

Bloomfield's French anecdote:

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On Chong:

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## 4 Allophonic sound substitution

The maintenance of meaning upon alternation is both necessary and sufficient for learners to determine allophonic relatedness

Consider the nasal sounds in the two words 'runs' and 'runner'. Whether written in English or transcribed phonetically, the same nasal symbol is used for both words, that is, 'n'. These two sounds are indeed quite similar, as both are made with the tongue tip up, the soft palate down, and the vocal folds vibrating. The major differences between them are that (1) the [n] of 'runs' is longer than the [n] of 'runner', and (2) the [n] in 'runs' is followed by another consonant, whereas the [n] in 'runner' is released into the following vowel. These articulatory differences, as we now know, have acoustic consequences. Specifically, the 'n' of 'runner' has formant transitions as the following vowel begins, whereas the 'n' of 'runs' lacks such transitions, since another consonant immediately follows. But although these two 'n's have systematic phonetic differences, most phonologists do not characterize them as alternants of each other. Instead, they regard them as one and the same sound, and would object to a characterization of this pattern as a genuine sound *substitution*. Nonetheless, I maintain that *any* systematic phonetic distinction that results from combining morphemes qualifies as a sound substitution, since there is inevitably *some* sort of phonetic change that sounds undergo as they combine with morphemes of distinct shapes. Moreover, the 'runs'–'runner' nasal alternation should be regarded as a specifically allophonic substitution, not a neutralizing substitution, since there are no words with which either form of 'run' might be confused. That is, this sound substitution maintains meaning.

From such minor, seemingly negligible phonetic differences, greater differences may ultimately emerge somewhere down the generations of language use. Indeed, although these two nasal sounds are indeed quite similar, I argue in this chapter that *articulatory or acoustic similarity between sounds is neither a prerequisite, nor a diagnostic, for allophonic relatedness*. Due to the gradual way sounds change over the generations, most sounds that alternate with each other are indeed quite similar in their phonetic characteristics. But whether these sounds are phonetically similar or not, all that matters to learners is the consequences their substitution have for word meaning; whether it changes word meaning, eliminates word meaning distinctions, or

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maintains word meaning. In fact, allophonic alternation reveals a remarkable cognitive characteristic on the part of language learners: functional identity overrides physical similarity in the determination of category membership or non-membership. To show this clearly, I consider three further cases of allophonic alternation: another case from English, one from Corsican, and one from Taiwanese Chinese. These will be followed by two examples – from Akan and New York English – which show that the *only* way sounds can be allophonically related is if they *alternate* with each other, that is, if they partake in a sound substitution which maintains meaning.

### Three cases of allophonic alternation

#### 1. English

We first consider another example of allophony from American English, one in which the phonetic distinction between the allophonic alternants is greater than that in our ‘runs’–‘runner’ example. In a natural, everyday way, say the words ‘fill’ and ‘filling’, and think about the way you make the two sounds represented by ‘l’. For most speakers of American English, these two sounds are made quite differently from each other. For ‘filling’, your tongue tip makes contact just behind the upper teeth (the same location as [t] and [n]), but also one side of your tongue is lowered (or both sides), allowing air to continually escape from your mouth. Consequently, ‘l’ sounds are called *lateral* sounds, since air flows around the side(s) of the tongue. Begin to say the word ‘filling’, but just before you release the l-sound into the following vowel, instead, sustain the ‘l’. If you make the sound in a natural way, this should confirm its articulatory configuration for you. Since the tongue is pushed forward in your mouth, the length of the oral cavity is rather short. This raises the relevant formant frequency of the sound, making it sound bright and clear. We often call this a ‘clear l’, and transcribe it, simply, [l].

Now reflect for a moment on the ‘l’ sound in ‘fill’. Again, if you say it in a natural way, your tongue is probably *not* pushed forward to the extent found in ‘filling’. Your tongue tip might not even make contact behind the teeth. If you say ‘fill’ and sustain the last sound, you can know for sure. With the tongue pulled back, the oral cavity lengthens, and so the relevant formant is lowered in frequency. This sound is often referred to as a ‘dark l’, and is transcribed with a tilde through the middle of the symbol: [l̈]. These two sorts of ‘l’s were referred to by Bloch and Trager when discussing the word ‘little’, remarked upon in Chapter One: the first ‘l’ is clear, the second one dark, even though speakers might feel they are the same.

In American English, as in a number of other languages, these two ‘l’ sounds systematically alternate with each other. When an ‘l’ sound finds itself in front of a vowel, the clear version, [l], is produced. Elsewhere, the dark version, [l̈], is found. So we have ‘fill’ [fɪl̈] (dark l), but ‘filling’ [fɪln̈] (clear l), ‘fool’ [fu̇l̈], but ‘foolish’ [fu̇ls̈]. Neither [l] nor [l̈] alternates with any other sound in the language: no other sound alternates with [l] when a vowel follows, and no other sound alternates with [l̈] when a vowel does *not* follow, and so this alternation never induces homophony. Consequently this is an allophonic sound substitution. You might feel that I’m just splitting hairs by regarding these sounds as genuine allophonic alternants of each other, and that they are really just tiny variants of the same sound, in just the same way that most phonologists regard the [nls] in ‘run’ versus ‘runner’ as one and the same. But in the same way that I disagree with these phonologists about ‘run’ and ‘runner’, I also disagree if you claim that the phonetic difference between these ‘l’s is negligible. I’ll repeat my assertion that *any* systematic distinction which results from adding or subtracting morphemes qualifies as a sound alternation. At any rate, by this point, you should always be suspicious of your intuitions about sound structure. You *feel* these sounds are so similar mostly because they *serve the same linguistic function*: whether [l] or [l̈] is used, the meaning of the morpheme stays the same.

The American English [l̈]–[l] alternation indicates – perhaps more clearly than our ‘run’–‘runner’ example – that phonetically distinct sounds may yet be equivalent in terms of their linguistic function. But there are further implications of this pattern. Recall the claim I made in Chapter Two that knowledge of allophony need not consist of learners deconstructing the multiple phonetic cues into their component constituents. Instead, what matters is that the ensemble of cues serves a single linguistic function. In the case of ‘runs’–‘runner’, we might incorrectly suspect that learners are taking note of the presence versus absence of following formant transitions in their determination of allophonic relatedness. This is due to the isolability of this particular cue from the entirety of the cue complex: sometimes it’s present, sometimes it’s absent. But the physical nature of the difference between [l̈] and [l] is not parallel to the difference between released and unreleased nasals, as one would be hard-pressed to characterize the distinction between the dark l and clear l in terms of adding or subtracting acoustic cues from otherwise identical sounds. Instead, there is a qualitative distinction between the two that is not phonetically isolable from the speech signal; the phonetic difference typically involves the genuine substitution of one tongue gesture for another. Yet these sounds are indeed allophonically related, just as released

and unreleased nasals are allophonically related. Is there any reason to insist that English learners might treat the distinction between released and unreleased nasals differently from how they treat the difference between clear l and dark l? I really don't think so. The *qualitative*, *functional* consequences are the same in either case – the maintenance of meaning – and therefore there is no reason for learners to respond differently to the *quantitative*, *phonetic* differences between the two pairs. The two sound substitutions are different in terms of the nature and degree of difference between the respective alternating sounds, but the functional consequences are the same in both cases – meaning is maintained.

## 2. Corsican

The [l]-[ɫ] allophonic sound substitution in English involves sounds that are indeed similar to each other but quite different from all other sounds of the language. So there's little chance of confusing either of these sounds with any other. But now we'll consider a more complicated case, one in which allophonic alternants are far more similar to *other* contrastive sounds of the language than they are to each other. Consider the following words from Corsican, concentrating on the underlined consonants: [p̪eðə] 'foot' versus [u b̪eðəl] 'the foot'; [t̪enɟu] 'I have', versus [u d̪enɟu] 'I have it'; [kazɑ] 'house' versus [a gaza] 'the house'. You'll notice that [p̪] and [b̪] alternate with each other, as do [t̪] and [d̪], and [k] and [g]. The [b, d, g] alternants are present when a vowel precedes them, and the [p̪, t̪, k] alternants are found when there is no preceding vowel. The difference between [p, t, k] and [b, d, g] is that the vocal folds are set apart from each other for the former set, while the vocal folds are close together and set into vibratory motion for the latter set. So the major difference between [p, t, k] and [b, d, g] is that the former set is *voiceless*, and the latter set is *voiced*. Most other aspects of these pairs of sounds – that they are stops, and the locations of their respective oral closures – are the same. Now, although we've only considered a mere three examples, further investigation of Corsican would show that voiceless stops ([p, t, k]) regularly alternate with their voiced stop counterparts ([b, d, g]) such that the voiceless variants are found when *not* between two vowels, and the voiced variants are found *only* between two vowels (that is, *intervocally*), just as our examples show. This is actually a very common pattern in the languages of the world. In Chapter Six we consider the phonetic reasons for its prevalence.

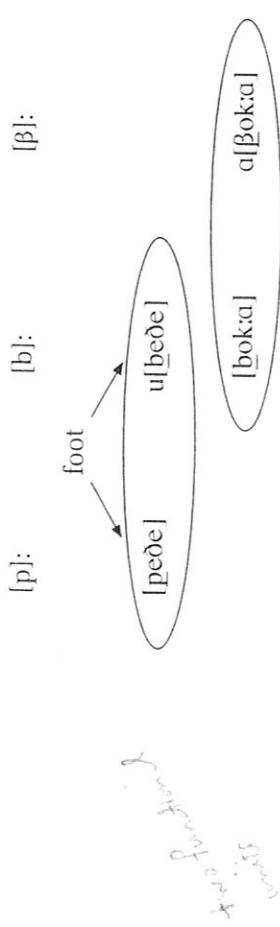
Since we don't yet know enough about the other sounds of the language, we can't conclude whether this alternation is allophonic

or neutralizing. So let's consider another alternation in Corsican, one on which our answer will hinge. I'll have to introduce several new symbols, two of which represent sounds that are not usually found in English: [bok:a] 'mouth' versus [a b̪ok:a] 'the mouth'; [dente] 'tooth' versus [u d̪ente] 'the tooth'; [gola] 'throat' versus [diɣoła] 'of throat'. (I should point out that Corsican has long voiceless stops as well. For these so-called 'geminate' stops, the oral closure is held longer than the so-called 'singleton' stops. As with long vowels, we indicate these with a colon following the consonant symbol, as in [bok:a]. These geminate stops are never voiced in Corsican. English has geminates only in compounds, like 'rat-tail'. We are already familiar with the voiced stops (underlined) in the first members of these three word pairs. But these stops are slightly different from the word-initial 'b, d, g' of English, because the English sounds very often lack vocal fold vibration until the stops are released. We have been transcribing these [b, d, g], the hollowed circles indicating their overall voicelessness. But the genuinely voiced stops of Corsican contain vocal fold vibration for most of the stop closure itself, and so our transcription lacks the hollowed circles: [b̪, d̪, g̪]. These voiced stops may be found at the beginning of a word in Corsican. Consequently, they are found at [p, t, k], which, as we've just seen, may also be found contrastive with [p̪, t̪, k̪], which are preceded in this position. But when these [b, d, g]-initial words are preceded by a vowel, the fricatives [β, ð, γ] substitute for [b̪, d̪, g̪] respectively. Of these three sounds, only [ð] is found in English, exemplified by the first sound in the word 'this': the vocal folds are vibrating, the tongue touches the upper teeth, and air continually flows out of the mouth in a turbulent fashion. For [β], the lips are close enough together so that a slight turbulence is created as air rushes through the narrow opening. The [γ] sound is the closest we have in English to the Corsican [β].

The [v] sound is made with the lower lip against upper teeth, not with both lips. Finally, for [ɣ], we make a [k]/[g]-like tongue gesture, but again, the tongue and soft palate do not come into full contact, and instead are sufficiently close so that the air rushing through the narrow passage becomes turbulent. As [β], [ð] and [ɣ] are all voiced, the Corsican sounds under discussion constitute a series of *voiced fricatives*.

What's especially interesting is that the voiced stops alternate with those with the voiced fricatives, but they may also contrast with those voiced stops that alternate with the voiceless stops! This is a bit confusing, so once again, it may be helpful to envision this situation with set-theoretic notation.

Figure 4.1 characterizes the fact that voiced stops alternate with two different sounds of the language (indicated by the two circles).

**Figure 4.1** Multiple alternation in Corsican

Now the important question arises: are these alternations allophonic, or might they potentially induce neutralization? The set notation provides us with a clear answer: the sets will never intersect. The voiced stops that alternate with the voiceless stops are *only* found between vowels, whereas the voiced stops that alternate with the voiced fricatives are never found between vowels. Consequently, there is never an opportunity for the presence of a voiced stop to induce neutralization. So if the words in this set-theoretic example were otherwise identical, the alternations would never induce neutralization. For example, [pa] would alternate with [a+bɔ], but [ba] would alternate with [a+βɔ], and so each contrast is inevitably preserved.

We know that there are phonetic differences between stops that follow a vowel, and stops that do not follow a vowel. The former have formant transitions preceding the stop closure, while the latter may lack these transitions. So the two different [b]s in our set notation are similar, but not identical. The important point is that these [b]s are quite similar to each other while being rather *less* similar to the sounds in [u bœðe] and [bok:a], although not allophonically related, are very similar to each other, while the underlined consonants in the pairs [peðe]–[u bœðe] and [bok:a]–[a Bok:a] respectively are less similar to each other, but *do* allophonically alternate. Now, I have already suggested strong caution in employing similarity as a diagnostic for linguistic relatedness, because we still lack a reliable determinant of what similarity actually consists of. So for now I'm simply appealing to an unscientific, impressionistic notion of similarity. But the point is that similarity – however it may eventually be quantified – is clearly not playing a role in Corsican allophony, as learners do not mistakenly group the two voiced stops into the same category. We know this

simply because children master all the complexities of the language without making mistakes: they come to speak the same language that their parents speak. So phonetic similarity is neither a prerequisite, nor a diagnostic, for allophonic relatedness.

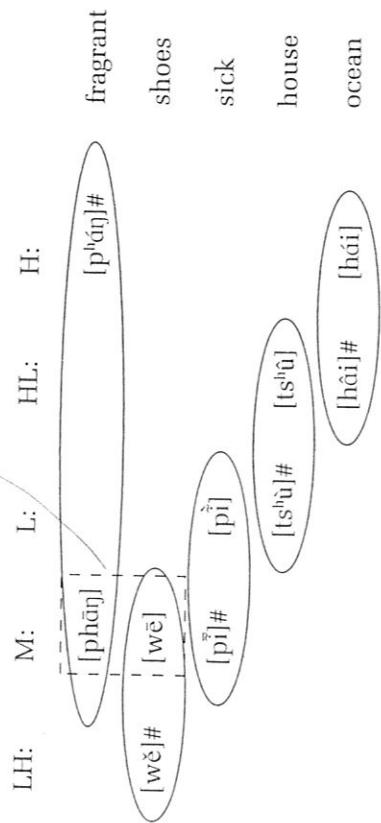
In short, Corsican (and the many other languages which have comparable patterns) shows us quite clearly that phonetic similarity is not isomorphic with functional identity. Rather, the maintenance of meaning upon alternation is both necessary and sufficient for learners to determine allophonic relatedness.

### 3. Taiwanese

Implicit in our discussion of Corsican is a further proposal about the nature of allophony: very dissimilar sounds may be functionally identical, provided, merely, that they alternate with each other. Let's consider the case of Taiwanese tone alternation in this light. Taiwanese, like all Chinese languages (as well as many North American, Mexican, African and other Asian languages – indeed, like the majority of the world's languages) is tonal. Recall that in tonal languages, pitch may behave just as consonants and vowels do, in that they may be substituted for one another in a contrastive, neutralizing or allophonic way. In Taiwanese, tones at the end of a phrase alternate with tones *not* at the end of a phrase. In Table 4.1, tones are indicated with superscripted diacritics. A high (H) tone is indicated [˥], a mid tone (M) is

**Table 4.1** Tone alternations in Taiwanese

	At the end of a phrase	Alternates with	Not at the end of a phrase
H#	[tsin p'āŋ]	↔	M [p'āŋ tsūŋ] fragrant water
LH#	[p'ē wē]	↔	M [wē tūŋ] shoe laces
M#	[wi pī]	↔	L [pī láŋ] sick person
L#	[ts'ǖ tñ̄]	↔	HL [ts'ǖ tñ̄] roof top
H#	[túa háī]	↔	H [háī kí]
			ocean front

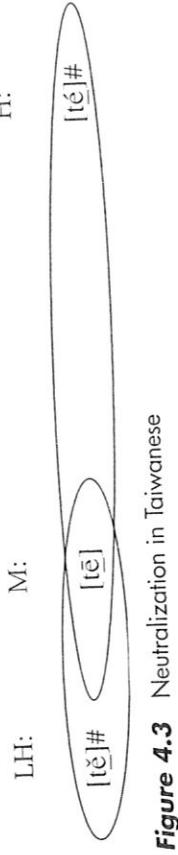
**Figure 4.2** The mostly allomorphic nature of Taiwanese tone alternation

indicated [-], and a low tone (L) is indicated [']. These marks may be combined to indicate a gliding, or *contour* tone, during which the tone rises or falls in pitch. So ['] indicates a HL falling tone, and ['] indicates a LH rising tone. Even if you can't envision the actual pronunciation of these words, just keep your eye on the changing tone symbols; the alternating tones are underlined. (Don't worry, I'll try again to acquaint you with tone production in Chapter Five.) Although the tone symbols appear over the vowel, they are actually pronounced during both the vowel(s) and the final nasal. Cross-hatching here (#) indicates phrase-final position.

If you carefully check the tonal alternations on display here (underlined) you'll notice that they are usually allomorphic, and not neutralizing. Our now-familiar set notation makes this more clear (Figure 4.2).

The tones found in phrase-final position are all distinct from each other, and except for the case of [pʰāŋ] and [wē], the non-final tones are distinct from each other as well (recall, [pí] is a phrase-final form). Since both LH# ([']#) and H# ([']#) alternate with M ([']) when in non-final position, tone substitutions are potentially neutralizing here. I have placed a dashed rectangle around these two forms to draw attention to them. Now, [pʰāŋ] and [wē] are not neutralized because the consonants and vowels are different. However, consider words like [tɛ̃]# 'tea' and [tɛ̃]# 'earth'. When in non-final position, these neutralize, becoming [tɛ̃], as shown in Figure 4.3.

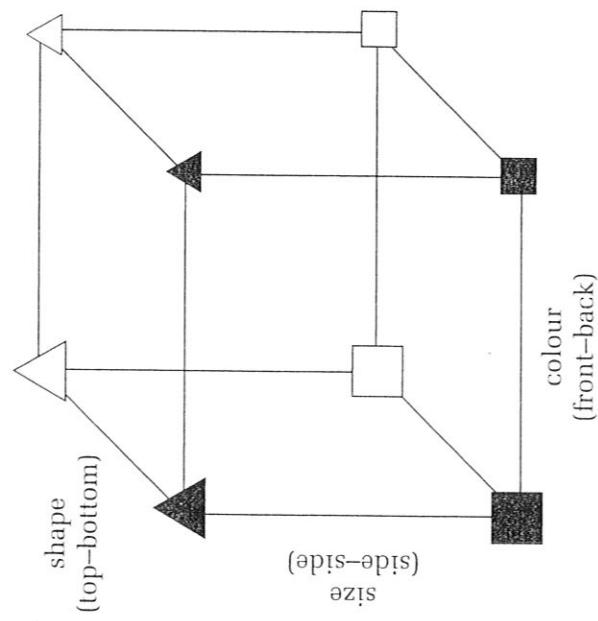
At any rate, the potentially neutralizing pattern is not the main topic of our investigation. Instead, let's stay focused on allophony. When discussing Corsican and Taiwanese consonants, I suggested that language learners come to ignore phonetic similarity or dissimilarity as they

**Figure 4.3** Neutralization in Taiwanese

determine the allomonic nature of the sound substitution, even when contrastive sounds bear more resemblance to each other than they bear to their respective alternants. Instead, learners focus their attention on the functional consequences of the sound substitution. The same thing is happening in Taiwanese. Tones in alternation may be less similar to each other than they are to tones with which they don't alternate. This is made perfectly clear in the set diagram in Figure 4.2, as the final alternant of one tone is the same as the non-final alternant of some other tone. But Taiwanese tone allophony reveals something even more remarkable, casting even graver doubt on the hypothesis that phonetic similarity plays a role in the determination of allophonic relations. In Taiwanese there is really no simple generalization we can make about the relationships between final versus non-final tones. The two sets have little in common in terms of their phonetic properties, and moreover, the phonetic nature of the alternation itself is strikingly different from one pair to the next. That is, the phonetic difference within one set of alternants is completely dissimilar to the phonetic difference within the other sets of alternants; they are all changing in their own independent ways. In short, Taiwanese tone allophony is something of a phonetic mess. This is quite different from the situation in Corsican, where the sets of alternants differed in very regular ways – in terms of voice-or-voiceless, and in terms of stop-or-fricative. But since Taiwanese children master their tonal alternations just as readily as Corsican children master their consonant alternations, there would seem little reason to maintain the hypothesis that phonetic similarity plays a role in the determination of allophonic relations. Again, all that matters is that meaning is maintained upon alternation.

### Physical similarity versus functional identity

Allophones may be viewed as belonging to one single functional category among many. Therefore, as learners determine the allophonic relatedness between sounds, they are engaging in a form of category formation. Given the conclusions we have drawn from the allophonic patterns of Corsican and Taiwanese, it's clear that any theory of category formation (be it linguistic sound categories or otherwise)

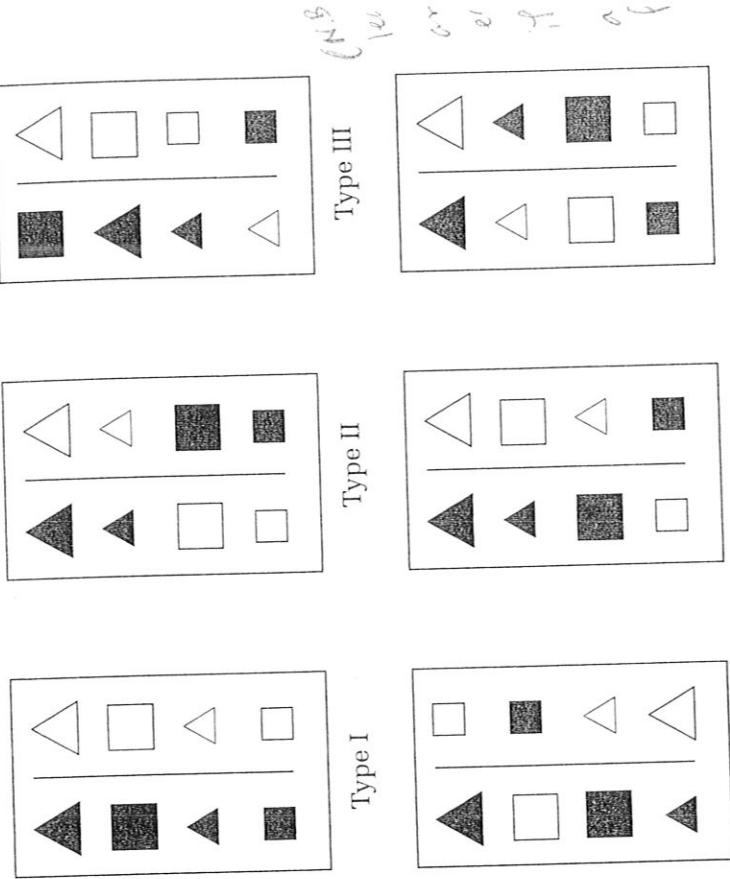


**Figure 4.4** Similarity and difference across three dimensions: colour, size, shape

which relies too heavily on physical similarity is unable to account for these and other such patterns. Instead, the functional identity of these linguistic objects clearly overrides their physical dissimilarity.

The relevance of functional identity in category formation is experimentally investigated in a landmark paper from 1961 by the psychologists Roger Shepard, Carl Hovland and Herbert Jenkins. These researchers tested subjects' ability to group visual stimuli into sets that possess either similar or dissimilar members. For example, the schematic in Figure 4.4 portrays an evaluation of similarity between eight members along three dimensions: colour, size and shape.

Here, colour, size and shape can be formed which consist of more-similar or less-similar members. Figure 4.5 shows the six logical breakdowns of the eight forms, each consisting of two groups with four members each. Group Type I contains groups with members that are maximally similar, here, on the colour dimension – black shapes group together, white shapes group together. Group Type II consists of groups with qualitatively less similar members, requiring two dimensions to be considered for classificatory purposes – black triangles and white squares group together, white triangles and black squares group together. Group Types III, IV and V consist of groups requiring



**Figure 4.5** The six logical breakdowns of the eight forms, each consisting of two groups with four members each

mention of all three dimensions. For example, in Group Type III, large black shapes and the small triangles group together, large white shapes and the small squares group together. Finally, Group Type VI requires learning the qualities on all three dimensions for each individual member – the large black triangle, small black square, large white square, and small white triangle group together; the large white triangle, small black triangle, large black square, and small white square group together.

In these six group types, physical similarity plays an increasingly insignificant role as we go down the list. In the limiting case (Group Type VI), physical similarity cannot be harnessed at all as an aid in classification. Indeed, attempting to do so actually confounds the process of categorization.

In the actual experiment, these colour-size-shape figures were not employed. Instead, pictures of actual objects were used which

differed along similar dimensions. Experimental subjects went through a number of sets of stimuli, with each set conforming to one of the six group types. Subjects were trained to associate a prescribed verbal response to each of eight stimuli within the given set. Four of the stimuli were associated with one verbal response, the other four with another. The pictures of objects used in the experiment did not bear *intrinsic* functional relationships to each other. Rather, their relationships were to be learned by subjects as the experiment progressed. After each response, subjects were provided with immediate feedback as to the correct response to the stimulus flashed, and were then presented with the next stimulus, and so on. After exposure to one set, stimulus presentation moved on to the next set, until 32 consecutive correct responses were produced.

Subjects were successful at learning all six sorts of groupings, but showed a clear facility with learning groups consisting of more similar members (I, II). Learning groups with the least similar members (VI), while slowest, nonetheless improved the most over time, and ultimately patterned similarly to all other groups in terms of their learnability.

How are these findings on category learning relevant to our investigation of learning allophonic relations? First, these findings suggest that learners may experience an initial difficulty, but an ultimate success, in discovering that phonetically disparate allophones should be grouped together. That is, in such cases as the Corsican [t-d]/[d-ð] type alternation, and in those unusual circumstances when allophones have strayed quite far from each other in terms of their phonetic quality, as in Taiwanese, the functional identity of phonetically distinct allophones is indeed learnable, although the category may take marginally more time to master. Thus, despite the initial boost that similar stimuli may receive in terms of category grouping, this boost is quickly overridden by functional cues to category membership.

With respect to learning allophonic relations, initial semantic feedback regarding category membership may fall on deaf ears, for just as experimental subjects do not immediately learn the intricacies and subtleties of category membership, so too early language learners are unaware of the sameness or distinctness in meaning that accompanies sound substitution. As discussed in Chapter One, functional relations between sounds cannot be learned until meaning is: learning allophonic relations is dependent upon learning allomorphic relations. But just as experimental subjects who, when provided with feedback, are ultimately able to group unlike elements together, so too may language learners, over time, exploit the lexical semantic feedback provided them regarding meaning changes or non-changes in order to

replicate the functional categories of the adult system, regardless of the phonetic values of these elements. In essence, the determination of identity or non-identity between stimuli is significantly affected by function – of categorization demands – rather than being an inherent component of the stimuli themselves. This approach to categorization therefore implicates the relevance of *function over form* in order to arrive at – or derive – the proper features necessary for effective category delineation.

But there is additional significance to Shepard, Hovland and Jenkins' findings. Until this point I have merely noted that phonetically unusual phonological processes, such as those found in Taiwanese, are rare consequences of historical change. But why are certain patterns so rare, and others so common? That is, given the possibility that the long march of history will take its toll on the phonetic order of a phonological system, why are not all phonological systems in a state of phonetically transmogrified disarray? A conceivable answer emerges when considering the learning curve involved in forming categories out of dissimilar elements. Recall that in Shepard, Hovland and Jenkins' experiment, subjects initially performed better on lower-numbered group types (forming categories out of elements with physically similar members), and initially performed rather poorly on higher-numbered group types (where physical similarity played an increasingly insignificant role), but that performance here improved dramatically over time as feedback was provided. It is reasonable to assume that linguistic category formation proceeds along similar lines. That is, categories with dissimilar members might indeed take a bit more time to master. Such categories may initially be mistakenly filled with similar members, which would be in keeping with the majority of the more readily learnable categories. Now, over time, such 'incorrectly' formed categories may be 'corrected' with sufficient feedback (sufficient exposure to allophonic alternations – which do not change meaning), but some incorrectly regularized forms may take hold, and consequently change the system towards a more regular state. The question is, which categories with dissimilar members should be most susceptible to a change toward regularity, and which categories should most likely maintain their dissimilar members? This may depend on the amount of feedback available to the learner. If there is a great deal of feedback in the form of exposure to frequently employed words in alternation, categories with dissimilar members should ultimately be successfully learned. Moreover, if there is little-to-no exposure to a given irregular pattern at early stages in the learning procedure, these irregularities too will probably be learned correctly later on, as feedback begins after the mature system is well in place – certain

archaisms may survive exactly due to their rarity of usage among children. However, those irregular categories with existing though minimal feedback at the early stages of language learning – again, in the form of minimal exposure to less frequently employed items – will likely be the most susceptible to regularization, as minimal amounts of feedback may be insufficient for the proper generalizations to emerge for the learner. The result is that the learner might fill the category with likely candidates – those that conform to the regularities of most other categories in that they possess phonetically similar members.

Now, we can't import wholesale the results of lab-based experimental work to the issue of language acquisition, nor can we necessarily take results ascertained through one modality – vision – and apply them to another modality – the hearing of linguistically relevant sounds. Nonetheless, there is a striking parallel between Shepard, Hovland and Jenkins' findings and what we observe in linguistic patterning. In language after language, irregular patterns are typically found both among the *most* frequently used items, and the *least* frequently used items. Words of moderate frequency are typically the most regular in terms of their linguistic patterning. The linguist Charles Hockett expressed these ideas in his book of 1958:

Other things being equal, irregular forms of high frequency are less apt to be replaced than are rarer ones ... [If] an irregular form is frequently used, a child learning his native language will hear it many times, and may never come out with any analogically produced regular alternant. Even if he does, he probably already knows the inherited irregular form and may reject his own innovation.

However,

For a rarer irregular form this argument applies in reverse ... Under some circumstances, extreme rarity may preserve an irregular instead of helping to lose it. The process, however, is quite different. The word *speak* (past tense of *speak*) and *beholden* still occur from time to time; it would seem that the rarity and irregularity of the forms constitute an integral factor in their peculiar archaic flavor, and it is because of the latter that the forms are used.

The initial tendency to group similar things together, and, in the face of a paucity of feedback, the likely assumption that other forms pattern similarly to the norm, may account for such patterns both morphological and phonological in nature. In Taiwanese, then, although we don't have an understanding of the *origin* of the marked irregularity of the tonal system, it may nonetheless be due to the punishing frequency with which learners are exposed to allomorphic alternations that this highly irregular pattern has survived.

## Two cases of mistaken identity

### 1. Akan

Sounds that alternate in an allomorphic fashion are traditionally said to be in complementary distribution, where 'complementary' is used in its geometric sense. That is, subtracting one angle from  $90^\circ$  yields its complementary angle. For example,  $60^\circ$  is the complement of  $30^\circ$ ;  $60^\circ$  plus  $30^\circ$  gives us a perfect right angle. In phonology, then, the group of sounds that engages in allomorphic alternation gives us the total set of allophonic alternants. The set consists of non-intersecting subsets such that each subset is the complement of the other(s). So American English [H] and [l], due to their allophonic alternation, are in complementary distribution because we may find one exactly where we may not find the other, and vice versa.

However, there is another source of complementary distribution, one that does not involve alternation at all. Look at the words from Akan in Table 4.2, a language of Ghana. I've arranged the words according to the quality of the underlined consonant–vowel sequences.

There is an interesting generalization to be made here. Before front vowels ([i, ɪ, e, ε]), we can find [tç] (this is somewhat similar to English 'j' in 'jeep'), and preceding the other vowels ([u, o, ɔ, ɑ]), we can find [k] ([l] as in 'bit'; [ε] as in 'bet'; [o] as in 'book'; [ɔ] as in 'New Yorker' pronounces 'bought'). Since these two sounds are not found in other contexts in Akan (although an important exception will be discussed in a moment), we may say that [k] and [tç] are in complementary distribution, since [k] may be found exactly where [tç] may not be found, and vice versa.

Despite their apparent complementary distribution, [k] and [tç] never alternate with each other in Akan. The only circumstances in which we encounter [k] or [tç] in Akan is when a vowel immediately follows *within the same morpheme*. If we were to investigate the way in which morphemes combine into words in Akan, we would find that there are no cases of one morpheme ending with a consonant, followed immediately by another morpheme beginning with a vowel. So we can't find even a single morpheme that has an allomorph that ends in

**Table 4.2** Front and back words in Akan

Front words	Back words
[tçim]	[kun]
[tçitçε]	[akom]
[tçε]	[kɔ?]
[tçε]	[ka]

[k] when an [u] immediately follows in the next morpheme, but has another allomorph that ends in [tç] when an [i] immediately follows in the next morpheme. This means that there is simply no opportunity for [k] and [tç] to alternate with each other. But still, the sounds are in complementary distribution.

What is the origin of these sounds' complementary distribution? Although we don't know for sure, it is quite possible that [k] and [tç] used to be quite similar in their phonetic attributes – probably, quite like [k] – but over the generations, the sound moved towards [tç] (or *patalized*) when it preceded front vowels. There are well-understood reasons for this sort of sound change. The first point to consider is that both the tongue body and the roof of the mouth have a fairly large surface area, and so there is a fair degree of 'wiggle room' here. What I mean is that we can form a constriction at different places in this region without significantly changing the acoustic character of the consonant, and so it won't be rendered confusable with another contrastive consonant. In English, for example, the [k] in 'coo' [kʰu] (with a back vowel) is made quite a bit farther back along the palate than is the [k] in 'key' [kʰi] (with a front vowel); the diacritic indicates that the tongue is more forward along the palate. So, it is quite possible that in the history of Akan, the tongue-body consonants that preceded front vowels were more forward than those that preceded back vowels. But this is only the beginning of the story. For these more-forward tongue-body consonants, the tongue actually makes more surface contact with the roof of the mouth than it does for more backward sounds. Because of this increased contact area, the release of a (front) [k] may be less sharp, less 'clean' than the release of a (back) [k], such that the air rushing through at the release is more likely to become turbulent. This will be especially true when vowels like [i, ɪ, e, ε] follow, since the tongue body remains fairly close to the roof of the mouth. Turbulent air, as we now know, is a characteristic of fricative sounds, which is exactly what we find in the latter portion of Akan's [tç]: [tç] is a palatal fricative. So the sound may have gone through an intermediate stage of [kç]. The last piece of the puzzle is the change from [kç] to [tç]. It is quite likely that the place of oral closure of [kç] might now be susceptible to change, because the formant transitions from the palatal fricative into the following vowel are not dissimilar to those of tongue-tip consonants. These fricative-to-vowel formant transitions are far more robust than those of the [k] itself, since the [k] is not immediately released into a vowel. In time, the [k] may indeed become a [t], giving us the [tç] that we see in Akan today.

In short, in the context of front vowels, there may have been a very gradual shift from [k] to [k] to [kç] to [tç]. Furthermore, *none* of

these changes would have affected [k]s which preceded back vowels, because the articulatory, aerodynamic, and acoustic conditions were not comparable.

So now I've now offered a hypothesis – rooted in historical phonetics, or *palaean phonetics* – for the present-day complementary distribution of [k] and [tç] in Akan. But now let's return to the main issue. What is the present-day linguistic significance of this complementary distribution? Are [k] and [tç] related in the same way that allophonic alternants are related, which, recall, are in complementary distribution by definition? In many languages, this is an impossible question to answer, due to a lack of linguistic evidence. Despite this lack of evidence, many phonologists (though not I) are satisfied with the guess that sounds in complementary distribution that do not alternate *are functionally related in the same way that sounds in allophonic alternation are, provided that the sounds are phonetically similar to each other.* In Akan, however, there is actually compelling linguistic evidence showing that [k] and [tç] are *not* treated as functionally equivalent. Getting at this evidence will require us to delve further into the phonology and morphology of the language.

*Reduplication* is a process whereby all or part of a word is copied, and a predictable change in meaning results. In Akan, one way to form a verb is to prefix a copy of a word's first consonant and vowel to the base word itself. The consonant copies exactly, but the vowel is always a high vowel, although its front/back/round quality is usually copied from the original word. Take a look at a few examples: [si+síi] 'stand'; [bu+bu?] 'bend'; [si+iε?] 'say'; [su+so?] 'seize'. When the original vowel is high, the prefixed vowel is a perfect copy. But when the original vowel is not high, it is raised in the copy, with its other features remaining as they were. So [e, o] raise to [i, u], respectively. These copied consonant–vowel complexes are fully-fledged morphemes, by the way, since they change the meaning of the word in a predictable way: in the Akan process we are looking at, the reduplication creates verbs. What makes reduplication unique is that the shape of the morpheme is largely or wholly dependent on the shape of the base word.

Now, remember that [k] and [tç] in Akan seem to be in complementary distribution but not in alternation with each other: [k] isn't found before front vowels, and [tç] isn't found before other vowels. The big question is, what happens when a [ka-]-word is reduplicated, which involves the replacement of [a] with [i]? If [k] is replaced with [tç], then we have linguistic evidence that [k] and [tç] are functionally related in Akan. But if [k] is *not* replaced with [tç], and remains [k], we have evidence that [k] and [tç] are *not* functionally related in Akan.

This would, moreover, falsify the claim that the two sounds are in perfect complementary distribution.

So what happens? Look at the following words for the answer: [tçɪ–tçɛ] ‘divide’, [ki–ka?] ‘bite’. The first word is just as we expect it to be, with [tç] preceding the front vowel in both morphemes. But look at the second example. When [ka-] reduplicates, the [k] remains [k] even though it comes to precede [i]. So, in the one circumstance when [k] and [tç] finally have the opportunity to alternate with each other, still they remain oblivious to each other’s existence, and retain their functional non-identity. This creates an exception to the generalization that [tç] is always found in the context of a front vowel. But as I’ve demonstrated several times, the generalizations that language researchers make are not necessarily the same generalizations that language users make. Phonologists might observe the almost-perfect complementary distribution of [k] and [tç] and conclude that the two sounds are allophonically related. But Akan speakers are making no such generalization, as the lack of alternation upon reduplication shows so clearly.

So what is the *origin* of this pattern? Akan reduplication suggests that the [k]-to-[tç] sound change occurred prior in history to the introduction of the reduplication process itself, as displayed in the proposed timeline in Figure 4.6.

This historical reconstruction of the *Akan pattern* offers a straightforward account of the present-day facts. At some point in the history of the language, [k]s which preceded front vowels palatalized to [tç]. This only occurred within morphemes, because [k] never came to precede a front vowel across a morpheme boundary. At a later point in time, the reduplication pattern was introduced into the language, perhaps through a process of language contact (just as English now has reduplications like ‘fancy-schmancy’, due to contact with Yiddish). This process introduced a new sound pattern into the language (or, rather, reintroduced an old sound pattern), for example [kil], as in [ki–ka?]. The [k] component of these [kil]s did *not* palatalize, however, because there were no alternations that established a functional relationship between pre-existing [tç] and new [kil]. Consequently,

these new [kil] morphemes were simply added to the inventory of morphemes of Akan without inducing a [k]-[tç] alternation. So in the new reduplication context – and in this context only – [k] comes to precede [i] within a morpheme, and the present-day pattern is accounted for.

Let me emphasize that this scenario is merely a proposed reconstruction, and that we don’t really know the detailed history of Akan. Linguists have developed several methods to investigate how present-day phonological patterns have come into being. The surest method is to study old linguistic descriptions or historical texts, which may provide quite reliable evidence about a language’s past. Our discussions of historical Korean and Chinese in Chapter Three were based in part on such texts. Unfortunately, very few languages have been carefully documented over a period of centuries, and so this method is not usually available. Alternatively, we can compare the sound pattern in one language to several of its closest and most obvious relatives. We look at words in each of the languages that clearly have a common historical origin (based upon their comparable meaning and their similar phonetic properties), and compare their phonological properties. The sorts and prevalences of differences and similarities between the sounds of these related languages can sometimes make it obvious which sounds have evolved into which other sounds, which sounds are older (often, the sounds shared by more of the relatives) and which sounds are more recent innovations (often, the rarer sounds). This is known as the *comparative method*. The method we have just employed in our discussion of Akan is known as *internal reconstruction*. In this method, as I just demonstrated, we consider the sounds in a single language at a single point in time. Based on how the sounds phonologically interact with each other, we might reconstruct their historical origins.

Back to Akan now: despite the ease with which we can express this sound change in terms of the individual sounds, the very fact that only a subset of morphemes starting with [k] underwent the change to [tç] strongly suggests that there was *never* a notion of ‘k-ness’ in the minds of Akan speakers, such that all instances of [k] were organized into a single phonological category. Rather, the sound change seems to be the result of a generalization that learners made over *words*, not a generalization made over component sounds themselves. There were phonetic reasons for words of certain phonetic shapes to undergo a sound change. However, since there were no alternations, there was no functional reason for learners to analyse these words’ internal structure; there was no linguistic motivation prompting learners to break down these *Gestalts* into smaller, isolable components, like [k]-[i] and [k]-[a], and so the [k]s from

<i>early form</i>	<i>palatalization</i>	<i>reduplication</i>	<i>present-day form</i>
ka? (bite)	–	ki–ka?	ki–ka?
ker (bind)	tçer	tçi–tçer	tçi–tçer

time →

**Figure 4.6** A suggested diachrony for Akan

[kil] and the [k]s from [ka] do not emerge as functionally related to each other: *structurettion is dependent upon alternation*. As I've already noted, expressing phonological patterns and changes in terms of the isolable sounds themselves may be the best way we can talk about linguistic generalizations. But of course, the generalizations we make as linguists are not necessarily the same as the generalizations we make as learners, as Akan has just shown once again.

So what about the future of Akan? We might speculate that those rare words like [ki-kiçil] will eventually become [kiçil-kiçil], with the stop again undergoing palatalization. It would be tempting to view such a change as a 'regularization' of a stray pattern, due to a pressure that is pulling these [k]s back in line with the [çil] pattern that is found elsewhere in the language. But I think this would be a mistaken analysis. We have reliable linguistic evidence that learners do not establish any relationship between [çil] and [ka] in the first place, and so there is no reason for them to treat these rare [kil] morphemes as having strayed from any other pattern in the language, including [çil]; even though this may be what happened in the history of Akan, history cannot possibly be recapitulated inside the heads of modern speakers. Instead, the same phonetic pressures that gave rise to the [ki]-to-[çil] change in the past may once again act on [kil]. This has happened in the past of Akan, and it could happen again in Akan, since reduplication has re-introduced [kil]-front vowel sequences into the language. But we just don't know, of course. Sound change is not deterministic, but probabilistic. We can no better predict the evolution of a sound than we can the evolution of a species. So even though some sound changes are quite likely to occur, we can never predict when or even if they will occur. We can only entertain more-likely and less-likely scenarios.

## 2. New York English

In Akan, the [kil]-to-[çil] change only showed its effects within morphemes, never having the opportunity to affect sounds across morpheme boundaries. Sound changes of this exclusively morpheme-internal sort may produce complementary distributions in which sounds don't alternate with each other, even when given a unique opportunity to do so, as when a process of reduplication creates the very pattern that the sound change has elsewhere eliminated. A language spoken much closer to home – closer to my home, anyway – provides us with further evidence for this. New York English has an unusual vowel quality that is sometimes referred to as a *tense 'a'*, as in the word 'ban'. For this vowel, the tongue is in a somewhat higher position than it is for, say, 'bat' [ba̚t̚], and there is a little schwa-like vowel that follows, creating

a diphthong (two sequenced vowel qualities). We'll transcribe this sound [æɔ̚], in which the first diacritic indicates the slight tongue-raising that accompanies this sound, the [æ] represents the little schwa, and the second diacritic indicates that this schwa is particularly short in duration: [bæ̚ɔ̚n]. I realize that [æ]-[æɔ̚] is a very subtle distinction, and non-New Yorkers are often either perplexed or amazed when I demonstrate it for them. If you have trouble conceptualizing it, at least you can observe the transcriptional distinction between the two. In New York, [æ] and [æɔ̚] are in complementary distribution, but never alternate with each other, just like [k] and [ç] in Akan. Specifically, the [æɔ̚] may be found before voiced stops, most of the fricatives, and [m] and [n], but only when these sounds are not immediately followed by another vowel within the same morpheme. There are additional distributional restrictions, but we can ignore them for the present. The [æ] may be found in complementary contexts.

This description is consistent with the pronunciations of 'ban' [bæ̚ɔ̚n] and 'bat' [ba̚t̚]. For 'ban' the vowel precedes [n], which is not followed by another vowel within the same morpheme, and so we find [æɔ̚]. For 'bat' the vowel is followed by [t̚], and so we don't find [æɔ̚]. Now, if a following vowel is in the same morpheme, again the lax vowel is used. So for example, the pronunciation of 'banner' – meaning 'pennant' – is [bæ̚ən̚al], because a vowel ([ə]) follows the [n̚] within the same morpheme. Especially interesting is that a person who *bans* something is a 'banner', pronounced [bæ̚ən̚al]. Here, the tense 'a' of the verb 'ban' remains tensed even though a vowel now follows the preceding [n̚]. In phonological terms, 'ban+er' and 'banner' differ only in terms of tensing, but in morphological terms, 'ban+er' has two morphemes, and 'banner' has one. The upshot is that [æ] and [æɔ̚] are in complementary distribution within morphemes, and so they are never responsible for a contrast between individual morphemes (there will at least be a following consonant that is different as well). But they can come to constitute a minimal phonological contrast when two words have different morphological structures: words with more than one morpheme can differ from words with only one morpheme solely in terms of the [æ]-[æɔ̚] distinction. Some additional examples include 'adder' [æ̚l̚dder] (a species of snake) versus 'adder' (add+er) [æ̚d̚d̚er] (one who adds); 'cannibal' [cl̚æ̚l̚n̚ib̚al̚] versus 'cannable' (can+able) [cl̚æ̚l̚n̚ib̚l̚e̚l̚] (able to be canned).

The unusual mixed status of the [æ]-[æɔ̚] relationship – that these vowels are in complementary distribution within morphemes, but may contrast when morphemes attach – can be traced directly to the historical origins of their phonetic distinction. Since the Middle

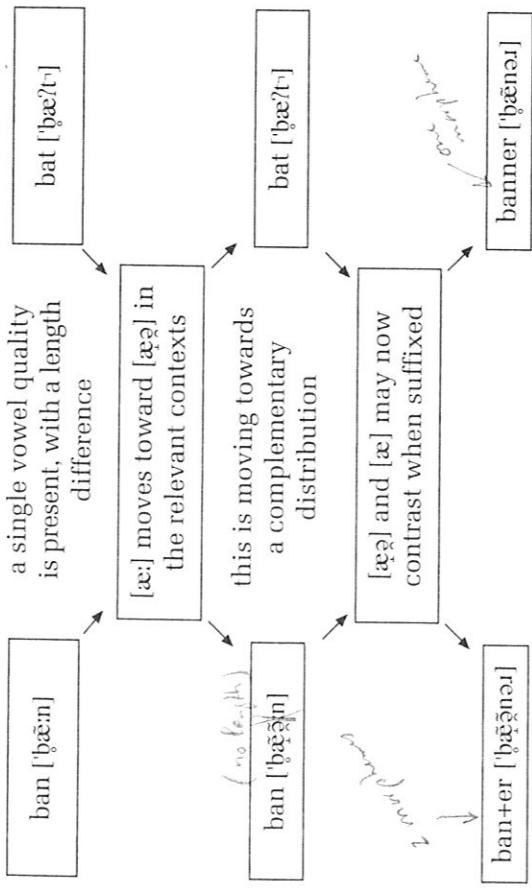


Figure 4.7 The diachrony of 'tense "ə"'

English period, the low front lax vowel [æ] was long in certain contexts, and only in the most recent times is it being replaced by a raised and diphthongized form ([æ̃]) in various eastern American locales. Thus, for example, where 'ban' and 'bat' may have previously both possessed the lower *monophthong* with a length difference, the longer vowel in 'ban' has undergone tensing and diphthongization. Consequently, a word like 'banner' ([lɪbæ̃nər]) – containing only one morpheme – meaning 'pennant', possesses the lax vowel, while a bimorphemic word like 'banner' (ban+er [lɪbæ̃nər]) meaning 'one who bans', retains its tense quality. The history of the tensing process is outlined in Figure 4.7.

Now comes the big question: is there any evidence that, despite the absence of alternation, [æ] and [æ̃] are functionally equivalent for New York speakers? Unlike Akan, New York does not have a reduplication process which would provide further testing ground for our hypothesis that these vowels are not functionally equivalent. However, it does have an unusual morphological process that is just as revealing as is reduplication in Akan, which provides us with another way to create words that minimally differ along the [æ]-[æ̃] dimension. Instead of adding morphemes to each other as in 'ban+er', and 'can+able', we can *subtract* part of a morpheme from itself. The remaining part of the morpheme may stand alone as a word, and since this subtraction process has (often subtle) consequences for word

Table 4.3 New York truncation exemplified

	shortens to	contrasts with
camera – c[æ]mera	[steady]cam – c[æ̃]m	cam – c[æ̃]m [engine]
Janice – J[æ̃]nice	Jan – J[æ̃]n	Jan [full name] – J[æ̃]n
Cabbott – C[æ̃]bott	Cab[Calloway] – C[æ̃]b	cab – c[æ̃]b

meaning, this shortened form is regarded as a separate morpheme in its own right. This subtraction process is known as *truncation*, and some examples follow: 'Nancy' N[æ̃]n<sup>y</sup> – 'Nan-' N[æ̃]n; 'Ashley' Al[æ̃]shley – 'Ash-' [æ̃]sh-. These truncation patterns are straightforward. The vowels in question are in the context where we expect tensing – both in their full form and in their truncated form. But now consider a second group of examples: 'Janice' J[æ̃]nice – 'Jan-' J[æ̃]n; 'cafeteria' cl[æ̃]feteria – 'caf-' cl[æ̃]f; 'Massachusetts' M[æ̃]ssachusetts – 'Mass-' M[æ̃]ss. Truncation does *not* induce alternations between [æ̃] and [æ]. Even though the [æ̃] vowel suddenly finds itself in the context where other morphemes have [æ̃], this means that truncation can produce words that differ minimally in terms of the [æ]-[æ̃] distinction, just like our 'banner' – 'ban+er' cases, as the further examples in Table 4.3 show.

So, if 'camera' (with [æ]: [kʰæ̃mərə]) is truncated to 'cam-', the vowel remains [æ], even though an [m] follows, and no vowel follows within the morpheme (no present-day English speaker says [kʰæ̃mərə], with three syllables). What's especially interesting is that there are two different names in New York, J[æ̃]n<sup>y</sup> and J[æ̃]n. The former is a full name, like 'Jan Brady' or 'Jan Murray'. The latter, however, is a shortened form of 'Janice' or 'Janet', where we have the expected [æ̃] in the full form, and so it is present in the truncated form as well. So truncation creates an exception to the generalization that [æ̃] is always found in this context. But again, the generalizations that I make as a phonologist of New York English are not the same generalizations that I make as a speaker of New York English. There is a generalization that [æ̃] and [æ] are in complementary distribution within morphemes. As in Akan, this generalization is over words, not individual sounds. So as a speaker of New York English, this distributional generalization has no bearing on the cognitive and functional arrangement of the sounds of my language, as the lack of alternation upon truncation shows so clearly.

There are some interesting exceptions to this pattern that, ultimately, prove the rule. Consider the word 'lab'. This word is pronounced [læ̃b], with the diphthong. However, 'lab' is related to the

full form 'laboratory', which is pronounced [læ]boratory, without the diphthong. In these related forms, then, it appears that the alternation is present when it 'shouldn't' be. I think the key to understanding this exception is found in the frequency of the word 'lab' in relation to the full form 'laboratory'. When a truncated form gets used often enough, it may lose its relationship to the full form, and become a fully-fledged word on its own, and come to conform to the phonological patterns that are characteristic of other full words in the language. So 'lab' has the diphthong, because it has become *lexicalised*: it has become an independent word. Consequently, it now behaves as any other word in the language does, and so we find the diphthong here.

Another interesting exception comes from Stevie Wonder's great song 'Master Blaster', from 1980. New Yorkers pronounce this title as a rhyme: m[æ]ster bl[æ]ster. Now, while 'master' is a single morpheme, and naturally has [æ], 'blaster' is built from two morphemes, blast+er, and is expected to have the diphthong [æɔ], and, indeed, whenever this word is encountered in other contexts, it is pronounced bl[æɔ]ster, just as expected. So why do New Yorkers treat this word exceptionally in this one single context? Why don't we say 'm[æ]lster bl[æɔ]ster'? Here's what I think is going on: these words rhyme for Stevie. After all, he's from Michigan, not New York. So I think New Yorkers are simply treating this term exceptionally because they unconsciously understand that a rhyme was intended by its creator.

By explaining away these (and a few other) potential counter-examples, we may now safely conclude that [æ] and [æɔ], despite their almost-perfect complementary distribution, are *not* related to each other in an allophonic fashion, and so they are not expected to alternate with each other upon truncation.

But how about a pair of sounds that are demonstrably allophonically related to each other? Do they substitute for each other upon truncation as they do in other situations? Let's go back to our H-[l] alternation. Recall that dark l may be found whenever a vowel does not immediately follow. This is true both within morphemes, and across morphemes, thus accounting for alternations of the 'fill'-'filling' sort. What happens to a clear l when a following vowel sound is eliminated as a consequence of truncation? Here is our answer: 'Melanie' Me[l]anie and 'Philip' Phillip allophonically alternate with 'Mel' Me[H] and 'Phil' Phi[H], respectively. It seems, then, that sounds in complementary distribution that alternate everywhere else do so upon truncation as well, but sounds in complementary distribution elsewhere that don't alternate anywhere else don't alternate upon truncation either. So the unusual sequence of sounds that may arise in truncated words turns out to be fully expected when we analyse

the *functional relationships* between sounds, and when we ignore the mere phonetic regularities that our preliminary phonological investigations reveal.

### Summary

We've covered quite a bit of conceptual territory in this chapter on allophonic sound substitution. We began with two examples from English showing how sounds that are similar to each other, but different from all other sounds in the language, may behave as functionally equivalent, provided that they allophonically alternate with each other.

When we considered Corsican consonant allophony, we found we could eliminate the requirement that sounds in allophonic alternation must be different from all other sounds of the language. Recall that in Corsican, sounds that alternate with each other are in fact more similar to *other* sounds of the language than they are to each other. Yet still, due to the nature of the alternations, there is no neutralization, and so the alternation retains its allophonic character. By employing palaeophonetically plausible internal reconstructions, we may come to see that sounds which allophonically alternate in the present might come from a single historical value.

Finally, Taiwanese tone allophony showed us that sounds in alternation can be radically different from each other in terms of their phonetic characteristics. The alternants are not only very different from each other, but also, as in Corsican, they are largely identical to *other* tones of the language. Moreover, each pair of alternants differs from every other pair of alternants in terms of the phonetic nature of the alternation. It bears repeating: Taiwanese tone allophony is a phonetic mess. But the mess is *only* phonetic. In functional terms, the system does a remarkably good job of keeping forms distinct which differ in meaning.

The upshot<sup>f</sup> is that physical similarity does not always correlate with functional identity, just as experimentally demonstrated in the work of Shepard, Hovland and Jenkins. Instead, what matters in the determination of allophonic relatedness is merely that sounds alternate with each other in a non-neutralizing way. This result shouldn't be surprising to us, given the assertions I've been making throughout the book. Learners of language are primarily concerned with pairing sound with meaning, not with extracting phonetic regularities from the speech signal. This point is driven home in our discussions of Akan and New York English. These patterns provided us with linguistic evidence for the necessity of alternation to the structuration of morphemes into

smaller units. Recall that in Akan, [k] and [tç] never alternate with each other, despite their complementary distribution. So we find [tç], [tçɪ], [tçɛ], [tçɛl], and also [ku, ko, kɔ, kɑ], but since there are never any alternations here, there is no motivation for learners to decompose these sound sequences into smaller units. That is, [k] and [tç] do not emerge from the phonetic background as elements of combination and recombination, just as our investigation of reduplicated forms showed us. This is not to say that language learners don't become aware of phonetic regularities in the speech stream – that [ku, ko, kɔ, kɑ] are often found, as are [tçɪ, tçɪ, tçɛ, tçɛ] – but there is no evidence to learners that these phonetic complexes are decomposable into smaller bits, since there are no alternations which would set their component parts into high relief against a stable phonetic background.

By contrast, exactly because [h] and [l] alternate in New York, and so function as re-combinatory units in their own right, they might emerge from the phonetic background of the morphemes to which they belong: 'filling' [fɪlh] but 'fill' [fɪl]; 'Philip' [fɪlɪp] but 'Phil' [fɪl]. In fact, we find this result in language after language: if two sounds don't alternate elsewhere, then they don't alternate upon truncation or reduplication either, even if they are phonetically similar. And if two sounds alternate elsewhere, then they always alternate upon truncation or reduplication too, even if they are phonetically dissimilar.

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N.B. The notion of alternation is applied to contexts / where more than one morpheme is involved!

↓  
p. 103 : innovative position  
pb ! phil (p. 110)  
phil  
mel  
melanie  
melanie  
Why not have concern of structure and  
diagram, . . .