ON THE EXPLANATION OF PHONIC INTERFERENCE[1]

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The question as to what information is of fundamental importance in the construction of phonological tasks in a course in a foreign language is raised and an attempt is made to indicate an answer with respect to a particular problem encountered by native speakers of Japanese and Russian in learning English. Conventional phonemics and contrastive analysis are found deficient as bases for the explanation of this problem and generative phonology is shown to provide a more promising basis. Finally, suggestions are made for incorporating information from a generative phonology into a set of tasks which would have the goal of eliminating the observed interference behavior.

That the goal of a foreign language (L2) course is the modification of the learner and his behavior in some way is beyond dispute. A major factor in such modification is the elimination of the influence of the native language (L1) on L2 behavior, i.e., the elimination of interference behavior. It follows that we cannot expect to attain maximum success in the teaching of the practical phonology of an L2 unless we have a clear understanding of what the nature of the influence of the L1 and L2 behavior might be—i.e., unless we have an explanation of interference behavior. This paper suggests that certain modes of explanation based on conventional phonemics and conditioning theory are unsatisfactory in the explication of a particular case of interference behavior and that generative phonology in the sense of Halle, Chomsky, et al., shows more promise in this area.

The substitution of different sounds for the interdental fricatives of English by learners from different L1 backgrounds has been marked by many investigators. Weinreich (1966, p. 20) notes that the majority of French speakers substitute [s] and [z] for English [θ] and [ð], respectively, whereas Russian speakers substitute [t] and [d]. Berger (1951, pp. 47-51) reports the same

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substitution for Russian speakers as well as the substitution of [s] and [z] among schooled French speakers—[t] and [d] among unschooled. Lado (1957) finds [s] for English [θ] in Japanese speakers, [t] in speakers of Thai and Tagalog. Kohmoto (1965) also reports [s] and [z] for [θ] and [ð] in Japanese speakers. Angus (1937) reports that Turkish speakers fluctuate between [t] and [s] for [θ]. The present discussion will be restricted primarily to the treatment of Russian-based substitution of [t] for [θ] and Japanese-based substitution of [s] for the same sound.

It is generally conceded that one kind of interference behavior, "phone substitution," results when a learner unconsciously identifies or categorizes an L2 sound as being "the same as" a particular L1 sound (even though it differs from the L1 sound in the perceptions of native speakers of the L2) and substitutes the latter sound for the former in L2 utterances. The two questions that must be answered by an explanation of phone substitution are: (1) On the basis of what property of the L2 sound does the learner identify the L2 sound—i.e., what properties are identified by the learner as being shared by the L2 sound and the substituted L1 sound? (2) Why does the learner identify the L2 sound on the basis of these properties rather than others?

A significant explanation of interference must be based on a phonological analysis which is justified independently of the specific goal of explaining interference. It is possible to construct a phonological analysis specifically for the purpose of explaining interference behavior; but such an analysis would explain nothing, since it would be entirely *ad hoc*. If our explanation of interference is to be significant, the dimensions we choose in identifying or describing L1 and L2 sounds (that is, the answer which we provide for question 1 in a given case of interference) must be motivated within the analyses themselves. For example, we may loosely describe the motivation behind a conventional phonemic analysis as the desire to provide an economical description of contrasting classes of phones (each phone described in articulatory terms), and therefore the dimensions chosen for the conventional description of a sound pattern are those articulatory dimensions (and only those) along which all members of one class are distinguished from all members of each other class. Conventional phonemics, then, provides such dimensions as manner and point of articulation, voicedness in the case of consonants, and height and degree of frontness-backness in the case of vowels (see below); if we are to explain phonic interference in terms of conventional phonemics, we must answer question 1 in terms of these dimensions.

A plausible answer to question 2 would be that the learner identifies the L2 sound on the basis of those of its properties which are distinctive or phonemic in the L1, although the obvious subsidiary question arises: On the basis of which of its distinctive features is the sound identified? A phonological analysis of a specific language (and the general theory of phonology from which the specific analysis derives) can be considered as an appropriate basis for the explanation of interference behavior if (a) it attributes distinctiveness to that property upon which the learner who speaks the specific language in question bases his identification of the L2 sound (b) in the cases where the learner "chooses" one from a *set* of distinctive properties, the analysis provides grounds for explaining this choice (for example, on the basis that some distinctive properties are more important than others in the categorization of sounds).

In the initial stages of L2 acquisition a learner may fluctuate considerably in the L1 segment he substitutes for a given L2 sound. Berger (1951, p. 47) reports that Russian speakers learning English substitute [ds], [tθ], [dð], [s], and [z] for the interdentals before they settle, for the most part, on [t] and [d]. Van Teslaar (1966) has noted that learners who pronounce well in a learning situation may revert to interference behavior under the strain of conversational conditions. In general we can expect the learner's L1 to influence his performance more deeply under the conditions found in conversation than under those in a learning situation where the learner may be allowed to concentrate on the careful, correct articulation or comprehension of isolated sounds or sound sequences. For these reasons, the study of interference in conversational performance is likely to be more revealing than that of interference in learning performance. An additional reason for studying and attempting to explain conversational rather than learning performance is the obvious practical one that conversational performance is precisely what we wish a course in an L2 to modify—a course which does not succeed in the specific task of modifying conversational performance must be considered a failure. What is to be explained, then, is the learner's performance in conversation.

CONVENTIONAL PHONEMICS AND CONTRASTIVE ANALYSIS

Most attempts to explain interference in general have been couched in terms of contrastive analysis based on "conventional"

or "classical" phonemics. It is thus important to ascertain the answers conventional phonemics can provide for the questions formulated above.

Phonetic Properties in Conventional Phonemic Analysis

Although the strictly articulatory or physiological description of speech sounds involves, from a narrowly linguistic point of view, an arbitrary system of classification, it has been found that the sound patterns of languages can be described in terms of a limited number of dimensions, usually expressed in articulatory terminology (as in Bloomfield, 1933, Chapter 6 on "Practical phonetics"; Jakobson, Halle, & Fant, 1952; and de Saussure, 1959, pp. 38-64 on "Phonologie"). Basic dimensions are (1) consonantal versus vocalic, (2) point of articulation among consonants, and frontness-backness among vowels, (3) manner of articulation among consonants, and height among vowels, and (4) voiced versus voiceless among consonants. Since we will be dealing only with voiceless consonants here, we can ignore the consonantal-vocalic and voiced-voiceless dimensions. In the consonant system, the dimensions point and manner of articulation have several well-known values ("bi-labial," "dental," "alveolar," etc., for the point dimension and "stop," "spirant," "nasal," etc., for the manner dimension). The presence in a given segment of one of these values on each dimension implies the absence from that segment of all others on that dimension so that, for our purposes, a voiceless consonant segment is fully determined within the sound pattern by its manner and place of articulation.

Assuming that the usual designations "stop," "alveolar," have universal validity—i.e., that these values have the same meaning from one phonemic description to another—we have some basis for comparison among sound patterns. In these terms the variants of English /θ/ and the variants of Japanese /s/ share the value "spirant" on the dimension "manner of articulation" and differ on the dimension of "point of articulation" in that /θ/ is interdental and Japanese /s/ is alveolar (Bloch, 1950, p. 343). Japanese /t/ is dental and therefore "phonetically closer" to /θ/ than is /s/ with respect to the point of articulation dimension although, of course, it differs from /θ/ on the manner dimension in being a stop rather than a spirant.

Trofimov and Jones (1923, p. 96) describe "normal" Russian /t/ as a voiceless dental plosive although one of its chief subsidiary members is alveolar. Russian /s/ is described by the same authors (p. 138) as a breathed blade-alveolar fricative.

Except that Russian /t/ has an alveolar allophone and Japanese does not, the variants of the dental stops and alveolar fricatives do not differ basically between Russian and Japanese.

Conventional Explanation of Substitutions for English [θ]

Phonetic Considerations

As noted above, the articulatory properties of the allophones of Russian /t/ and those of Japanese /t/ are quite similar, as are those of Russian /s/ and Japanese /s/. It seems improbable, then, that the substitutions of different sounds for English [θ] by Russian and Japanese speakers can be explained on purely articulatory grounds.

We might seek to explain the learners' behavior in terms of their respective histories of reinforcement. However, the form of behavior which must have been reinforced in the learner in order for him to exhibit the observed interference behavior—that is, production of [s] and [t] in echoic response to [θ]—is highly improbable since it would require a situation in which Russian- and Japanese-speaking adults produce [θ] and require their children to imitate them with [t] and [s], respectively.

It is possible that a Japanese adult who has a lisp history might identify English [θ] with his earlier attempts to produce [s] and therefore substitute specifically [s] for [θ] but the acceptance of this as a general explanation is excluded on obvious grounds.

The hypothesis that Japanese and Russian children must in general be trained to substitute [t] for earlier [θ] is not in keeping with what is known about child acquisition of phonology: In Lewis' compilation of 310 cases of phone substitution in French-, German-, and English-speaking children there are no cases of the substitution of the interdentals for other segments (Lewis, 1951; pp. 310-331).

The characterization of a sound pattern as a three- or four-dimensional matrix in conventional phonemics is apparently motivated on the grounds that this arrangement is convenient either for organizing fieldwork or for publication purposes. While the categories that arise from this motivation may offer the investigator a useful framework, they do not necessarily match the way in which the speaker-hearer tacitly categorizes the same segments. In order to be relevant to an investigation of interference behavior, a linguistic description must make the claim that those categories which it posits are, in fact, the categories in terms of

which a native speaker-hearer of the language categorizes or interprets speech utterances. Whether or not the native speaker-hearer unconsciously categorizes, e.g., consonantal sounds in accordance with their point and manner of articulation or in terms of some other set of dimensions and values, is an empirical question and a very basic one for the explanation of interference behavior.

Distinctiveness in Conventional Phonemics

Although conventional phonemicists have not always agreed in detail among themselves as to the basis for phonological analysis, the crucial distinction in phonemic analysis is clearly that between "contrastive" and "non-contrastive" distribution of phonetically similar segments. For example, Bloch (1948) finds the set of dental stops in Japanese to be in contrast with (and therefore phonemically distinct from) the set of dental (or denti-alveolar) affricates on the grounds of such pairs as [mats.to] 'if one waits' and [mat.te] 'waiting'.

Bloch finds, on the basis of conventional criteria, that the phonetic difference between the dental and alveolar point of articulation is not distinctive but is predictable on the basis of manner of articulation—stops are dental, spirants alveolar. It might be hypothesized that the possible substitution in Japanese speakers of [t] for [θ] does not actually occur because the basis for such a substitution—that is, the greater proximity of [t] to [θ] than of [s] to [θ] with respect to point of articulation—is undermined by the lack of contrast between dental and alveolar point of articulation in Japanese.

However, the same explanation does not hold for Russian. Apparently, the same relationship between dental stop and alveolar fricative holds in Russian (i.e., dental versus alveolar point of articulation is non-distinctive) since Russian /t/ has alveolar allophones. Thus, according to the hypothesis given above, we would expect the Russian, like the Japanese, to substitute [s] for [θ], whereas he actually substitutes [t].

Although the above treatment of interference behavior in terms of conventional phonemics does not exhaust the possibilities, a satisfactory explanation of interference in these terms is difficult, if not impossible.

GENERATIVE PHONOLOGY

A generative phonology, as a part of a full generative grammar, describes an aspect of the speaker-hearer's linguistic

competence. That is, an empirically adequate generative phonology characterizes that information upon which the native speaker-hearer's categorization or interpretation of speech sounds and sound sequences is based (though its relation to actual categorization performance may be quite indirect). In other words, it makes precisely the claim that a linguistic description must make if it is to be relevant to the explanation of interference behavior.

Phonological Properties in a Generative Phonology

There are two sets of dimensions or features in a generative phonology: (1) classificatory features, which are two-valued, and (2) phonetic features, which may have more than two values (Chomsky, 1964). The first set is a modification of the Jakobsonian features. It serves to categorize segment types in the underlying representations of morphemes from which the phonetic representations (in terms of phonetic features) are derived by the rules of the phonology (Chomsky, 1964; Halle, 1964a, 1964b; McCawley, 1965). The underlying representations of morphemes, then, are matrices with segments as columns and features as rows. Except for certain cases which will be noted immediately, each segment is designated within the matrix as having a value with respect to a given classificatory feature. However, if the designation of the value of a particular segment with respect to a particular feature is predictable by the rules of the phonology, either from the values of other features in the segment or from the values of features in neighboring segments, then that feature designation is left unspecified in the underlying form of the morpheme. Such designations will be supplied by the rules. For example, McCawley (1965) finds that the affricateness and length of [ts.] in, e.g., the Japanese form [mats.to] 'if one waits' is predictable by two general rules. The first (Rule 25, p. 136) states that when *u* occurs between two voiceless obstruents in underlying representations, it is represented phonetically by its voiceless counterpart [U] and the second (Rule 26, p. 137) that all dental stops that precede non-consonantal, diffuse, grave segments (including [U]) are phonetically affricate. (Apparently, Bloch interpreted McCawley's phonetic sequence [tsU] as phonetically [ts.].) Thus affrication need not be represented in the underlying forms of morphemes containing phonetic affricates before underlying *u* since this feature will be supplied by the rules of the grammar.

Part of the problem of explaining a particular instance of phone substitution is establishing what interpretation the learner has imposed on the context in which the substitution occurs.

This task is a highly complex one and we shall not attempt to perform it for the particular case of interference under discussion here. Instead we will limit the domain of our explanation of substitution for English interdentals to a phonetic environment which can be assumed to have minimal contextual influence on the learner's interpretation of the consonants in question.

Pause is, perforce, always identifiable by the learner as a boundary in L2 utterances; we assume that true vowels in L2 utterances are more easily identified as such than, say, glides are as glides; initial consonant clusters, if they exist in the L1 at all, are likely to exhibit interdependencies among their constituent segments which may influence the learner's identification of initial clusters in L2 utterances. With these factors in mind, we choose to limit our explanation to substitutions in the position between pause and true vowel.

Assuming a direct relationship between the substantive universal classificatory features (that is, "stridency," "continuity," "compactness," etc.; e.g., Halle, 1964a) and their phonetic correlates, we may evaluate English [θ], Japanese [t] and [s], and Russian [t] and [s] as consonantal, non-vocalic, diffuse (versus compact), acute (versus grave), and voiceless. Japanese and Russian [t] are discontinuous and mellow; [s] in both languages is continuous and strident. The facts to be explained, then, are that the Russian speaker categorizes [θ] as primarily mellow (as like his [t]) whereas the Japanese categorizes it as primarily continuous (like his [s]).

Explanation in Terms of Generative Phonology

Distinctiveness in a Generative Phonology

In a generative phonology a property of a particular segment may be said to be distinctive or phonemic in that segment if it is not predictable by a phonological rule. If it is predictable then it is non-distinctive. Bloch found the segment sequences [ts.] and [t.] to be in contrast on the basis of such forms as [mats.to] 'if one waits' and [mat.te] 'waiting.' In terms of a generative phonology, on the other hand, these two segment sequences are not distinct since the affricateness (or, in Jakobsonian terms, the stridency) of [ts.] is predictable. In this example, the value strident (versus mellow) of the segment [ts.] is predictable from the segment's position before *u* in underlying representations. The value of a particular segment with respect to a given feature may also be predictable on the basis of the values which that segment

alone has with respect to other features. For example, the fact that Japanese [s] is strident (rather than mellow) is predictable from the fact that it is "distinctively" obstruent, grave, continuous, and non-sharp (Rule 23, McCawley, p. 136).

Halle (1959) imposes on the inventory of underlying segments the condition that the maximum number of feature specifications in underlying segments be rendered predictable by phonological rule. He states (p. 34) that this condition is equivalent to the requirement that the inventory of segments be determined or described by a decision tree (more specifically the *simplest* decision tree) in which each node represents a feature and each branch from a node represents a value (+ or -) of the feature. The first (top) node divides all segments into two classes (those which are [+ consonantal] and those which are [- consonantal]), the second node divides each of these further into two classes ([+ vocalic] and [- vocalic]) and so on. Each path through the tree represents a distinct segment. That is, each segment is identified by answering a sequence of questions about it—Is it consonantal? Is it vocalic? diffuse?, etc. However, the process of identification of any one segment is generally more efficient for a given language if the questions are asked in one order than if they are asked in another. Thus, as a consequence of representing the structure of the segment inventory as the simplest decision tree, a hierarchy is established among the features. Halle writes (1959, p. 34): "The hierarchy of features seems to provide an explanation for the intuition that not all features are equally central to a given phonological system."

Although a generative phonology makes no direct claims about the perception of utterances, we might hypothesize a rather simple relationship between the phonological code and speech perception with respect to centrality of features within a system. This is namely that the information represented by the feature hierarchy on the decision tree is, all things being equal, reflected in perception by a "hierarchy of cue preference" (Bruner, Goodnow, & Austin, 1956, pp. 31, 35). The phonetic correlates of a feature which is high in the phonological decision tree will have greater importance in perception or, to use the term of Bruner, et al. (p. 31), a higher "degree of criteriality" in the classification of speech sounds by native speakers than that of a lower-placed feature.

Explanation

The value of any segment with respect to the stridency feature is predictable in Japanese (Morpheme-structure Rule 7,

p. 129; Phonological Rules 23 and 26, pp. 136-137 (McCawley, 1965)). On the other hand, the value of continuity is predictable only in very limited contexts. Although McCawley does not impose Halle's simplicity criterion on the inventory of underlying segments in his analysis of Japanese, the complete predictability of stridency values and the incomplete predictability of continuity values would be represented in tree-diagram form by the placement of continuity above stridency in the feature hierarchy. We would thus predict that a Japanese speaker, all things being equal, will "attend to" the phonetic correlates of continuity in speech utterances and ignore the correlates of stridency. This would explain his production of [s] for [θ] since these two segments share the same continuity value though they differ with respect to stridency.

The Russian situation presents a slightly more subtle problem since both continuity and stridency are distinctive. However, the description of the sound pattern of Russian as a whole is simpler if the stridency feature is placed above the continuity feature in the underlying decision tree than if the order is reversed (Halle, 1959, p. 46). The Russian speaker will thus attach a higher degree of criteriality to the stridency dimension than to the continuity dimension. He thus groups [θ] with [t] on the basis of shared mellowness. A general rule in Russian states that all mellow non-nasal consonants are stops (Halle, 1959, Rule P 5a, p. 65). Having categorized [θ] as mellow, the Russian speaker derives the information that it is also a stop and produces [t] instead.

Explanations of the other cases of phone substitution enumerated above may be attempted with the reservation that the structure of the underlying segment inventory of a language cannot be known with any degree of certainty without a set of explicit rules which relate underlying forms to their phonetic consequences—that is, without a generative phonology. Since treatments of Thai, Tagalog, and French from this point of view are not available (Lees, 1960, provides a generative phonology of Turkish), we must rely on distinctive feature analyses of conventional phoneme inventories for our explication of interference in these cases.

From what has preceded, it should be clear that an explanation of phone substitution for [θ] of the sort offered above for Japanese and Russian speakers is based on the independence of the stridency and continuity features. If a language has only strident continuants and mellow stops among its obstruents then we cannot explain the substitution of, e.g., [t] for [θ] by speakers of that language on the basis of the higher position of stridency

(over continuity) in the hierarchy of features since stridency and continuity are combined in the same feature. French (Jakobson & Lotz, 1949), Turkish (Lees, 1960), Tagalog (Bloomfield, 1917), and Thai (Abramson, 1962) all have coalesced continuity and stridency. Turkish and French speakers exhibit fluctuation between [s] and [t] as might be expected on the grounds of the coalescence of stridency and continuity. On the other hand, the explanation of Thai- and Tagalog-based substitution of [t] for [θ] is not possible in this way. We might conjecture that, although there is no independent formal reason to differentiate between continuity and stridency in these languages and no way to establish whether the distinctive phonetic correlates upon which categorization of sounds is based are those of stridency or those of continuity, the feature in question is, in fact, stridency, since this would explain the categorization of mellow [θ] with mellow [t] by speakers of these languages. However, in the absence of independent evidence for this conjecture the explanation is *ad hoc*.

PEDAGOGICAL IMPLICATIONS

Phonological systems are notoriously well entrenched in adults. Halle (1964b, p. 344) conjectures that "... changes in later life are restricted to the addition of a few rules in the grammar and that the elimination of rules and hence a wholesale restructuring of his grammar is beyond the capabilities of the average adult." Although this conjecture is made specifically with respect to changes in the native-language grammar of an adult its implications for L2 learning are clear; in fact, if the conjecture is extended to changes in the conceptual structures underlying speech perception in general (including the perception of L2 utterances by learners) then, as is well known, considerable evidence can be adduced from the study of L2 learning to support it. In some cases, though, learners do gain a strong intuition for an L2, and it is well to inquire how we may increase the probability that a course in an L2 will produce such learners.

It should be clear that the observed cases of interference in Japanese- and Russian-based articulations of English interdentals cannot be explained simply as the failure of the Russian speaker to "discriminate the stimuli [θ] and [t]" or of the Japanese speaker to "differentiate the responses [θ] and [s]." These problems apparently lie in the identification of an unfamiliar event-type (the sound [θ] in English utterances) in terms of a highly-structured cognitive system (the phonology of the L1) which is not

appropriate to the task of identifying the event-type in question. The solution to these problems lies not in the modification of the superficial, particular consequences of the underlying general system, but in a basic alteration of the underlying general system itself.

One way in which we might proceed to alter the linguistic cognitions of learners of English as an L2 is by assigning the task of learning to read aloud systematic phonemic (or perhaps more abstract) representations of English utterances. Since the phonology of a language is a set of rules which relate syntactic representations of utterances to their phonetic realizations, the ability to "read" the syntactic representation of an utterance can be considered as equivalent to a tacit knowledge of the phonology of the language. The tacit application of phonological rules in the reading of an abstract transcription demands that segment-letters be categorized by the reader in accordance with the classificatory-feature complexes which characterize their corresponding segments (since the rules are formulated in terms of these features). For this reason, a major goal of phonological instruction is the learner's acquisition of the ability to categorize segments accordingly.

Various simple techniques for accomplishing this task come to mind: for example, in order to teach the consonant system, we might simply present the learner with single-syllable utterances composed of a consonant of the L2 followed by the optimal vowel [a] and ask him to assign the syllables to categories, reinforcing him positively when he groups them in accordance with the compactness value of the initial consonant and negatively when he does not. Then present him with the same syllables (or perhaps only with syllables that have consonants of the same compactness value) and ask him to categorize them in accordance with their gravity values; similarly with stridency, continuity, etc. This method has several drawbacks. First of all, it is virtually certain to be more time-consuming than its effects warrant. Second, it may be confusing for the learner to find (at least in this way) that one categorization places two given segments in different classes and another categorization places the same two segments on the same class. It is conceivable that, if features and their categories are presented in this way, the learner will resort to the completely meaningless and *ad hoc* memorization of features and the semgnet categories that they determine.

Phonetic features (as opposed to classificatory features) represent the intrinsic physical properties of sounds; the categories which they determine may therefore be termed formal in the

sense of Bruner, et al. (1956, pp. 5-6). The method of teaching classificatory features and categories suggested above is based on the supposition that classificatory categories might fruitfully be learned formally in terms of the intrinsic physical properties of the sounds which correlate with the segments categorized. However, the role of classificatory features and categories in a phonology is functional or relational rather than formal in that they represent the relationships among segments in the sound pattern and the way in which segments enter into the applicability of phonological rules or the way in which segments "pattern." These facts suggest that the representation of particular segments in terms of classificatory features might best be learned simply as one aspect of learning the rules in which they appear. For example, the choice of the phonemic form of the regular plural and possessive of nouns, and the third person singular of verbs depends upon categorizing correctly the final segments of noun and verb stems—first with respect to gravity and stridency (since stems with final non-grave, strident consonants take the form [ɨz]), and second with respect to voiced-voiceless (since, of the stems that do not come under the above rule, those that end in voiced segments take [z] and those that end in voiceless segments take [s]). The Japanese speaker's problems distinguishing [θ] from [s] may thus be subsumed under the general problems of first, distinguishing strident continuants from mellow continuants and second, choosing the correct ending for regular noun plurals and possessives, and for third singular verbs. In this case the acquisition of the ability to categorize segments correctly with respect to the stridency feature takes on a functional significance which is lacking in the learning procedure suggested earlier. In fact, the ability to form correctly novel regular noun plurals and possessives, etc., under conversational conditions is strong (if not conclusive) evidence that the learner has acquired the classificatory categories of strident and mellow regardless of whether the learner "differentiates the responses" [θ] and [s].

Similarly, we might make the Russian's mastery of the continuant-discontinuant distinction a part of his acquisition of the rule (noted by Sapir, 1925) that certain noun stems which end in voiceless continuants have corresponding stem-final voiced continuants in their pluralizations (for example, [nayf]-[nayvz], [bæθ]-[bæðz], [haws]-[hawzɨz], etc. This rule will in no case apply to nouns with stem-final stops. Thus, we might expect a new formation [feyðz] (meaning "religious denominations") as the plural of [feyθ], but we would not expect a new formation *[bædz] related to [bæt] or *[kʌbz] related to [kʌp]. In learning this rule,

then, the Russian speaker must learn to intuit the systematic distinction between continuants and stops and, as a consequence, the functional distinction between [θ] and [t].

It should be clear that the remarks above are only suggestive and that the construction of a maximally effective course in the practical phonology of an L2 is an intricate task into which all kinds of factors enter. I do not claim that Japanese speakers will suddenly distinguish [θ] from [s] upon learning to pluralize nouns—only that systematic factors are of basic importance in the construction of courses in L2's and that we cannot hope to maximize the effectiveness of L2-phonology instruction without giving them central consideration.

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