

CHAPTER 36

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SECOND LANGUAGE ACQUISITION AND PHONOLOGICAL CHANGE

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36.1 INTRODUCTION

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THE defining role played by language contact in historical change has long been recognized, particularly in comparative sociolinguistics and in the study of lexical borrowing and of pidginization and the emergence of creoles (Hickey 2010, Sankoff 2001). Other contributions to this volume lay out the influences on historical change that can be attributed to first language acquisition (Foulkes & Vihman, this volume) and synchronic language variation (D'Arcy, Jones, both this volume), and several address the relationship between phonetics and phonology in historical change (Dresher, Purnell & Raimy, Hale et al., Kiparsky in the generative paradigm; Bybee, Phillips, Yu more in the exemplar tradition, all in this volume). But in the study of sound systems, it is also appreciated that one language can exert influence on another, as inferred, for example, with respect to the history of Dutch in its shift from a Germanic-type language contrasting voiceless aspirated with weakly voiced stops over to a Romance-type contrasting voiceless unaspirated with prominently voiced stops (Iverson & Salmons 2003, 2008). Modern work in second language (L2) acquisition, with parallels in the phonology of loanword adaptation (Uffmann, this volume), reveals just how close contact with a second language can affect these phonetic changes in a speaker's native language, e.g., shifted voice-onset-time values in Dutch that is influenced by English (Simon 2011), or in English that is influenced by Korean (Chang 2010a,b), French (Flege 2007), Portuguese (Sancier & Fowler 1997) or Spanish (Lord 2008).

At the phonemic level, borrowed pronunciations may induce allophonic splits, as in the often cited (if controversial, see Minkova 2011) separation of voiced from voiceless

fricatives in the history of French-influenced English, allowing now *veal* (French borrowing) alongside *fox* (native Germanic). In earlier English, voiced fricatives occurred only as allophonic variants (intervocally, and, at some point, initially in typically unstressed words) of phonemes which were otherwise voiceless, as reflected in modern English relict distributions favouring voiceless initial (*thick*) and final fricatives (*bath*) but voiced medials (*mother, brother*), along with voiced initials in unstressed minor classes (*this, there, thou*). As French all along contrasted voiced (*vin* ‘wine’) with voiceless fricatives (*fin* ‘end’), its status as a prestige L2 in England following the Norman Conquest presumably facilitated the extension of this pattern to native English as well. In other cases, the split of native language allophones into independent phonemes is progressive, leaving subtle traces to be uncovered in analysis of the patterns of second language phonology. We illustrate this patterning with respect to the staged acquisition of the English /s/—/ʃ/ contrast by adult native speakers of Korean versus Japanese. Both of these languages deflect [s] in favour of [ʃ] before the high vowel [i], but the L2 contrast between the two fricatives emerges in proportion to the degree that [ʃ] occurs in other contexts in the learner’s native language. If we view the acquisition of an L2 as a series of changes in the learner’s internalized grammar of the target language, i.e., in the interlanguage (IL) grammar, then the mechanisms of L2 acquisition can be shown to both parallel and inform the process of historical change in phonology.

This chapter is structured as follows. The background section defines the construct ‘interlanguage’ and motivates the hypothesis that IL grammars obey the same linguistic principles as primary languages. This is followed first by a characterization of L2 phonetic influences on the L1, then of phonological effects as exemplified by the different acquisition patterns of the English /s/—/ʃ/ contrast by native speakers of Korean and Japanese. The chapter concludes with a discussion of implications for historical change in phonology.

36.2 BACKGROUND

The field of L2 phonology seeks to explain the pronunciation patterns of adult language learners and to understand why these patterns are generally different from those of child learners. One of the most straightforward hypotheses addressing this question, the contrastive analysis hypothesis (Lado 1957), claimed that the divergent L2 phonological patterns could be explained on the basis of the differences between the learner’s native language and the target language. Over the decades, empirical tests of this hypothesis have uncovered numerous instances in which the claims were not supported, largely because the L2 pronunciation patterns could not be attributed to differences between the native and the target languages, and, in a number of cases, were independent of both. This kind of data supported the postulation that L2 learners internalized a mental system, their own version of a grammar of the target language, that enabled them to produce and understand utterances in that language. This learner-language system was

termed an interlanguage (Selinker 1972). The most compelling kind of evidence for the necessity of hypothesizing an IL is a pattern of L2 utterances that is not attributable to the native language (because it does not exhibit this pattern) nor to input from the target language (which also does not evince the pattern).

In the present context, there are two significant implications of the concept of interlanguage for second language phonology. The first is that the research programme in second language acquisition theory changed from trying to predict L2 learning difficulty to theorizing about the nature of IL grammars. And the second is that second language acquisition can be viewed as the internalization of an interlanguage; specifically, progress in L2 learning is characterized as the acquisition of a series of IL grammars. This naturally raises the question as to whether the learning of IL grammars can affect the native language grammars of L2 learners, leading to historical change. In the next sections, we cite briefly recent findings attesting first to sub-phonemic influences that an L2 may exert on L1 pronunciation (the ‘phonetic drift’ effect), which may set the stage for subsequent phonological change *per se*). Second, we exemplify how the progressive imposition of foreign phonemic contrasts onto native allophonic differences prepares a seedbed for classic phonemic (technically, allophonic) split and novel phonemicization. We do not address here, however, the less well studied role played by the phonology of ‘heritage’ as opposed to second languages *per se*; but see Polinsky & Kagan (2007) and Rothman (2009) for reviews of some of the issues worth investigating that this rather special type of language contact raises.

36.3 PHONETIC EFFECTS

Grammars learned through second language acquisition, i.e., IL grammars, have the potential to affect the learner’s L1 grammar phonetically (with no change in contrasts) as well as phonologically (merging or creating new contrasts). The most widely studied phonetic influences in this direction are the effects of L2 voice onset time values on those of the L1. Thus, in acoustic analysis of American adults learning Korean in Korea, Chang (2010b: abstract) discovered that

‘... experience with Korean stop types is found to influence the production of English stop types in terms of voice onset time (VOT) and/or fundamental frequency (f_0) onset as early as the second week of Korean classes, resulting in the lengthening of VOT in English voiceless stops (in approximation to the longer VOT of the perceptually similar Korean aspirated stops) and the raising of f_0 onset following English voiced and voiceless stops (in approximation to the higher f_0 levels of Korean).’

Similar influences on English have been reported from other languages, as cited above, and current work by Simon (2011) on Dutch learners of English lends empirical second language acquisition support to the arguments and evidence presented by Iverson and

Salmons (2003, 2008) that the ‘voicing language’ stops of Modern Dutch (contrasting voiceless unaspirated with voiced) likely emerged out of the typical Germanic ‘aspirating language’ type (contrasting heavily aspirated with weakly voiced stops) through L2 learning contact with a Romance-type system. Underscoring the synchronic variability of this kind of influence according to the dominant ambient language, Sancier & Fowler (1997:421) report that

Acoustic measurements of our speaker’s voiceless stops produced in both Brazilian Portuguese [Romance system] and English [Germanic] show that, whereas her VOTs are always shorter for productions in Brazilian Portuguese than in English, VOTs of stops produced in both languages are shorter after a several month stay in Brazil than after a several month stay in the United States.

The common thread running through these findings from second language acquisition research is that an L2 can exert subtle sub-phonemic phonetic influences on the L1, thus laying a foundation for subsequent phonological change. As charted by Iverson & Salmons (2008), for example, a largely non-functional shift such as Grimm’s Law likely arose out of such a ‘substratum’ context, as this effect is traditionally referred to, but the nature of that kind of influence now can be better understood from the findings of synchronic studies on the second language acquisition process. By the same token, modern investigations of the development of simultaneous bilingualism show that the emergence of dual phonetic systems is sharply affected by age of exposure (Bullock, Toribio, González & Dalola 2006; Abrahamsson & Hyltenstam 2009). For example, Lee & Iverson (2012) found that Korean-English bilingual children at age 10 had established distinct VOT and f_0 values for the two languages, whereas 5-year-olds generally implemented acoustically blended systems. This suggests that language change under L2 influence is more likely to be characteristic of adult learners, or older children, than of very young simultaneous bilinguals, who appear to integrate rather than distinguish the phonological systems they are acquiring.

Finally, the findings of acoustic work among second language learners now can be verified through brain imaging, a research technique that has only recently become available. Thus, in fMRI studies, Park & Iverson (2008) (cf. also Park, Park & Iverson 2010 and Park, Iverson & Park 2011) show that there is a significant difference in activation between L1 and L2 speakers with respect to the apprehension of Korean laryngeal contrasts, particularly in areas of the brain associated with pitch perception. These brain imaging results support acoustic findings that the aspiration contrasts of Korean initial stops are increasingly distinguished less by VOT differences between a heavily and a lightly aspirated series than by the differing values of f_0 in the following vowel. This merger of aspiration values, in turn, points toward phonetic influence from English, a pervasive second language (especially for younger Koreans) whose VOT delay properties support only a single, heavily aspirated series of stops.

36.4 PHONOLOGICAL EFFECTS

Efforts by speakers to pronounce foreign words as closely to the source language pronunciation as the rules and constraints of the L₁ allow result in predictable adaptations and adjustments (cf. Iverson & Lee 2006), but these constraints may be relaxed as familiarity with the source language increases through its status as an L₂. For example, the fricative *f* in Japanese (phonetically [ɸ]) in native vocabulary is restricted to occurrence before *u*, as in the place names *Fuji* or *Fukushima*; elsewhere, the variant is *h*, as in *Hokkaido* or *Hiroshima* (**Fokkaido*, **Firoshima*). This pattern is imposed on older borrowings as well, as in *hoomu* < ‘(plat)form’, variably in more recent adaptations such as *hooku/fooku* < ‘fork’, and generally not at all in even more recent loans like *faitto* < ‘fight’. The consequence is that the allophonic pairing of *h* and *f* in native vocabulary comes to be split into separate phonemes in words of foreign origin, but only there. The role played in this process by the widespread learning of English as an L₂, with its phonemic /h/ and /f/, seems incontestable.

The phonology of Japanese continues to treat *h* and *f* as allophones of the same phoneme, presumably, but as awareness of the foreign status of words like *fooku* and *faitto* begins to wane, so will the allophonic relationship between *f* and *h*, thus giving rise to phonemic split under the influence of an L₂. A similar, but weaker split is also under way in the language with respect to the affricated variant of *t*, which in native vocabulary only occurs before *u*, as in *tatsu* ‘to stand’ (cf. *tate* ‘stand!’, *tatanai* ‘don’t stand’; Kaneko 2004:52). But now, under English L₂ influence, non-affricated renditions occur before *u* in foreign vocabulary, as in *tuba* ‘tuba’, *tatuu* ‘tattoo’. The strength of the allophonic relationship between [t] and [ts] in Japanese native vocabulary remains, but has been weakened in the foreign component by these borrowings and the influence of English as an increasingly prominent L₂, setting the stage for ultimate phonemicization of the two segments throughout the language. From a theoretical point of view, moreover, such gradual progression from allophonic to phonemic status within a layered lexicon fits in well with a stratal model of phonological structure and change as laid out by Kiparsky (this volume). In short, the role of foreign pronunciation and L₂ influence in the splitting of native language allophones, such as occurred in the history of English voiced and voiceless fricatives alluded to in the introduction above, is a prominent means by which change in phonemic systems takes place.

Depending on the morphological circumstances, however, the path to phonemic split under the effects of L₂ learning may be more progressive, and staged, than as just outlined for monomorphemic words. Eckman & Iverson (2013) investigated the learning of the English /s/—/ʃ/ contrast by native speakers of Korean, noting that the sounds [s] and [ʃ] occur in native Korean vocabulary in complementary distribution, with [ʃ] found only before [i] and [j], [s] elsewhere. This pattern is captured by a rule (or equivalent constraint) to the effect that /s/ is realized as [ʃ] before high front vocoids. The task of the

L2 learner, then, is to split these two native allophones into separate phonemes in the IL by suppressing the application of the persisting native rule.

As we have argued in previous work (Eckman, Elreyes & Iverson 2003; Eckman, Iverson, Fox, Jacewicz & Lee 2009), L2-conditioned implementation of allophonic split proceeds according to a well-defined, implicational pattern. In early stages, the IL rule applies without limitation, causing learners to err on all target words containing the sequence which violates the phonological constraints of the L1, in this case, [si]. However, once learners acquire the /ʃ/ phoneme in at least some words, the rule applies only in contexts where the [s] plus [i] sequence spans a morpheme boundary, that is, in morphologically derived environments. The final stage emerges with complete suppression of the rule, the IL grammar then evidencing the contrast in the same contexts as found in the L2.

In sum, the first pattern of rule application within the IL is that early learners exhibit no contrast between [s] and [ʃ] in any target words. The second pattern occurs when the learner acquires the /s/—/ʃ/ contrast in at least some words, thus introducing /ʃ/ as a phoneme into the IL lexicon. General principles (structure preservation, the derived environment constraint) then restrict the application of the rule to only morphologically derived contexts. This means that learners show the contrast in morphologically simplex words, as in *mess* versus *mesh*, but still present [ʃ] in words like *messing*, which remains homophonous with *meshing*. The third pattern is that in which the learner suppresses the NL rule altogether, and has thus acquired the /s/—/ʃ/ contrast in both morphologically simple (*mess* ≠ *mesh*) and complex environments (*messing* ≠ *meshing*).

These findings support the claim that the L2 acquisition of an allophonic split may not proceed directly in a single stage from no contrast between the sounds to a final stage in which a complete contrast has been attained. Rather, there is the possibility of an intermediate stage in which the contrast exists in only one class of lexical items.

Taking this work on the acquisition of L2 phonemic contrasts a step further, we tracked the learning of the English /s/—/ʃ/ contrast by native speakers of Japanese as a function of the identical phonological environment considered in the study of Korean learners. Korean parallels Japanese in this respect in that both languages employ the sounds [s] and [ʃ], and both exhibit a pattern whereby [s] is palatalized before high front vocoids. In Japanese, however, the palatalization process arguably is neutralizing because [s] and [ʃ] contrast in the native vocabulary (cf. minimal pairs such as [sakai] ‘boundary’ vs. [ʃakai] ‘society’); but in Korean, [ʃ] is found other than before [i] only in loanwords (e.g., [ʃawə] ‘shower’). A further basis for the claim that these fricatives represent separate phonemes in Japanese, but not in Korean, is the systematic difference between the two languages in the incidence of default epenthetic vowels in the adaptation of loanwords ending in palatoalveolar sibilants (see Heo 2010, Iverson & Lee 2006, Eckman & Iverson 2013 for detailed arguments). In consequence of this difference in phonemic status between otherwise identical L1 segments, native speakers of Japanese acquiring the English /s/—/ʃ/ contrast in our study did not exhibit the same acquisition patterns as the Korean learners, nor did they produce the same kinds of errors.

36.5 IMPLICATIONS

There are several implications that the findings of research on L2 phonology hold for language change. Chief among these is the repeated demonstration that, through phonetic drift, L2 learning may affect L1 pronunciation, modifying the phonetics so as to prime subsequent restructuring of the L1 sound system. Influence from the sounds of one language on the phonological system of another can also be exerted through the adaptation of loanwords, as Uffmann (this volume) exemplifies, though the learning of (as opposed to borrowing from) a second language is an even more intimate, and extensive, form of contact. Yet much of interest in this area remains to be explored, including the extent and persistence of phonetic effects on L1, and indeed on L2, that learning another second language (L3) might have, or the variations in phonetic drift that may arise when the phonetic and phonological systems of the L1 and L2 are similar (e.g., English L1 vis-à-vis German L2) or not (English L1 vis-à-vis Korean L2). Another way that analyses in second language acquisition may inform the field of historical linguistics is by attesting stages in the series of IL grammars that occur during L2 acquisition. If we take seriously the claim that interlanguages are, in fact, languages, and that, therefore, IL grammars are subject to the same principles that govern primary languages, then the IL grammars attested in L2 acquisition may well mirror the sequence of grammars that are involved in historical change. With respect to phonological changes involving allophonic splits, specifically, whether in acquisition of the L2 or in historical development of the L1, the possible existence of an intermediate stage is predicted in which the split occurs first in monomorphemic lexical items, then expands to all vocabulary at a later stage. The study of synchronic language contact due to second language learning is thus fertile ground for growing our understanding of historical change in phonology, with many questions yet to be posed, let alone answered.