Chapter 3: Expressing Sound Changes

3.1 WRITING RULES

When reading the literature of the history of sound changes in languages, you are almost certain to come across various formal rules written by linguists to express these changes. You will therefore need to know how to write and interpret such rules. This short section of the chapter aims to provide you with this know1edge.

When a sound undergoes a particular change wherever that sound occurs in a language, we refer to this as an *unconditioned sound change.* Comparatively few sound changes are completely unconditioned, as generally there are at least some environments (however restricted) in which the change does not take place, or in which perhaps some other changes occur. One example of a completely unconditioned sound is that found in the Motu language of Papua New Guinea, where there has been an unconditioned loss of earlier [ŋ], as shown by the following forms:

		Motu	
*asaŋ	→	lada	'gills of fish'
*taŋi	→	tai	'cry'
*laŋi	→	lai	'wind'
*taliŋa	→	taia	'ear'

Similarly, in Hawaiian there was an unconditioned change of **[t] to [k],** and another of **[ŋ]** to **[n]**, as shown by the forms presented below:

		Hawaiian	
*tapu	→	kapu	'forbidden'
*taŋi	→	kani	'cry'
*taŋata	→	kanaka	'man'
*ŋutu	→	nuku	'mouth'
*tolu	→	kolu	'three'

Unconditioned sound changes such as these are the simplest historical changes to express in terms of formal rules. The earlier form is given on the left, and the later form on the right, with the two being linked by an arrow. So, the Hawaiian changes just described can be expressed simply as:

t → k
ŋ → n

The Motu change involving the loss of the velar nasal can be expressed as:

ŋ → ø

(The symbol **ø** represents the absence of any sound)

A great many sound changes only take place in certain phonetic environments, rather than in all environments in which the sound occurs. Such changes are referred to as *conditioned sound changes*, or sometimes as *combinatory sound changes.* Most of the sound changes that you saw in chapter 2 were conditioned sound changes. A sound change can be conditioned by a great range of different types of environments. Factors to consider include the position of the sound in a word (whether it is initial, final or medial), the nature of the preceding and following sounds, the position of stress, whether or not the syllable is open, or perhaps some combination of such conditioning environments.

If a change takes place only in a specific phonetic environment, this environment is written following a single slash (*/*). The location of the changing sound with respect to the conditioning environment is indicated by a line (____) . If a change takes place before some other sound, then the line is placed before the sound that conditions the change; if a change takes place after some other sound, then the line follows the conditioning sound. Some examples of rules expressing conditioned changes that we have looked at, with their expressions in words, are given below:

t → s / ___ front V	[t] became [s] before front vowels (in Motu)
x → k / s ___	[x] became [k] after [s] (in Afrikaans)
p → v / V___V	[p] became [v] between vowels (in Banoni)

(Note that the symbol V is the standard symbol to express any unspecified vowel. Similarly, any unspecified consonant is expressed by the symbol C).

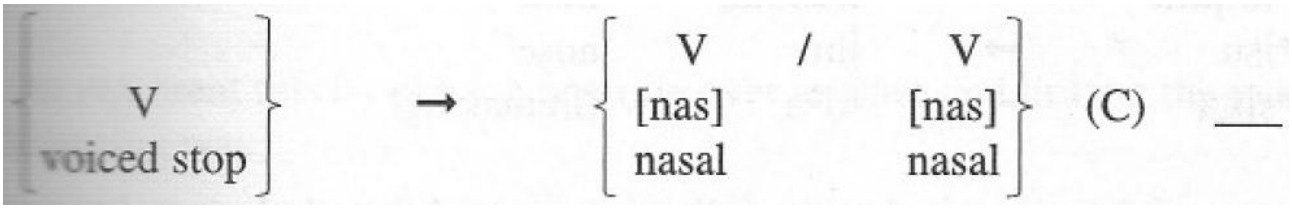
To express the fact that a change takes place word finally or word initially, we use the symbol # to represent the beginning or end of a word, as follows:

p → w / #____	(Initial **[p]** became **[w]**, as in Uradhi)
voiced C → voiceless C / ____#	(Final voiced consonant becomes voiceless, as in German)
V → ø / ___ #	(Word final vowels were deleted, as in SE Ambrym)

Elements that are optional (i.e. whose presence or absence does not affect the application of the rule) are placed in round brackets. Thus:

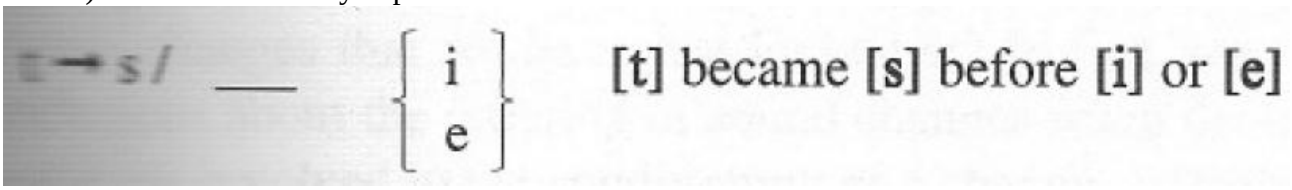
V → / V [nas] (C) ____ (V were nasalized after nasal vowels, whether there is an intervening consonant, as in Enggano)

When there are two different sets of sounds involved in a change, this can be represented by placing the sounds one above the other in curly brackets. The Enggano nasal harmony rule described in Section 2.7 earlier can actually be described more fully in the following way:



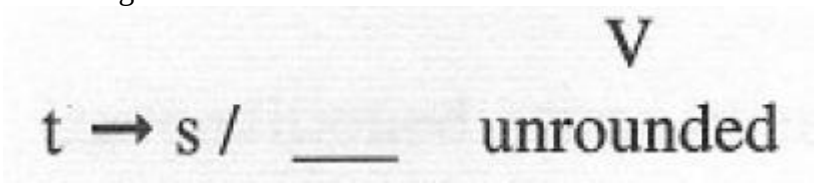
(A vowel or voiced stop became a nasalised vowel or a nasal consonant respectively when there is a preceding nasal vowel or nasal consonant).

Also, the change in Motu involving palatalisation (and subsequent lenition that I described earlier) can be alternatively expressed as:



(Note that although this is an alternative formulation for the change in Motu, it is considered to be a less 'elegant' statement because it misses the generalization that the conditioning environment is the class of front vowels).

Rules should always be stated in as general a way as possible, without being *too* general. They are meant to be interpreted literally, so they should not point to changes that did not actually take place. So, while it is true to say that both [i] and [e] are unrounded vowels, we cannot represent this change in Motu as follows:



This would be incorrect because [a] is also an unrounded vowel and the change of [t] to [s] did *not* take place before [a].

3.2 ORDERING OF CHANGES

When a language undergoes a whole series of sound changes, it is sometimes possible to reconstruct not only the changes themselves, but also the order in which the changes took place. Let us examine the following data from Hawaiian:

		Hawaiian	
*taŋi	→	kani	'cry'
*kaso	→	ʔaho	'thatch'
*takele	→	kaʔele	'back of canoe'
*aka	→	aʔa	'root'
*pito	→	piko	'navel'
*paki	→	paʔi	'slap'
*tapu	→	kapu	'forbidden'
*taŋata	→	kanaka	'man'
*isu	→	ihu	'nose'
*sika	→	hiʔa	'firemaking'

This set of data reveals that the following unconditioned changes have taken place:

t	→	k
k	→	ʔ
ŋ	→	n
s	→	h

Of these four changes, we can say something about the order in which they applied. To begin with, let us check the first two sound changes to see if we can decide whether [t] shifted to [k] first, or whether [k] first shifted to [ʔ]. If we were to assume that the [t] first shifted to [k], and that the other shift of [k] to [ʔ] took place after this, then changes like the following would have taken place:

*takele	→	kakele	'back of canoe'
*pito	→	piko	'navel'
*tapu	→	kapu	'forbidden'

If [k] then shifted to [ʔ], these words would also have changed as follows, along with all of the other words that contained [k]:

*kakele	→	ʔaʔele	'back of canoe'
*piko	→	piʔo	'navel'
*kapu	→	ʔapu	'forbidden'

The forms [ʔaʔele], [piʔo] and [ʔapu], however, are not the correct forms in Hawaiian, as these words should contain the [k] sound rather than glottal stops. So we must conclude that at the time that [k] shifted to [ʔ] in Hawaiian, there must still have been a distinction between [k] and [t], otherwise all original [k] and [t] would have ended up as [ʔ]. If we were to assume that these two changes applied in the opposite order, then we would get the correct results:

Protolanguage	Stage 1 k → ʔ	Stage 2 t → k	Modern Hawaiian	
*takele	taʔele	kaʔele	kaʔele	'back of canoe'
*aka	aʔa		aʔa	'root'
*pito		piko	piko	'navel'
*paki	paʔi		paʔi	'slap'
*tapu		kapu	kapu	'forbidden'

We can represent this by placing one rule over another and linking the two in the following way:

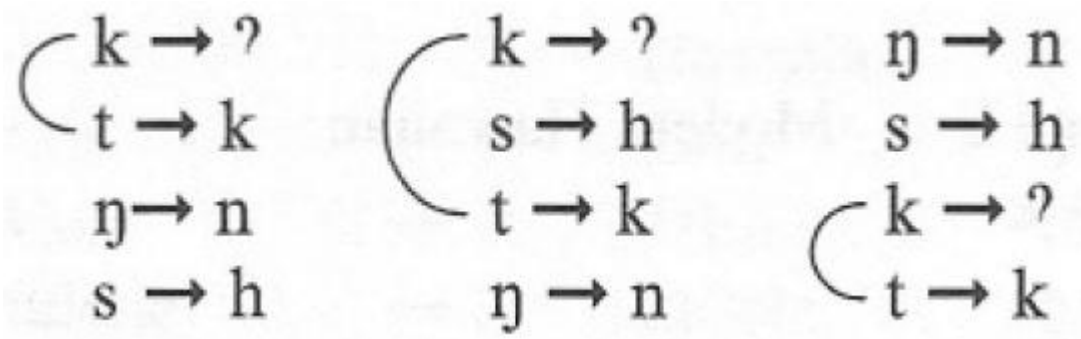
k → ʔ
t → k

But what about the other changes that have taken place? Can we say anything about whether these changes took place before or after (or between) the two changes that we have just looked at? In fact, we can only come to conclusions about the ordering of sound changes when the changed sound, or the sounds involved in the conditioning of a change, actually *overlap* in some way. In the shift of [t] to [k] and the shift of [k] to [ʔ], we were able to say something about the ordering of the two rules because the symbol [k] appears somewhere in the statement of *both* of these changes. In the Hawaiian data that I presented above, there were also two other changes involved:

ŋ → n
s → h

None of the symbols in these two rules appear in the statements for either of the changes that I have just been describing. As there is no overlap between the symbols involved in the statement of any of these rules, we cannot come to any conclusion about the ordering of these rules. It does not make any difference whether we apply these two rules first, last, or between the other rules - the end results will not be affected in any way. Historically, of course, these two changes must have applied

at some period, either before the change of [k] to [?], or after it, or perhaps at the same time as that change.
However, on the evidence that we have, there is no way that we can find out when these other changes took place. In listing the full set of changes for this set of data in Hawaiian, we can indicate the fact that there is no evidence that a particular change is ordered either before or after any other change simply by not linking them as we did above. So, the ordering of these four changes could be equally represented in any of the following ways:

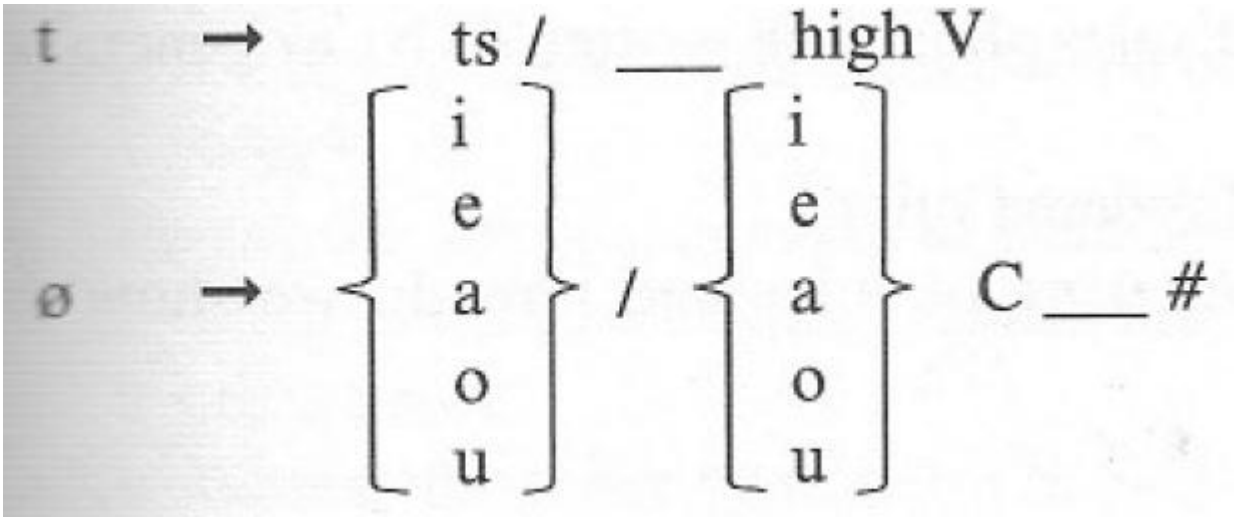


In fact, it does not matter in what order you write the rules for these changes, as the only changes that are linked in time are those that are marked with the special symbol that is used for indicating the ordering of sound changes. The placement of any other changes among a set of changes is purely a matter of convenience.

Let us now look at a more complicated example, in which conditioned sound changes are involved. The data comes from the Banoni language of the North Solomons Province of Papua New Guinea:

		Banoni	
*koti	→	kotsi	'cut'
*tina	→	tsina	'mother'
*puti	→	putsi	'pull out'
*mata	→	mata	'eye'
*mate	→	mate	'die'
*matua	→	matsua	'rise'
*makas	→	maɣasa	'dry coconut'
*pakan	→	vaɣana	'add meat to staple'
*kulit	→	ɣuritsi	'skin sugarcane'

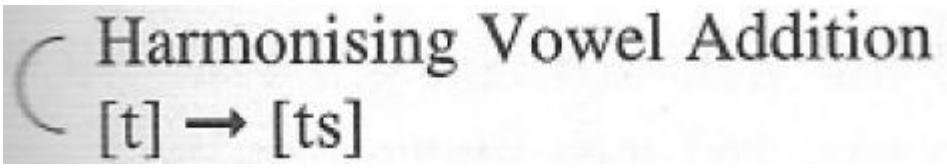
The sound changes that I will look at are the following:



The first rule changes [t] to [ts] before the high vowels [i] or [u]. The second rule involves the addition of a harmonising vowel after a consonant at the end of a word. (There are some other changes indicated in this data, but these will be ignored at this point)

The question that you should ask yourself is: can these two changes be ordered with respect to each other? According to what I said earlier, if two changes involve some common sound either in the changing sounds or in the conditioning sounds, then we can test to see which applied first. Since these two rules both involve the symbol V referring to vowels, we can test them for ordering.

If we were to assume that the change of [t] to [ts] took place first, we could correctly predict the application of this change in all cases but one – the Banoni form of the original word [*kulit] 'skin sugarcane.' Because this form has no following vowel in the protolanguage, it does not meet all of the conditions for the application of the rule that changes [t] to [ts]. However, if the vowel addition rule were to apply only after the change of [t] to [ts], we would end up with [yuriti] for this word (assuming that we apply the other incidental consonant changes as well). The fact that the actual form is [yuritsi] rather than [yuriti] means that there must already have been a high vowel after the [t] when the rule affecting the [t] applied. This shows that the rule adding a final harmonising vowel must have applied before the rule changing the [t] to [ts]. So, we can state the ordering of these two changes as follows:



READING GUIDE QUESTIONS

1. What is meant by saying that rules should be written to be as general as possible but not *too* general?
2. What is meant by speaking of ordered rules?
3. How do we decide on the ordering of rules and how do we show the relative ordering of rules?

EXERCISES

1. Express the following changes formally:
   (a) intervocalic [s] undergoes rhotacism while [s] before consonants is deleted
   (b) word initial consonants undergo weakening to [j]
   (c) intervocalic [h] changes to glottal stop
   (d) the second member of all consonant clusters is deleted
   (e) an epenthetic [ɔ] is added between the two members of a word final consonant cluster
   (f) word final high vowels are deleted while interconsonantal high vowels become schwa
   (g) a prothetic [h] is added before [e] and [ɔ]

2. Examine the Nganyaywana forms in Data Set 2.
   (a) Under what conditions are the vowels of initial syllables retained, and when are they lost?
   (b) Long vowels are shortened. Did this change take place before or after the loss of vowels dealt with in the previous question? Why?

3. Examine the Mbabaram forms in Data Set 3.
   (a) Some word-final [a] became [e], some became [0], and some remained unchanged. What are the conditioning factors?
   (b) Initial syllables were lost. Did this change take place before or after the changes affecting final [a]? Why?

4. Examine the Yimas and Karawari forms in Data Set 4.
   (a) Formulate explicit rules for the changes that have taken place in each of the two languages.
   (b) Can you find any evidence concerning the ordering of any of these changes either in Yimas or Karawari?
   (c) Given the following original forms, what would you expect the modern Yimas and Karawari words to be?

*simari	'sun'
*simasim	'sago'
*naŋgun	'mosquito'

5. Examine the Lakalai forms in Data Set 5.
   (a) Write formal tules to account for all of the changes that have taken place.
   (b) Do any of these changes need to be ordered with respect to each other? Why?

6. Examine the changes in Motu in Data Set 9.
   (a) What are the rules that express the various changes that have taken place here?
   (b) What is the ordering of these rules?

7. Examine the Burduna forms in Data Set 11.
   (a) Write rules that express the changes that have taken place.
   (b) Is there any evidence that any of these changes must have taken place before any others? If so, say what they are.

8. Examine the following data from the Mpakwithi language of Cape York Peninsula in northern Queensland (Australia):

*maɹa	→	ʔa	'hand'
*kuta	→	ʔwa	'dog'
*pakaj	→	kaɹa	'down'
*pama	→	ma	'person'
*puŋku	→	gu	'knee'
*ɲipima	→	pimi	'one'
*muŋka	→	gwa	'eat'
*ʈuma	→	mwa	'fire'
*ɲaŋku	→	gaw	'that'
*japi	→	paj	'forehead'
*ŋampu	→	baw	'tooth'

   (a) Describe in words the changes that have taken place in this language. (There is not enough data here for you to be able to write fully explicit rules.)
   (b) Can you suggest anything about the order in which these changes have taken place?

9. Examine the standard French and rural Quebec French forms in Data Set 12. Assuming that the standard French forms represent the original pronunciation, except that [ʁ] was originally pronounced as [r], write rules expressing the changes that have taken place in rural Quebec French.

Lenition includes:

1. An opening of the obstruction in the oral cavity – a shift downwards – from stop > fricative > approximant
2. Voiceless to voiced – a shift downwards and to the right
3. De-oralisation – a shift from oral to glottal sounds
4. Sound Loss – a shift to zero

Sound Deletion

Aphaeresis

English:

knife
know
knee
knight

Apocopy

French:

spelling	pronunciation	gloss	C > Ø / #
lit	/li/	bed	t > Ø / #
gros	/gro/	big	s > Ø / #
soûl	/su/	drunk	l > Ø / #
murs	/myr/	walls	s > Ø / #
aimer	/ɛme/	love	r > Ø / #

Syncope

Standard English	some varieties of English	medial vowel >
family	famly	i > ø
medicine	medcine	i > ø
memory	memry	o > ø
chocolate	choclate	o > ø
battery	battry	e > ø
camera	camra	e > ø

Sound Addition

Prothesis

Latin	French	Spanish	gloss	
scutu	écu	escudo	shield	Ø > e / #
scola	école	escuela	school	Ø > e / #
stabula	étable	estable	stable	Ø > e / #

In Motu, there has been a change whereby an intial [l] has been added to words which originally started with [a]:

Proto Oceanic	Motu	gloss	
api	lahi	fire	Ø > l / # a
asan	lada	gill of fish	Ø > l / # a
au	lau	I, me	Ø > l / # a

Excrescence

Middle English	**Modern English**	
amonges	amongst	Ø > t / #
amiddes	amidst	Ø > t / #
betwix	betwixt	Ø > t / #

Epenthesis

Standard Finnish	**Eastern Finnish**	**gloss**
neljä	nelejä	four
kolme	kolome	three
pilkku	pilikku	comma, dot
jalka	jalaka	foot, leg
kylmä	kylymä	cold
silmä	silimä	eye

Old English	**Modern English**
ðunor	thunder
breamel	bramble
ðymel	thimble
æmtig	empty
alre	alder

Metathesis = Switch

English: wæps > wasp

Indo-European: spek/skep in (“see”; cf. bishop < episkopos, skeptic, vs spectacles)