienable and inalienable possessions, English does not. Gender is another cognitive category that is expressed to widely varying degrees in different languages. While cognitive development may be a pacesetter for cognitive categories available to the learner, the semantics of each particular language is often specific to that language. Thus, in learning a second language, semantics is an important consideration insofar as the learner must decipher the clusters of cognitive categories from which the second language draws its semantic distinctions.

How might a second language learner go about learning the form classes of the second language? We can consider L<sub>1</sub> evidence for starters. Maratsos and Chalkley (in press) argue that in learning English form classes, in particular adjectives and verbs, children are quite good at *not* violating the formal syntactic categories across semantic distinctions. They do not make errors as *He's angrying*, where *-ing* is extended to process adjectives. Additionally, when children overgeneralize the regular past tense *-ed*, they are equally likely to make this overgeneralization on process verbs as on nonaction verbs. Maratsos and Chalkley conclude that "children find it natural to define the formal units for a semantic-distributional pattern according partly to the appearance of terms in other distributional-semantic patterns" (p. 40).

For the L<sub>2</sub> learner, one obvious possibility is that pattern is the same as for L<sub>1</sub> learners, guided by the semantic-distributional properties of the input language. We would expect similar observances of syntactic boundaries under this possibility. Another possibility would be that one may in fact find learners at a certain age range to be more sensitive to the semantic similarities across syntactic classes when they have come to recognize both adjectives and verbs as, say, "words." This would result in errors across syntactic classes. A third possibility, addressing the question of transfer from L<sub>1</sub>, is that words would be classified according to the semantic-distributional properties of the particular language. The task of learning L<sub>2</sub>

would then involve deciphering what privileges of occurrence the native language form classes (NL/FC) have in the target language. Say that the learner finds an equivalent for a particular member of the native language form class, NL/FC<sub>1</sub>, in the target language (TL). With the TL, the structure is such that this lexical item is a member of the target language form classes (TL/FC), specifically TL/FC<sub>1</sub>. As the learner acquires new lexical items corresponding to NL/FC in the TL, once the learner discovers the distributional properties of TL/FC, it would be quite efficient for the learner to go ahead and assume that all equivalent words in the target language for NL/FC could take on the distributional properties of TL/FC. If the NL and TL do not agree on membership of terms in NL/FC and TL/FC, we would predict certain errors in form class of the target language.

There is at present little evidence on which to decide between these possibilities. The transfer hypothesis has some support in my own data from Uguisu (Hakuta, 1976), where she in fact made errors of the following sort: *you're mistaking*. In Japanese, *mistake* is most often used as a verb as opposed to English, where it is a noun. Thus, Uguisu may have extended the "-ing-able" property of her class of verbs in Japanese, including *mistake*. That such errors have not been reported in the literature forces one to question the generality of the example.

L<sub>2</sub> studies with a focus on the acquisition and representation of form classes should be quite informative. With L<sub>2</sub> learners particularly, we need not rely solely on data from form class violations in spontaneous speech. Older learners are amenable to judgments of acceptability, sorting tasks, and other clever on-line methods for tapping the organization of their linguistic categories for the language they are in the process of learning. Additionally, one of the most important considerations about form classes is that their privileges of occurrence are correlated. Given a sentence *Gutch you*, you know other contexts when *gutch* can appear: *Her gutching was considered by the police to be disgusting, don't gutch me*; and where it cannot: *His gutch ran out*. By asking learners to judge or produce sentences of this sort, their knowledge concerning correlated privileges of occurrence can be explored. In short, take advantage of adults' ability to follow detailed instructions.

Recent evidence indicates that some matters of syntax are semantically or lexically bounded. For example, Sinclair, Sinclair, and De Marcellus (1971) report that children fail to comprehend the passive version of sentences involving the verb *follow* until much later than other verbs, such as *hit* or *kick*. Thus, *The horse was followed by the cow* is much harder than *The horse was kicked by the cow*. Such evidence goes against the claim that there is a rule that transforms the order of the two nouns about a transitive verb without making restrictions as to the individual lexical items involved. In

other words, if the rules operated on categories NP and verb phrase (VP), as in the standard transformation account (Chomsky, 1965), we would expect performance to be homogeneous across lexical items. Maratsos, Kuczaj, and Fox (1977) report a pair of studies in which they systematically investigate the effect of verb type on comprehension of reversible passive sentences. They compared four- and five-year-olds' comprehension of sentences with verbs that were either actional (e.g., *hold*, *shake*) or nonactional (e.g., *remember*, *see*). The subject of actional verbs can be described semantically as the agentive role, while the subject of the nonactional verbs are described as the experiencer role (Fillmore, 1968). Although the children performed equally well on active sentences involving both types of verbs, they did significantly better on passive sentences with actional verbs. Thus, it appears that children at this age do not have a generalized passive rule operating on categories such as Subject. Rather, they can be regarded as lexically specific. That is, their formulation of the rule centers about verbs that take agents as their first NP argument and patient as their second NP argument, and not verbs that take the experiencer role as their first NP argument. In this way, their rules are also semantically bounded.

De Villiers (in press) finds inherent biases in the accessibility of subject position in formulating passive sentences, depending on the semantic relation of the noun to the verb. She used a modeling paradigm in which children were exposed to certain kinds of passives and subsequently tested for production of passives in novel contexts. Even controlling for frequency of opportunities to produce each type of passive, the children found passive sentences easiest to produce in the following order:

1. ANIMAL + ACTION + ANIMAL  
(e.g., The frog was squirted by the turtle.)
2. INANIMATE THING + ACTION + ANIMAL  
(e.g., The ball was thrown by the rabbit.)
3. INANIMATE THING + NON-ACTION + ANIMAL  
(e.g., The dress was worn by the elephant.)

The children were differentially exposed to either passive models of type (1) or type (3), yet both groups found type (1) the easiest to produce as passives. Although the study is preliminary, it does suggest the semantically bounded nature of grammatical rules. The question, of course, is the origin of such biases in promotion of nouns to subject position. For example, do such biases exist in native adult speakers as well? Could we talk about degrees of membership in grammatical categories, with prototypical and peripheral members? The analogy between such a view and recent work in concept for-

mation (e.g., Rosch & Mervis, 1975) is intriguing and has not escaped notice (de Villiers, in press; Bates & MacWhinney, 1978). It is a promising area for collaborative research between psychology and linguistics, since independently motivated linguistic evidence has been used by Ross (1973, 1974) to argue for nondiscrete grammars based on implicational hierarchies.

For purposes of the present paper, it is sufficient to note that the trend within L<sub>1</sub> research seems headed in the direction of decomposing grammatical categories into semantic and distributional properties. Just as the trend within linguistics recently has been to capture significant generalizations at the lexical level (Bresnan, 1978), the trend in L<sub>1</sub> is to search for significant variations between individual lexical items within grammatical categories. It is not clear at this point whether ultimately the adult speaker would come to unify these decomposed properties under increasingly abstract categories like *subject*, as would many linguists, or whether they remain separate. It is possible that depending on situation- or task-dependent processing demands, different organizational levels of the category will be tapped. These types of questions would have important implications for L<sub>2</sub> acquisition at various ages.

Let me propose a hypothesis: Learners at the stage in L<sub>1</sub> where the rules are semantically bounded will exhibit similar constraints in learning the rules of L<sub>2</sub>. On the other hand, learners who have access to more abstract categories in L<sub>1</sub> will more readily generalize their rules of L<sub>2</sub> across semantic boundaries.

If the hypothesis holds, there is a further consequence regarding the characteristics of the learner's language that would require attention. This concerns whether the native language recruits the syntactic category of subject as central to the system, for example English and Spanish, or peripheral, for example Mandarin, where the central role is played by a discourse category, topic. Li and Thompson (1976) propose that the world's languages can be classified along a continuum ranging from Subject-prominent to Topic-prominent. The most fundamental difference between subject and topic is that subject is considered a sentence-internal notion, while topic is a discourse notion. Thus, although subjects are always required to have a selection related with the verb, not so with topics, which are selected through discourse. But the fact that topic is discourse-related does not mean that it is less formal or abstract than subject.

Li and Thompson give an example from Mandarin, a topic-prominent language:

Nei-chang	huo	xingkui	xiaofang-dui	lai	de	kuai
that-classifier	fire	fortunate	fire-brigade	came	adverb	quickly

That fire (topic), fortunately the fire-brigade came quickly.

Li and Thompson argue that in Mandarin topic is always coded by being in sentence-initial position. Additionally, the topic takes precedence over subject in controlling co-reference. Topics are most conspicuously present in the pervasive *double-subject* construction, such as

Neike shu yezi da  
that tree leaves big

That tree (topic), the leaves are big.

They offer a fascinating argument to explain why Mandarin, like other topic-prominent languages, rarely has passives.

In subject-prominent languages, the notion of subject is such a basic one that if a noun other than the one which a given verb designates as its subject becomes the subject, the verb must be marked to signal this 'non-normal' subject choice. . . . In topic-prominent languages, it is the topic, not the subject, that plays a more significant role in sentence construction. Any noun phrase can be the topic of a sentence without registering anything on the verb. It is, therefore, natural that the passive construction is not as widespread in topic-prominent languages as it is in subject-prominent languages. (p. 457)

I suspect that there will be interesting differences in L<sub>2</sub> learning that cross and do not cross the subject-topic distinction. Consider the hypothetical cases of Chinese and Spanish speakers learning English. Under the assumption that the formal categories of subject and topic are established, if they ever are, at similar ages in the native language of the respective language learners, both Spanish and Chinese young learners of English should show similar boundedness of English rules. On the other hand, older learners should show a systematic difference as a function of their L<sub>1</sub>. Spanish speakers are predicted to perform stably in tasks involving the subject, while Chinese speakers will exhibit unstable performance, with possible interpretation of the English subject as being "topic."

This speculative example is intended to illustrate the kinds of questions that might be asked as a consequence of the search for the appropriate level of describing linguistic categories that are psychologically real. Schachter & Rutherford (1978\*) have made important first steps in describing errors in English of adult L<sub>1</sub> speakers of Japanese and Chinese in subject and topic. These learners used the English subject primarily as a topic marker. This line of research is extremely promising for investigating not just the nature of the categories but also age-related changes.

### WHAT COGNITIVE VARIABLES ACCOUNT FOR THE PATTERN OF SECOND LANGUAGE ACQUISITION?

In the previous section, I suggested a danger in concluding that, because a second language learner is cognitively more developed than a first language learner, he or she would have no difficulty with the semantic units of the second language. Semantics cannot be confused with cognition. In this section, I would simply like to bring to attention some factors that would be different for second language learners by virtue of their being cognitively advanced.

Wong-Fillmore (1976) and I (Hakuta, 1974b\*) both independently observed from our studies that children around five years of age seemed to produce a large number of utterances that were prefabricated, formulaic forms. The fact that these children could memorize whole sentences (e.g., How do you do dis?) and use them in conversationally appropriate contexts attests to their highly developed memory span, as well as their ability to hypothesize and test the functions of such forms.

Older L<sub>2</sub> learners, having better memory, probably develop a larger vocabulary at a more rapid rate. This is supported by Gillis' (1975) data on two Japanese children, whose mental age score on the Peabody Picture Vocabulary Test increased by up to one year in the period of one month! Furthermore, Snow and Hofnagel-Hohle (1978) found that older children developed faster than younger children in their second language vocabulary.

Lightbown (1977) studied the semantic relations encoded in the utterances of two six-year old English speakers learning French. She found that the children from the very beginning expressed relations such as intensifier, Wh-questions, manner, and conjunction. Since these relations are not expressed by L<sub>1</sub> children at the earliest stages, Lightbown argued that this was a manifestation of cognitive development. Thus, these semantic relations, which I believe are universally expressed in languages, are not constrained for the L<sub>2</sub> learner. It is in matters such as tense-aspect, which languages slice up in a number of different, apparently arbitrary ways, that we would expect even the cognitively mature learner to have difficulty deciphering.

Finally, both Tiphine<sup>1</sup> and I (Hakuta, 1976\*) observe a variety of coordinating conjunctions from the very first appearance of sentences. The use of such natural language connectives has been linked to the development of logical connectives (Beilin, 1976), and this area is certainly a promising candidate for necessary cognitive prerequisites. Older learners know that

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<sup>1</sup>Tiphine, personal communication, 1979.

sentences represent propositions, and these propositions can be related through a relatively single mechanism.

### **HOW DOES THE INTERACTIONAL NATURE OF LANGUAGE INFLUENCE ITS ACQUISITION?**

No one would argue with the claim that language serves a critical role in social interaction. The study of language acquisition must include in its account the context in which it occurs in nature. Certain conventions must be followed in maintaining a smooth conversation; for example, turn-taking, repetitions, and conversational repairs. Researchers in both L<sub>1</sub> and L<sub>2</sub> acquisition have looked at conversation protocols to catalogue the manifestations or lack of such discourse functions (Garvey, 1975; Keenan, 1975; Keller-Cohen & Dennis, 1975\*; Keller-Cohen, 1976\*). Although a theory of conversational maintenance would be a valuable augmentation to the theory of language development, it might be considered an additive rather than an interactive component. To the extent that these processes are noninteractive, the researcher need not incorporate them into a theory of language acquisition.

There are other views, however, that hold that an understanding of the social interactional context is critical to the linguistic outcomes in the language learner. I shall label two theories: The Interaction-To-Structure Theory and the Interaction-As-Structure Theory. Although no particular researcher would identify himself or herself exclusively with either theory, the most prominent subscriber to Interaction-To-Structure Theory might be Wong-Fillmore (1976). In a study of six Spanish-speaking children learning English, she identified a large number of routine, formulaic utterances that were embedded in specific functional envelopes. Presumably, the children learned these formulaic utterances as specific to the initially encountered context and subsequently analyzed the formulas through internal comparison with similar utterances. I have labeled this approach the Interaction-To-Structure Theory because the interaction is the route through which the structure is initially entered into the child's cognitive machinery. The structuring itself, however, is conjectured on the basis of observed utterances in the input. This is in contrast to the Interaction-As-Structure Theory, which might be identified with Hatch (1978). Hatch borrows from Scollon's (1974) research on an L<sub>1</sub> child, where he argued that parts of sentences that were strung together through a conversation formed the basis of the child's later, longer constructions. The structure, thus, is constrained by the nature of the conversation, and it is this structure that is stored and forms the basis of later utterances.

For both these interactional theories to gain credibility, it would be

necessary first to demonstrate that there indeed exists an empirical relationship between interaction and utterances. If, say, interactional quality covaries with utterance quality, then the first requirement for credibility is met. Then one would need to build a theoretical argument as to how these discourse categories might be the source from which later, mature linguistic categories are derived.

Several practical considerations arise in testing the adequacy of the interactional theories. The first is in the area of measurement. The descriptions thus far have been qualitative and in some cases ethnographic. But how to measure interactional quality? A first stab can be made through the use of raters who observe random sequences of interaction. A better alternative would be to develop a theory of interactional quality that has several different empirically measurable dimensions, and then to independently measure these dimensions and look at their interrelationships. Depending on the number of sensible dimensions that can be extracted, predictions can be made to relate to utterance quality.

#### **ARE THERE DIFFERENCES IN SECOND LANGUAGE ACQUISITION AT DIFFERENT AGES, AND IF SO, IN WHAT WAYS ARE THEY DIFFERENT?**

A number of studies indicate significant effects for the age of initial exposure to L<sub>2</sub>. For morphology and syntax, Snow and Hoefnagel-Hohle (1978), Ervin-Tripp (1974), Fathman (1975), and Asher and Price (1967) all report that older children exceed younger children in developing L<sub>2</sub> proficiency. Oyama (1978), however, did find a negative relationship for the age of arrival to the United States among Italian immigrants in a test for listening comprehension. For phonology, Snow and Hoefnagel-Hohle (1977) found older learners to be better, while several studies find a negative relationship with age (Williams, 1974; Oyama, 1976; Fathman, 1975; Seliger, Krashen, & Ladefoged, 1975).

It is extremely difficult to make cross-age comparisons without confounding test-taking ability at different ages. Essentially, three variables are under consideration when conducting a study of age and L<sub>2</sub> learning: age of initial exposure, length of exposure, and age at which the individual is tested. While the first two variables can be varied, the third is determined by the first two, since it is simply their sum. Thus, any positive relationship between L<sub>2</sub> learning and age of initial exposure (holding length of exposure constant) or length of exposure (holding age of initial exposure constant) is inherently confounded with the age at which the individual is tested, hence with test-taking ability. Although a negative relationship might be interpreted with somewhat more confidence, one should still be cautious that the



older persons, for example, were more inhibited than the younger, a non-trivial likelihood if the older individuals are adolescents.

I suggest that at present, the most worthwhile design in assessing the relationship between age and L<sub>2</sub> learning is through a study of within-age group variance, seeking correlates (e.g., cognitive ability, social factors, physical maturation) with degree of L<sub>2</sub> learning within particular age ranges. Statements about age can be made through assessing the correlates of all these variables with age and the changes in intercorrelations between these variables as a function of age.

### **HOW DOES BILINGUALISM RELATE TO INDIVIDUAL DIFFERENCES IN COGNITIVE FUNCTIONING?**

The way in which a bilingual upbringing might influence the intellectual functioning of the child has generated a great deal of interest. Early studies of intellectual performance in bilingual children produced a fairly consistent line of evidence suggesting negative effects of bilingualism (Manuel & Wright, 1929; Mitchell, 1937; Rigg, 1928; Seidl, 1937; Smith, 1923; Pintner, 1932; Pintner & Keller, 1922; Saer, 1923; Graham, 1925; Wang, 1926; Arsenian, 1937; Darcy, 1953; Jensen, 1962). The differences, however, are dubious. Investigators frequently failed to match the populations on some critical parameters, such as socioeconomic status (SES). In addition, tests of verbal intelligence were commonly used as the dependent measure. Since many of the studies looked at children of immigrant families in the United States, tests of ability in English were certain to disfavor the bilingual's performance.

More recent studies have chosen to define a bilingual as one balanced in both languages, where degree of competence in the languages is measured by some combination of self-reported language use, teacher's ratings, performance on vocabulary tests, and other tests involving verbal material. This population is matched, generally for SES and for ethnic group, with a population of monolinguals, and a battery of cognitive measures is administered. Peal and Lambert (1962) compared a group of ten-year-old Canadian bilingual and monolingual children in this manner. Contrary to the results of earlier studies, they found bilingual children showed superior performance on many of the verbal and nonverbal tasks. In addition, the tasks reflected quite distinct types of ability in children, with bilingual children showing superior ability in tasks requiring *mental reorganization*, such as the rearrangement of pictures or the abstraction of relations between symbols (e.g., the Raven's Progressive Matrices Test).

Other studies support the Peal and Lambert finding of superior performance by bilinguals on measures of cognitive flexibility and divergent

thinking (Balkan, 1970; Cummins & Gulutsan, 1974; Torrance, Gowan, Wu, & Aliotti, 1970; Ben-Zeev, 1972; Carringer, 1974). Although these authors give no adequate definition of cognitive flexibility, the tasks involved synthesizing simultaneously separate elements of a stimulus field into a system of relationships. Ben-Zeev (1972), for example, found that bilinguals performed better than monolinguals on tasks requiring classification and reclassification of objects and figures from different perspectives. In addition, bilinguals were found to have a higher degree of *metalinguistic awareness*, or the ability to treat language as an object rather than solely as a medium for communication (Ben-Zeev, 1972; Cummins, 1978). Cummins, for example, used a task requiring evaluation of the logic underlying language in Irish-English bilingual children, and found them to be better judges of the logic than their monolingual counterparts. In Ben-Zeev's study, the children performed a symbol-substitution task that involved substituting an arbitrary word into a sentence. Presumably, as the bilingual child becomes facile at operating between two languages, he or she comes to separate himself or herself from the specific language and to treat it more abstractly.

Three conclusions might be drawn from the results of the studies reviewed above. Each of these must be critically evaluated.

1. *Bilingual children are cognitively more flexible than monolingual children.* One must assume here that the children involved in the above studies were truly representative of the population in which they are classified. MacNamara (1966) severely criticized the criterion of using only balanced bilinguals for the studies. He argued that such a selection procedure biased the sample of bilinguals toward the more intellectually gifted end of the population, accounting for their superiority on cognitive tasks. Other researchers defend the assumption of true representation, emphasizing that the balanced bilingual can be an individual who is equally *lacking* in his or her competence for both languages or an individual who is highly competent in both (Lambert & Anisfield, 1969). Cummins (1976) argues that in most of the studies, the criterion for being "balanced" is sufficiently loose so that only children who were grossly dominant in either language were excluded. One worries, however, about a "loose" criterion. An investigation of the performance of bilinguals with varying degrees of language dominance on tasks of cognitive flexibility should lead to a resolution of this issue, but the research has yet to be conducted.

2. *The fact that bilinguals speak two languages and monolinguals*

*speaking one language constitutes the critical difference between bilinguals and monolinguals. This difference is correlated with cognitive flexibility.* The claim is that of the potentially infinite number of differences between the two types of populations, language is the critical ability associated with cognitive flexibility. Matching for SES and ethnic group, among other variables, clearly reduces the inherent differences most frequently found between bilinguals and monolinguals. However, it is not difficult to imagine other nonlinguistic differences correlated with the two different groups. Such complications are often encountered in cross-cultural research (Cole & Scribner, 1974). Given that a difference is found between two cultures, to what should this difference be attributed? After all, the cultures differ in an infinite number of dimensions. Cole and Scribner emphasize that a solution can often be found by looking for differences *within* a particular culture to find the relative variables. Along a similar vein, investigating the differences between individual bilinguals should control for the inherent nonlinguistic differences between bilinguals and monolinguals, and inform us as to whether the extent to which a bilingual is fluent in the two languages is correlated with their cognitive flexibility. Such evidence would establish a critical link between language and cognitive flexibility.

3. *Becoming bilingual causes the individual to become more cognitively flexible, rather than cognitive flexibility causing the bilingualism.* Longitudinal studies would provide for more certain statements about this claim. One study by Scott (reported in Lambert, 1977) used a longitudinal design, where monolingual children entering either a bilingual school or a monolingual school were matched for SES and IQ. Several years later, the same children were tested for their performance on tests of divergent thinking, and the results showed higher performance by the bilingual children. Unfortunately, Scott did not match the children at Time 1, when both groups were monolingual, on their ability in divergent thinking.

### **THE FUTURE**

The following recommendations for future research emerge:

1. There is very little research involving Asian-Americans in any of the areas reviewed. Future studies involving Asian-Americans can complement and extend present knowledge.

2. Very few studies exist in the area of phonology. It seems very worthwhile to continue studies of perception and production of speech sounds based on the contrastive analysis of languages. Aside from the theoretical interest, this area may provide reliable indices for the study of individual differences in second language acquisition.
3. Error analysis of phonological production should be pursued.
4. Although error analysis at the level of morphology, syntax, and semantics will continue to provide interesting insights into the role of both the structure of the native and the target languages, emphasis should be placed on particular errors and areas of difficulty (such as articles) and an in-depth inquiry into the cause.
5. One needs to determine the level(s) at which grammatical categories are psychologically real. The Topic-Subject distinction of Li and Thompson (1976) holds particular promise, and is relevant to most Asian languages.
6. While the interactional hypothesis is interesting, there are still some severe problems with measurement and appropriate testing of the hypothesis. The first step in this area must be theoretical refinement followed by operationalization of the individual difference dimensions.
7. Studies relating age with L<sub>2</sub> learning yield conflicting results, some of which might be confounded with differential test-taking ability with respect to age. Within-age group comparisons are recommended.
8. Studies of bilingualism and cognitive functioning generally suggest a facilitating effect for bilingualism on the latter. However, there are not many studies that look at within-bilingual differences. In addition, longitudinal investigations to establish causality are required. There are no studies involving Asian-Americans here.

### GLOSSARY

- Discourse:** The study of how utterances combine into coherent conversations to achieve functional goals.
- Grammatical Morphemes:** A set of morphemes that are frequently redundant in meaning and high in frequency, and serve as structural signals for sentence structure.

<b>Morphology:</b>	The study of the forms and formation of words through combination of morphemes.
<b>Phonology:</b>	The study of categories of speech sounds and their combinatorial properties.
<b>Semantics:</b>	The study of the meanings of words and the meanings expressed in the relationship between words, such as <i>agent-action</i> or <i>possessor-possessed</i> .
<b>Syntax:</b>	The study of how words combine in a linear or hierarchical system to form sentences.

### REFERENCES

- Arsenian, S. *Bilingualism and mental development*. New York: Columbia University Press, 1937.
- Asher, J., & Price, B. The learning strategy of the total physical response: Some age differences. *Child Development*, 1967, 38, 1219-1227.
- Balkan, L. *Les effets du bilinguisme Francais-Anglais sur les aptitudes intellectuelles*. Bruxelles: Aimav, 1970.
- Beilin, H. *The cognitive basis of language development*. New York: Academic Press, 1976.
- Ben-Zeev, S. The influence of bilingualism on cognitive development and cognitive strategy. Unpublished doctoral dissertation, University of Chicago, 1972.
- Bowerman, M. Structural relationships in children's utterances: Syntactic or semantic? In T. M. Moore (Ed.), *Cognitive development and the acquisition of language*. New York: Academic Press, 1973.
- Bresnan, J. A realistic transformational grammar. In M. Halle, J. Bresnan, & G. Miller (Eds.), *Linguistic theory and psychological reality*. Cambridge, MA: M.I.T. Press, 1978.
- Brown, R. *A first language: The early stages*. Cambridge, MA: Harvard University Press, 1973.
- Brown R., & Herrnstein, R. J. *Psychology*. Boston: Little, Brown, 1975.
- Cancino, H. Grammatical morphemes in second language acquisition—Marta. Unpublished qualifying paper, Harvard Graduate School of Education, 1976.
- Carringer, D. C. Creative thinking abilities in Mexican youth: The relationship of bilingualism. *Journal of Cross-Cultural Psychology*, 1974, 5, 492-504.
- Chomsky, N. *Aspects of the theory of syntax*. Cambridge, MA: M.I.T. Press, 1965.
- Cole, M., & Scribner, S. *Culture and thought*. New York: Wiley, 1974.
- Cummins, J. The influence of bilingualism on cognitive growth: A synthesis of research findings and exploratory hypotheses. *Working Papers on Bilingualism*, 1976, 9, 1-43.
- Cummins, J. Metalinguistic development of children in bilingual education programs: Data from Irish and Canadian Ukrainian-English programs. In M. Paradis (Ed.), *Aspects of bilingualism*. Columbia, SC: Hornbeam Press, 1978.

- Cummins, J., & Gulutsan, M. Some effects of bilingualism on cognitive functioning. In S. Carey (Ed.), *Bilingualism, biculturalism, and education*. Proceedings from the Conference at College Universitaire Saint-Jean, University of Alberta 1974.
- Darcy, N. T. A review of the literature on the effects of bilingualism upon the measurement of intelligence. *Journal of Genetic Psychology*, 1953, 82, 21-57.
- de Villiers, J. G. The process of rule learning in child speech: A new look. In K. E. Nelson (Ed.), *Child language* (Vol. 2). New York: Gardner Press, in press.
- de Villiers, J. G., & de Villiers, P. A. A cross-sectional study of the acquisition of grammatical morphemes in child speech. *Journal of Psycholinguistic Research*, 1973, 2, 267-278.
- de Villiers, J. G., & de Villiers, P. A. Syntax and semantics in the first two years. In F. D. Minifie & L. L. Lloyd (Eds.), *Communicative and cognitive abilities: Early behavioral assessment*. Baltimore: University Park Press, 1978.
- Dulay, H., & Burt, M. Should we teach children syntax? *Language Learning*, 1973, 23, 245-258.
- Dulay, H., & Burt, M. Natural sequences in child second language acquisition. *Language Learning*, 1974, 24, 37-53. (a)
- Dulay, H., & Burt, M. A new perspective on the creative construction process in child second language acquisition. *Working Papers on Bilingualism*, 1974, 4, 71-98. (b)
- Edwards, W., Lindman, H., & Phillips, L. D. Emerging technologies for making decisions. *New directions in psychology* (Vol. 2). New York: Holt, Rinehart and Winston, 1965.
- Ervin-Tripp, S. Is second language learning like the first? *TESOL Quarterly*, 1974, 8, 111-127.
- Fathman, A. Language background, age, and the order of English structures. Paper presented at the TESOL Convention, Los Angeles, 1975.
- Fillmore, C. J. The case for case. In E. Bach & R. Harms (Eds.) *Universals in linguistic theory*. New York: Holt, Rinehart and Winston, 1968.
- Fodor, J., & Garrett, M. Some reflections on competence and performance. In J. Lyons & R. Wales (Eds.), *Psycholinguistic papers*. Edinburgh: Edinburgh University Press, 1966.
- Garvey, C. Requests and responses in children's speech. *Journal of Child Language*, 1975, 2, 41-63.
- Gass, S., & Ard, J. L<sub>2</sub> data: Their relevance for language universals. Paper presented at the TESOL Convention, San Francisco, 1980.
- Gillis, M. The acquisition of the English verbal system by two Japanese children in a natural setting. Unpublished master's thesis, McGill University, 1975.
- Gillis, M., & Weber, R. The emergence of sentence modalities in the English of Japanese-speaking children. *Language Learning*, 1976, 26, 77-94.
- Graham, V. T. The intelligence of Italian and Jewish children. *Journal of Abnormal and Social Psychology*, 1925, 20, 371-376.
- Hakuta, K. A preliminary report on the development of grammatical morphemes in a Japanese girl learning English as a second language. *Working Papers on Bilingualism*, 1974, 3, 18-43. (a)

- Hakuta, K. Prefabricated patterns and the emergence of structure in second language acquisition. *Language Learning*, 1974, 24, 287-297. (b)
- Hakuta, K. A case study of a Japanese child learning English. *Language Learning*, 1976, 26, 321-351.
- Hakuta, K., & Cancino, H. Trends in second language acquisition research. *Harvard Educational Review*, 1977, 47, 294-316.
- Hatch, E. Discourse analysis. In E. Hatch (Ed.), *Studies in second language acquisition*. Rowley, MA: Newbury House Publishers, 1978.
- Huebner, T. Order-of-acquisition vs. dynamic paradigm: A comparison of method in interlanguage research. Paper presented at the TESOL Convention, Mexico City, 1978.
- Jensen, J. V. Effects of childhood bilingualism. *Elementary English*, 1962, 39, 132-143.
- Keenan, E. Conversational competence in children. *Journal of Child Language*, 1975, 2, 163-183.
- Keller-Cohen, D. Repetition in the non-native discourse: Its relation to text unification and conversational structure. In O. Freedle (Ed.), *Discourse processing: A multidisciplinary approach*. Hillsdale, NJ: Ablex Publishing, 1976.
- Keller-Cohen, D., & Dennis, J. The acquisition of conversational competence. In R. Grossman, L. J. San, & T. J. Vance (Eds.), *Functionalism*. Chicago: Chicago Linguistics Society, 1975.
- Kleinmann, H. Avoidance behavior in adult second language acquisition. Unpublished doctoral dissertation, University of Pittsburgh, 1976.
- Krashen, S., Madden, C., & Bailey, N. Theoretical aspects of grammatical sequencing. In M. Burt & H. Dulay (Eds.), *New directions in second language learning, teaching, and bilingual education*. Washington, DC: TESOL, 1975.
- Lambert, W. Effects of bilingualism on the individual. In P. Hornby (Ed.), *Bilingualism: Psychological, social, and educational implications*. New York: Academic Press, 1977.
- Lambert, W., & Anisfield, E. A note on the relation of bilingualism and intelligence. *Canadian Journal of Behavioural Science*, 1969, 1, 123-128.
- Larsen-Freeman, D. The acquisition of grammatical morphemes by adult ESL students. Paper presented at the TESOL Convention, Los Angeles, 1975.
- Li, C. N., & Thompson, S. A. Subject and topic: A new typology of language. In C. Li (Ed.), *Subject and topic*. New York: Academic Press, 1976, 457-90.
- Lightbown, P. French L<sub>2</sub> learners: What they're talking about. Paper presented at the first Los Angeles Second Language Research Forum, University of California, Los Angeles, 1977.
- Los Angeles Public School System, *English as a second language for the Asian languages and cultures*. Los Angeles City Schools, California, (n.d.) (Eric Document Reproduction Service No. ED 152 868).
- MacNamara, J. *Bilingualism and primary education*. Edinburgh: Edinburgh University Press, 1966.
- Manuel, H., & Wright, C. The language difficulty of Mexican children. *Journal of Genetic Psychology*, 1929, 36, 458-466.
- Maratsos, M. P., & Chalkley, M. A. The internal language of children's syntax: The ontogenesis and representation of syntactic categories. In K. E. Nelson (Ed.), *Child language* (Vol. 2). New York: Gardner, in press.

- Maratsos, M. P., Kuczaj, S., & Fox, D. Some empirical studies in the acquisition of transformational relations: Passives, negatives and the past tense. Paper presented at the Minnesota Symposium on Child Psychology, Minneapolis, MN, 1977.
- McLaughlin, B. *Second language acquisition in childhood*. Hillsdale, NJ: Erlbaum, 1978.
- Miller, G. A., & McKean, K. O. A chronometric study of some relations between sentences. *Quarterly Journal of Experimental Psychology*, 1964, 16, 297-308.
- Milon, J. The development of negation in English by a second language learner. *TESOL Quarterly*, 1974, 8, 137-143.
- Mitchell, A. J. The effect of bilingualism in the measurement of intelligence. *Elementary School Journal*, 1937, 38, 29-37.
- Miyakawa, K., Strange, W., Verbrugge, R., Liberman, A., Jenkins, J., & Fujimura, O. An effect of linguistic experience: The discrimination of [r] and [l] by native speakers of Japanese and English. *Perception and Psychophysics*, 1975, 18, 331-340.
- Oyama, S. A sensitive period for the acquisition of a non-native phonological system. *Journal of Psycholinguistic Research*, 1976, 5, 261-285.
- Oyama, S. The sensitive period and comprehension of speech. *Working Papers on Bilingualism*, 1978, 16, 1-17.
- Peal, E., & Lambert, W. The relation of bilingualism to intelligence. *Psychological Monographs*, 1962, 76 (No. 546).
- Pintner, R. The influence of language background on intelligence tests. *Journal of Social Psychology*, 1932, 3, 235-240.
- Pintner, R., & Keller, R. Intelligence tests of foreign children. *Journal of Educational Psychology*, 1922, 13, 214-222.
- Ravem, R. Language acquisition in a second language environment. *International Review of Applied Linguistics*, 1968, 6, 175-185.
- Rigg, M. Some further data on the language handicap. *Journal of Educational Psychology*, 1928, 19, 252-257.
- Rosansky, E. Second language acquisition research: A question of methods. Unpublished doctoral dissertation, Harvard Graduate School of Education, 1976.
- Rosch, E., & Mervis, C. Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology*, 1975, 7, 573-605.
- Ross, J. R. Nouniness. In O. Fujiwara (Ed.), *Three Dimensions of Linguistic Theory*. Tokyo: TEC Company, 1973.
- Saer, D. J. The effects of bilingualism on intelligence. *British Journal of Psychology*, 1923, 14, 25-38.
- Schachter, J. An error in error analysis. *Language Learning*, 1974, 24, 205-214.
- Schachter, J., & Rutherford, W. Discourse function and language transfer. Paper presented at the Second Los Angeles Second Language Research Forum, USC, Los Angeles, 1978.
- Schlesinger, I. M. Relational concepts underlying language. In R. L. Schiefelbusch & L. L. Lloyd (Eds.), *Language Perspectives: Acquisition, Retardation and Intervention*. Baltimore: University Park Press, 1974.



- Scollon, R. One child's language from one to two: the origins of construction. Unpublished doctoral dissertation, University of Hawaii, 1974.
- Seidl, J. The effect of bilingualism on the measurement of intelligence. Unpublished doctoral dissertation, Fordham University, 1937.
- Seliger, H., Krashen, S., & Ladefoged, P. Maturation constraints in the acquisition of a native-like accent in second language learning. *Language Sciences*, 1975, 36, 20-22.
- Sinclair, A., Sinclair, H., & De Marcellus, O. Young children's comprehension and production of passive sentences. *Archives de Psychologie*, 1971, 61, 1-20.
- Smith, F. Bilingualism and mental development. *British Journal of Psychology*, 1923, 13, 270-282.
- Snow, C., & Hoefnagel-Hohle, M. Age differences in the pronunciation of foreign sounds. *Language and Speech*, 1977, 20, 357-365.
- Snow, C., & Hoefnagel-Hohle, M. The critical period for language acquisition: Evidence from second language learning. *Child Development*, 1978, 49, 1114-1128.
- Tarone, E. Some influences on interlanguage phonology. *Working Papers on Bilingualism*, 1976, 8, 87-111.
- Torrance, E. P., Gowan, J. C., Wu, J., & Aliotti, N. C. Creative functioning of monolingual and bilingual children in Singapore. *Journal of Educational Psychology*, 1970, 61, 72-75.
- Tversky, A., & Kahneman, D. Judgment under uncertainty: Heuristics and biases. *Science*, 1974, 185, 1124-1131.
- Wang, S. L. A demonstration of the language difficulty involved in comparing racial groups by means of verbal intelligence tests. *Journal of Applied Psychology*, 1926, 10, 102-106.
- Williams, L. Speech perception and production as a function of exposure to a second language. Unpublished doctoral dissertation, Department of Psychology and Social Relations, Harvard University, 1974.
- Wong-Fillmore, L. The second time around: Cognitive and social strategies in second language acquisition. Unpublished doctoral dissertation, Stanford University, 1976.