As learners of a second language study the various aspects of non-native language – including vocabulary, sentence structure and phrases – they often find that sound discrimination and native-like pronunciation aspects are difficult to acquire. To obtain that native-like pronunciation, it is usually not a matter of memorization. We begin acquiring the sound structure and the ability to distinguish phoneme contrasts in their own native language system as infants (Kabak, “contrasts”, 360), and these native sound systems can interfere with acquiring and speaking with a native-like pronunciation in a foreign sound system. Looking at the intricacies involved in sound discrimination and production can help the language teacher, as well as the language learner, become aware of specific skills needed to make the jump from production in native to non-native sound systems.

The following sentence may need moved.) A major aspect of second language pronunciation discrepancies result from differences between the L1 and the L2. It may be obvious that the dissimilarities between the L1 and the L2 will have an effect on the pronunciation of the L2, but it is important to note how L2 learners deal with these differences. A language learner upon hearing non-native sounds or words that don’t abide by the rules of their native language tends to alter those sounds to fit them into the closest phoneme they are familiar with, according to research by Kabak (Kabak,
This is why non-native English-speakers – or speakers of any language they are not native to – can often be identified as from a particular country or first language. In everyday language, we might say that someone speaks English with a German accent or French accent. These accents are the result of the speakers fitting the pronunciation or word phrasing into the rules of their native language. The “rules” can include sound systems, phoneme contrasts, and allophone usage. Some researchers think that features being distinguishing or not distinguishing in particular languages are a factor to consider. Sound systems and the phoneme contrasts that they include are among the first things that native speakers acquire, and they begin acquiring them as infants.

Infants acquiring sound systems

Infants begin hearing their mother’s -- or main caregiver’s -- tongue almost as soon as they are born, and from that moment on, begin to acquire the sound system of that language. Barts Kabak shows that infants under six months old are already gaining the ability to distinguish contrasts in their native language. He shows that during this same time, they are losing their ability to distinguish non-native contrasts (Kabak, “contrasts”, pg. 360). This is corroborated by Hayes whose studies of native language learning shows that part of the natural process of learning that first language involves a person retaining sensitivity to some speech sound contrasts and losing sensitivity to others. She notes that infants, even as young as six months old, begin to lose sensitivity (Hayes, 15). This loss of sensitivity is one aspect that affects the ability to perceive and discriminate between some sounds and not others in the non-native language.

Effects of the L1 - Shifting the phoneme
This sensitivity to contrasts in speech sounds in the native language and loss of sensitivity to the contrasts in others causes several things to happen as a person tries to learn a second language. Christina Chan refers to many researchers (e.g. Best and Strange, 1992; Flege, 1991; Hacin-Bhatt, 1994) who corroborate that “in constructing the representation of an L2 sound . . . learners tend to perceive the L2 sounds by drawing similarities between the unfamiliar sounds and the L1 sound categories” (Chan, “word initial”, 28). The first language has certain sound categories that the phonemes of that language fit into. The native speaker of a language is accustomed to fitting allophonic variations of the sounds they hear into the known phonemes of the language. The non-native sounds are perceived through a filter that often shifts them to the closest phoneme representation in their native language.

An example of this shift of unfamiliar sounds is given by Min Wang and Esther Geva in a study of Cantonese ESL kids. The study used spelling performance as a representation of the sounds that were distinguished by the ESL learners. The English phonemes /θ/ and /∫/ are absent in Cantonese, and the error analysis indicated that in spelling, the Cantonese ESL children’s dominant error was to “use s for sh and s or z for th” (Wang, Geva, “spelling”, 342). Because the phonemes /s/ and /z/ are in the Cantonese language, the children borrowed the close phonemes from their L1 (/s/ and /z/) and mapped the L2 sounds (/θ/ and /∫/) to them. This spelling substitution indicates more than difficulties in orthographic representation because in the same study, the same children often misspelled the ck in “thick” as k. This misspelling of ck as k is merely an orthographic error as the phoneme /kl/ is in their L1 and is not related to the mapping of L2 phonemes to their close L1 phonemes (Wang, Geva, “spelling”, 343).
Because of this tendency to map a novel L2 phoneme to a known L1 phoneme, it is worthwhile to note that the degree of similarity or dissimilarity may also affect how the novel L2 phoneme is mapped. Laura Bosch quotes Flege saying, “The greater the perceived phonetic dissimilarity between an L2 sound and the closest L1 sound, the more likely it is that the phonetic differences between the sounds will be discerned” [Flege, 1995, p. 235]. This indicates that not all L2 sounds will be mapped to an L1 phoneme, but rather that the likelihood of this occurrence increases the more similar the sounds are. Regarding the ways that learners respond to the novel L2 phonemes, Bosch refers to one of the current models of cross-language speech perception, Perceptual Assimilation Model [PAM; Best, 1993, 1994a, 1994b; Best, McRoberts, & Sithole, 1998]. “According to the PAM, when perceiving non-native segments, listeners can (a) assimilate them to a native category (either as good or bad exemplars of it), (b) perceive them as uncategorisable speech sounds, or (c) perceive the segments as non-speech (noise)” (Bosch, “vowel perception”, 190). Thus, the response for sounds in the L2 that are close to L1 phonemes are likely to be assimilated to the native category, but the further the sounds are from the L1 phoneme, the more likely they will be identified by the listener as their own distinct speech sounds. When it comes to the listener attempting to produce these L2 uncategorized sounds, they may produce it more accurately because it has not been mistakenly mapped to an L1 phoneme, or they may produce it less accurately because there has been no L1 sound category to remember it as.

**Allophonic usage as it affects sound categories**

Another factor making the categorization of non-native sounds challenging is the allophonic usage of those sounds in the L1. One example of this can be seen in the
typical difficulty that Japanese have discriminating the /l/ - /r/ distinction. In the Japanese language, the /l/ and /r/ are allophones of the same phoneme, and so it is difficult for them to perceive and reproduce them in English as separate phonemes (Kabak, “contrasts”, 360). The [d] – [t] distinction for English and Spanish speakers is another example of allophonic discrepancies between languages. English speakers tend to not notice the distinction between [d] and [t] and treat them as allophones, but they do make a distinction between those two and [tʰ]. Spanish speakers, on the other hand, have the phonemes for [d] and [t] and hear [tʰ] as an allophone of [t]. Therefore, when those sounds occur in the L2, the non-native speaker may categorize that sound as the known L1 phoneme which, when reproduced, is often pronounced as the incorrect variation for the L2 intended sound.

![Diagram of allophones](image)

**Fig. 1: Adapted from Hayes, pg. 17**

**Age Factor - youngsters**

Bosch proposes that in addition to (phoenetic?)similarities and differences affecting the mastery of a second language contrast, age of acquisition and duration of
exposure are also important factors. She notes from studies especially involving adults that “when listening to L2 speech, inexperienced learners seem to use the phonemic categories of their L1 to impose phonemic structure on it.” (Bosch, “vowel perception”, 190). Adults seem to respond in this way because their sound categories are already “fully specified, whereas children may still be able to modify their initial construction” (Bosch, “vowel perception”, 190). Bosch refers to the observations that Tees and Walker made in 1984 regarding long-lasting effects of exposure to a second language at a very early age. Their studies were of Hindi children who had a bilingual environment – English/Hindi – up until the age of two. After the age of two, they were exposed exclusively to English. Later on, after two weeks of instruction, they could again perceive Hindi contrasts that were typically very difficult for English speakers, whereas the monolingual English subjects could not perceive the contrasts after a full year of training (Bosch, “vowel perception”, pg. 192). The work of Pallier, Bosch, and Sebastián-Gallés in 1997 observing Catalan-Spanish bilingual adults who learned Spanish first at home and then before the age of six learned Catalan also points to the influence of age in language acquisition and ability to discriminate sounds. These studies showed that even though they learned Catalan before the age of six, they still had difficulties acquiring the Catalan /e/-/ε/ phonemic contrast because Spanish only has the one /e/ category (Bosch, “vowel perception”, pg. 193). This appears to corroborate Kabak’s claim that “the ability to distinguish non-native contrasts declines as infants acquire their native language systems” (Kabak, “contrasts”, pg. 360).

**Adult improved perception**
Some authors propose that it should be possible to acquire foreign contrasts “given early and/or intensive exposure” (Bosch, “vowel perception”, 191) implying that the loss of speech sound contrast following infancy is reversible and that developing new phonemic categories in the L2 into adulthood is possible. There is evidence that “even adult learners improve their non-native speech perception abilities” (“vowel perception”, 191), but when compared to native speakers, the competence of even highly skilled second language learners is lower in perceptions tasks. Bosch notes that this implies that although the second language learners can become skilled at differentiating difficult non-native contrasts, they “rely on different acoustic parameters than those used by native listeners” (Bosch, “vowel perception”, 191). She does not elaborate on what those acoustic parameters are, but that aspect may be valuable to explore in future studies.

Auditory Discrimination and Representation

Regardless of what acoustic parameters a listener uses to differentiate non-native contrast, they need a way to internally and/or externally represent the phonology. Wang and Geva refer to Perfetti’s lexical representation hypothesis which is that “the quality of word representations rests on how precisely the constituent letters in words are represented phonologically and orthographically” (Wang, Geva “spelling”, 326). A difficulty in acquiring the sounds in a non-native language is not just perceiving that a sound is not the same as the L1 sound, but, once learners perceives the difference, they need to be able to represent that phone in their mind in some way. Mapping those phones to orthographic representations is an obvious stepping stone in remembering and reproducing them. Wang and Geva note that second language learners tend to make
more reading and spelling errors in vowels than in consonants because the phonemic mapping for vowels is more variable. The learner “acquire[s] phonological knowledge of the target language . . . which in turn helps build accurate and specific phonological representations. . . Reading and spelling then require mapping these phonological representations into the printed words” (Wang, Geva, “spelling”, 326). The written representations can be concrete ways to record and remember the perceived phonological differences.

Christian Chan suggests that another way to help second language learners is to alter their tendencies of how they perceive L2 sounds by comparative minimal pair training which requires the learners make choices in comparing and discriminating the target sounds. The objective is to help the learner shift from phonemic categorization to phonetic analysis, which would “enable them to incorporate the minute differences . . . into their representation constructions for the L2 sounds” (Chan, “word initial”, 40). Kabak puts this same concept into terms of phonemic inventories by noting that “without constructing phonological representations, no inventories can be acquired” (“contrasts”, 360). Helping learners to perceive that sounds in the L2 do not fit into their L1 phoneme categories and helping them to reconstruct representations (internal and external) will in turn help their production of those sounds.

**Distinctive Features**

Some recent research has been done to show how the distinctive features in the L1 affect the pronunciation in the L2. Kabak attempts to prove this with the example of Japanese and Chinese learning to discriminate and pronounce the /l/ - /r/ contrast in English. The Japanese have great difficulty perceiving and producing this contrast, and
one reason could be that the /l/ and /r/ are used only allophonically in Japanese. The Chinese do not employ the /l/ - /r/ distinction either, so it could be puzzling that they have little difficulty discriminating these two phonemes in English. Kabak points to Brown’s linking of this behavior to “the availability of the phonological features that can be employed to distinguish . . . pair[s] in the L1” (Kabak, “contrasts”, 360). In this case, the [coronal] feature is a distinguishing aspect of these two liquid sounds in English. Although the Chinese do not employ the /l/ - /r/ distinction, they do employ the [coronal] feature to distinguish sounds. The Japanese phoneme inventory does not use the [coronal] features to differentiate any phoneme in their L1, and therefore they have more difficulty with the English sounds that employ the [coronal] features to distinguish (Kabak, “contrast, 360).

Bosch has noticed distinguishing features affecting the perception and production of non-native language sounds. She suggests that “the perception of non-native speech may . . . be strongly influenced by speakers’ internalized knowledge about contrastive features in the first language (L1)” (Bosch, “contrasts”, 360), she also notes that the two current models for cross-language speech perception, PAM (Perceptual Assimilation Model) and SLM (Speech Learning Model) both work on opposing assumptions. These assumptions as related by Strange et. Al. (1998) are that “(1) perception of L2 segments is similarly influenced by the perceived phonetic similarities between L2 and L1 segments, and therefore (2) contrastive analysis of L1 and L2 segment inventories at the phoneme or distinctive feature level is too abstract to capture important relationships between languages” (Bosch, “vowel perception”, 190). The work on these models was
done in the years from 1988 to 1998, so further study of the phoneme and distinctive feature level may be able to capture some of these relationships.

**Conclusion**

Second language learners are affected by many aspects of their first language as they acquire non-native languages, but by being aware of the aspects that (might) influence their perception and production, they have hope to minimize the effects. The best results for acquiring a second language may come by lengthy or intensive exposure to the language at a young age, especially before reaching six months of age because at that point they will already begin losing sensitivity to un-used sound contrasts. Adult(s) learning a second language still have hope for acquiring native-like pronunciation, but they have to overcome the natural tendencies to perceive and categorize sounds by their L1 rules and sound systems by learning to phonologically and orthographically construct representations for the target language sounds. As more research is done with distinguishing features employed by different languages, methods can be developed and improved to help learners gain distinguishing features that are not native for them.
Bibliography:


