Appendix 3. Phoneme production through mergers:

This section is an abbreviated outline of the essentials of phoneme production, more fully described in the section *Phoneme Production (not included in the material.)*

The **functions** of the upper visceral tract are respiration, mastication, pre-deglutition and speech. Anchors of a function sustained at minimal dimensions and energy levels are the base or **germinal** anchors of the function. The anchors merge to create anchors of higher energy levels with larger envelope dimensions which become the superimposed frameworks of new behaviors.

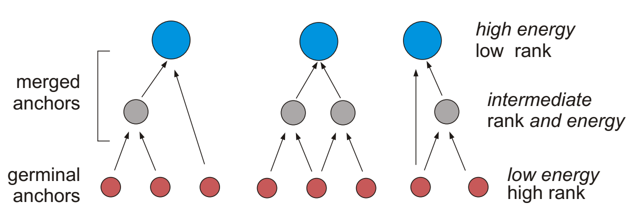
Respiration, mastication and pre-deglutition (cf. Hiiemae's transport) are capable of a number actions and all three behaviors work through a variety of metaperistaltic tract shaping and gating. Speech combines the anchor mechanics of respiration, mastication and pre-deglutition and thereby gains an extended variety of possible combinatory patterns with which to create the entire class of phonemes.

Mergers according rank of element

Merging is the method through which **lower** rank level anchors are generated from **higher** level ones, through combinations and recombinations ultimately stemming from the inherent respiratory tract germinal anchors h, n, m, and ʕ **(ayin)**, which are the most basic and inherent upper visceral tract mechanical shaping agents. See fig. 1.

It is important to remember that we are dealing not with complete phoneme articulations, but only with their **lingual** anchors.

Various possible types of merger combinations fig. 1



Mergers according complexity

There are three merger types according to structural pattern. The **simple** ones are composed of the germinal respiratory (RSP) consonants. **Complex** mergers result from the merger of RSP consonants stops and stops. **Compound** mergers form when complex consonants merge with either RSP consonants or with stops. See Table 0. on page 3.

Figures 2 and 3 give examples of consonant mergers and indicate how differences in the merger product are determined by complexity and by the assignment of primacy (bold type) in antagonist relations or by the positional character (superscript) of the anchors. Underlined characters, such as t̲ or h̲ stand for base (or germinal) anchors.

fig.2 **Complexity**

Simple mergers

1. h^{MC} + n yields /j/
   n^{MC} + h yields /w/

Complex mergers

2. p + h mergers yield /f/, /pf/ or /ph/
3. t + h mergers yield /s/ or /ts/
4. front t + any j yields /th/
   central t + front j yields /ɕ/ =/hs/

Voicing

5. s + n yields /z/, the voiced counterpart of /s/
   n + z yields /s/

Primacy and position

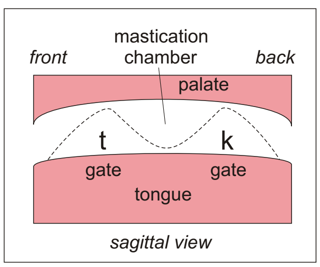
fig. 3

2	**p**	+	h	=	/f/
	h^{F}	+	p	=	/pf/
	h^{C}	+	p	=	/pʰ/
3	**t**	+	h	=	/s/
	h	+	t	=	/ts/
4	**t**^{F}	+	j^{FCB}	=	/θ/
	t^{C}	+	j^{F}	=	/ɕ/
5	**s**	+	n	=	/z/
	n	+	z	=	/s/

Note 1: The germinal anchoral forms of the basic vowels (i, ə, a), of the **respiratory** phonemes (h, n, m, ayin), and of the **masticatory** consonants (p, t, k) inherently exist in the structure and behavior of the upper visceral framework, and can be employed at different hierarchical and articulatory-phonatory levels and in different frameworks. For example, the characteristic sound of the framework of **yawning,** /ha/, demonstrates the function in the respirational frame of the germinal base consonant /h/ with or without a germinal base vowel. The vocalization of **coughing** is often heard as approximating /ʕ(a)h(e)m/.

The germinal base anchors of /t/ and /k/ (or their voiced vers ions) appear in the **masticatory** framework as the lingual anchors of the anterior and posterior sphincter gates of the oral masticatory chamber. The mastication chamber is served by the germinal n. *See fig .4.*

fig. 4



Note 2: Various **alternate** mergers are available for certain phonemes but are of reduced in efficiency if independently created; they are necessary products of **coordinate articulation**.

Observing phoneme merger production

The following can assist in observing the anchor merger processes of phoneme generation:

1. Generate (mid-centrally) the lingual anchor of /t/. Holding on to this anchor, then generate the anchor of /h/ on top of the /t/. Allow the merging of the two anchors, each moving them to meet midway between them. The merger will generate /s/, superimposed over the masked underlying embedded /t/ and /h/.

Thus, transformation in either direction, while also maintaining the lingual position and shape, between s and t, or between s and h, as well as between t and h, is an **efficient** process. (This applies to h, n and w , or s, n, and z as well.) There is an easy **glide** path, without recourse to clutch closures, between each merger element and the merger product, and between the merger elements themselves. See fig. 5.

In contrast, the efficiency of similar transformations among phonemes mechanically unrelated through mergers is inefficient, requiring significant movement and reshaping of the tongue, as well as glottal constriction of the clutch-type change. See fig. 6.

fig. 5

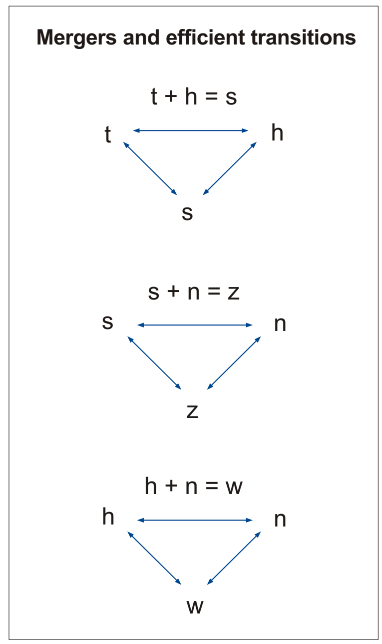
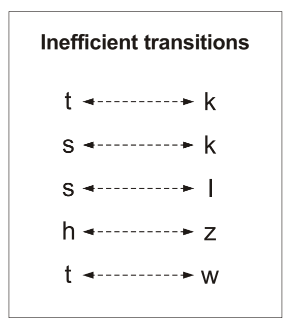


fig. 6



2. The fact that /t/ and /h/ are indeed **embedded,** maintaining the lingual shape of the merger as much as possible, and using minimal effort, is demonstrated because one is able to move between this resultant phoneme and its merger sources, that is between /s/, /t/ and /h/, as illustrated with arrows in the diagram. Such a transition is executable through minimal action, through a small glide, with the tongue remaining largely in place, and requiring no clutch-type switching (or only as much as the glide requires). (For "clutch" see *The essentials of speech mechanics, g.1, Anchor transformations*).

Examples of mergers according to complexity

Table 0.

level	merger elements	examples	merger product	peristaltic aspect
simple mergers	RSP cons. + RSP cons.	**m**^{MC} + h^{LF} = /i/* **h**^{MC} + m^{HF} = /k/ **m** + n = /l/ **h** + n = /j/	vowels stop cons. semivowels	full apertures full closures intermediate closures
complex mergers	stop + RSP cons.	**t** + h = /s/ **k** + j = /x/	complex merger cons.	modified closures
compound mergers	complex cons. + RSP complex cons. + stop	s + **h** = š š + **t** = /č/	compound merger cons.	high tension modified closures

Notes:
RSP consonants = h, n, m

Merger elements:
primary = (**t**) **bold**
secondary = (h) normal

* In these examples all prime anchor positions are mid-central. However, positions are indicated for the two mergers that create vowels and stop consonants (in the top lines) because here the identity of the product is determined by the position of the active (mobile) secondary anchor in relation to the mid-central (stable) primary one.

Figure 7 shows the matrix diagrams for the production of /i/ and /k/.

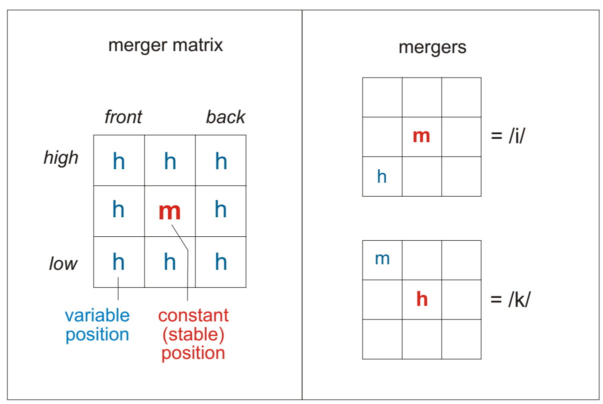


fig. 7

General Merger tables of phoneme generation:

Table A. shows the highest level general organizational map of the merger production of vowels and consonants.

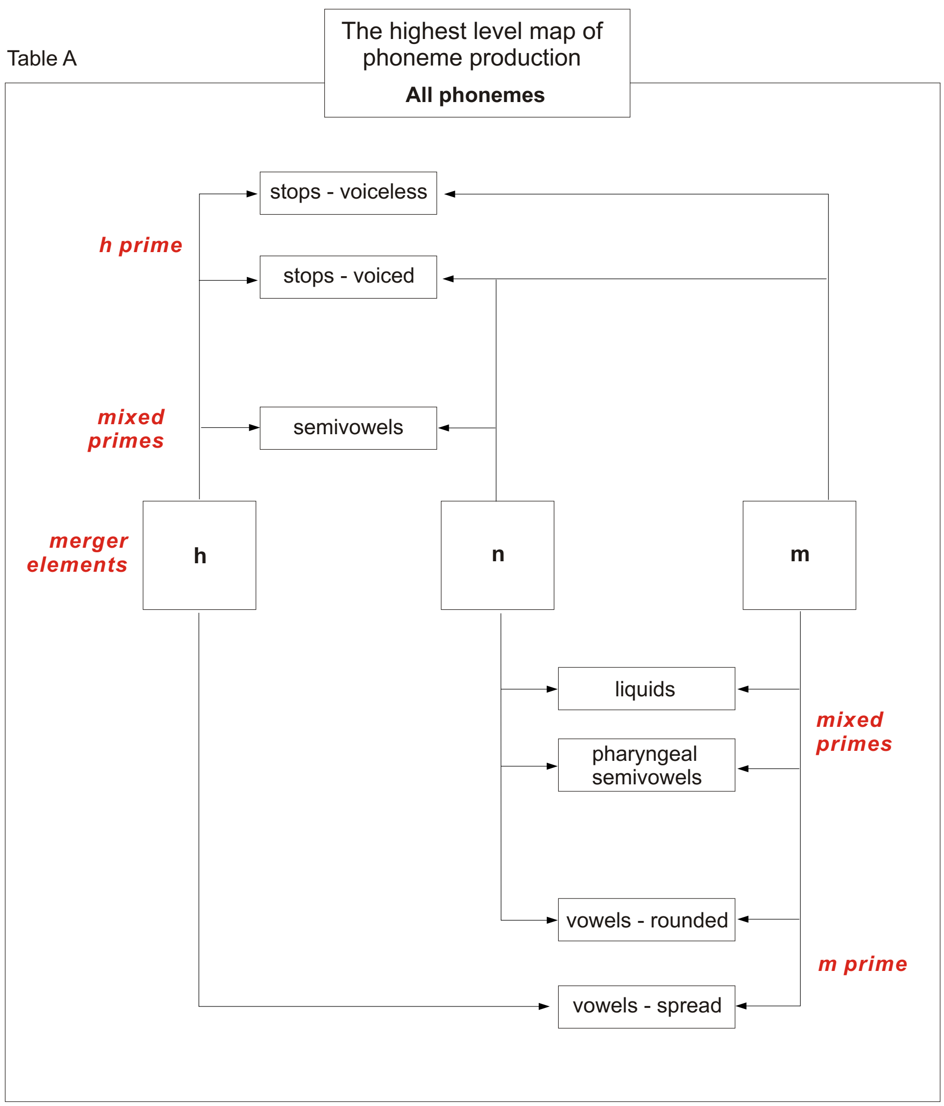
The merger sources (or merger elements) of phonemes are the base anchors innate in the respiratory-masticatory tract. Operating within the speech framework, these fundamental basic phonemes can combine in a number of patterns of merging to generate **all** the remaining phonemes. **Primacy** in antagonist pairs and relative lingual **position** of anchors (front, center, etc.) are the chief factors of variation in these patterns but are not shown in Table A.

The various **symmetries** visible in phonemic descent through mergers underline the mechanical structuring of speech. For details see chapter Production of Phonemes.

Note 1: Only the voiceless consonants are presented as voicing is regularly accomplished by the additional merger of voiceless phonemes with n (and m for labials).

Note 2: The inherent base anchor ayin is not included because it has a relatively limited role in phoneme production. Although the base anchor of ayin is active in all respiratory-masticatory-speech behaviors it is developed as a full phoneme only in certain phonetic language families, cf. Arabic in the Hamito-Semitic family, etc. In its masticatory role /ayin/ is the anchor of the tract section anterior to the epiglottic gate.

Table A



In Tables B. and C. the content of Table A. is repeated but separated for vowels and consonantsm thereby emphasizing the symmetries of phoneme production.

Table B

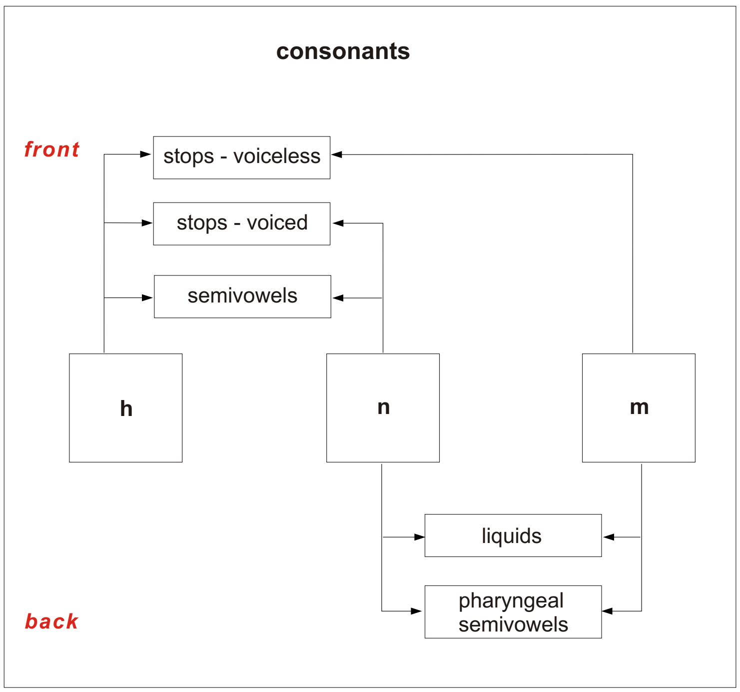


Table C

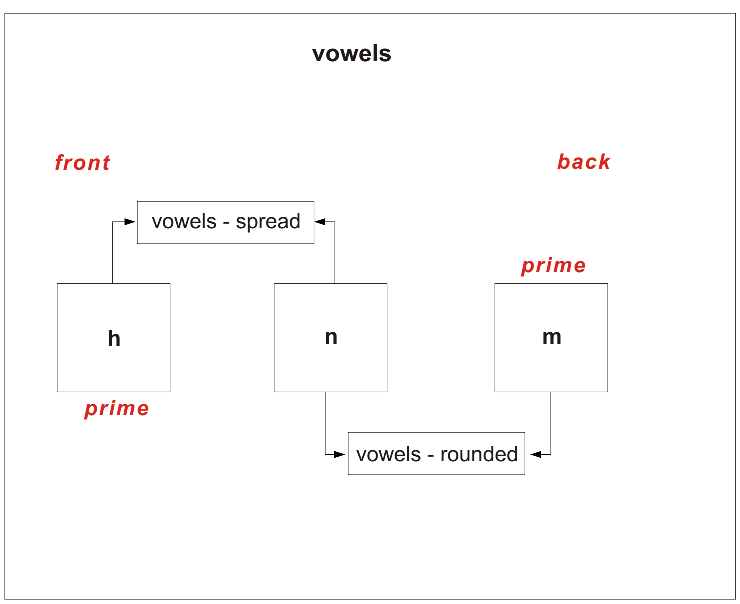


Table D. charts the merger production of semivowels and liquids, and also shows differences as determined by primacy and position variation.

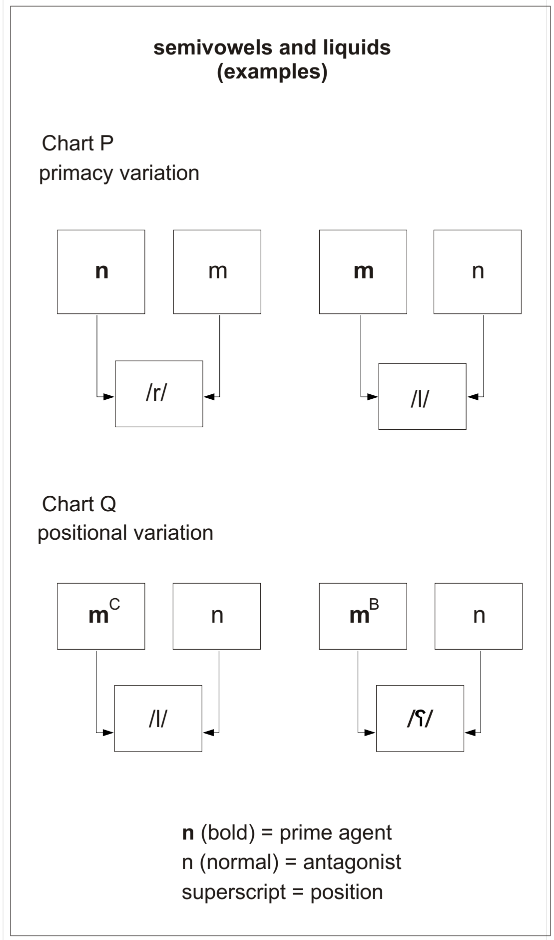
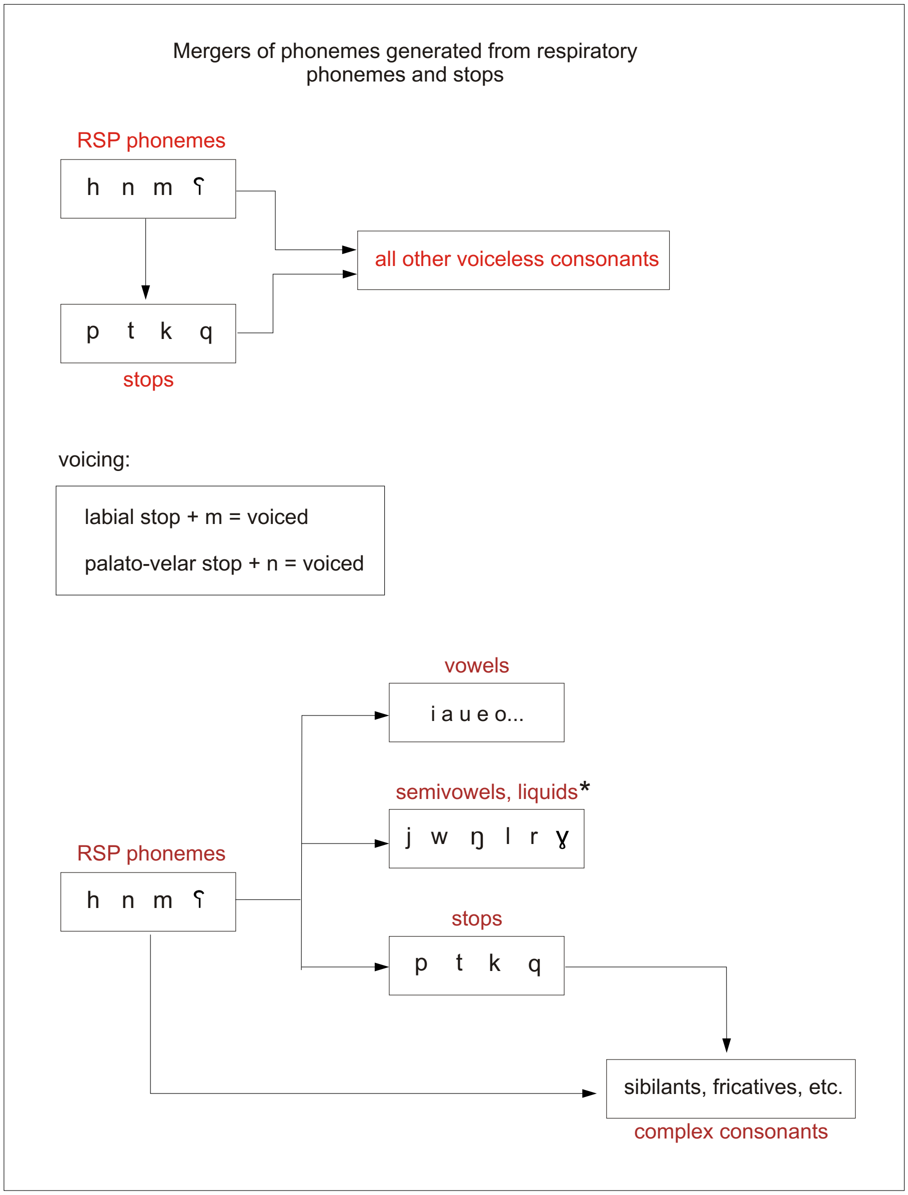


Table E. shows a less detailed alternate organizational chart of phonemic descent.



*Although /ŋ/ is voiced, it is included here.

Table F. The merger patterns of complex voiceless consonants shown at three hierarchical levels.

Table F

Complex or labial-palato-velar consonant mergers

diagram level 1

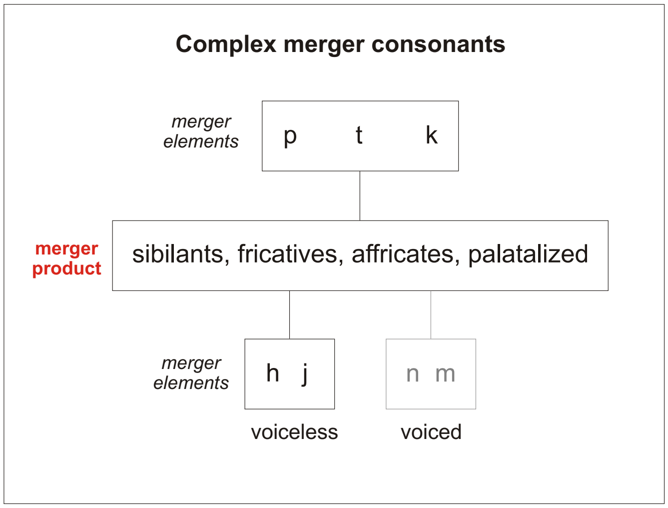


diagram level 2

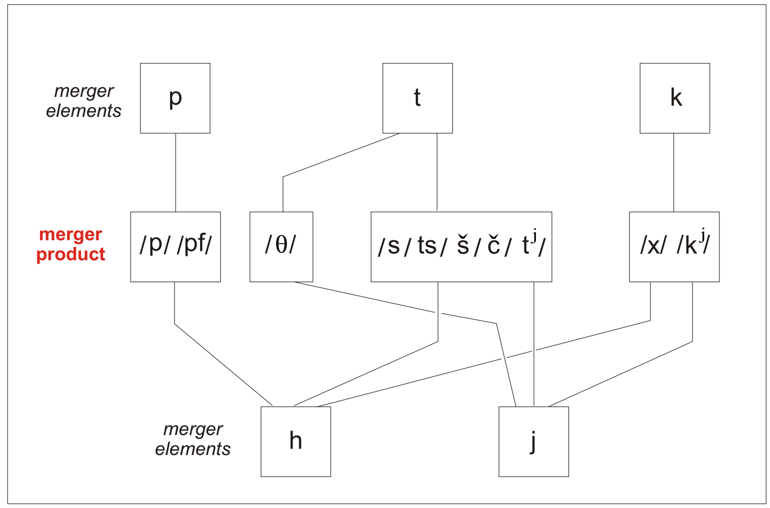
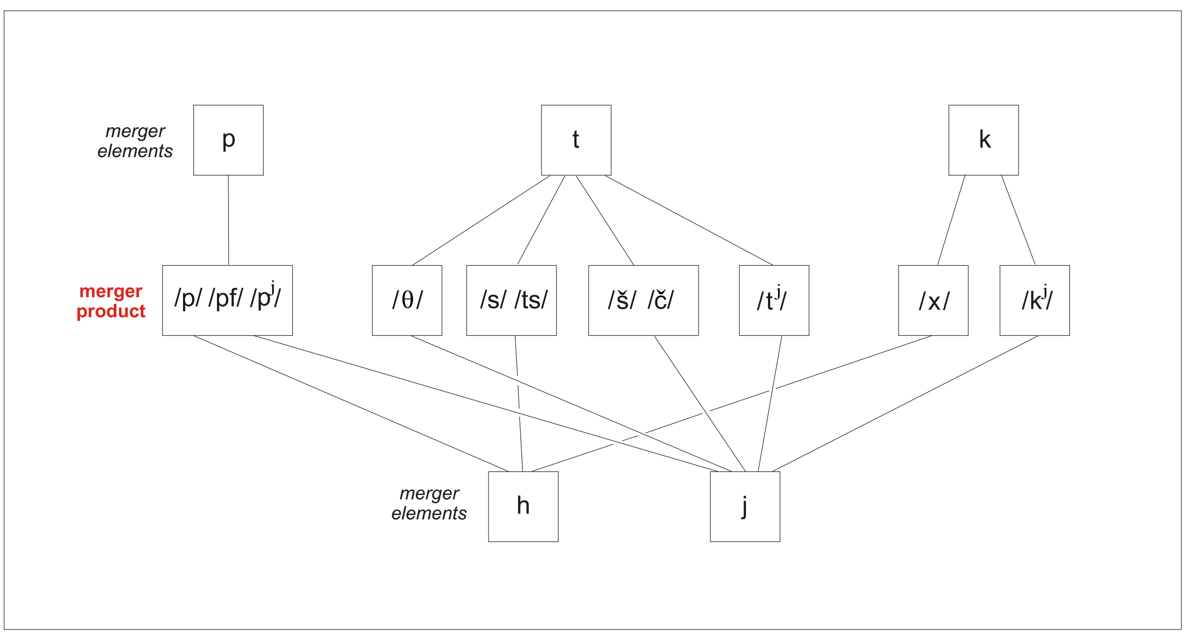
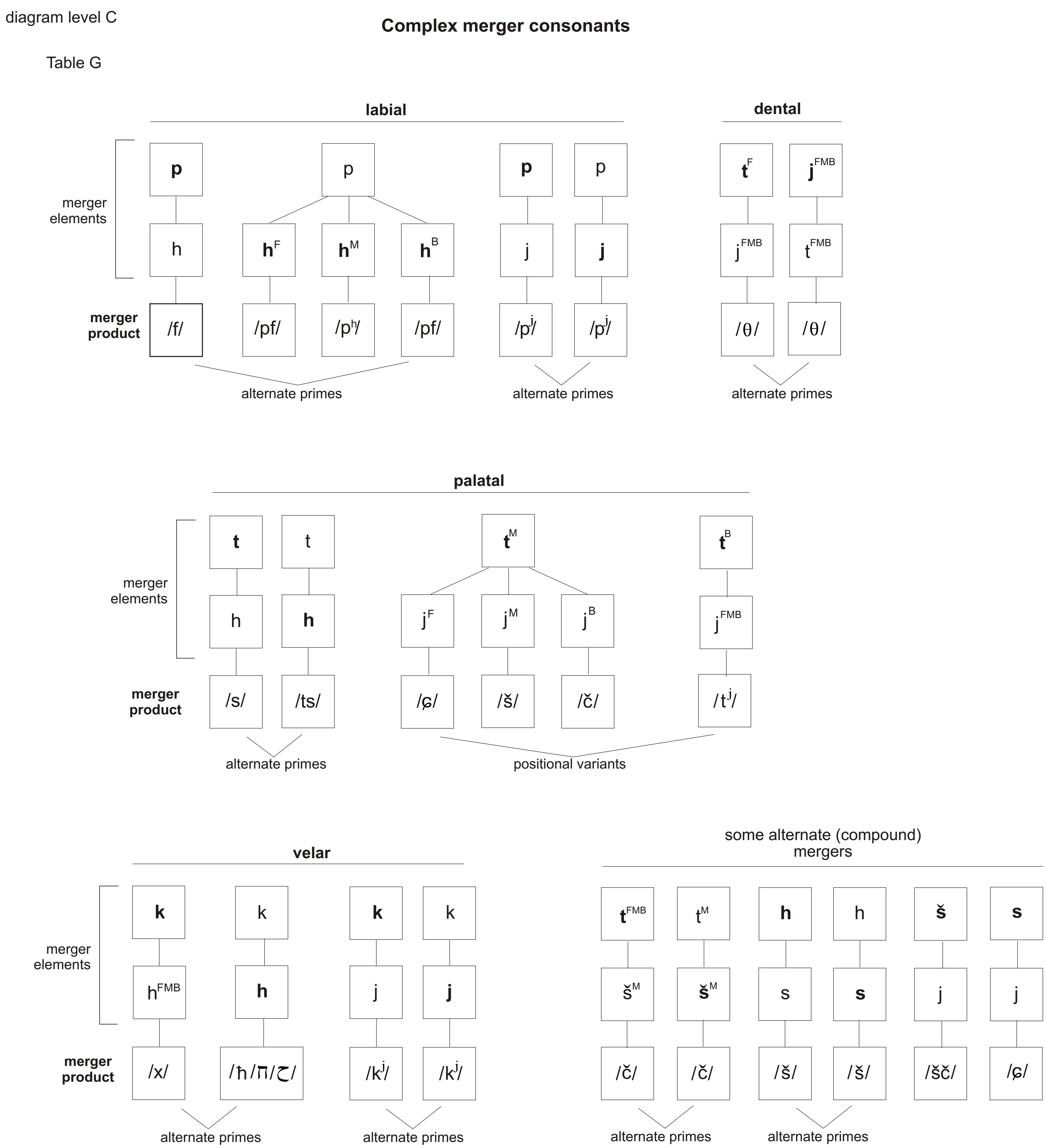


Diagram level 3



Note: There are many other variant merger combinations that produce consonants, which chiefly occur in coarticulation and at higher energy and lower hierarchical levels. The mergers listed here are the simplest ones, generated at the highest hierarchical level.

Table G. The complex consonant mergers at the most detailed level



Legend:
primary merger element = **h (bold)**
secondary merger element = h (normal)
F, M, B superscript = positional variants

Voiced consonants, including /ŋ/ and /ñ/ are not included in these charts.