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The Acquisition of Second Language Phonology: A Comparison with the Acquisition of First Language Phonology[1]

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Introduction

Is the acquisition of a second language (L2) like that of a first language (L1)? Do L2 learners acquire L2 in a similar way regardless of their L1 backgrounds? These questions have been explored in studies on acquisition of L2 syntax in the last decade (Dulay & Burt 1973, 1974b; Bailey et al. 1974; Hakuta 1974; Larsen-Freeman 1975; Makino 1979). These have been sparked primarily by the creative construction hypothesis: namely, that the L2 learning process is guided by the learner's innate language acquisition device as is the L1 learning process (Dulay & Burt, 1974a). However, these questions have been largely ignored in studies on acquisition of L2 phonology until recently. This seems to be due to the assumption that the process which shapes L2 phonology is solely L1 transfer. Hence, it has been thought that acquisition of L2 phonology is entirely different from acquisition of L1 phonology. However, this assumption is premature since, as I will show in this paper, transfer is only one of the processes operating in the shaping of L2 phonology.

The purpose of this paper is to investigate the nature of the acquisition of L2 phonology by means of a comparison with the acquisition of L1 phonology. Firstly, a brief overview of the major theories of L1 and L2 acquisition of phonology will be discussed. This will be followed by the comparison of phenomena observed in the acquisition of L1 and L2 phonological systems with an emphasis on the latter. A

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review of relevant literature will reveal phenomena common to both types of acquisition. Thus, this paper will conclude that the acquisition of L2 phonology is not entirely different from that of L1 phonology.

1. Overview of Major Theories

There are two dominant views of acquisition of L1 phonology. The first is the behavioristic, as represented by Mowrer (1952) and Winitz (1969). The second is the universal, as proposed by Jakobson (1941/1968). The behavioristic theories explain acquisition of L1 phonology as resulting from imitation and reinforcement. That is, when children correctly imitate sounds in their environment, this behavior is reinforced by rewards from parents in the form of attention and close physical contact. When they produce sounds not existing in their environment, this behavior is not reinforced and these sounds disappear.

This behavioristic view of phonological acquisition is untenable in light of present-day evidence. Wahler (1969) showed that sounds receive no more reinforcement from parents when approximating adult speech than when not. Furthermore, the behavioristic view cannot explain the orderly nature of phonological development reported in many studies after Jakobson's (1968) influential theory of phonological development.

According to Jakobson, the development of the sound system can be viewed as the acquisition of successive contrasts between features that are maximally different. He claimed that there is a universal hierarchy of feature contrasts. This hierarchy is reflected in the universal acquisition order of phoneme contrasts by children learning any L1. There exists some counterevidence with respect to Jakobson's specific predictions about acquisition order (Menn, 1976). Furthermore, more variability is reported in acquisition order among individual children than Jakobson predicted (Garnica, 1973; Edwards, 1974). In

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general, however, reported data support the existence of some universal principle governing acquisition order (Velten, 1943; Ferguson & Farwell, 1975). The universal view of L1 phonological acquisition fits today's dominant view of language acquisition: that children are born with an innate capacity for language acquisition, including considerable knowledge of language universals (Chomsky, 1959). Thus, phonological development is considered to be not the result of imitation and reinforcement, but rather the function of innate phonological acquisition mechanisms.

Just as behaviorists describe acquisition of L1 phonology as the formation of a set of pronunciation habits, they describe acquisition of L2 phonology as the formation of a second set. Fries (1945) and Lado (1957), early proponents of the contrastive analysis hypothesis, contended that errors in L2 derive from interference from L1 habits. Structural differences between L1 and L2 then become the sources of errors. The claim is that structural comparisons of linguistic systems permit predictions of learning difficulties. However, the contrastive analysis hypothesis has been challenged in the field of acquisition of L2 syntax by studies which have claimed that L2 syntactic errors are mainly developmental and that only a small proportion of them are attributable to L1 transfer (Dulay & Burt 1973; Ervin-Tripp 1974; Hansen-Bede 1975; Gillis and Weber 1976). On the other hand, in the field of acquisition of L2 phonology the contrastive analysis hypothesis has been largely unchallenged and still has wide acceptance (Scovel 1976). A major criticism of the hypothesis as it applies to L2 phonology, however, is that its predictions were not rigorously tested (Tarone 1978). Furthermore, concern with initial contacts between L1 and L2 did not include the developmental continuum of acquisition of L2 phonology. It will be shown in the course of this review that L1 transfer is not the only process which shapes L2 phonology. Some developmental phenomena found in acquisition of

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L1 phonology are also observed in acquisition of L2 phonology. The contrastive analysis hypothesis fails to account for such non-transfer phenomena.

2. Perception

Substantial evidence indicates the existence of universals in L1 speech perception. Young infants can discriminate the voicing of English stops (Eimas et al., 1971), certain place features (Moffitt, 1971), and certain vowels (Trehub, 1973). Eiler et al. (1979) indicated that certain feature discrimination abilities are part of an innate perception mechanism, while others are learned by infants in specific language environments at a fairly young age. Shvachkin's (1948/1973) study of the development of phonemic contrast discrimination in Russian infants provides additional support for the existence of universals in speech perception. He concluded that the ordering for perception was very close to the universal order proposed by Jakobson for production.

In L2 phonology, a number of studies investigated the degree to which subjects' perception of L2 sounds is influenced by L1 transfer. Experiments conducted by Carrol and Sapon (1958), Lotz et al. (1960), Scholes (1968), and Miyawaki et al. (1975) all indicated that subjects' perception of L2 sounds was conditioned by their L1. For example, Miyawaki et al. studied differences in the perception of English /r/ and /l/ by native speakers of English and Japanese. They found that while English speakers can perceive the /r/-/l/ distinction categorically, Japanese speakers cannot.

These studies, however, did not consider the perception of advanced learners. MacCain et al. (1981) showed that proficient Japanese learners of English having substantial exposure to native English were able to discriminate /r/ and /l/ categorically, in a manner similar to native English speakers. Japanese subjects with little exposure to

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native English were unable to so discriminate. More recently, Gass (1983) conducted a longitudinal study of perception and production with respect to voice onset time of initial /p/ and /b/ in adult ESL learners. Her subjects had little exposure to spoken English prior to the experiment. Gass found that the subjects perceived stop consonants continuously rather than categorically. Furthermore, the location of the voice onset time boundaries in both L1 and L2 influenced perception. Gass also found that the extent of L1 influence decreased as a function of time, along with a corresponding increase in L2 influence. Findings for the simultaneous influence of L1 and L2 systems support Flege's (1981) hypothesis: that L2 learners base L2 phonetic learning on an acoustic model provided by pairs of similar sounds in both L1 and L2, rather than on a single acoustic model, as in L1 acquisition.

Several studies suggest the existence of universals in L2 speech perception. Experiments by both Singh and Black (1966), and Stevens et al. (1969) indicate that subjects' perception of certain sound features works independently of transfer. For instance, Singh and Black tested speakers of Hindi, English, Arabic, and Japanese for their recognition of certain consonants. From most to least difficult, the features: aspiration, frication, duration, voicing, liquidity, place, and nasality were found to be of identical perceptual difficulty for all groups of subjects regardless of their L1.

In sum, perception of L2 sounds seems to be greatly affected by L1 transfer at an initial stage. However, L1 influence may diminish as a function of exposure to L2. In addition, some universals seem to operate in L2 speech perception, just as they do in the case of acquisition of L1 phonology.

Barton (1976, 1978) investigated the question of whether knowledge of vocabulary influences the perception of sounds in children's acquisition of L1 phonology. Using minimal pairs of words, he tested the phonemic discrimination abilities of young children. He found most of

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the failures in discrimination occurred when at least one word of the pair was an unfamiliar word, thus indicating the effect of word familiarity on speech perception. Lobo and Yoshida (1982) investigated the same question in L2 phonology. Using minimal pairs of actual words; nonsense words; and a combination of actual and nonsense words, they tested the ability of Japanese learners of English to discriminate certain phonemic contrasts presumably difficult for Japanese students. The greatest number of errors were found in the actual/nonsense word pairs and the fewest errors in the actual word pairs. These results indicate that lexical knowledge may influence the perception of L2 sounds. Thus, similar perceptual phenomena as found in acquisition of L1 phonology has been evidenced in acquisition of L2 phonology.

3. Production: Developmental Processes

One of the two major developmental processes found in acquisition of L1 phonology is approximation: attempts to bring sound closer to target pronunciation. It has been reported that children make systematic, rather than random, attempts at adult words (Menyuk, 1971). For example, several investigators have noted the consistent substitution of certain kinds of [w] for the initial English /r/ (Klein, 1969; Smith 1973). Furthermore, children frequently produce sounds which do not exist in the target phonology (Smith, 1973). For example, Smith's English-learning child substituted [Φ] (voiceless bilabial fricative) and [β] (voiced bilabial fricative), sounds nonexistent in English, for /f/ and /v/ respectively. Children seem to produce only certain features of target sounds, probably due to the constraining effects of innate mechanisms of speech perception and production.

The other major developmental process noted in L1 phonological acquisition is overgeneralization: the use of one sound in the target language for another. Velten (1943) writes that his English-learning child initially used [u] in words that have /ʊ/ or /u/, later using it

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for all mid and high vowels as well.

A study by Johansson (1973) suggests that these two developmental processes are also at work in the acquisition of L2 phonology. In her study, 180 native speakers of nine different languages, learning Swedish as L2, were asked to repeat a set of Swedish words and sentences. Results indicated that though many errors were attributable to L1 transfer, some were not. Johansson identified approximation and over-generalization as underlying non-transfer errors.

The presence of such non-transfer variants has been also pointed out by other researchers such as Nemser (1971), Dickerson (1975), and Beebe (1980, 1983). The findings of these researchers support the interlanguage hypothesis: that L2 learners' speech is the patterned, internally structured, product of a linguistic system, distinct from L1 and L2. Interlanguages' successive stages represent an evolving series of linguistic systems (Nemser, 1971). Similar notions have been pointed out by Menyuk (1971) and others with respect to acquisition of L1 phonology. According to this view, child phonological systems have their own structure, distinct from adults'. The child's system has also been described as constantly evolving toward adults' (Menyuk, 1971).

Non-transfer variants are not necessarily free from the influence of L1 even though they are not produced by exact transfer of an L1 variant. Flege's (1980) study of the phonetic contrast between English /p,t,k/ and /b,d,g/ produced by Arabic speakers suggests that L2 learners often produce sounds phonetically intermediate between L1 and L2 sounds. Such 'intermediate' sounds gradually approximate the norms of L2 sounds, showing increasingly fewer features of L1 and more of L2. Thus, at least some L2 approximative variants are influenced by L1.

Wode (1980) proposed an interesting hypothesis with regard to developmental sequences in acquisition of L2 phonology. He claims that those L2 phonological elements which are sufficiently similar to

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L1 elements are replaced by those elements initially. Those L2 elements which are not sufficiently similar, however, are acquired in developmental sequences similar to those in L1 acquisition. An example of the former is the substitution of the German clear [l] for the English dark [ɬ] by his German-speaking children learning English in naturalistic environments. An example of the latter is the substitution of [w] for the English initial [ɹ] by the same subjects. Wode notes that these two processes also operate in classroom L2 acquisition. The latter process, the one following L1 developmental sequences, however, manifests itself to a much lesser extent in classroom L2 acquisition than in naturalistic L2 acquisition. He claims that the two types of L2 acquisition do not differ with respect to the basic neuropsychological processes involved in phonological acquisition. The difference between these two types of L2 acquistion lies in the effects of teaching methodology in classroom L2 acquisition. For example, although the substitution of [w] for the English [ɹ] by German learners of English has been reported to occur in classroom L2 acquisition, it is much rarer than the substitution of the German [R]. He attributes this to the influence of orthography. Wode's hypothesis requires further supporting data. It does, however, point to a path research will have to tread: in order to construct a comprehensive theory of acquisition of L2 phonology, we need not only identify the processes shaping L2 phonology, but specify the conditions governing learners' adoption and use of the processes.

One principal issue related to the developmental aspect of L2 phonology is the relative effect of L1 transfer over time. Taylor (1975) analyzed syntactic errors made by elementary and intermediate ESL students. His findings suggest that transfer errors occur more frequently at the initial stage of L2 learning, while overgeneralization errors occur more frequently at later stages. The previously mentioned studies conducted by Flege (1980) and Gass (1983) suggest that

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Taylor's finding may also be valid in the acquisition of L2 phonology. Beebe (1983) provides some support for this claim as well. In analyzing data collected from low-intermediate and low-advanced ESL students, she found that very few pronunciation errors result from exact transfer of an L1 variant. Two main types of non-transfer errors were approximations and composites — the sequential production of two variants for one target sound. Although further experimental studies are necessary, it seems to be the case that direct transfer is more prevalent in the initial stage than at later stages, and that other processes such as approximation and overgeneralization become more prevalent at later stages.

To summarize, processes such as approximation and overgeneralization identified in L1 acquisition have been shown to be at work in L2 acquistion. Furthermore, direct L1 transfer seems the dominant process only at the initial stage of L2 learning. The aforementioned developmental processes seem to become salient at later stages.

4. Production: Universal Phenomena

Stampe (1969, 1973) proposed the theory of natural phonology. This theory claims that the learning of L1 phonology requires a gradual elimination of the child's tendencies toward simplification. These innate tendencies or processes are thought to be the result of "the restrictions of the human speech capacity (1969:443)", and thus to be universal. Ingram (1976, 1979) outlines some frequently observed processes: (1) stopping: substitution of a stop for a fricative or an affricate, e.g. 'shoes' [tu:d]; (2) fronting: substitution of a front consonant for a back consonant, e.g. 'goose' [du:s]; (3) gliding: substitution of a glide for a liquid, e.g. 'ready' [wɛdi]; (4) vocalization: substitution of a vowel for a syllabic consonant, e.g. 'apple' [apo]; (5) vowel neutralization, e.g. 'basket' [sʌkʌ]; (6) final obstruent devoicing, e.g. 'bed' [bɛt]; (7) consonant harmony: assimilation of consonants

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to each other, e.g. 'duck' [gʌk]: (8) syllable simplification: modification of syllable structure to CV, e.g. 'dog' [dogə].

If the 'universal' processes reported in L1 phonological acquisition are the result of the restriction of the human speech capacity, as Stampe claims, it seems possible to find at least some of these processes operating in L2 phonological acquisition, despite the differences in physiological maturation of L1 and L2 learners. In fact, this seems to be the case. Wode (1977, 1980) reports substitution of the glide [w] for the liquid [r] in German learners of English, a phenomenon not attributable to L1 transfer. Sekiya (1976) noted the substitution of a schwa or back vowel for the dark [l] in the speech of advanced Japanese learners of English, a phenomenon not attributable to L1 transfer. Johansson's (1973) study, previously described, shows evidence of a phenomenon similar to vowel neutralization: subjects with different L1 backgrounds showed a general tendency for the articulator to move from the extreme higher and lower positions to a neutral position.

Stampe (1969) notes that speakers of languages without final obstruents tend to devoice final voiced obstruents of foreign words. Although Stampe does not give any specific empirical data to support this claim, there may be some validity in it. Japanese is one of those languages which lack final obstruents. The data reported by Dickerson concerning Japanese learners' pronunciation of the English /z/ reveal a tendency to devoice /z/ in final position, a phenomenon not totally attributable to their L1.

Tarone (1980) claims that universal preference for the CV syllable operates as a process independent of transfer. In order to show that some syllable structure errors are not due to L1 transfer, but due to universal CV preference, Tarone found it necessary to demonstrate that subjects would make syllable structure errors even when the same sequence of sounds exist in both L1 and L2. Thus, she categorized syllable structure errors made in English by speakers of Korean,

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Cantonese, and Portuguese into transfer and non-transfer errors, and then attributed the non-transfer errors to the postulated universal CV preference. One weakness of Tarone's study is that her subjects were native speakers of open syllable-dominant languages. It is conceivable that even if both L1 and L2 have the same sequence, the learner may still alter that sequence in L2 so as to fit it into the dominant CV pattern of L1. To conclude safely that some syllable structure errors are due to universal CV preference rather than L1 transfer, future research should investigate the L2 syllable structure of learners such as Poles, whose L1's are closed syllable-dominant.

To summarize, although more empirical evidence is required to claim the validity of these reported 'universal' processes, it seems likely that L2 phonological acquisition shares some proposed 'universal' processes of L1 phonological acquisition.

It was noted previously that some universal principles seem to be operating in determining the order of acquisition in L1 phonology. This order has been claimed by Jakobson (1941/1968) to reflect a universal hierarchy of distinctive features. Ferguson (1979) notes that empirical data seem to support this claimed relationship between universal markedness and order of acquisition. Czech [r̝] (alveolar rolled fricative) for instance, a sound rarely found in world languages, is among the last to be acquired by Czech children, while [t] and [d], sounds commonly found in world languages, are among the first to be acquired by any child.

In L2 phonology, there have been attempts to establish a hierarchy of difficulty in learning L2 sounds. Proponents of the contrastive analysis hypothesis claimed that "those elements that are similar to [the learner's] native language will be simple for him, and those elements that are different will be difficult (Lado, 1957:2)." Stockwell and Bowen (1965) attempted to establish a hierarchy of difficulty in learning L2 sounds based on a theory of contrastive analysis. Unlike

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this theoretical ordering, Briére's (1966) hierarchy is data-based. In testing English speakers' reproduction ability of fourteen non-English sounds, Brière established a hierarchy for the sounds tested based on the mean number of correct reproductions produced by subjects. He found that the target sounds which were close equivalents of L1 sounds were easier for the subjects to learn than the target sounds without such equivalents. He concludes that a description of sounds at the phonemic level is inadequate, and that a description in terms of detailed articulatory features is necessary to determine a hierarchy of difficulty.

All the aforementioned studies support the stance of the contrastive analysis hypothesis that the more similar the L1 and L2 sounds in question, the easier to learn the L2 sound. Johansson's (1973) study, however, presents some evidence showing that this is not necessarily the case. She found that some L2 sounds similar to L1 sounds were hard for subjects to reproduce, and that some L2 sounds different from L1 sounds were easy for them to reproduce. Her data also showed that the same vowels which appear early in children's speech and which are commonly found in world languages were reproduced with fewest phonetic deviations. Wode's (1980, 1981) study also supports Johansson's results. He compared L2 substitutions for selected English vowels made by speakers from various L1 backgrounds. He noted that the diphthongs /aɪ, ɔɪ, aʊ/ tended to be produced in a fairly target-like manner irrespective of students' L1 backgrounds.

Further support for the influence of universal markedness in determining the relative degree of difficulty in learning L2 sounds comes from a study conducted by Anderson (1982). She analyzed syllable structure errors made by Egyptian Arabic, Mandarine Chinese, and Amoy Chinese learners of English to investigate the validity of predictions made by contrastive analysis. She found that some of the predictions were valid, but others were not. Furthermore, she examined shared patterns of syllable structure error to ascertain whether language

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universals and developmental processes found in L1 acquisition are operating in the acquisition of L2 syllable structure.

One of Anderson's findings was that a longer consonant cluster was more difficult than a shorter one for both Arabic and Chinese groups. Anderson explains this phenomenon in terms of universal markedness. Greenberg (1978) had reported that the existence of longer clusters implies the existence of shorter ones, but not vice versa in world languages. Therefore, the longer the cluster is, the more marked it is. This universal markedness rule had also been claimed to play a role in acquisition of L1 phonology. Templin's (1957) cross-sectional study of American children's acquisition of consonant clusters had shown that L1 children also have more difficulty pronouncing longer consonant clusters than shorter ones.

Anderson's second finding was that initial clusters were pronounced accurately significantly more often than final clusters by both groups. This phenomenon also seems to be related to a proposed rule of universal markedness. The notion of strength of position from the theory of natural phonology states that initial position in the syllable is universally stronger than final position (Hooper 1976). This universal markedness rule also seems to be operating in L1 acquisition. Templin's (1957) study had indicated that children acquiring English as L1 also have more difficulty pronouncing final clusters than initial clusters.

To summarize, the findings reported by these researchers support the claim that a universal hierarchy, as proposed in the acquisition of L1 phonology, is also influencing the acquisition of L2 phonology.

Eckman (1977, 1981) proposed a hypothesis which combines the notion of a universal hierarchy with the contrastive analysis hypotheses. His Marked Differential Hypothesis states that if the contrastive analysis hypothesis incorporates the notion of universal markedness, it can then predict the relative degree of difficulty in learning L2

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sounds. According to this hypothesis, those areas of L2 which will be difficult are those areas which are different from, and relatively more marked than, L1. For example, Eckman's (1981) Cantonese subjects sometimes devoiced the final voiced obstruents /b,d,g,z/, although they always maintained a voice contrast in other positions. Eckman proposes a terminal devoicing rule for these speakers. Since Cantonese has no voice contrast in any position, this rule cannot be attributed solely to L1. Contrastive analysis predicts that Cantonese learners of English would have difficulty maintaining a voice contrast in initial, medial, and final positions. The voice contrast hierarchy determines the relative degree of difficulty of maintaining a voice contrast in each position. His subjects had mastered a voice contrast in less marked positions, initial and medial, but not in the most marked position, final. Combining the contrastive analysis hypothesis with universal markedness seems promising in light of increasing evidence that: (1) there is a close relationship between universal markedness and order of acquisition in L1 phonology; and (2) universal processes seem to be working in the shaping of L2 phonology, independent of L1 transfer or, perhaps, in interaction with it.

Conclusion

This paper has attempted to clarify the nature of the acquisition of L2 phonology by means of a comparison with the acquisition of L1 phonology. The studies reviewed in this paper have shown that L1 transfer is not the only process shaping L2 phonology. The following phenomena seem to have parallels in the acquisition of L1 and L2 phonology: universal perceptual constraints; influence of lexical knowledge on perception; approximation; overgeneralization; and universal processes such as gliding, vocalization, vowel neutralization, final obstruent devoicing, the relative degree of difficulty of consonant clusters depending on their position and length, and CV syllable pref-

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erence. Furthermore, it has been suggested that L1 transfer operates to a lesser extent at later stages of L2 acquisition. Such developmental processes as approximation and overgeneralization become more prevalent at those later stages. Thus, the view that the acquisition of L2 phonology is entirely different from the acquisition of L1 phonology is untenable. In order to further clarify the nature of acquisition of L2 phonology, future research needs to be directed towards systematically collecting empirical data on which to base claims. Furthermore, findings from the research on acquisition of L1 phonology and language universals should be incorporated into the study of acquisition of L2 phonology. Such an endeavor will eventually contribute to the establishment of a comprehensive theory of phonological acquisition.

Notes

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Bibliography

Anderson, J. I. "Syllable Simplification in the Speech of Second Language Learners." Paper presented at the Sixteenth Annual TESOL Convention, Honolulu, Hawaii, 1982.

Bailey, N., et al. "Is there a 'Natural Sequence' in Adult Second Language Learning?" *Language Learning,* 24 (1974), 235–243.

Barton, D. "Phonemic Discrimination and the Knowledge of Words in Children under Three Years." *Papers and Reports on Child Language Development,* 11 (1976), 61–68.

_____. "The Discrimination of Minimally Different Pairs of Real Words by Children Aged 2;3 to 2;11." In *The Development of Communication.* Ed. N. Waterson & C. Snow. New York: John Wiley and Sons, 1978.

Beebe, L. M. "Sociolinguistic Variation and Style Shifting in Second Language Acquisition." *Language Learning,* 30 (1980), 433–48.

_____. "Myths about Interlanguage Phonology." In *Theoretical Issues in*

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The Japan Association of College English Teachers (JACET)

Contrastive Phonology. Ed. S. Eliasson. Heidelberg: Julius Groos Verlag, 1983.

Brière, E. J. "An Investigation of Phonological Interference." *Language*, 42 (1966), 768–96.

Carroll, J. and S. Sapon. "Discriminative Perception of Speech Sounds as a Function of Native Language." *General Linguistics*, 3 (1958), 62–71.

Chomsky. N. "Review of Skinner (1957)." *Language*, 35 (1959), 26–58.

Dickerson, L. "The Learner's Interlanguage as a System of Variable Rules." *TESOL Quarterly*, 9 (1975), 401–8.

Dulay, H., and M. Burt. "Should We Teach Children Syntax?" *Language Learning*, 23 (1973), 245–258.

_____. "A New Perspective on the Creative Construction Process in Child Second Language Acquisition." *Language Learning*, 24 (1974a), 253–78.

_____. "Natural Sequences in Child Second Language Acquisition." *Language Learning*, 24 (1974b), 37–53.

Eckman, F. R. "Markedness and the CA Hypothesis." *Language Learning*, 27 (1977), 315–30.

_____. "On the Naturalness of Interlanguage Phonological Rules." *Language Learning*, 31 (1981), 195–216.

Edwards, M. L. "Perception and Production in Child Phonology: the Testing of Four Hypothesis." *Journal of Child Language*, 1 (1974), 205–19.

Eilers, R.E., et al. "Linguistic Experience and Phonemic perception in Infancy: A Cross-Linguistic Study." *Child Development*, 50 (1979), 14–18.

Eimas, P., et al. "Speech Perception in Infants." *Science*, 171 (1971), 303–6.

Ervin-Tripp, S. "Is Second Language Learning Like the First?" *TESOL Quarterly*, 8 (1974), 111–27.

Ferguson, C. A. "New Directions in Phonological Theory: Language Acquisition and Universal Research." In *Current Issues in Linguistic Theory*. Ed. R. W. Cole. Bloomington: Indiana University Press, 1979.

_____., and C. Farwell. "Words and Sounds in Early Language Acquisition." *Language*, 51 (1975), 419–39.

Flege, J. E. "Phonetic Approximation in Second Language Acquisition." *Language Learning*, 30 (1980), 117–34.

_____. "The Phonological Basis of Foreign Accent: A Hypothesis." *TESOL Quarterly*, 15 (1981), 443–55.

Fries, C. C. *Teaching and Learning English as a Foreign Language*, Ann Arbor: University of Michigan Press, 1945.

Garnica, O. K. "The Development of Phonemic Speech Perception" In *Cognitive Development and the Acquisition of Language*. Ed. T. E. Moore. New

NII-Electronic Library Service

The Japan Association of College English Teachers (JACET)

York: Academic Press, 1973.

Gass, S. "Development of Speech Perception and Speech Production Abilities in Adult Second Language Learners." A revised version of a paper presented at AILA in Lund, Sweden, 1983.

Gills, M. and R. Weber. "The Emergence of Sentence Modalities in the English of Japanese-Speaking Children." *Language Learning*, 26 (1976), 77–94.

Greenberg. J. H. "Some Generalizations Concerning Initial and Final Consonant Clusters," *in Universals of Human Language*, II. Ed. J. H. Greenberg. Palo Alto, CA: Stanford University Press, 1978.

Hakuta, K. "Prefabricated Patterns and the Emergence of Structure in Second Language Acquisition." *Language Learning*, 24 (1974), 287–297.

Hansen-Bede, L. "A Child's Creation of a Second Language." *Working Papers in Bilingualism*, 6 (1975), 103–23.

Hooper, J. B. *An Introduction to Natural Generative Phonology*. New York: Academic Press.

Ingram, D. *Phonological Disability in Children*. New York: Elsevier North-Holland, Inc., 1976.

Johansson, F. A. *Immigrant Swedish Phonology: A Study in Multiple Contact Analysis*. Lund, Sweden: CWK Gleerup, 1973.

Jakobson, R. *Child Language, Aphasia, and Phonological Universals*. The Hague: Mouton, 1968. (English translation of *Kindersprache, Apasie und Allgemeine Lautgesetze*, Uppsala, 1941.)

Klein, P. P. "Acoustic Analysis of the Acquisition of Acceptable /r/ in American English." Paper presented at the Society of Research in Child Development, Santa Monica, California, March, 1969; cited in Menyuk, 1971.

Lado, R. *Linguistics Across Cultures: Applied Linguistics for Language Teachers*. Ann Arbor: The University of Michigan Press, 1957.

Larsen-Freeman, D. "The Acquisition of Grammatical Morphemes by Adult ESL Students." *TESOL Quarterly*, 9 (1975), 409–19.

Lobo, F., and K. Yoshida. "The Perceptual Acquisition of English Phonology by Japanese Students." Paper presented at the 33rd Annual Georgetown Round Table on Languages and Linguistics, March, 1982.

Lotz, J., et al. "The Perception of English Stops by Speakers of English, Spanish, Hungarian, and Thai: a Tape-Cutting Experiment." *Language and Speech*, 3 (1960), 71–7.

MacCain, K., C. Best, and W. Strange. "Categorical Perception /r/ and /l/ by Japanese Bilinguals." *Applied Psycholinguistics*, 2 (1981), 369–390.

Makino, T. "English Morpheme Acquisition Order of Japanese Secondary School Students." Ph.D. dissertation, University of New Mexico, 1979.

NII-Electronic Library Service

The Japan Association of College English Teachers (JACET)

Menn, L. "Pattern, Control and Contrast in Beginning Speech, a Case Study in the Development of Word Form and Word Function." Ph.D. dissertation, University of Illinois, 1976.

Menyuk, P. *The Acquisition and Development of Language.* Englewood Cliffs, N.J.: Prentice-Hall, 1971.

Miyawaki, K., et al. "An Effect of Linguistic Experience: The Discrimination of [r] and [l] by Native Speakers of Japanese and English." *Perception and Psychophysics,* 18 (1975), 331–340.

Moffitt, A. "Consonant Cue Perception by 20–24 Week Old Infants." *Child Development,* 42 (1971), 717–31.

Mowrer, O. H. "Speech Development in the Young Child: the Autism Theory of Speech Development and Some Clinical Applications." *Journal of Speech and Hearing Disorder,* 17 (1952), 263–68.

Nemser, W. "Approximative Systems of Foreign Language Learners." *IRAL,* 9 (1971), 115–23.

Scholes, R. "Phonemic Interference as a Perceptual Phenomenon." *Language and Speech,* 11 (1968), 86–103.

Scovel, T. S. "Contrastive Analysis is Alive and Well and Living in Phonology." Paper presented at the Tenth Annual TESOL Convention, New York, 1976.

Sekiya, Y. "Phonological Interference in the English Speech of Japanese Speakers." Unpublished MS; Term Paper, University of Wisconsin, Green Bay, 1976.

Shvachkin, N.Kh. "The Development of Phonemic Speech Perception in Early Childhood." In *Studies of Child Language Development.* Ed. Ferguson and Slobin. New York: Holt, Rinehart & Winston, 1973. (English translation of "Razvitiye Fonematicheskogo Vospriyatia Rechi V Rannem Vozraste," 1948.)

Singh, S., and J. Black. "Study of 26 Intervocalic Consonants as Spoken by Four Language Groups." *Journal of the Acoustic Society of America,* 39 (1966), 372–387.

Smith, N. V. *The Acquisition of Phonology: A Case Study.* Cambridge: Cambridge University Press, 1973.

Stampe, D. "A Dissertation on Natural Phonology." Ph.D. dissertation, University of Chicago, 1973.

_____. "The Acquisition of Phonetic Representation." In *Papers from the Fifth Regional Meeting of the Chicago Linguistic Society.* Ed. Binnick et al. Chicago: University of Chicago Department of Linguistics, 1969.

Stevens, K. N., et al. "Crosslanguage Study of Vowel Perception." *Language and Speech,* 12 (1969), 1–23.

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The Japan Association of College English Teachers (JACET)

Stockwell, R. P., and J. D. Bowen. *The Sounds of English and Spanish.* Chicago: The University of Chicago Press, 1965.

Tarone, E. "The Phonology of Interlanguage." in *Understanding Second and Foreign Language Learning.* Ed. J. C. Richards. Rowley, Mass.: Newbury House, 1978.

_____. "Some Influences on the Syllable Structure of Interlanguage Phonology." *IRAL,* 18 (1980), 139–52.

Taylor, B. "The Use of Overgeneralization and Transfer Learning Strategies by Elementary and Intermediate Students in ESL." *Language Learning,* 25 (1975), 73–107.

Templin, M. C. *Certain Language Skills in Children.* Minneapolis: The University of Minnesota Press, 1957.

Trehub, S. E. "Infants' Sensitivity to Vowel and Tonal Contrasts." *Developmental Psychology,* 9 (1973), 91–96.

Velten, H. V. "The Growth of Phonemic and Lexical Patterns in Infant Language." *Language,* 19 (1943), 281–92.

Wahler, R. G. "Infant Social Development: Some Experimental Analyses of an Infant-Mother Interaction During the First Year of Life." *Journal of Experimental Child Psychology,* 7 (1969), 101–13.

Winitz, H. *Articulatory Acquisition and Behavior.* New York: Appleton, 1969.

Wode, H. "The L2 Acquisition of /r/" *Phonetica,* 34 (1977), 200–17.

_____. "Phonology in L2 Acquisition." In *Second Language Development: Trends and Issues.* Ed. S. W. Felix. Tübingen: Gunter Narr Verlag, 1980.

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