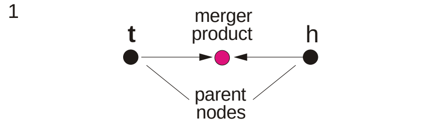
PARTS 7-8 — COMPLEX AND ULTRA COMPLEX CONSONANTS

7.1 Complex consonants

1. Complex consonants (CCs) are produced in three ways: (a) by mergers of the nodes of primal phonemes h, n, m with the nodes of the simple consonants, t, k, ɣ, ŋ, ɲ, w, j, l, r. (b) by mergers of nodes of simple consonants, and (c) by a single case of merger of two primal phonemes, figs.1& 2.

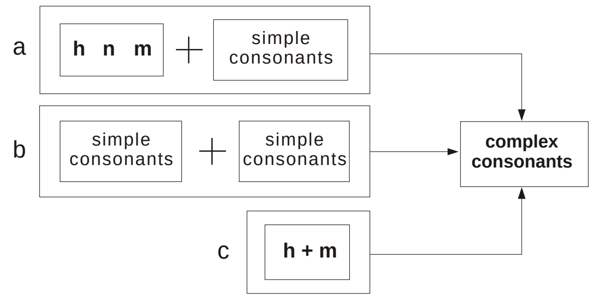
1



The merger of two parent phoneme nodes creates a new phoneme node.

2

Production of complex consonants



7.2 The three formats of complex mergers

There are three formats in which mergers occur in forming complex phonemes: linear, orbital and matricial. Each format employs a different mechanical configuration to combine nodes, fig. 3.

The mechanics underlying these function is covered in section *Phase Relations*.

The formats are diagrammatically represented in different ways:

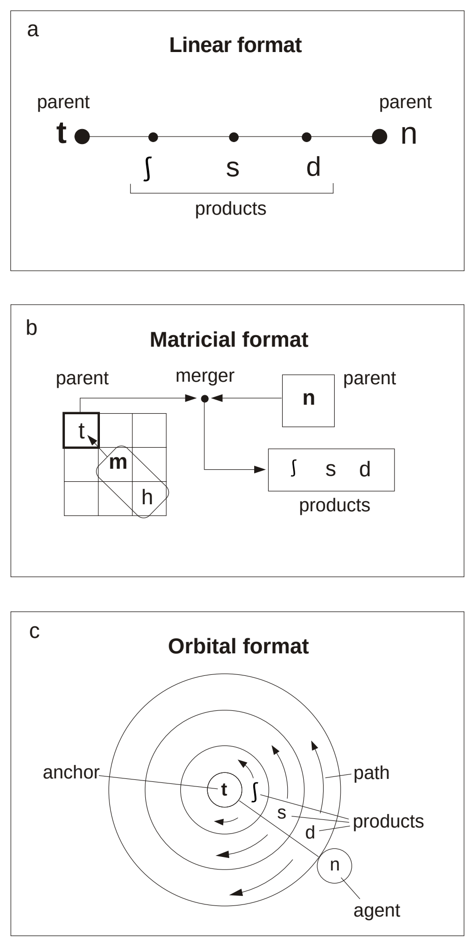
(a) The **linear** format employs a line connecting the parent nodes along which the generated complex consonant nodes are distributed. **Either** parent node may serve as the anchor or the agent. This format is the most concise one.

(b) The **matricia**l format parallels the 3x3 cell frame mechanics that are described in the generation of simple phonemes, in section *Matrix.cdr*.

(c)The **orbital** format consists of concentric orbits, or paths which surround the central stabilizing anchor node. The agent node is at the outer periphery. It is in one of the orbits that a particular consonant is generated. This format also shows the distance of the generated phoneme from either parent. The orbital paths are the tracks along which a node can move to its various (front, high, etc.) positional variants. Such positioning is not indicated in the linear diagrammatic format.

3

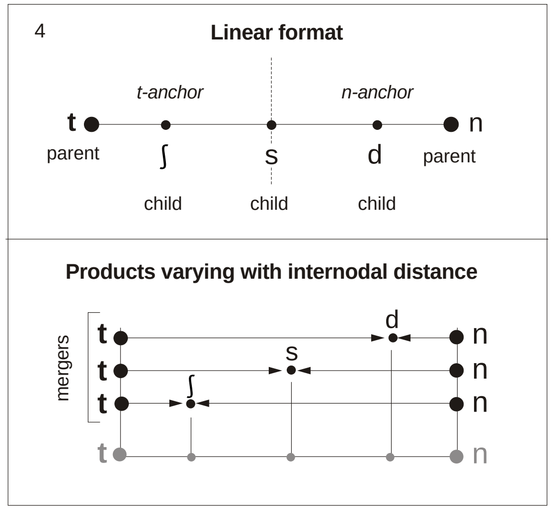
Formats of complex consonant mergers



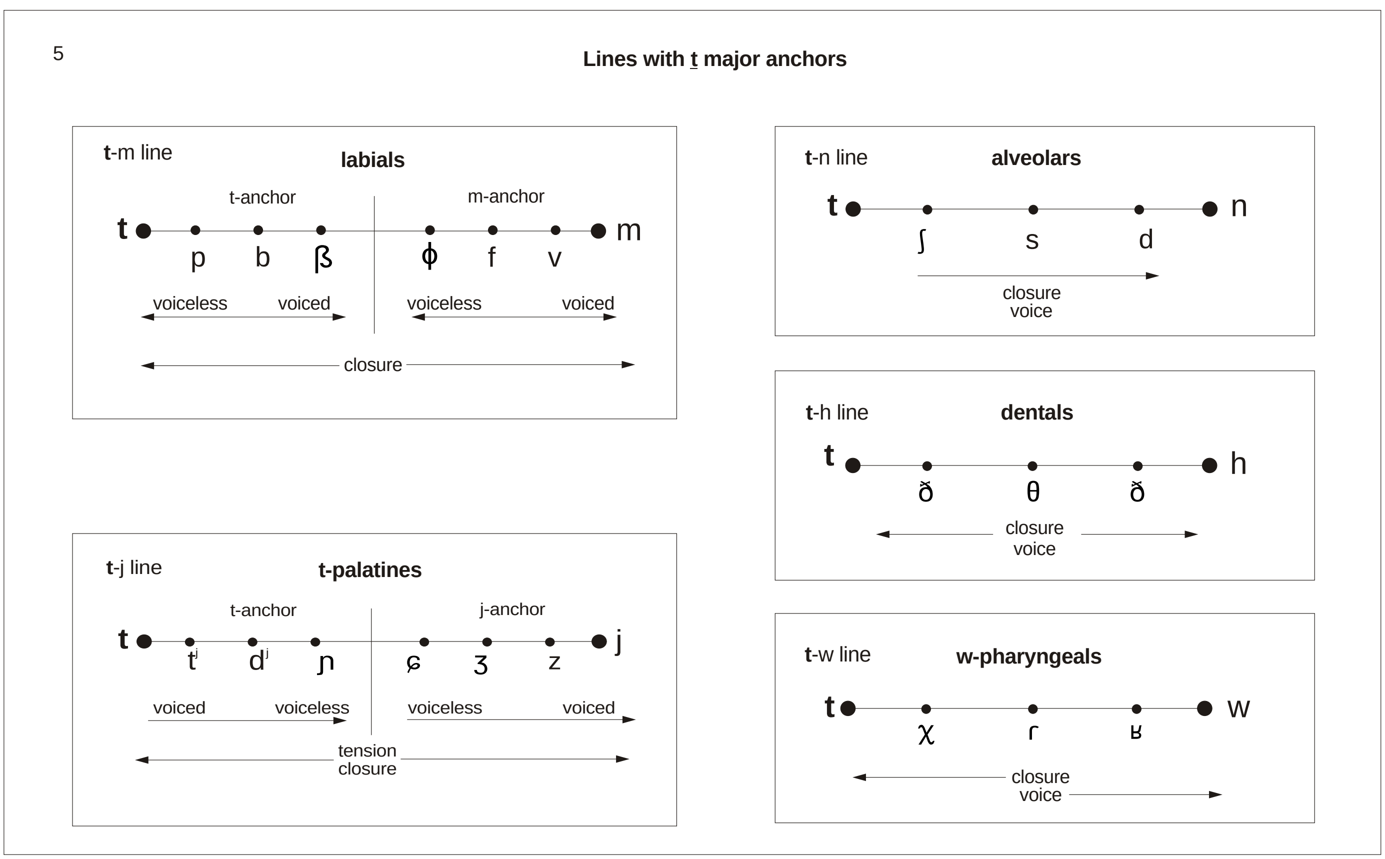
7.3 Linear merger format

Complex consonant generation in the linear format occurs when two symmetrically placed **parent** nodes **merge**. Their mergers produce new nodes lying along the **line** bridging the two. The parent nodes can merge at different specific distances between them.

Fig. 4 shows the merger of t and n creating at different positions between them the complex consonants /ʃ/, /s/ and /d/. It can be noted that proximity to the voiceless parent t produces the voiceless /ʃ/, while the voiced /d/ is adjacent to the voiced n. The parent nodes can **alternately** act as anchors or agents and potentials in alternation are one factor in fluency of speech production. Role reversal does not change the order of nodes generated— as long as the isolated nodes are observed, prior to the onset of phonation. When the onset of phonation completes the articulation, the order is **reversed.**

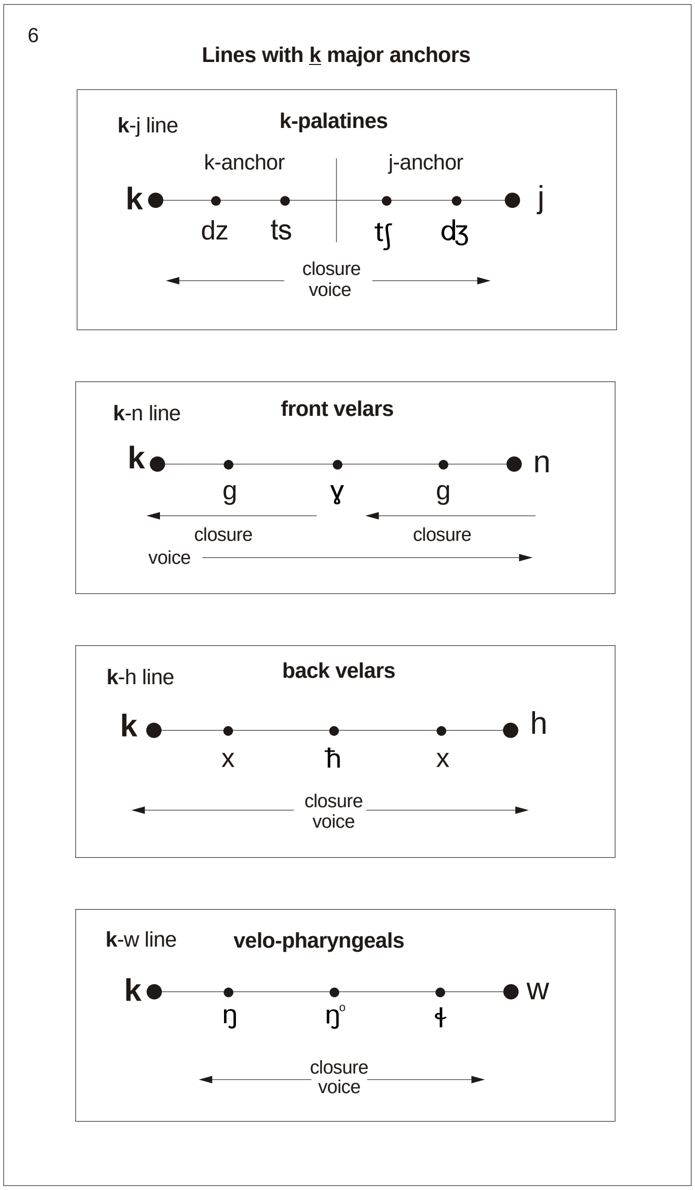


In the following diagrams the merger units comprised of the parent nodes, their connecting lines and their products are extracted from the total lingual node framework of complex consonants shown below (see the CCT chart, p. 4). That is, each merger line from the global map is dissected out. This treatment allows for indicating the close-open tract aspect and voiced-voiceless nature of the nodes produced. The various groups of mergers are arranged according to nodes that are frontal in the pair, even if the parent nodes can exchange roles. The parent nodes lie at each end of a merger line. The stabilizing anchor is shown in bold type, and is referred to in the headings as the "major" anchor. However, this is only an organizational convention since the parents may exchange anchor-vs-agent roles. Vertical lines separate symmetrically opposite regions where alternate parent anchoring is applicable. Linear order in placements of nodes reflects actual physical relations.



Linear format (continued)

6



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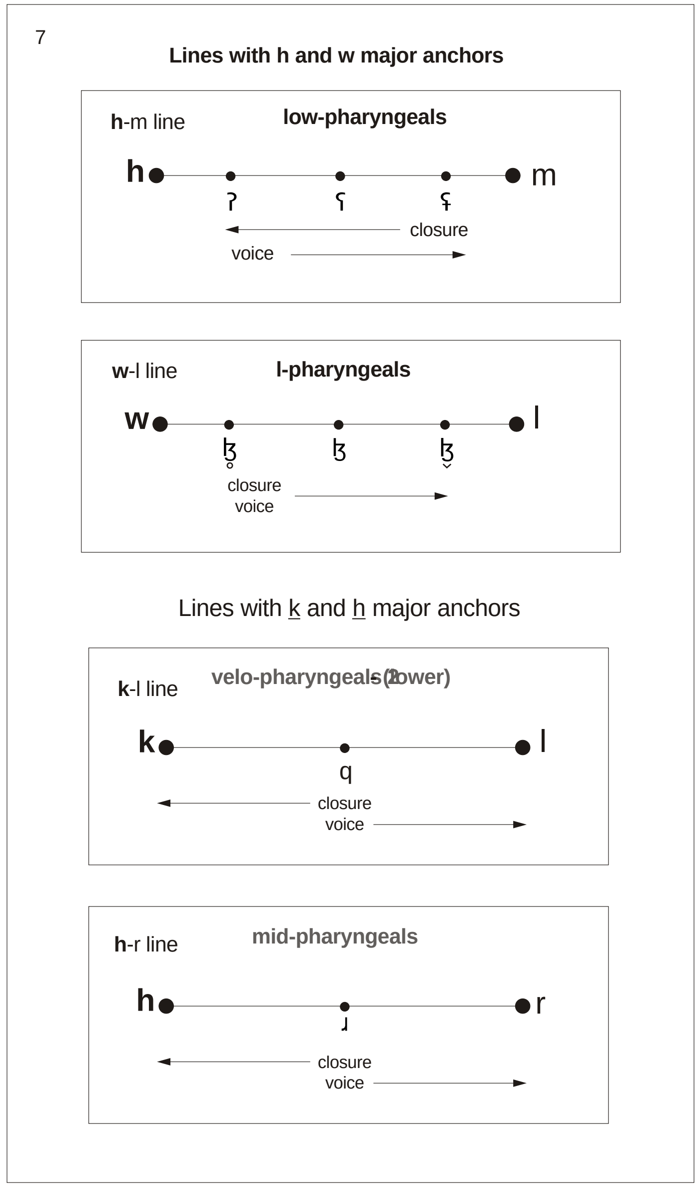


Another grouping of merger lines is possible when sorted by rank according to levels of node hierarchy, as in fig. 9.

8

Merger couples that do not generate useful speech sound include:

t-r t-l
n-j n-l n-w n-r
m-t m-j m-r m-l

9

high — hierarchical rank — low

primal phoneme + primal phoneme	**simple consonant + simple consonant**	**primal phoneme + simple consonant**
h + m	j + t j + k	h + t h + k h + r
	w + t w + k w + l	n + t n + k
	l + k	m + t

low — energy level — *high*

7.4 Linear format - lingual node framework of complex consonants

The chart **Complex consonant taxonomy** (CCT) shown below, is the map of the nodal framework of the tongue that generates complex consonants. It is a conglomeration of the various phoneme producing mergers in linear format. The mapping depicts the physical **distribution** of phonemic **nodes** within the tongue before full articulation takes place, that is, when the articulation frame stands isolated, before any measure of **phonation** is emerges. If this condition is observed the nodes, connecting routes and products are observable. It should be noted that even voiceless consonants have some degree of phonation as otherwise there is air column vibration. It is notable that this system can be perceived either with **isolated** nodes or with **fully articulated** phonemes.

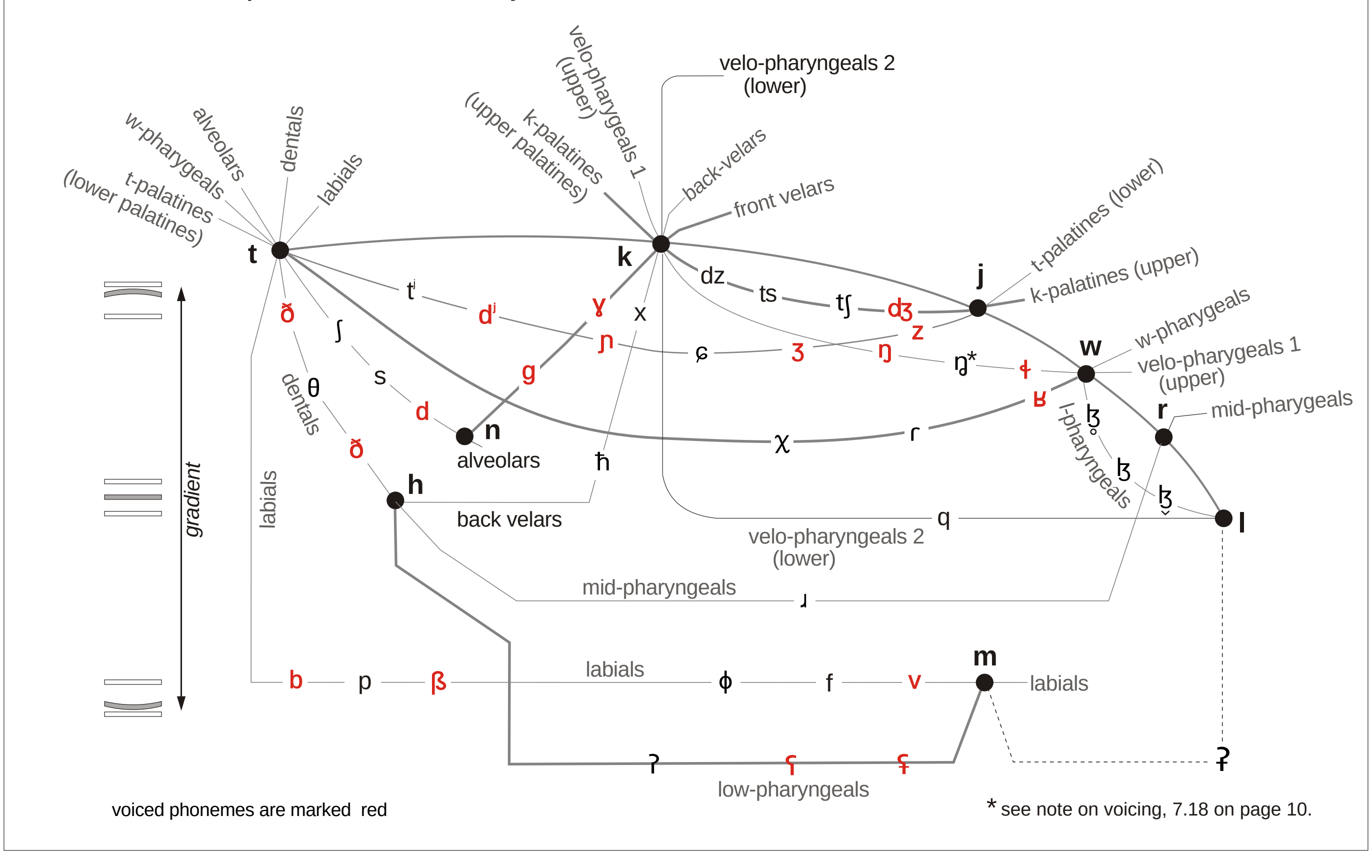
All the simple consonant nodes, designated in bold type, lie on the uppermost curved line, except for ɲ , ɳ and ɣ , which when combined produce non-speech sounds. The action of linear mergers was covered above. **Voiced** consonants are in red type.

This chart in general typically represents Indo-European and Oriental languages, especially regarding the alveolars and palatals, and does not indicate variants of phonemes in these two regions that occur in language groups including Arabic. African and Indian languages. These are discussed on p. 7 under *Palatalization*.

The chart demonstrates the organic relationships between consonants. Members in nodal families are classified according to source parent pairs. A physical unity among class members is also revealed in that transfer between them can be achieved through a glide, rather than an intermediary glottal closure which occurs when transfer of nodes is activated across lines.

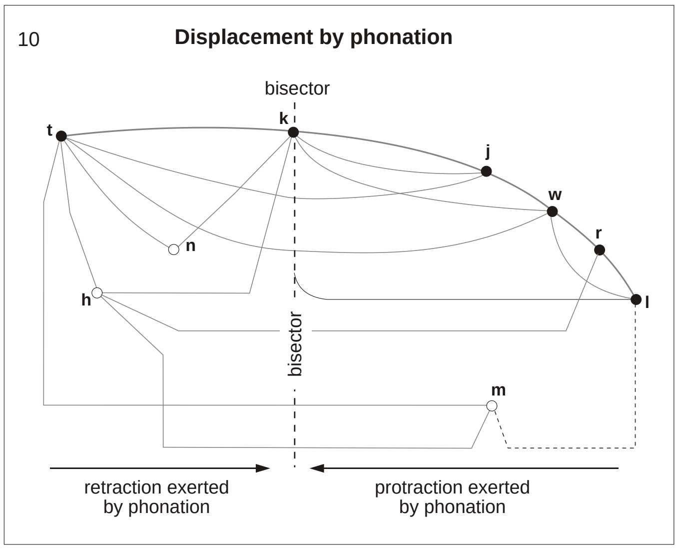
Some other characteristics visible in the CCT: among primal phoneme nodes h ties to 4 lines, n to 2 lines, and m to 3 lines.The n node merges only with t and k, creating frontal, or dental, alveolar and mid-palatal consonants. Central, or palato-velar ones are k-generated. the h node joins front, mid and back nodes: t, k, and r. The w node connects the pharyngeal region to frontal t and k. The p and esophageal stop are the front and back actuators of gates leading into and out of the oro-pharyngeal tract.

Chart CCT — Complex consonants taxonomy

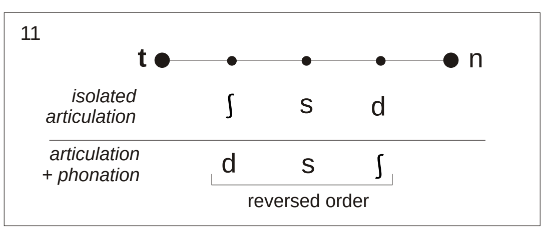


7.5 The nodal positions in full articulation.

The nodal locations in **full** articulation become repositioned, but interestingly enough this process follows a simple rule in which the tongue divisions play a role.
When a vertical line across the k node is admitted to divide the global region into a front and back areas, then once it is produced, the faculty of **phonation** protracts or retracts the entire **tongue** lying on either side of the **bisecting** line. Due to this lingual displacement in relation to the walls of the oral tract all nodes frontal to the k divisor are retracted and all nodes posterior to it are protracted. See fig. 10.
The size of dislocation depends on how far the node is from the bisector prior to phonation. Thus, t, is more retracted than s and dz is less protracted than ts.



This reversal of the linear order of nodes due to phonation clarifies why the order of nodes on the merger lines, when generated in isolation becomes reversed once phonation is added to articulation, fig. 11.



7.6 Lingual presetting aspects

Lingual presettings are present in the taxonomic mapping of complex consonants. The primal phonemic (or h, n, m) level is medially preset; the nodes superior to it are palatally preset, and those below are ventrally preset. The presettings also group together certain consonant clusters. Cf. dorsal: /tj/, /kj/; medial: /tl/, /tk/; ventral: /tw/, / kw/.

7.7 Perceptibility

The merger procedures in complex consonant generation are readily observable. It can be perceived that starting with fully articulating any of the **child** nodes there is easy transformation between phonemes on the same line, i.e., one can with minimal effort glide from one to another or to a parent node, but **not** to a node lying on a different line. This documents their mechanical/organic connection and derivation from the same parent nodes.

7.8 Relation of complex consonants taxonomy to IPA

The complex consonant taxonomy chart (CCT) presents the field in which the nodes of these phonemes are created. The simple consonants, which are the parent nodes, are aligned uppermost on the tectal surface, and they are connected by lines between one another and between them and primal phonemes. The node placements and merger **lines** approximate spatial relationships in the lingual nodal field. The merger lines are in some cases analogous to linear relations in current articulatory ordering such as those in IPA classification, but this taxonomy classifies consonants in their relation to parent nodes and to each other, and thus offer a natural and organic systematization. The traditional classification based on articulative targets and oral tract stricture reflects relatively more superficial connections between consonants. In the diagram the parent nodes are shown as black dots, while the child phonemes lie along the lines connecting the parents.

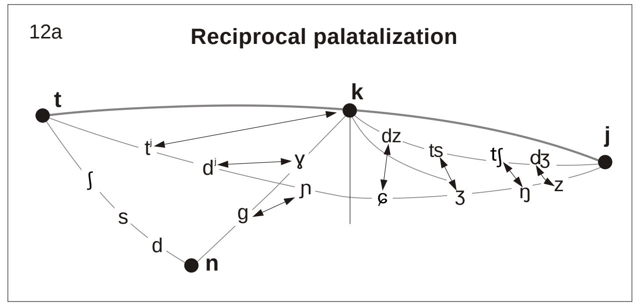
7.9 Complex consonant secondary glide lines

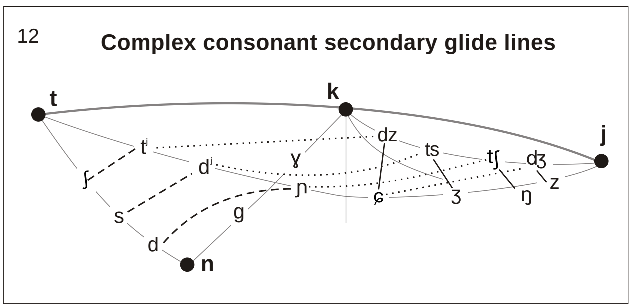
There are also **secondary** lines, or paths through which one can glide between two nodes, that is, where abrupt change of frame is not necessary for a transition. Changing nodes along these secondary paths requires more force compared to that needed in moving across the parent node bridges. It is still relatively to change between these particular articulations. Three sets of pairs connectible through glides are indicated with variously dashed lines in fig. 12. They include those that occur connecting nodes of the t-n line with those on the k-j line, the nodes on the t-j line with the k-j and t-w lines, and the /b/ node of the t-m line with those of the primal phonemes /h/, /n/ and the pharyngeal /l/.

This availability of exchanges represents both the efficiency of tongue movements and pressure applications in food manipulation of the tongue and efficiency in switching between consonant nodes in syllable formation.

These are palatalization paths built into phonemic mechanics: in t̲-n̲ as well as in t̲ and k̲ mergers with j̲ and w̲ , gliding between phoneme pairs is enhanced. This is partly the basis for the palatalizing tendency in certain language groups, fig. 12.

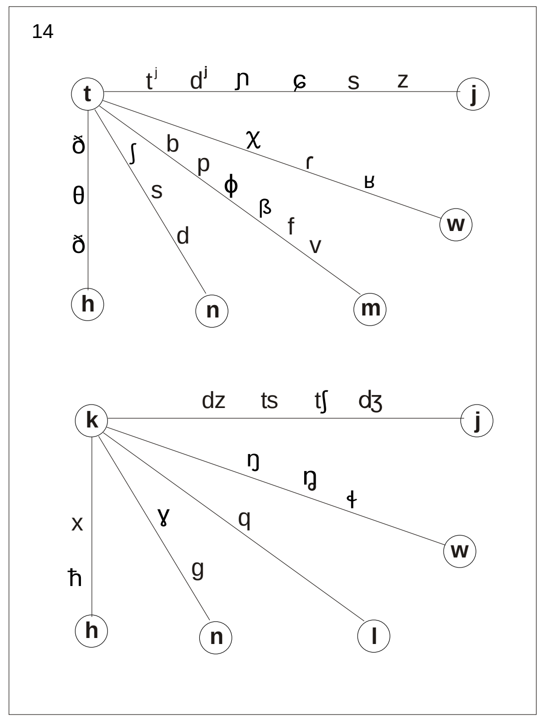
There is a special connection between the t-j (t-palatines) line and the k-j (front velars) and n-k (k-palatines) lines, as represented in fig. 12. The pairs of phonemes connected by arrows are mutually convertible through the action of palatalization. That is, palatalization of /k/ yields palatalized /t/, and vice versa, just as /z/ and /dz/ are products of reciprocal palatalization, fig 12a.

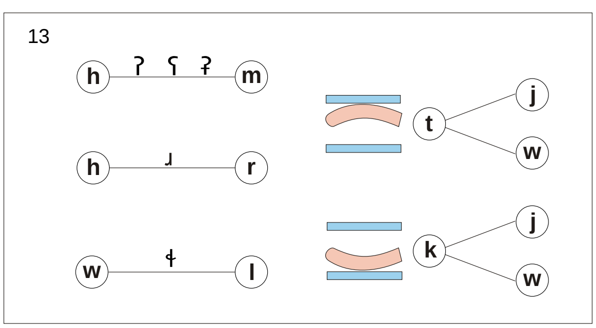




7.10 CCT alernate diagrams

Mergers, extracted from the global CCT map, and grouped according to prime mover agents offer a branched pattern of classification of complex consonants,
Figs. 13 and 14 show such classification with parent nodes and branches or lines of mergers. The parent nodes are the two dorsal simple phonemes t̲ and k̲ as well as nodes of the primal phonemes. The t̲ and k̲ nodes each connect to the j̲ and w̲ pair as well as to the primal phonemes. Whether t̲ and k̲ merger with j̲ or w̲ is determined, respectively, by dorsal or ventral superimposed lingual presettings.





7.11 Node regions related to specific languages

Since each language group have particular phonetic characteristics each language will include different parts of the complex consonant map. Regions can be pointed out where some typical phonemes of a language occur.

Chinese: the k-j line: dz ts tʃ dʒ

English: the t-n line: ð θ ð ʃ s d

Arabic: the k-h, k-l, m-t and m-h lines: x ħ q b f ʔ ʕ

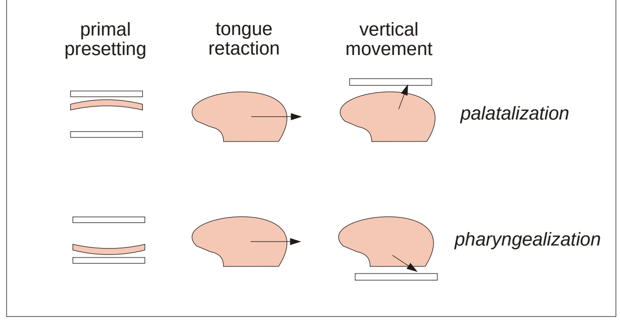
7.12 Palatalization

Palatalization, both historical and synchronic, is a general tendency in various languages to **raise**, as well as to **retract** the tongue so that a secondary glide to /j/ is appended to the articulation of certain phonemes. Such secondary articulation produces allophones of these consonants.

Although it is it is traditionally held velar consonants. like /k/ or /g/ are protracted in palatalization since the velum is posterior to the palate, where /j/ articulation occurs, this is not true at the **isolated** nodal level, where the n node is anterior to the j node. In nodal mechanics palatalization is always **retractive**.

It is important to note that among the various variations of palatalization one type needs to be **distinguished** because it morphologically and mechanically differs from the others. While in general palatalizations create allophones, morphological palatalizations produce phonemically contrasting nodes, that is, new phonemes. Such is the case in Russian (hard) /t/ vs. palatalized (soft) /tʲ/, etc., as in /brat/ (brother) vs. /bratʲ/ (to take).

However, this process whereby palatalization creates **new phonemes** is only one member of a class of tongue-retractive merger processes, in which certain frontal consonants are merged with the nodes either j, or w, or l. It is convenient to call this process r**etrovection**. The reason for considering such a process is that associated inherent movements occurring during tongue retraction differ according to primal presettings. This is shown in fig. 15a.



7.13 Retrovection: directionality in certain phonemic consonant mergers

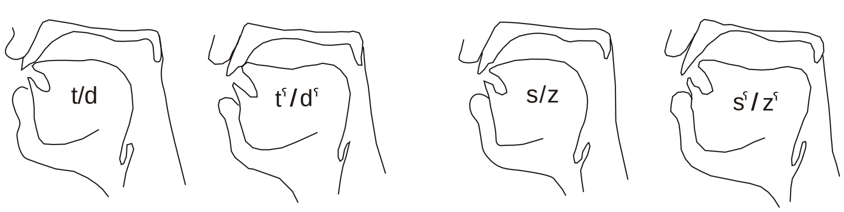
In retrovection the nodes of modified consonants are created by the mergers of certain consonants with the nodes of j, w, and l. The option as to which of these mergers appears is determined by the **articulatory basis** of a given language.

The merger lines of alveolar-palatal consonants with j, w , and l, as illustrated in the CCT represent only those languages in which **palatalizing** retrovection is **typical**. For Semitic, Indian or African phonologies, that have different bases of articulation the same merger lines yield different results where approximations focus not on palatal, or /j/, but rather **lacunar**, or /w/, and **pharyngeal**, or /l/ targets.

These processes include the Arabic emphatics /tˤ/, /dˤ/, /zˤ/, etc., the retroflex and aspirated phonemes /ʈ/, /tʰ/, /ɖ/, /ʂ/, etc., in the languages of India, the glottalized consonants /tˠ/, /dˠ/, /kˠ/, etc., in Hausa.

Palate-directed tongue body, (i.e., n-division) elevation occurs in all three modes of retrovection, but this cannot be regarded as "palatalization" because the tongue dorsum is significantly distant from the palate. See fig. 15b.

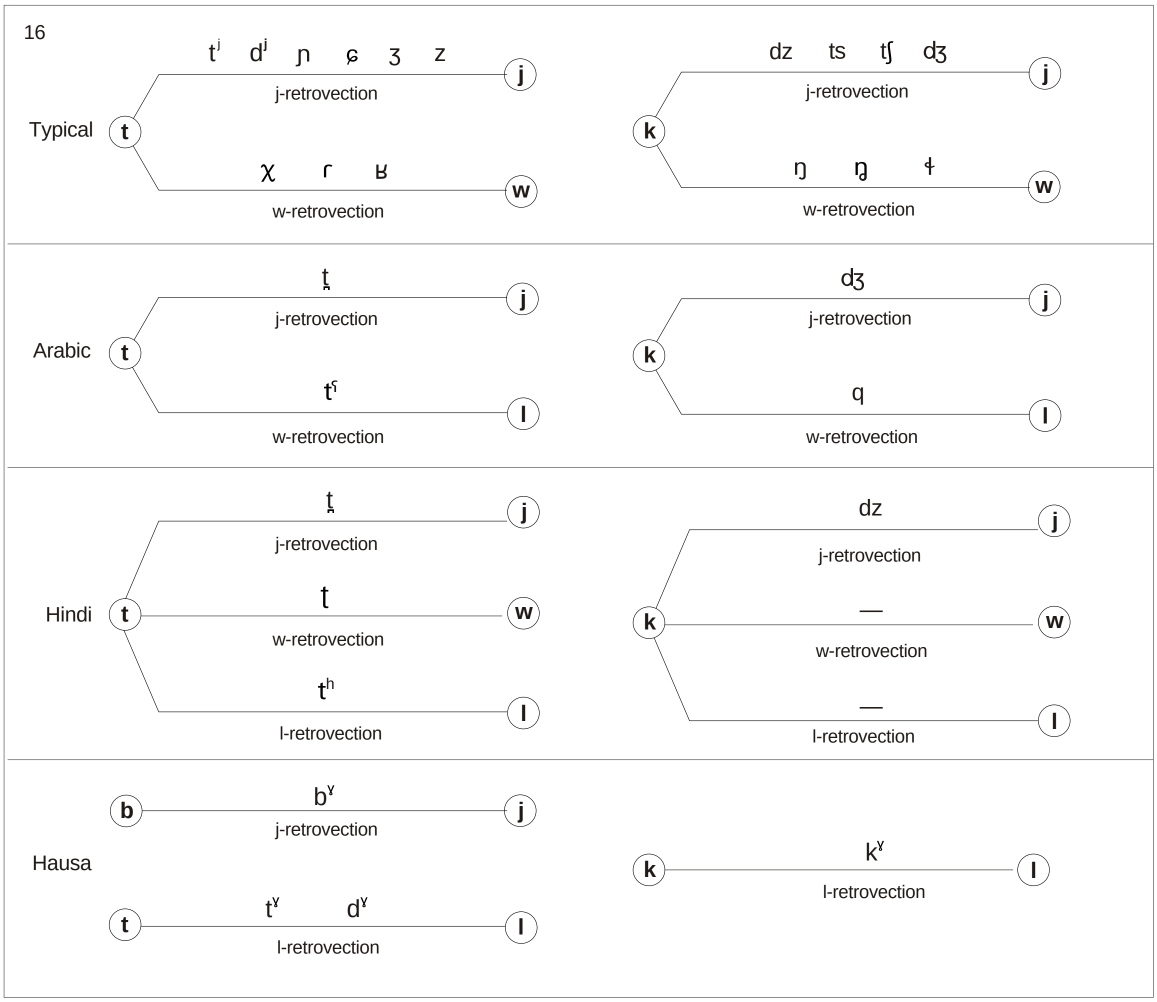
15b **A case of retrovection: glottalized /t/ and /d/ in Arabic**



After Marcais, 1948, in Harmut Kästner, "Phonetik und Philologie de Modernen Hocharabisch", VEB, Leipzig, 1981.

Fig. 16 below illustrates patterns of typical **retrovections** of /t/ and /k/ and /b/ in several languages.

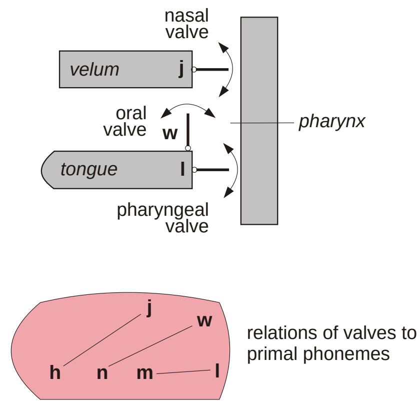
The typical example features the j-node palatal retrovection. The Arabic sample is lacunar retrovection associated the j and w nodes. The Hindi sample shows lacunar j, w and pharyngeal l retrovections. The Hausa sample exemplifies lacunar j and pharyngeal l retrovections are evident.



7.14 The j, w, l valvular faculties

These three are among the simple consonants. Their presence at such high-ranked hierarchical level is derived not so much for their roles in speech, but those in respiration. They are, when isolated, the nodes that control the valves leading into the three interconnected air channels: j closes the nasal passage, w opens the nasal passage and l closes the pharyngeal one. This is ascertainable when one generates these isolated nodes and then observes the route of the respiratory airflow. This faculty is supporter by the fact that there is efficient nodal connectivity between the nodal couplings, respectively, of h-j, n-w and m-l, see fig. 17. This faculty justifies the prominence of their roles in retrovective targeting in the context of speech .

17 **Triad of air flow valves**



7.14.1 Initial consonant clusters

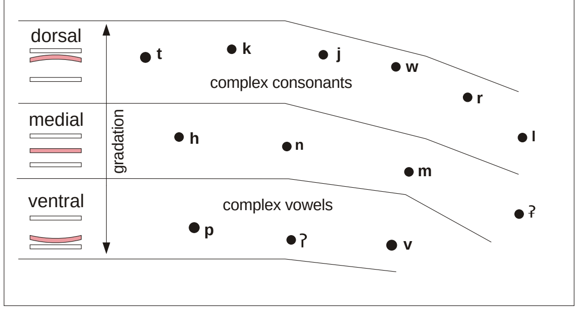
Clusters of two consonants with initial primal phonemes and with initial simple consonants /t/ and /k/ are common in languages that allow clusters. Of the former the number of occurrences increases going posteriorly. It can be seen that the second component in these clusters is typically /j/, /w/ or /l/, emphasizing the roles of these phonemic nodes in feeding as controllers of the valves of the oro-velo-pharyngeal tracts during the conveyance of the bolus from the oral to the pharyngeal region in a fluent, unobstructed motion. This fact may be apparent in the relative comparative frequency of /-w/ vs. /h-/, where /h/ being the more anterior node, and /w/ being the more posterior node. This interesting topic needs further examination, fig 18.

18 **Initial consonant clusters**

primal phonemes			simple consonants	
hw-	nt-	mt-	kt-	tw-
hr-	nk-	mk-	kw-	tr-
hl-	nj-	mj-	kr-	
	(nw-)	mw-	kl-	
		(mr-)	km-	
		ml-		

7.15 Lingual presetting aspect

Lingual presettings apply to the taxonomic map of complex consonants. The primal phoneme (or h, n, m) level is medially preset; the nodes superior to it are palatally preset, and those below are ventrally preset. But there is a gradation in presetting biases: complex consonants appear at levels intermediate between fully biased presettings. Complex vowels (i.e., rounded and otherwise modified) are present at levels between the medial and ventral regions, fig 17. See *Complex Vowels*.



17 **Primal presettings of CCT groups**

7.16 Comparing IPA and CCT

There are **two** main **variables** for defining phonemes both in the IPA and in the CCT. In IPA these are the places of articulation and type of air flow constriction. In CCT the two variables are the option of parent pairs and the order of placement between the parent nodes. Classification in terms of articulative air flow constrictions is **not** considered in the CCT. Whereas the IPA indicates no structural relationships between phonemes, the CCT maps the nodal framework and the nodal relationship within it, both as parent-child and parent-parent connections and hierarchies.

Concordance of IPA and CCT terminologies is only approximate. For example, in the nodal system of CCT the phonemes /l/ and /r/ are pharyngeal, not alveolar; there are also differences in dental or palatal groupings.

7.17 Quantity of consonants in t and k lines

The areas of most productive consonant production are the alveolar and palatal regions reflecting relatively large mobility capabilities of the blade and body of the anterior 2/3 tongue. This facility, no doubt arises from the tongue's abilities to execute intricate manipulations in mastication.

In the CCT the merger lines in these highly productive regions are the termed t-palatines (or upper palatines) and k-palatines (or lower palatines), according to their main parent anchors.

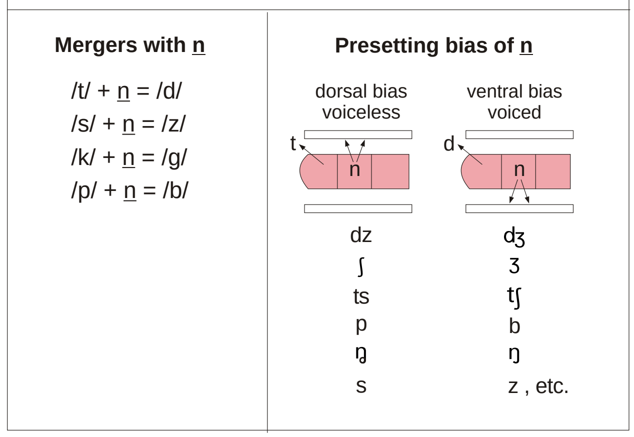
7.18 Voicing

Voicing is a **subfunction** of complex consonant generation and it is performed in two ways:

(a) a voiceless consonant is merged with articulation of the n node,

(b) once coupled with articulating the consonant, the setting of the n nodal tongue division is biased for dorsal presetting in the case of voiceless consonants and is biased ventrally for the voiced versions. The bias constitutes a secondary superimposure and it does not apply to the whole tongue, but only to the n tongue division or region. This process is observable without much difficulty. Fig. 18.

18 **The mechanics of voicing**



Note: the phoneme represented in the present work as / ŋ̊ / is not recognized in the IPA. It is here posited as the voiceless counterpart of the / ŋ /, and it is the initial sound "gn" found in languages such as Cantonese or Swahili. In the nodal system this consonant is entitled phonemic rank because it exists as an independent node, one not identical with that of / ŋ /. It also differs articulatorily in having the n lingual division dorsally preset, and not ventrally as for /ŋ/. Thus / ŋ̊ / is closer to a consonant, while / ŋ / is closer to a vowel. If carefully observed, it is voicelessly initialized and gains voice only as it opens into a vowel.

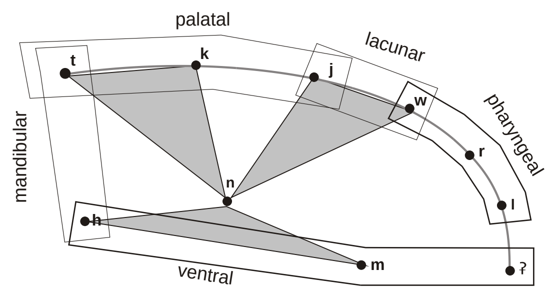
The stops traditionally considered as the voiceless /d/, /g/ and /b/ of Chinese, can in the nodal system be termed instead, voiced /t/, /k/ and /p/. These sounds are characterized by a mixture of voiced and voiceless faculties for the simple reason that the /t/ which normally has a dorsally preset /n/ component, is in this case secondarily ventrally preset. This way the plosive quality of /t/ is attenuated, while it is also given a degree of voicing. The reason behind this phenomenon lies in the articulatory bias of Chinese.

7.19 Triadic functional areas

Relating to the CCT chart, although not implicitly dealing with complex consonants, it may be shown, as in fig. 276, that the nodal framework contains triadic groups of nodes which are functionally integrated with actions performe d in various oral regions. The/ t-n-k/ unit is a anterior-palatal, the /k-n-/ unit is posterior palatal, the /j-n-w/ unit is lacunar* , the /h-n-m/ unit is ventral, and the /w-r-l/ unit is pharyngeal. The t-n-h unit is associated with jaw movement. All of the unit play a role in mechincal orgqanization of the three functions of the oral-tract, in respiration, mastication and speech. *(Section on *Lacunars* is not online at this time)

Fig. 19 shows three of these units. Showing more would make the diagram unclear.

19 **Primary anchors of complex consonant node merger lines**



These triadic frames are syllabic presettings. The central anchor in any of these truss-like frames is a consonantal syllable onset, i.e., it initiates a particular syllable. See fig. 20 for examples.

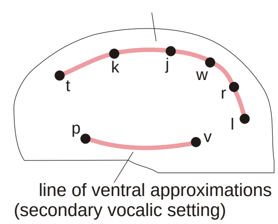
20 **Syllable anchors of stable triadic frames**

t-k-j	/tʃ-/	k-n-w	/ʃ-/
t-h-j	/ɕ-/	k-h-m	/dʲ-/
t-h-k	/tʲ -/	k-n-l	/ʁ-/
t-n-k	/ɲ-/	k-m-j	/ŋ-/
t-m-w	/k-/	k-m-w	/ŋ-/
h-m-l	/ʔ-/	k-n-j	/s-/
h-w-m	/dz-/	w-m-l	/ɣ-/

7.20 The presence of primal presettings

The upper and lower approximations are supported by the consonantal and vocalic presettings. In mastication the upper one is a palatal tongue approximation and the lower one is the ventral approximation. It is size of food bolus as well as head tilt determines which setting dominates. The medial presetting is only transient between upper and lower bolus placement. Fig. 21.

21 **Lines of dorsal approximations (primary consonantal setting)**

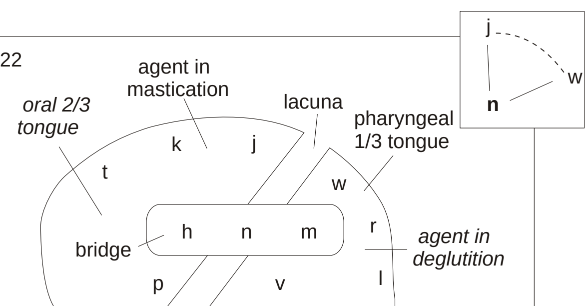


7.21 Divisions of articulatory targeting nodes

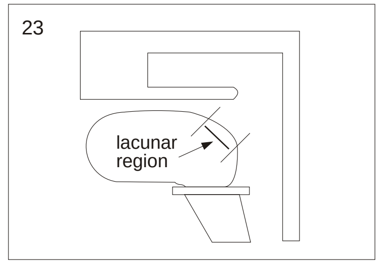
The series of articulatory targeting nodes can be grouped in three divisions. In speech these correspond to frontal, back and low articulatory regions. These areas are functional in an anatomic sense: the front and back parts are agents, respectively, of the oral 2/3 tongue and the pharyngeal 1/3 tongue. The two are bridged by the truss of the primary phonemes.

In mastication t-k-j and w-r-l stand, respectively, for frontal and posterior positional mastication, and p-v serves in low mastication. The primal phonemic region is the agent mediating between mastication and swallowing, fig. 22.

22

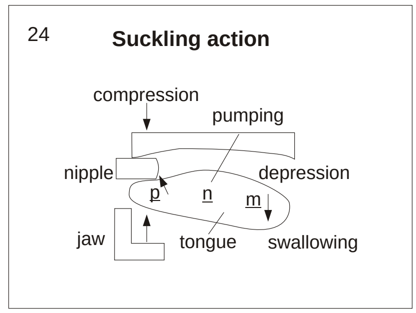


The term *lacuna* refers to the hiatus in the dorsal wall at the oro-pharyngeal region, where the velar-nasal, oral and pharyngeal tracts meet. The hiatus can be closed by exertion of the parapharyngeal muscle but that action is only briefly employed because causes an uncomfortably block to respiration. The term is useful for classifying nodes positioned between fully oral and fully pharyngeal ones, such as j and w. Fig. 23. More available on this topic in section *Consonants*, but this is not onlione at present.



7.22 Infant vocalization

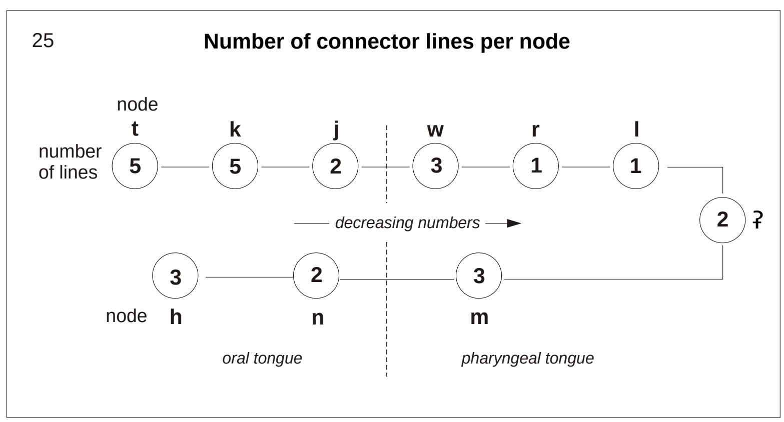
As seen in the CCT chart the m node merges with three other nodes, t and produces the labials b and p, while in its other two mergers it creates layrngeals and epiglottic vocalizations. Thus, the typical speech sounds b and p are essential parts of the m frame. The **infant's** oral framework is adapted for **suckling**, where the jaw and tongue tip compress and the posterior tongue swallows, and mastication takes on the pumping function. The compression by the jaw initiates action by the lingual node of p/b, which creates frontal compression. The m node, on the other hand activates swallowing. These two nodes, then, are inherent nodal components of suckling. This fact appears to explain why the typical initial sounds of infancy are approximately /m/ and /p/b/. If one simulates the oro-lingual-mandibular suckling framework this fact is readily **observable**. Fig. 24.



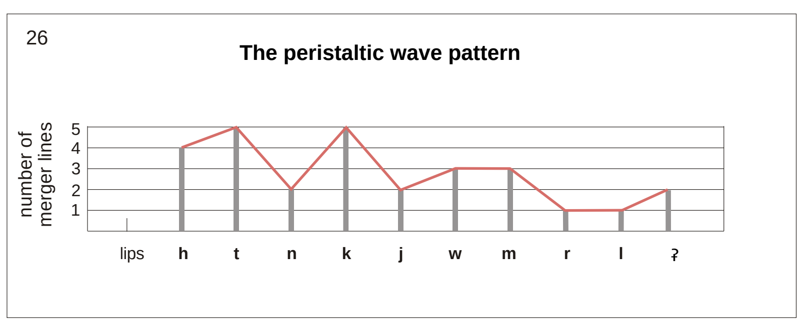
The m node also merges to produce laryngeal and epiglottal vocalizations, and it is easily ascertainable that **crying**, a laryngeally constrictive action is allied with the glottal stop /ʔ/.

7.23 The quantities per node of connecting lines

There are two parallel nodal lines, an upper and a lower one, united at each end, respectively, by the labial and epiglottal closures. The palatal, velar and pharyngeal nodes occupy the upper line and the primal phonemes lie on the lower one. The number of connector lines diminishes posteriorly in the upper line, indicating the decreasing articulating capabilities in that direction. For primal phonemes the number of connections on either side of the central n node are symmetrical. See fig. 25 .



If the numbers connector lines per nodes are plotted a pattern emerges that exhibits a **wave** pattern. This is just one of the examples of an element of structural organization in the oral-respiratory tract which derives from its ancestral function of food movement, or peristalsis, fig. 26. More in this topic in section *Metaperistalsis* (presentlynot online .)



7.24 Complex consonant production — matricial format

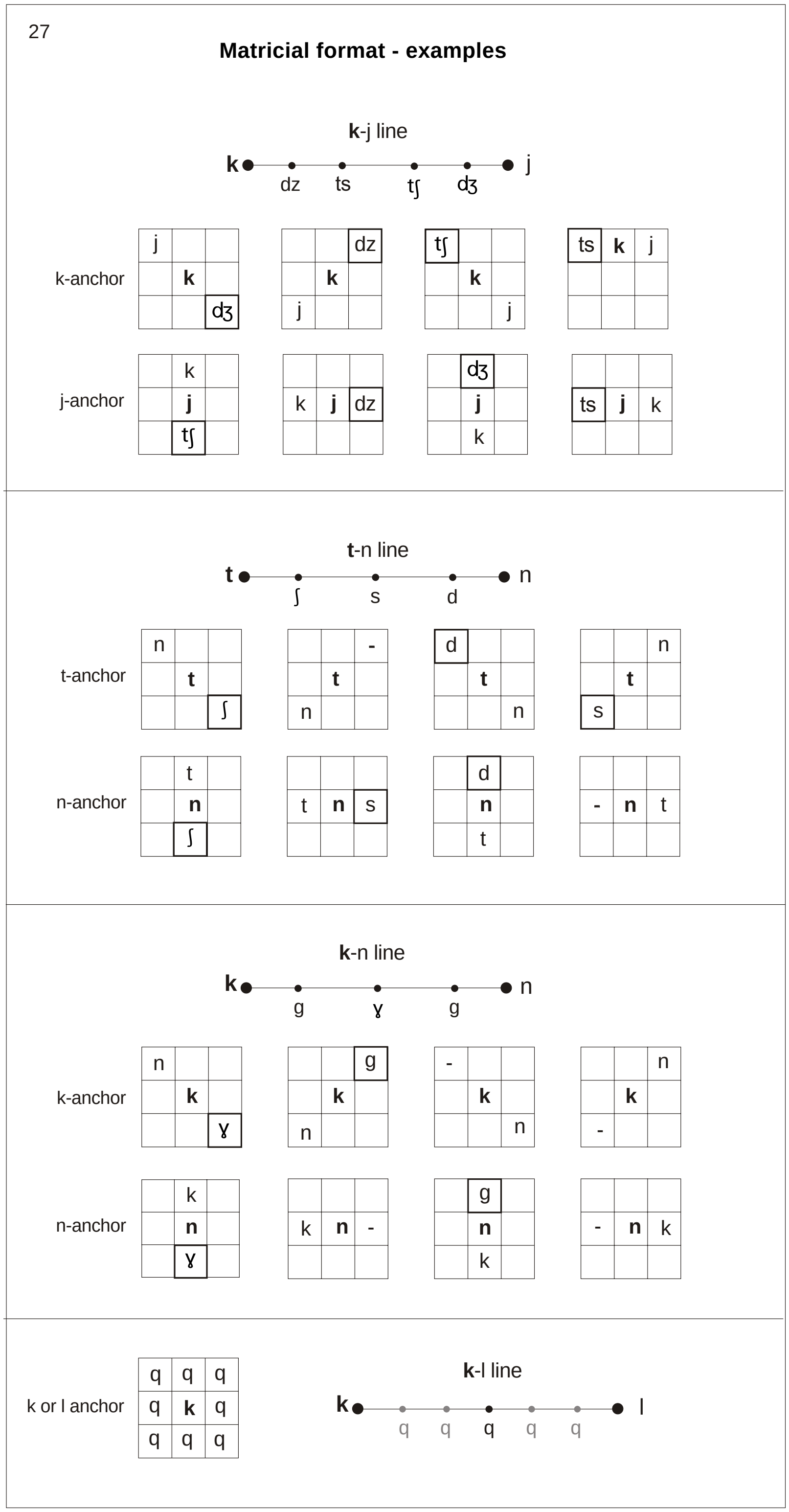
The **matricial** merger action in generating complex consonants is similar to that in the production of simple phonemes, fig. 27.

1. One parent node moves to the **central** anchor position and this action distorts the initial frame.

2. The **antagonist** parent node becomes the **agent** and moves to one of the cells surrounding the anchor cell in an equalization action. This node generally locates in cells lying along one of the axes (true or oblique). The frame is now partly equalized.

3. A **third** node is generated in the cell symmetrically **opposite** the agent node and this action builds the immediate pre-equalization frame. When the third node is further **energized** by the application of phonation and pulmonic pressure it **articulates** a complex consonant.

4. The process described can be best observed when generating **isolated** (pre-articulation) nodes, but can also be perceived at low or even high levels of **articulation**.



Only four examples are offered here; the design of the remaining mergers can be readily inferred from these.

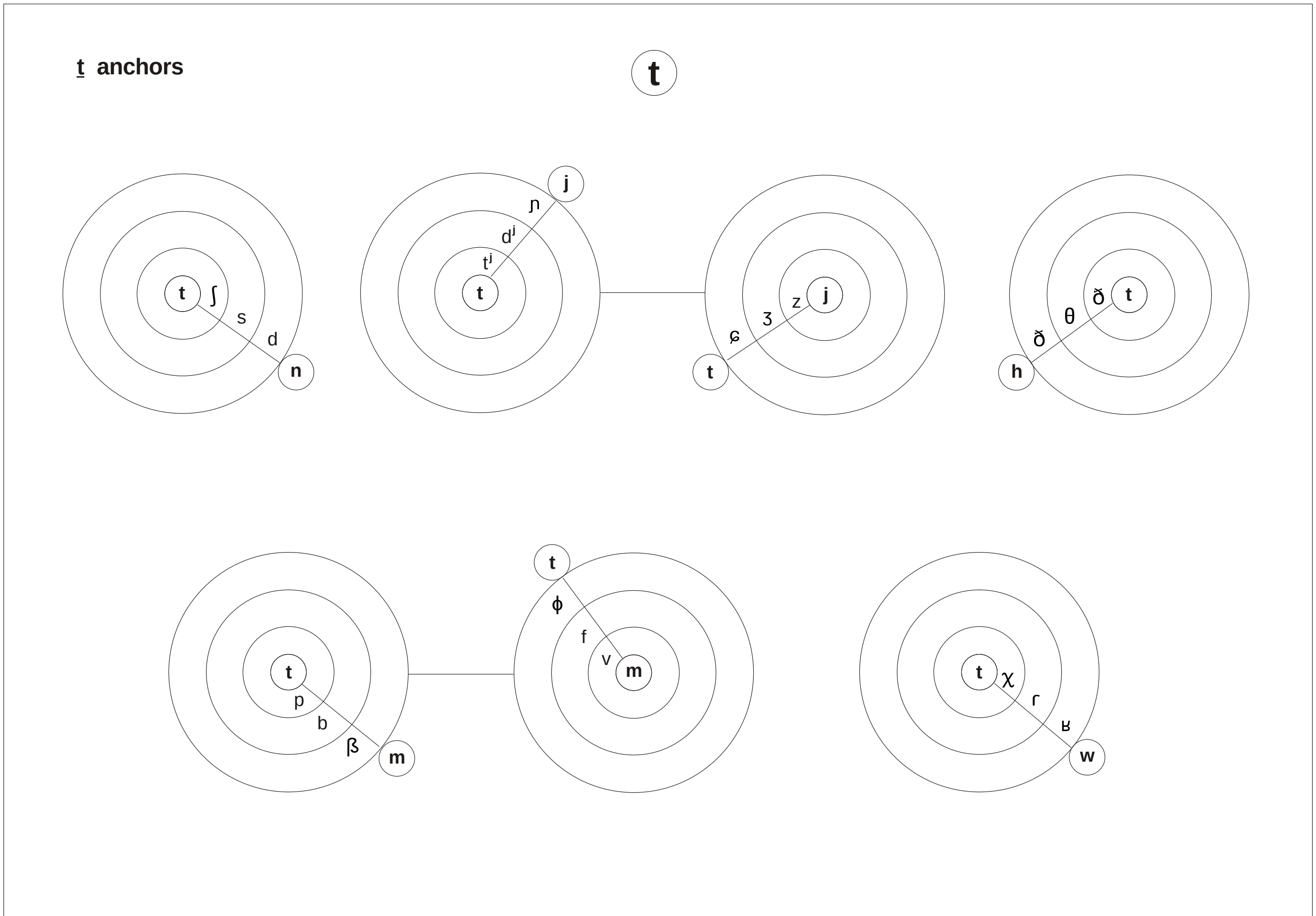
Note: Linear formats are included with each matricial merger group. Bold character depicts the central anchor and the boxed cell contains the product node.

7.25 Complex consonants - orbital format

In these diagrams of the orbital mergers of complex consonants the **central** cell holds the **anchor**. The **active agent**, as well as the **product** appear in a peripheral path surrounding the anchor. The merger **products** lie within a fourth orbit, the outline of which is not indicated. The mergers are grouped according to their major anchor. However, the parent nodes can exchange assignations of roles as stabilizing anchors versus active agents. Figs.28-31.

Blank orbits signify that the product is not a standard speech sound. The mechanics underlying the locations of the parents and products are discussed in section *Phase Behaviors*.

Tilt of merger lines reflects the approximate relative physical positions of the parent nodes. The mechanical basis of concentric merging is covered in section *Phase Relationships*.



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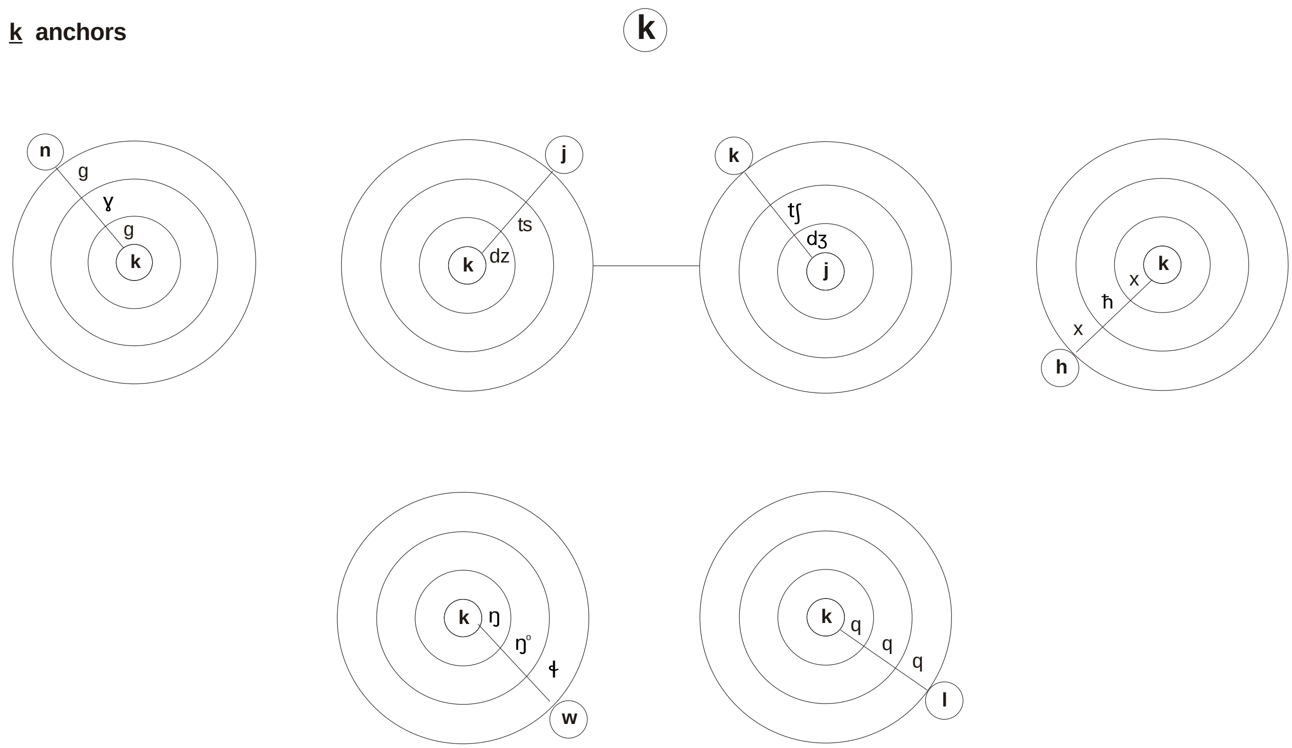
Complex consonants - orbital format (continued)

k anchors



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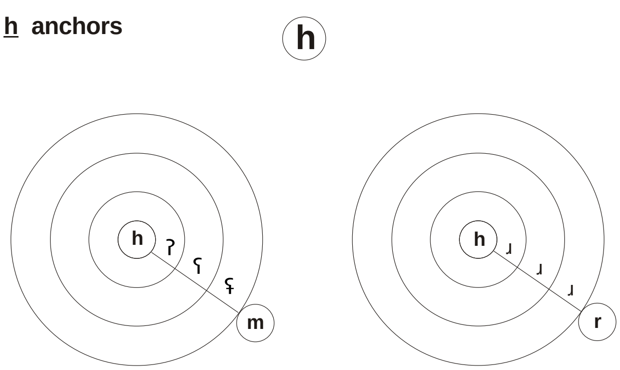
h anchors



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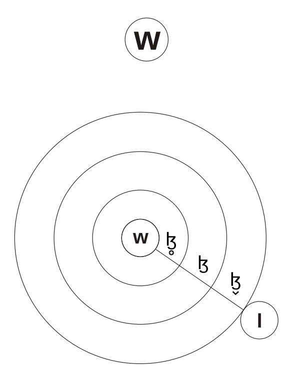
w anchor



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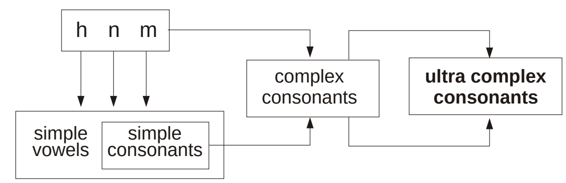
PART 8—ULTRA COMPLEX CONASONANTS

8.1 Ultra complex consonants

The term ***ultra complex consonants*** refers to consonants secondarily created by the merger of complex consonants, such as /d/, /s/, etc. They are produced at higher level of frame complexity giving rise to no new phonemes, but rather, add to number of **alternative** articulations. As the nodal frameworks of phonemes grow in intricacy going from the simplest phonemes to the ultra complex ones, the superimposed frames come to contain increasingly more interconnected subframes. Thefull scope of ***ultra complex consonants*** requires further examination.

Fig. 32 illustrates in a general manner some secondary complex mergers. The phonemes produced replicate those already extant in the primary complex consonants.

32 **Ultra complex consonants**



8.2 Merger mechanics of ultra complex consonants

As with complex consonants the **production** of ultra complex consonants once again appears in three formats: linear, matricial and orbital. The existence of these three ways of merger manipulation are in effect **alternative** articulations. They doubtless **derive** from the versatility of lingual shaping and positioning essential in mastication: specific parts of the tongue can reach targets and perform actions in all parts of the oral tract. Such connection between speech and feeding is **supported** by the fact that any phoneme can be produced during mastication as long as the mouth is allowed to open—except for labials, of course. Conversely, any speech phoneme frame can be readily converted to a stance in mastication.

8.3 Ultra complex consonants - linear format

Fig. 33 and 34 offer some **examples** of ultra complex mergers. The merger line is represented by a *plus* sign. The role of anchoring is assumed to be the first consonant. The case of reversal of roles are considered in the matricial format, below.

Note: the intuitive notion of creating phonemes by combining two, especially in the symbolic designation of affricates does not hold up in nodal phoneme production. Fig. 35 lists some of these cases.

Affricates, in their simplest mergers results from the union of /d/and /t/ with /n/.

There are several unexpected merger results. E.g., the traditionally accepted combination /t/ + /ʃ/ does not result in /tʃ/, but yields /ts/. Or that /n/ plus /j/ is not /ɲ/, which is, in fact, the product of /t/+/j/. Fig. 35.

Voicing is another function which is not intuitively predictable in mergers. For example, combination of the /t/ and /z/ nodes adds up to be voiced, namely /dz/, while /z/ + /t/ becomes the voiceless /ts/. Thus, the initial voiceless /t/ parent does not determine voicing.

33 **Examples of linear mergers in ultra complex consonants**

parent 1 + parent 2 = product

d + n = ç tʃ	**l** + m = g
n + d = s ʃ	**m** + l = k
n + g = dz ʤ	**ʃ** + s = z
g + n = d^j t^j	

34 **More ultra complex consonant mergers in the linear format**

b + d = ɣ	k + r = tʃ	r + j = ɣ
g + n = t^j d^j ŋ	m + k = ɣ	r + t = ʤ
d + z = ʒ	m + l = k	s + m = g ɣ
z + d = dz	m + g = dz	ʃ + s = z
z + t = ts	m + s = k	t + r = ʃ
h + v = x ɣ	l + m = g	t + g = ʤ
j + r = ɕ	n + g = dz ʤ	t + z = dz
h + r = tʃ	ɲ + dz = ħ	t + ʃ = tʃ

35 **Unexpected merger products**

merger	expected	actual
t + h =	θ	s
t + z =	ts	dz
t + ʃ =	tʃ	ts
t + j =	t^j	ɕ
d + z =	dz	ʒ
n + j =	ɲ	not speech sound

8.4 Ultra complex consonants - matricial format

Fig. 36 below illustrates some secondary complex mergers in the matricial format. For clarity the cells are not depicted except in the initial matrix.

The two sets of examples are the mergers of /d/ and /n/. Their is a variety of products, with an epmohasis on affricates and certain fricatives.

Results obtained by reversing the anchor and agent nodes are also illustrated. For the /m/ + /k/ mergers only the /m/-anchored case is provided.

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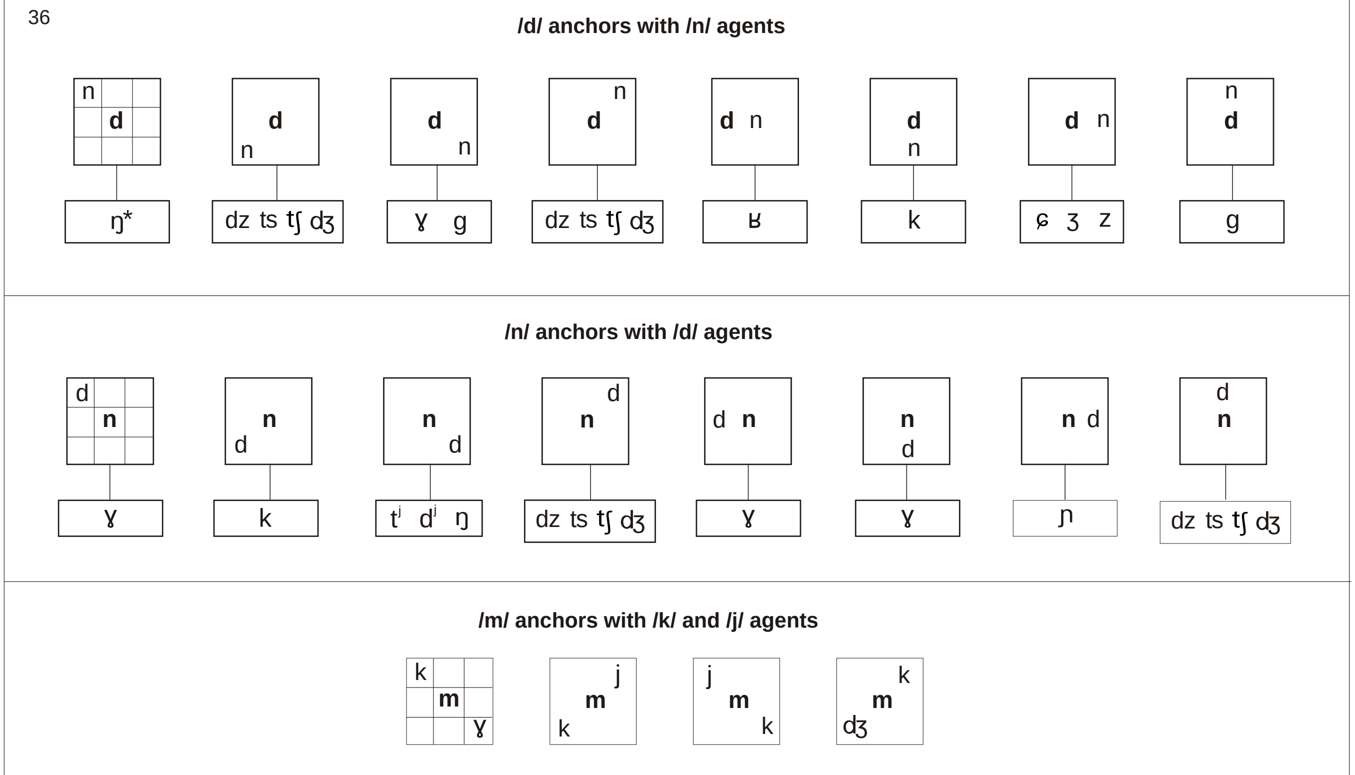

8.5 Ultra complex consonants - orbital format

The two samples of the orbital merger format of ultra complex consonants may suffice to represent the group. See fig. 37.

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