Considerations for the Assessment of Phonology in Second Language Learners

Considérations pour l'analyse des systèmes phonologiques dans l'apprentissage d'une langue seconde

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Abstract

Most current Speech-Language Pathology training programs contain only minimal information on second language (L2) learning. This paper is an attempt to fill that void by using contrastive analysis to discuss how phonologic systems interact during the normal L2 learning process. By appreciating normal interactions, clinicians should be better equipped to manage disordered phonologic systems in this population. The discussion is based largely on the four components of the Edwards and Shriberg model of the phonologic system: phoneme inventory; allophonic rules; morpheme structure rules and sequential constraints; and morphophonemic rules. In addition, tone-based structures, timing and stress patterns, fossilized forms, voice quality settings, and dialect issues are examined.

Résumé

La plupart des programmes actuels de formation en orthophonie contiennent peu de renseignements sur l'apprentissage d'une langue seconde (L2). Ce présent document tenta de combler cette lacune au moyen d'une analyse différentielle qui examine la façon dont les systèmes phonologiques interagissent pendant le processus normal d'apprentissage L2. En évaluant les interactions normales, les cliniciens devraient être mieux équipés pour gérer les troubles des systèmes phonologiques. L'analyse repose en grande partie sur les quatre composantes du modèle de systèmes phonologiques mis de l'avant par Edwards et Shriberg: inventaire phonémique; règles allophoniques; règles régissant la structure morphémique et contraintes séquentielles; règles morphophonologiques. L'auteur se penche également sur les formes désuètes, la qualité de la voix et la question du dialecte.

Introduction

Currently most training programs for speech-language pathologists (SLPs) contain very little specific information that relates to second language (L2) learners (ASHA, 1985; Cheng, 1987). At least two reasons are likely to account for

this. First, there is the issue of whether or not an SLP should be involved with the management of L2 learners (ASHA, 1985; Bjarkman & Cunningham, 1981; Brand, 1981; Dreher, 1981; Gandour, 1980; Wolfram, 1986). Certainly, given the size of current caseloads and waiting lists, it is difficult to justify direct SLP involvement with L2 learners when no communicative disorder is present (private practitioners excepted).

For cases in which progress in L2 acquisition is slow or follows an unusual pattern however, the opinion of an SLP may be sought in order to rule out the presence of a speech or language disorder. A review of the applicable literature in this area highlights the second reason why training programs do not provide much information to SLP students. There is little research on how to separate the influence of the normal L2 learning process from a speech or language disorder.

Making this separation is no minor issue. Although prevalence data on speech and language disorders in L2 learners is also noticeably absent from the literature, demographic shifts suggest that, in the next decade, fully one-third of SLP caseloads in North America may consist of members of minority groups (Crago & Cole, 1991). Because many of these shifts may be the result of immigration (Westernoff, 1991), many of these individuals will be L2 learners of English. It therefore behooves SLPs to avail themselves of any information that would allow them to deal more effectively with this group. This paper is an attempt to provide some of that needed information by laying a foundation for the assessment of phonology in L2 learners.

While a number of examples will be cited, the discussion which follows is, of necessity, general in nature. It is beyond the scope of this paper to include all possible language interactions. Specific knowledge about the phonologic systems of the two languages that are interacting must be sought by clinicians themselves before attempting intervention. Such

information is essential to the assessment process (ASHA, 1985; Westernoff, 1991).

This discussion is also, by definition, highly idealized but it should not be assumed that native-like or normal phonologic skill would always be the intervention target with the impaired L2 learner (Hannah & Brooks, 1968; Leather, 1983). This is particularly so when dealing with adult learners (O'Grady & Dobrovolosky, 1987; McLaughlin, 1981; Selinker, 1972). It should be recalled that such less than perfect targets are often used with other populations (e.g., the hearing impaired, the cerebral palsied). As always, clinical judgment should be used to determine goals in each case.

Second Language Learning

The L2 learning process has long been recognized as very different from learning a first language (Brown, 1987; Ellis, 1986). At least three broad theoretical approaches have been used to try to understand this difference. The first of these approaches is known as *contrastive analysis* (CA), which holds that the structure of the first language interferes with learning the second. Potential errors, in theory, could be predicted by contrasting the structures of the two languages. The process of L2 learning is viewed as one of overcoming the differences between the two linguistic systems. In theory, one could generate a hierarchy of the relative difficulty of the differences (Brown, 1987; Dulay, Burt, & Krashen, 1982; Ellis, 1986) and thus predict a pattern for normal L2 learning.

CA, however, has proven less than adequate for a number of reasons. First there is a lack of sufficiently detailed and accurate linguistic descriptions of most languages. As well, CA fails to account for the majority of errors made by L2 learners (Ellis, 1986). Finally, it assumes that the L2 learner is a relatively passive channel for the interaction of the two linguistic systems (Brown, 1987).

As a result of these inadequacies, L2 researchers followed the example of L1 literature and hypothesized that the L2 learner is actively involved in the learning process. Rather than two linguistic systems interacting and setting up well-defined barriers, an *interlanguage* is thought to evolve. This interlanguage is believed to be a separate intermediate system that changes over time from being more similar to L1 to being more like L2 (Dickerson, 1976; Eckman, 1981; Selinker, 1972).

Interlanguage theory led to the development of a second approach to studying L2 learning known as the *error analysis* (EA) approach. In this case the actual productions of L2 learners, at various points in the process, are analyzed for errors in order to determine the status of the interlanguage

(Altenberg & Vargo, 1983). Studies using this approach have shown the L2 learning process to be both dynamic and somewhat individualized (O'Grady & Dobrovolosky, 1987).

EA, however, was not without its own problems. It could not, for example, account for the presence of fossilized forms, which are intermediate structures that fail to develop into the L2 target (Selinker, 1972; Acton, 1984). It also failed to account for the development of pidgin and creole language forms, which never evolve into either of the contact languages (Brown, 1987).

Following these earlier approaches, a third theoretical approach to L2 learning developed based on the analysis of *communicative effect* (CE). In this approach, errors are analyzed in terms of the degree to which effective communication is hindered. It predicts that errors that do not interfere with communication are more likely to become fossilized. CE was intuitively quite appealing, but determining the relative effect of various errors proved to be much more difficult than expected (O'Grady & Dobrovolosky, 1987).

Of these three theoretical approaches to L2 learning, this paper follows the path of CA because phonology is the one component of language that lends itself best to analysis of L1-L2 interaction. It is in the area of phonology that L1 has the greatest direct influence on L2 performance, and as such, CA "is a useful predictor of a substantial portion of the phonological performance of L2 learners, in particular that of adults and beginning level children" (Dulay, Burt, & Krashen, 1982, p. 111).

CA will be used here to demonstrate how to predict the phonological interactions of two language systems. By understanding the nature of the expected interactions that can occur in L2 learners, one can separate these, at least theoretically, from atypical or unusual interactions that may warrant intervention and be the focus of intervention goals.

The Phonologic System

Wolfram (1986) outlined some of the problems encountered in phonologic acquisition by L2 learners. He did not, however, address all of the components of the phonologic system. To extend his discussion, the model of Edwards and Shriberg (1983) will be utilized here. This model was selected both for its comprehensiveness and because of the communicative disorders perspective upon which it is based.

There are four major components of the phonologic system that must be acquired for a person to become a competent speaker of any language (Edwards & Shriberg, 1983). Each component will be discussed below in relation to the acquisition of a second language.

Phoneme Inventory

The most obvious component of any phonologic system and the one that typically receives the most attention is the inventory of contrastive sounds. Every language makes use of its own set of contrastive phonemes. Based on the interactions between the inventories of L1 and L2, it is possible to predict areas of difficulty for the L2 learner.

Wolfram (1986), drawing from the work of Weinreich, describes four general patterns of interaction that might be seen between any two phonologic systems. These are: (1) *underdifferentiation*, in which two L2 phonemes are not contrastive in L1 and the speaker treats them as if they were one phoneme; (2) *overdifferentiation*, in which an L1 contrast is applied contrastively to the L2 in which they are not normally contrastive; (3) *reinterpretation of distinctions*, in which an L2 contrast is maintained but the phones used do not follow the usual L2 pattern; and (4) *actual phone substitution*, in which L1 and L2 contrasts are similar, but different phones are used to show the contrast in each language.

An example of underdifferentiation can be seen in speakers of Japanese learning English. These speakers often have difficulty with the liquid consonants (/r, l/). These phonemes are not contrastive in Japanese, which contains a single phoneme whose articulation is actually a hybrid of the two (Cheng, 1987). Japanese speakers tend to use this hybrid in English contexts requiring either liquid /r/ or /l/. The loss of the contrast may result in reduced message intelligibility. Underdifferentiation errors may be more serious than errors created by the other three interaction patterns (Wolfram, 1986).

Overdifferentiation is seen in some Hindi speakers learning English. In Hindi, the unaspirated voiceless bilabial stop [p=] and its aspirated counterpart [pʰ] are contrastive, while in English they are allophones of /p/. These types of errors are less likely to create intelligibility problems (Wolfram, 1986).

Flege (1988) conducted a study of Mandarin speakers learning English that illustrated reinterpretation of distinctions. Syllable final voiced obstruents are not normally permitted in Mandarin. The subjects in Flege's study were able to maintain the contrast between final /p/ and /b/ using other means. They tended to devoice /b/, but contrasted it with /p/ by lengthening the preceding vowel (see also Flege & Hillenbrand, 1986).

Cheng (1987) noted an example of actual phone substitution. In Japanese, the English dental fricatives (/Θ, ð/) are not part of the phonemic inventory. When Japanese speakers learn English, these phonemes are often replaced by alveolar fricatives (/s, z/). This illustrates what has been called the

"phonological translation hypothesis," wherein there is "a tendency by native speakers to interpret sounds occurring in a foreign language in terms of sounds found in their native language" (Flege, 1981, p. 448-9).

In addition to the interactions noted by Wolfram (1986), certain groups of phonemes can create predictable problems for L2 learners. The dental fricatives, for example, pose particular problems for many L2 learners of English. These sounds are present in the inventories of only a few other languages (e.g., Greek, Spanish). These phonemes are also produced with less acoustic energy than most other phonemes and therefore are less easily heard (Calvert, 1986).

A number of error patterns are predictable for the dental fricatives. As cited above for Japanese speakers, the substitution of adjacent fricatives (/s, z/) can occur. In the case of Farsi speakers, a different pattern has been observed. Farsi speakers normally dentalize the alveolar fricatives. So, in order to maintain a degree of contrast between the dental and alveolar phonemes of English, Farsi speakers tend to substitute alveolar stops (/t, d/) for the dental fricatives (Yarmohammadi, 1969).

Vowel systems also cause frequent problems for L2 learners. English is particularly difficult in this regard because it has a more extensive vowel system than most other languages. The result for the L2 learner may be underdifferentiation. For example, in Vietnamese the tense-lax contrasts /i, I/ and /u, U/ do not exist. Rather, these four English vowels are represented by Vietnamese speakers with the tense vowels (/i, u/) (Cheng, 1987). This is not a surprising observation because words in tonal languages such as Vietnamese usually end in open syllables and because lax vowels usually occur only in closed syllables (Ladefoged, 1982).

Allophonic Rules

Allophonic rules are the second component of the Edwards and Shriberg (1983) model. Every language has unique rules that specify the contexts in which particular allophones occur. In English, for example, when voiceless stop consonants occur in word final position they are typically unaspirated. However, they tend to be aspirated in word initial position and when they follow the phoneme /s/. These context-sensitive rules frequently do not correspond to those of other languages.

The four interaction patterns that occur at the phonemic level (Wolfram, 1986) can be extended to the allophonic level. Thus, similar predictions can be made for the types of allophonic errors that are likely to occur. For example, phones that are separate allophones in L2 might be represented by a single allophone in L1, resulting in un-

derdifferentiation. Spanish speakers, for example, normally do not produce voiceless aspirated stops (Flege & Eefting, 1988). One would predict that they would use an unaspirated production for both aspirated and unaspirated allophones of English. This may be observed, although, in the case of Spanish speakers at least, it probably represents a temporary phenomenon as illustrated below by the results of the study by Flege and Eefting (1988).

An example from Hindi suggests the possibility of allophonic overdifferentiation. Nasalization of some vowels is phonemic in Hindi (Beddor & Strange, 1982) but not in English. Hindi speakers learning English might attempt to use this feature phonemically. However, this overdifferentiation would not result in a serious loss of intelligibility because no meaningful contrast is created or lost in the L2.

Flege and Eefting (1988) studied a group of Spanish speakers learning English and illustrated a process akin to the redistribution of phonemic distinctions but on the allophonic level. The voiceless stop phonemes /p, t, k/ occur in both languages, but aspirated versions normally do not occur in Spanish. Flege and Eefting found that Spanish subjects did create two separate allophones to represent each English stop, but these did not match the usual English productions. Instead of [t⁼] and [tʰ], for example, these speakers used aspiration [tʰ] and devoicing [d̥] in an attempt to maintain the contrast.

An example of allophone substitution can be seen in Farsi. Speakers of Farsi normally dentalize the alveolar fricatives /s, z/ (Yarmohammadi, 1969). These productions may be carried over into English productions of these fricatives.

Morpheme Structure Rules and Sequential Constraints

The third component of the Edwards and Shriberg (1983) model consists of morpheme structure rules (rules for creating morphemes) and sequential constraints (limitations on ordering phonemes in syllables), and L2 learners may experience considerable difficulty in these areas (Wolfram, 1986). Although no research has been done in the area of morpheme structure rules, one can speculate on a few potential problems that might arise. For speakers of languages that do not permit word final consonants, for example, plural and past tense morphological markers may be omitted in English productions. In some instances, this might not impair intelligibility significantly because both of these morphemes can be marked in English in other ways (i.e., "three dog" and "three dogs" both mark plurality; "play yesterday" and "played yesterday" both mark past tense). But in situations in which there is no such redundancy, (e.g., "to the dog" vs. "to the dogs"; "he play" vs. "he played") intelligibility may be compromised.

The effects of L1 on sequential constraints are easily evidenced. Cantonese, for example, does not permit the use of consonant blends. In learning English, speakers of Cantonese tend to produce epenthesized versions of the blends (i.e., a schwa vowel, is inserted between the two consonants). Cantonese also does not permit use of word final consonants, so Cantonese speakers learning English would show morphological difficulties as well (Cheng, 1987).

Another example comes from Farsi which does not permit initial /s/ + stop clusters. Farsi speakers learning English tend to add an initial schwa vowel in effect putting these clusters into a medial position (Yarmohammadi, 1969). Consonant clusters in general are a problem for many L2 learners of English because these sequences are less common in other languages (Cheng, 1987).

Morphophonemic Rules

A final component of the Edwards and Shriberg (1983) model that must be mastered by L2 learners is morphophonemic rules. These represent knowledge of how different variants of the same words are pronounced. For example, the second vowel in the words *divide* and *division* are different even though both words contain the same root morpheme. This *vowel shift* must be accounted for in learning the phonologic system of a language. As is the case with morpheme structure rules, research is limited in this area. Nevertheless, some predictions are possible. English plural markers might cause problems for L2 learners, particularly in languages that do not allow final consonants. A phonetic analysis might indicate marking of the singular-plural contrast by some other means (e.g., vowel lengthening, see Flege, 1988). Past tense morphemes might create similar problems.

Other Considerations

Several other aspects of phonologic interaction, not accounted for by the Edwards and Shriberg (1983) model, need to be considered. These are discussed below.

Tone-based Phonologic Structures

In English, pitch (or intonation) patterns are applied at the syntactic level. Some languages (e.g., Laotian, Vietnamese, most Chinese languages) make use of tone applied to vowels to contrast meaning. Tone can be said to be phonemic in these languages. In Mandarin Chinese, for example, the syllable /ma/ can be uttered with four different tonal patterns resulting in four uniquely different meanings: (1) unchanging pitch = mother; (2) rising pitch = a certain plant species; (3) falling pitch = to scold; and (4) falling then rising pitch = horse.

Individuals whose first language is tonal may experience difficulty adapting to a language such as English where intonation is of much less consequence at the phoneme level. A problem of overdifferentiation might be the result at the word level.

Timing and Stress Patterns

English is said to be a stress-timed language (Calvert, 1986). Syllable stress influences the rate at which speech is uttered. These points of added stress tend to coincide with pauses. Speakers of languages such as English try to fit in all the necessary syllables between the pauses so that the timing of the pause and the stressed syllable coincide. The result is that the number of syllables between each pause can vary considerably.

French, on the other hand, is a syllable-timed language. The use of syllable-stress is much less common. Pauses tend to occur after a regular number of syllables. Speakers making the transition from one type of language to another may experience difficulties creating "natural" prosody.

Fossilized Forms

As noted in the introduction, slow progress in L2 learning, was cited as a possible basis for a referral to an SLP for evaluation. In these assessments, one must consider that the individual may have developed fossilized forms. Recall that these are forms intermediate between L1 and L2 that fail to resolve into the target L2 form (Selinker, 1972). The reasons for the appearance of these forms have yet to be determined but given that they are typically quite difficult to modify, intervention focussing on them should be given careful consideration (Acton, 1984).

Voice Quality Setting

This rather unusual terminology (Esling & Wong, 1983) might more appropriately be called *general articulatory posture*. It is based on the notion that each language has its own particular focus for articulator positioning that may influence both general resonance and the approach to individual sound production. Esling and Wong describe these features for a number of dialects in English as well as for a number of other languages. For example: (1) French features are rounded lips, fronted tongue, slightly open jaw, and nasal breathy voice; (2) Russian features are closed jaw, spread lips, palatalized tongue, and faucial constriction; and (3) Pakistani features are open lips and jaw, and retroflex tongue.

Esling and Wong (1983) believe that languages that are more closely related historically share more of these features and hence, create less of a problem when one or the other is learned as a second language. Languages differing greatly in these features however, would create more challenges for the L2 learner.

Dialect Considerations

A useful question to ask during a case history interview is how intelligible is the speaker in L1. Reduced intelligibility in L1 might signal an underlying phonologic problem. However, one must be careful to consider dialect in this equation (ASHA, 1985). For example, the speaker of L1 may be using an uncommon dialect of L1 and be perceived by others familiar with more common dialects as being deviant in L1. Only by asking detailed questions about the speaker's intelligibility in L1, would one discern this fact. For example, one might enquire how well others in the speaker's native village could understand him/her, or how well his/her fellow villagers can make themselves understood in conversations with speakers of more common dialects.

Conclusion

The phonologic characteristics of L2 learners can be as diverse as the population. It is not possible to specify all of the interactions that can occur between various languages but the changes seen are typically quite systematic (Dickerson, 1976). In fact, McLaughlin (1981) noted that most adults learning a second language utilize logical (i.e., systematic) deduction of the rules of that language during acquisition. As discussed in this paper, contrastive analysis can be used to predict many of the changes that occur, based on the interactions between L1 and L2 (Dickerson, 1975). The SLP encountering the L2 learner should be aware of these interactions in order to make reasoned judgments about whether the patterns observed reflect the influence of the normal L2 learning process or an actual speech or language disorder. Appreciating these normal interactions also can assist the SLP with ongoing management decisions in cases in which the L2 learner does become part of the SLP caseload.

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