GIMSON'S PRONUNCIATION OF ENGLISH

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Revised by

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accent back to the first syllable, kept the full vowel quality in the final syllable or, in the case of polysyllables such as *justify, temporary*, retained a full vowel on a syllable following the primary accent. In words of the *temporary, secretary* type, American English, for instance, keeps a full [e] vowel, as was the case in English up to the eighteenth century, whereas in present RP the former [e] or [ɛː] is reduced to [ə] or elided. As a result of influences of this kind, full vowels were found in eModE in a number of situations where to-day qualitative weakening is once again the rule,[11] e.g. *certain, bargain*, with [eɪ] in the final syllable; *history, majesty, tragedy*, and *merrily*, with [əi] finally; and *emperor, saviour*, with [əur] finally.

8.14 *Frequency of Occurrence of RP Vowels*

In colloquial RP, /ə/ (10.74%) and /ɪ/ (8.33%) clearly emerge as the vowels having the highest text frequency. This is to be expected, since /ə/ is the most common vowel in unaccented syllables in a language which has a high proportion of unaccented syllables, and /ɪ/ has a high frequency of occurrence in both accented and unaccented syllables. The frequency of occurrence of each RP vowel as given in Fry (1947) is shown in Table 7. Frequency of occurrence measured by other authors in both RP and in American English[12] (in so far as similar measurements can be made, given that /ɒ,ɪə,eə,ʊə/ do not occur in General American and /ʌ/ is not always given phonemic status) produces the same top five /ə,ɪ,e,aɪ,iː/, a second group of three /eɪ,ə,æ/ and a bottom six of /uː,ʊ,ɑː,aʊ,ɔɪ/ with /ɔɪ/ always last.

	%		%
ə	10.74	ɔː	1.24
ɪ	8.33	uː	1.13
e	2.97	ʊ	0.86
aɪ	1.83	ɑː	0.79
ʌ	1.75	aʊ	0.61
eɪ	1.71	ɜː	0.52
iː	1.65	eə	0.34
əʊ	1.51	ɪə	0.21
æ	1.45	ɔɪ	0.14
ɒ	1.37	ʊə	0.06
Total all vowels: 39.21%			

Table 7. *Text frequencies of vowels in RP (from Fry, 1947)*

[11] For an account of vowels in unaccented syllables in eModE see Dobson (1957)
[12] See French *et al.* (1930), Carterette and Jones (1974), Mines *et al.* (1978), Knowles (1987)

9

The English Consonants

9.1 *The Distinctive Consonants*

It is possible to abstract from a continuous utterance of English by means of a process of commutation (see §5.3) 24 distinctive units which are consonantal both in terms of their position in syllables (see §5.6) and also, in the majority of cases, in terms of their phonetic nature (i.e. they have, at least in some of their realizations, articulations involving the obstructions or narrowings which produce, acoustically, a noise component—see §4.2).

These 24 consonantal phonemes are classified in Table 8 in two general categories:

(a) Those articulations in which there is a total closure or a stricture causing friction, both groups being typically associated with a noise component (OBSTRUENTS); in this class there is a distinctive opposition between voiceless and voiced types.

(b) Those articulations in which there is only a partial closure or an unimpeded oral or nasal escape of air; such articulations, typically voiced, and frequently frictionless, i.e. without a noise component (SONORANTS), may share many phonetic characteristics with vowels.

	Plosive	Affricate	Fricative	Nasal	Approx.
Bilabial	p,b			m	(w)
Labiodental			f,v		
Dental			θ,ð		
Alveolar	t,d		s,z	n	l
Post-alveolar					r
Palato-alveolar		tʃ,dʒ	ʃ,ʒ		
Palatal					j
Velar	k,g			ŋ	w
Glottal			h		

Table 8. *The distinctive consonants of English*

Notes

(1) In some types of RP it may be necessary to include the labial-velar voiceless fricative [ʍ] as a phoneme, e.g. in words like *which, what, whether*, but for most RP speakers these words are pronounced with a /w/.

(2) In practical teaching it may sometimes be convenient to treat /tr/ and /dr/ as distinctive affricates as well as /tʃ/ and /dʒ/ (see §9.3).

(3) The glottal stop [ʔ] has been excluded, since it is not phonemically distinctive in RP; its use as a reinforcement for vowels and its allophonic association with /p,t,k/ will be treated in §9.2.8.

It will be seen from Table 8 that:

(a) the plosive and nasal phonemes fall into three contrastive groups as far as the place of articulation is concerned, i.e. bilabial, alveolar, and velar;

(b) the affricates, lateral, and /r/ phonemes have an alveolar basis;

(c) the fricatives have five areas of articulation, i.e. labiodental, dental, alveolar, palato-alveolar, and glottal.

These basic areas of articulation, convenient for labelling the phonemes, will need to be extended when the various allophonic realizations are discussed, but in any particular context the number of oppositions involving the place of articulation will remain unchanged; thus, the allophones of /t/ may be dental or post-alveolar, and the allophones of /k/ may be palatal, without constituting additional distinctive areas of articulation, since such variants are conditioned by the context.

Class A: Obstruents

9.2 *Plosives*

The complete articulation of a pulmonic egressive plosive, or stop, consonant consists of three stages:

(1) the CLOSING stage, during which the articulating organs move together in order to form the obstruction; in this stage, there is often an on-glide (a TRANSITION) audible in a preceding sound segment and visible in an acoustic analysis as a characteristic curve of the formants (see §9.2.2 below) of the preceding sound;

(2) the COMPRESSION stage, during which lung action compresses the air behind the closure; this stage may or may not be accompanied by voice, i.e. vibration of the vocal folds;

(3) the RELEASE stage, during which the organs forming the obstruction part rapidly, allowing the compressed air to escape abruptly (i.e. with an explosion, hence 'plosive'); if stage (2) is voiced, the vocal fold vibration will continue in stage (3) if a vowel follows; if stage (2) is voiceless, stage (3) may also be voiceless (aspiration) before silence or before the onset of voice (as for a following vowel), or stage (3) may coincide with the onset of vocal fold vibration, as when a voiceless plosive is followed without intervening aspiration by a vowel; again, an off-glide (TRANSITION) associates the plosive with a following sound.

Since a condition of plosive articulation is that the whole of the speech tract behind the primary closure should form a chamber sealed to the escape of air, and since the primary closures for the English plosives are normally made in the oral cavity, it follows that the soft palate is held in its raised position in the compression stage and usually also during the closing stage (the exception being when a nasal consonant precedes).

9.2.1 The Phonetic Features of English Plosives

The RP plosive phonemes comprise three pairs: /p,b/; /t,d/; /k,g/. Table 9 illustrates oppositions in word-initial, medial, and final positions.

	/p/	/b/	/t/	/d/	/k/	/g/
Initial	pole	bowl	toll	dole	coal	goal
Medial	riper		writer	rider		
		bitter	bidder	bicker	bigger	
	caper	caber	cater			
		rubber		rudder		rugger
	lopping	lobbing			locking	logging
Final	rip	rib	write	ride	rick	rig

Table 9. *Minimal oppositions among English plosives*

These oppositions may be realized by means of one or several of the following phonetic features:

(1) *Place of articulation*—/p,b/, generally bilabial; /t,d/, generally alveolar; /k,g/, generally velar.

(2) *Force of articulation*—/p,t,k/ tend to be pronounced with more muscular energy and a stronger breath effort than /b,d,g/; the former are known as relatively strong or fortis, the latter as relatively weak or lenis.[1]

(3) *Aspiration*—The voiceless series /p,t,k/, when initial in an accented syllable, are usually accompanied by aspiration, i.e. there is a voiceless interval consisting of strongly expelled breath between the release of the plosive and the onset of a following vowel, e.g. *pin, tin, kin* [ˈpʰɪn, ˈtʰɪn, ˈkʰɪn]. When /l,r,w,j/ follow /p,t,k/ in such positions, the aspiration is manifested in the devoicing of /l,r,w,j/, e.g. in *please, pray, try, clean, twice, quick, pew, tune, queue*; some devoicing may also occur in relatively unaccented situations, e.g. *apricot, atlas, applicant, heckler, buckram, vacuum* etc. In other positions, i.e. preceding a vowel in an unaccented syllable and finally, such aspiration as may occur is relatively weak, e.g. /p/ in *polite, lip*; in absolute final positions, i.e. preceding silence, /p,t,k/

[1] Lower intraoral pressure for /b,d,g/ was reported by Subtelny *et al.* (1966) and Malécot (1968).

may have no audible release (see §9.2.4(1)). Where a plosive follows /s/ within the same syllable the distinction between /p,t,k/ on the one hand and /b,d,g/ on the other is neutralized (see §5.3.4); the resulting plosives are unaspirated (i.e. similar to /b,d,g/ in all other positions), although they have no voicing in the compression stage (similar to /p,t,k/ in all other positions); only the apparent fortis nature of these articulations suggests a preferred transcription of *spin, stop, skin* as /spɪn,stɒp,skɪn/ rather than /sbɪn,sdɒp,sgɪn/.[2] This is confirmed by sequences of /s/ plus /p,t,k/ which cross morpheme or word boundaries where the aspiration of /p,t,k/ may be lost but where nevertheless a distinction may remain between /p,t,k/ and /b,d,g/ based on strength of articulation alone, cf. *discussed* vs *disgust*.

(4) *Voicing*—The voiced series /b,d,g/ may have full voice during their second stage when they occur in positions between voiced sounds, e.g. in *labour, leader, eager, windy, rub out, read it, egg and, to be, to do, to go*. In initial and especially in final positions, i.e. following or preceding silence, /b,d,g/, while remaining lenis, may be only partially voiced or completely voiceless, e.g. in *bill, done, game, cub, lid, bag*. In these positions /b,d,g/ are realized as [b̥,d̥,g̊], vocal fold vibration beginning only in the last portion of the compression stage in initial position, and finishing in the first portion of the compression stage in final position (or having no voicing at all in this stage). Even in the intervocalic positions mentioned at the beginning of this section /b,d,g/ may sometimes be subject to devoicing, particularly where a word boundary is involved.[3] It has also been claimed that, even when vocal cord vibration is not present, glottographic and laryngoscopic studies show that whisper-like narrowing is present.[4]

Aspiration and voicing in syllable-initial position can together be regarded as involving differences in Voice Onset Time (or VOT), i.e. the interval between the release burst and the onset of voicing. VOT differences, and the voicing of [d] in other positions, are shown schematically in Table 10. Note that an initial fully devoiced [d̥] as in *done* has approximately the same VOT value as an initial unaspirated [t] as in *stun*. VOT values for aspirated voiceless stops are generally around 40–75 ms, whereas VOT for voiced plosives varies from a much smaller positive value or has a negative value (i.e. voicing starts before the point of plosion). VOT in voiceless plosives has been shown to increase as the place of articulation moves from labial to velar.[5]

(5) *Length of preceding sounds*—When the RP plosives occur finally in a syllable, their value is determined largely (since the voicing factor is not strongly operative) by the length of the syllable which they close. It is a feature of English (and to varying extents universally in languages) that syllables closed by voice-

[2] Wingate (1982) also shows that the fundamental frequency of the following vowel equates with /p,t,k/ rather than /b,d,g/

[3] Suomi (1976, 1980) reported only 11 out of 144 instances of interruptions in the voicing of voiced plosives in word-medial position compared with 76 out of 213 such interruptions in word-final plosives preceding a vowel. Docherty (1992) found interrupted voicing in the compression stage in 97% of word-initial voiced plosives following vowels and in 46% of word-final voiced plosives preceding vowels.

[4] Catford (1977:112)

[5] See Docherty (1992), Volaitis and Miller (1992)

l	iː	d			final devoiced [d̥]
l	iː	d	ə		medial fully voiced [d]
		d	ʌ	n	partially voiced [d̥] (negative VOT)
	s	t	ʌ	n	unaspirated [t] (zero VOT)
		t	ʌ	n	aspirated [tʰ] (positive VOT)

Table 10. *VOT differences in English (underlining indicates voicing) in 'lead, leader, done, stun, ton'*

less consonants are considerably shorter than those which are open, or closed by a voiced consonant.[6] We have seen in the chapter on vowels that this variation of length is particularly noticeable when the syllable contains a 'long' vowel or diphthong, cf. the fully long vowels or diphthongs in *robe, heard, league* (closed by voiced /b,d,g/) with the reduced values in *rope, hurt, leak* (closed by voiceless /p,t,k/). Preceding consonants, notably /l,n,m/, are also shortened by a following /p,t,k/, especially when the consonants are themselves preceded by a short vowel, e.g. compare the relatively long /l/ in *killed, Elbe*, /n/ in *wand*, and /m/ in *symbol* with the reduced varieties in *kilt, help, want, simple*. A phonemic transcription of *rope, robe*, as /rəʊp, rəʊb/ is, therefore, to be interpreted as indicating that the words are distinguished not only or even primarily by a difference of the final consonant, but rather by a complex of quantitative and qualitative contrasts extending over the whole of the coda of syllables. The same effect of reduction also operates when /p,t,k/ occur medially in a word, cf. the length of /aɪ/ in *rider, writer*, although in this situation voicing throughout the compression stage is also likely to be present in /b,d,g/ as another cue to the voiced series.

(6) *Summary*—The RP plosives may, therefore, be said to be distinguished—

(a) by means of a three-term series in respect of place of articulation—bilabial vs alveolar vs velar;

(b) at each point by a phonological feature labelled 'voice' which phonetically consists of a complex of phonetic features, each feature being more prominent in certain positions:

(i) aspiration operates where /p,t,k/ are in syllable-initial position. It is most apparent initially in accented syllables, cf. *pole* vs *bowl*. This aspiration is much less apparent initially in unaccented syllables, particularly those preceding accented syllables. So in *potato* we have three degrees of aspiration: most following the plosion of the /t/ of the second syllable, much less for the /t/ of the third syllable, and even less for the initial of /p/. Indeed /p,t,k,/ in pre-accent unaccented positions like the /p/ in *potato* are auditorily almost indistinguishable from /b,d,g/;

(ii) shortening of vowels and sonorants operates where /p,t,k,/ are in syllable-final position, cf. *rope* vs *robe, kilt* vs *killed*;

[6] Peterson and Lehiste (1960) found vowels up to one and a half times as long preceding voiced consonants as preceding voiceless consonants

(iii) full voicing of /b,d,g/, i.e. voicing throughout the compression stage, applies only in word-medial positions between voiced sounds (in other positions voicing usually occurs only at the very beginning or end of the compression stage when adjacent to a voiced sound), cf. *rabid* vs *rapid*. This phonetic feature of voicing may operate in addition to the features of length and (lack of) aspiration in (i) and (ii) above; so in *sordid* the /d/ will be preceded by a unshortened vowel of the same length as in *sword*, (and will of course have no aspiration) as well as having voicing through the compression stage (i.e. it is behaving in all ways as an 'intersyllabic' consonant).

(7) *Advice to foreign learners*—Particular attention must be paid to the aspiration of /p,t,k/ when these phonemes occur initially in accented syllables. If a word such as *pin* is pronounced [pɪn], instead of [pʰɪn], there is the danger that the English listener may understand *bin*, since he interprets lack of aspiration as a mark of the voiced /b/. The danger is particularly great for speakers of those languages, e.g. many in the Romance and Slav groups, where oppositions between pairs of plosives rely purely upon presence or absence of voice. Although Hindi speakers have a phonemic distinction between /p,t,k/ and /pʰ,tʰ,kʰ/, they tend to identify English /p,t,k/ with their unaspirated series.

The aspiration cue for /p,t,k/ should also be retained, when /p,t,k/ are followed by /l,r,j,w/, by the devoicing of these latter, e.g. compare *plight, try, crate, tune, twelve*, with *blight, dry, great, dune, dwell*.

Speakers of some other languages, e.g. Cantonese, German, and Russian, neutralize the oppositions between /p,t,k/ and /b,d,g,/ in syllable-final positions, using only voiceless plosives. Such speakers should concentrate on the vowel preceding the plosive, remembering that vowels and sonorants are shortened before /p,t,k/ while keeping their full length before /b,d,g/, so, for example, the /iː/ of *beat* is shortened compared with the same vowel in both *bee* and *bead*.

9.2.2 Acoustic Features of English Plosives

Perceptual cues, capable of being expressed in acoustic terms, may be provided by all three stages of plosive articulations, so that it is possible to distinguish: (1) plosives from other consonants, (2) /p,t,k/ from /b,d,g/, (3) the bilabial, alveolar, and velar types.

(1) Plosives differ from other consonants mainly in the stage corresponding to the articulatory 'hold'. This part of the consonant is generally characterized acoustically by a perceptible period of silence throughout the whole spectrum or, in the voiced /b,d,g/, an absence of energy except at a low frequency as in (2).

(2) /b,d,g/ may be distinguished from /p,t,k/ by means of a low frequency component present in the former, i.e. voice; such a 'voice bar' is generally below 250 Hz. For /p,t,k/ there is also usually a higher onset or offset in fundamental frequency to a following or from a preceding vowel.[7] Moreover, there is likely

[7] Ohde (1984)

to be a marked rising bend of F1 of the adjacent vowel in the case of /b,d,g/, which is not as marked in the case of /p,t,k/.[8] However, as we have seen, /b,d,g/ may often be voiceless, in which case they are distinguished from /p,t,k/—initially, by the comparatively weak burst of noise associated with the onset of the release stage and by the longer VOT characterizing /p,t,k/; finally, by their influence on the duration of the preceding sounds; medially, by the longer closure period (absence of energy) required for /p,t,k/.[9] Although there is a tendency for the longer length of the vowel before /b,d,g/ and the longer closure for /p,t,k/ to produce a similar overall vowel plus consonant duration, the sequences of vowel plus /b,d,g/ is usually somewhat longer.[10]

(3) Cues to the distinction between bilabial, alveolar, and velar plosives are provided by the frequency of the noise burst at the onset of the release stage together with characteristic bends of F2 and F3 (called FORMANT TRANSITIONS) towards following vowels and from preceding vowels.[11] Before [a][12] bilabial /p,b/ have MINUS TRANSITIONS, i.e. transitions which start from and go to a point (called a LOCUS) lower than the steady-state formants for the vowel, while alveolar /t,d/ have PLUS TRANSITIONS, i.e. transitions which start from and go to a higher locus. Velar /k,g/ have a plus transition for F2 and a minus transition for F3. The formant transitions accord with the location of the noise bursts associated with the various places; low for bilabials (maximum around 800 Hz), high for alveolars (maximum around 4000 Hz) and intermediate for velars (maximum around 2,000 Hz). See Fig. 31 for a diagram of formants and bursts before [a] and Fig. 32 for spectrograms of /b,d,g/ before /aɪ/.

The outline of noise bursts and formant transitions given in the preceding paragraph applied to cases with a following or preceding /a/. There is, however, considerable variation when other vowels are involved. This applies particularly to the velars (and, to a lesser extent, the alveolars) and reflects the different articulation of these consonants in different vocalic environments, e.g. before /i,ɪ,e/, /k,g/ may be considerably fronted and on the verge of being palatal [c,ɟ], and thus their noise bursts will approach those for /t,d/ and both F2 and F3 may have plus transitions.

Formant transitions do not extend fully from the formants of the vowel to a locus in the noise burst of the plosive, but merely point in the direction of the latter. Best recognition is achieved in synthetic speech if the first half of the transition from plosive to vowel consists of silence; if the transition is extended too far (so that the total period of voiced transition exceeds 30 ms) then glides of the type [j,w] may be perceived.

[8] Liberman *et al* (1958) and Stevens and Klatt (1974)

[9] Lisker (1957) showed that an intervocalic /b/ has an average duration of 75 ms while an intervocalic /p/ has an average of 120 ms. See also Malécot (1968) and Subtelny *et al.* (1966)

[10] See Laeufer (1996)

[11] Cooper *et al* (1952), Stevens and Blumstein (1978) and Lieberman and Blumstein (1988)

[12] As [a] is described as part of a seven-vowel systems in much American work, its quality is best assumed to be intermediate between RP /æ/ and /ɑː/

The VOT (aspiration) usual in /p/ is always greater than that for /t,k/[13] and this may constitute an additional, although weak, cue to the recognition of the labial.

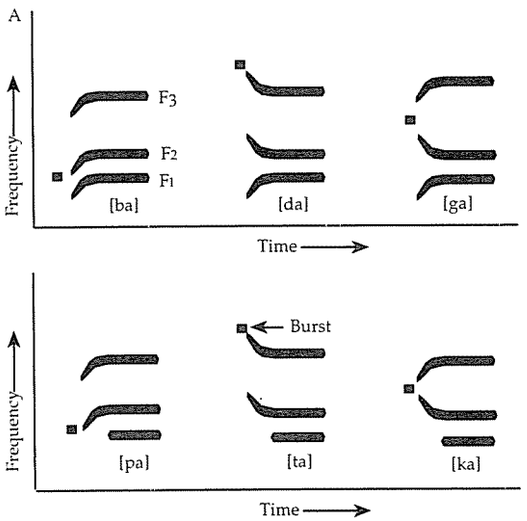

Fig. 31. *Formant transitions and bursts for the syllables [ba, da, ga, pa, ta, ka] (from Lieberman and Blumstein, 1988).*

9.2.3 Acquisition of Plosives by Native Learners

Plosives, along with nasals, are the first consonants to be acquired. They are the most frequent consonants in babbling (which occurs during the latter half of the first year), and occur regularly in the first words (which occur between 0;9 and 1;6). During early babbling labials and velars occur most frequently but in late babbling and early words it is more usually labials and alveolars which predominate, the velars being replaced by alveolars (although a minority of children may show a preference for velars). Like most consonants plosives are generally acquired first in syllable-initial positions; final plosives in adult words are often completely omitted in children's early words. In all languages it is the the plosive series with zero VOT (i.e. where voicing starts simultaneously with the release) which is acquired first: in English (see Table 10) this means that /b,d,g/ precede /p,t,k/. When /p,t,k/ are first differentiated from /b,d,g/, it is aspiration which is the main distinguishing cue; at first children may make an uncertain use of such aspiration,[14] either underaspirating (and hence the distinction not being

[13] Docherty (1992) finds word-initial /p/ having a VOT of around 40 ms and /t,k/ a VOT of around 60 ms

[14] Macken and Barton (1980)

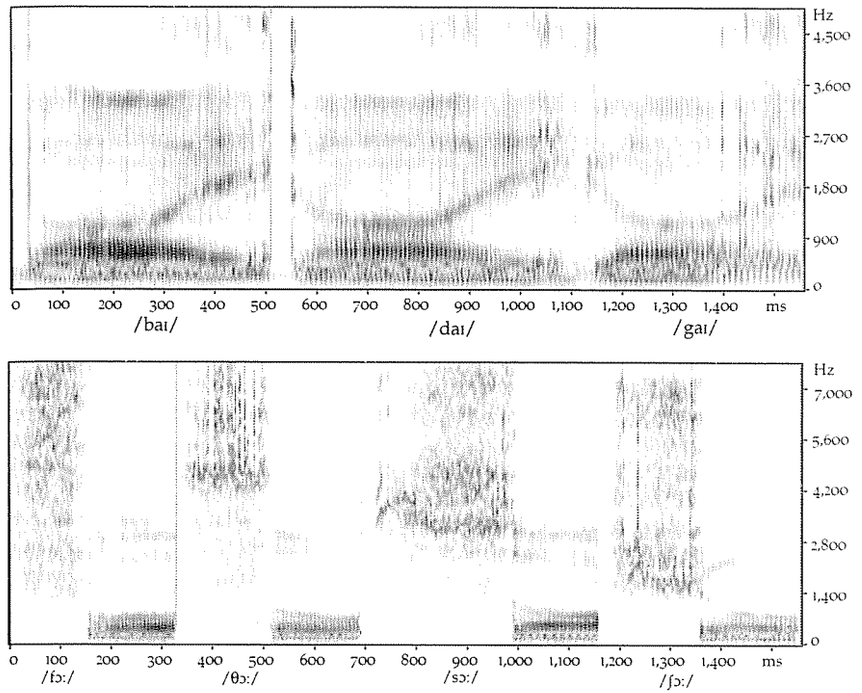

Fig. 32. *Spectrograms of* /baɪ/, /daɪ/, /gaɪ/ *and of* /fɔː/, /θɔː/, /sɔː/, /ʃɔː/ *as spoken by a male speaker of RP (the full length of* /ɔː/ *is not displayed).*

perceived by adult listeners) or overaspirating (and hence the plosives sounding as if they are being followed by an /h/).

9.2.4 The Release Stage of English Plosives

It is not always the case that plosives in English have a third stage[15] consisting of a sudden oral release of air, either in the form of aspiration or as an immediately following vowel. The main variants are:

(1) *No audible release in final positions*—In syllable-final positions (i.e. particularly before a pause), as in *map, mat, mack*, or *robe, road, rogue*, the closure stage may be maintained, the air compression becoming weak and the release being achieved by a gentle, delayed, and relatively inaudible opening of the oral

[15] Some writers, e.g. Arnold (1966), argue that this stage should be separated into a 'release' (an articulatory feature which is the converse of the 'closure') and a 'plosion' (an auditory feature)

closure; or the compressed air may be released nasally and relatively inaudibly by lowering the soft palate and delaying the separation of the organs forming the oral closure. When an audible third stage is missing, the plosive is sometimes termed 'incomplete'. The absence of an audible release stage entails the loss of the release noise burst as a cue to the identification of the plosive. Unreleased final bilabial, alveolar, and velar plosives will, therefore, be distinguished mainly by the transitional features of the preceding sound. The sensitivity of English listeners to such cues is proved by the high percentage of correct discrimination between pairs such as *mat, mack*, or *road, rogue*, presented without a context, even when the final plosive is not released. The voiceless series /p,t,k/ will, of course, be distinguished in final positions from the voiced series /b,d,g/ either by the reduction of length of the sounds preceding /p,t,k/ or by the presence of some voicing in /b,d,g/, or by a combination of both factors. The non-release of final plosives is a feature of colloquial RP. Careful speakers, however, tend to release such plosives audibly and those who, in ordinary conversational style, use the unexploded variety will often use an audible release in more formal circumstances. Velar stops are more prone to non-release than bilabial and alveolar stops.[16] (See further under §12.7 on stylistic variation.)

(2) *No audible release in stop clusters*—It is also a feature of most kinds of English that in a cluster of two stops (plosives or plosive+affricate) either within a word or at word boundaries, the first plosive has no audible release, e.g. in *dropped* (/p/+/t/), *rubbed* (/b/+/d/), *white post* (/t/+/p/), *good boy* (/d/+/b/), *locked* (/k/+/t/), *big boy* (/g/+/b/), *object* (/b/+/dʒ/), *great joke* (/t/+/dʒ/), *big chin* (/g/+/tʃ/). In those languages where plosives in such situations are released audibly, the result is an intervening [ʰ] in the case of voiceless plosives and an obscure vowel of the [ᵊ] type in the case of voiced plosives. In English the closure for the second stop is made before the release of the first,[17] forming a further obstacle to the airstream if the second closure is at a more advanced point, e.g. /t/+/p/ in *white post*, or checking the air pressure if the second closure is at a more retracted point, e.g. /t/+/k/ in *white cat*. No separate release of the first plosive is made in cases of GEMINATION, i.e. sequences of identical stops, e.g. *top people, good dog, big girl*; in such cases one closing stage and one release stage are involved together with an approximately double-length compression stage. Much the same applies when plosives which are homorganic but different in voicing occur in sequence, e.g. *top boy, white dog, big car*; in these cases, cues to recognition of the voiced or voiceless series are provided by the onset or cessation of voice, by the aspiration of the voiceless series, and by the duration of preceding vowels or sonorants. It should also be noted that, in addition to the omission of an audible third stage of the first plosive in clusters, the first stage (onglide, transition) of the following stop is also inaudible. Thus, in sequences of three plosives, e.g. *wept bitterly* (/p/+/t/+/b/), *locked door* (/k/+/t/+/d/), *jogged by* (/g/+/d/+/b/), the central plosive has no audible first or third stage; when this position is occupied by /p,t,k/, the plosive is manifested only by a silence of a certain duration, i.e. the length of its second stage. Alternatively, the middle plosive in such sequences may be dropped completely (see §12.4.6).

[16] Byrd (1992b)

[17] For articulatory overlap in plosive clusters, see Byrd (1994)

(3) *Glottal reinforcement of final* /p,t,k/—It is increasingly typical of many types of British English that final /p,t,k/, in words such as *shop, shot, shock*, have the oral closure reinforced by a glottal closure [ʔ]. In some cases this glottal coincides in time with the oral closure, inhibiting much of the air pressure behind the oral closure, whether or not this latter is released audibly; in others the glottal closure may slightly anticipate the articulation of the oral obstruction so that the closing stage of a glottal closure is heard followed by the audible release of an oral plosive. In other, rarer, cases there may be some compression of the air between the glottal and oral closures by means of the raising of the larynx and a constriction of the pharyngeal cavity, resulting in a potential ejective release. In such a case the plosive is no longer glottally reinforced or glottalized but is instead produced using the egressive glottalic (or pharyngeal) airstream mechanism. This is rather more common in some dialects (e.g. south-east Lancashire) than in RP. In certain cases, too, [ʔ] may replace /p,t,k/, see §9.2.8.

(4) *Nasal release*—When a plosive is followed by a homorganic nasal consonant, either syllabic or initial in a following syllable, the release of air is normally effected not by a removal of the oral closure, which is retained, but by the escape of the compressed air through the nasal passage, opened by the lowering of the soft palate for the nasal consonant, e.g. /p/+/m/ *topmost*, /p/+[m̩] sometimes in *happen* [ˈhæpm̩], /b/+/m/ *submerge*, /b/+[m̩] sometimes in *ribbon* [ˈrɪbm̩], /t/+/n/ *chutney*, /t/+[n̩] *cotton*, /d/+/n/ *madness*, /d/+[n̩] *sudden*; and, more rarely, /k/+[ŋ̍] *thicken* [ˈθɪkŋ̍], /g/+[ŋ̍] *organ* [ˈɔːgŋ̍], *token* [ˈtəʊkŋ̍], *pagan* [ˈpeɪgŋ̍]. The same release takes place when the plosive and homorganic nasal occur at word boundaries, e.g. *cheap meat, robe mistress, not now, red nose* etc. (Since /ŋ/ does not occur initially in syllables, this last generalization does not apply to /k/ and /g/.)

A different kind of nasal release occurs when the nasal consonant following a plosive is not homorganic, e.g. in *cheap nuts, rub now, nutmeg, bad man, black magic, big nose, big man* etc. In these cases the plosive closure is not normally released until the articulatory movements for the nasal consonant, i.e. the second oral closure and the lowering of the soft palate, have been accomplished. Thus the plosion will be more or less inaudible, depending on which of the two closures is the fronter.

(5) *Lateral release*—The most frequent tongue contact for English /l/ being alveolar, the sequences /t/ or /d/+/l/ are homorganic (i.e. made at the same place of articulation). /t/ and /d/ in such situations are normally released laterally, i.e. one or both sides of the tongue are lowered to allow the air to escape, the tongue tip contact remaining. Such a release occurs whether the following /l/ is syllabic, e.g. in *cattle, medal*, or if it is initial in the next syllable or word, e.g. in *atlas, at last, regardless, bad light*. Such homorganic lateral release is to be distinguished from sequences of /p,b,k,g/+/l/, e.g. in *apple, up late, bubble, blow, rub lightly, tackle, clean, blackleg, glow, eagle, big lad*. In these cases, the partial alveolar contact for /l/ is made before or at the time of the release of the plosive and, in this sense, the escape of air is lateral; but since /p,b/ and /k,g/ may be released in a truly lateral way, i.e. by the removal of one or both sides of the bilabial or velar closure, the term 'lateral release' is best reserved in English for the homorganic alveolar + /l/ sequences. Such true lateral releases must be taken as typical of English usage, there being no intervening removal of the tongue contact on the alveolar ridge, such as would result in aspiration or an obscure vowel.

Pronunciations of the type [ˈlɪtʰɬ], [ˈmɪdᵊɬ] for *little, middle*, are frequently to be heard in the speech of children.

(6) *Affrication and weakening of plosives*—If the release of plosive closures is not made rapidly, a fricative sound, articulated in the same area of articulation as the plosive, will be heard; plosives made with this slow, fricative release are said to be AFFRICATED. Common realizations of the English plosives /p,b,t,d,k,g/ might, therefore, be followed by brief fricatives of the types [ɸ,β,s,z,x,ɣ]. In some varieties of English the alveolars /t,d/ may frequently be heard in affricated form [tˢ,dᶻ]: in strongly accented positions, e.g. in *time, day*; in relatively weakly accented positions, e.g. in *waiting, riding*; and in final positions, e.g. in *hat, bed*. (Note that, in these last two examples, the forms [tˢ] and [dᶻ] differ from the realization of the plural terminations /t/+/s/ and /d/+/z/ mainly in the brevity of the friction associated with the affricated plosives.) Affrication is also occasionally also heard with the velar plosives, i.e. [kˣ] and [gˠ], e.g. in hesitant or emphatic speech in accented situations in words such as *come, good*, or, more commonly with /k/, in weakly accented or final positions, e.g. in *talker, talk*. /p/ and /b/ are rarely affricated.

It should also be noted that in rapid, familiar speech, where speed rather than articulatory precision is the aim, the closure of plosives is often so weak that the corresponding fricative sound, without a preceding stop, is produced, especially in weakly accented intervocalic positions. The following examples have been noted among educated speakers; *imported* [ɪmˈpɔːsɪd], *invaded* [ɪŋˈveɪzɪd], *baker* [ˈbeɪxə], *dagger* [ˈdæɣə] (this latter, on the stage, in the *Macbeth* 'dagger' soliloquy), and even *pepper* [ˈpeɸə], rubber [ˈrʌβə].

(7) *Advice to foreign learners*—All the foregoing variants of the hold and release stages of English plosives may be heard from RP speakers. A foreign speaker of English may be generally intelligible without adopting any of these features, such is the redundancy of information carried in the English utterance. But the foreign learner who aims at a near approximation to the speech of English natives should adopt the following features at least:

(a) Inaudible release of plosives preceding other plosives or affricates.
(b) Nasal release of plosives followed by a homorganic nasal, especially /t,d/+/n/, with avoidance of any intervening [ʰ] or [ᵊ].
(c) Lateral release of /t,d/+/l/, also with avoidance of intervening [ᵊ].
(d) Affrication of /p,t,k/ as a stage in learning aspiration of these plosives in strongly accented positions.

On the other hand, speakers of most varieties of Chinese have final /p,t,k,/ unreleased or replaced by glottal stop so regularly that this may produce problems of intelligibility when introduced into English; such learners should practise releasing final /p,t,k/.

9.2.5 Bilabial Plosives

(1) *Examples*
/p/—*voiceless* (regularly spelt with <p> or <pp> but note 'hiccough' /ˈhɪkʌp/. Note also silent <p> in 'pneumonia, psychology, psalm, ptarmigan, receipt, cupboard, raspberry').

accented, aspirated—pin, pill, pain, appear, impatient; play, pray, pew
accented after /s/, *unaspirated*—spin, spill, Spain, spear; splay, spray, spew (but see §5.3.4)
weakly accented, relatively unaspirated—upper, capable, opportunity, gospel; simply, apricot, champion
syllable-final (often with no audible release)—cheap, lip, lap, shape, lisp, pulp, pump; upright, chaplain, upward
followed by another plosive, with no audible release—captain, topcoat, wiped, hop picker, top boy, top girl, top dog, ripe cheese
nasal release, followed by nasal consonant—topmost, happen, cheap meat
lateral release, followed by lateral consonant—apple, couple, please, up late

/b/—*voiced* (regularly spelt with <b> or <bb>. Note silent <b> in 'limb, lamb, bomb, thumb, comb, debt, subtle, doubt')

word-initial, partially devoiced—big, boast, banana, begin; blow, brain, beauty
between voiced sounds, fully voiced—rubber, labour, harbour, husband, symbol
final, fully devoiced—rib, ebb, sob, robe, bulb
followed by another plosive, with no audible release—obtain, rubbed, subconscious, sob bitterly, sub-prefect, rib cage, object
nasal release, followed by nasal consonant—submerge, robe mistress, ribbon
lateral release, followed by lateral consonant—bubble, blow, rub lightly

Compare

/p/, /b/—post, boast; peach, beach; rapid, rabid; dapple, dabble; sopping, sobbing; simple, symbol; cup, cub; rope, robe; plead, bleed; pray, bray; puke, rebuke; mopped, mobbed.

(2) *Description*—The soft palate being raised and the nasal resonator shut off, the primary obstacle to the airstream is provided by the closure of the lips. Lung air is compressed behind this closure, during which stage the vocal folds are held wide apart for /p/, but may vibrate for all or part of the compression stage for /b/ according to its situation in the utterance. The air escapes with force when the lip closure is released, unless the airstream has been blocked by a second closure at

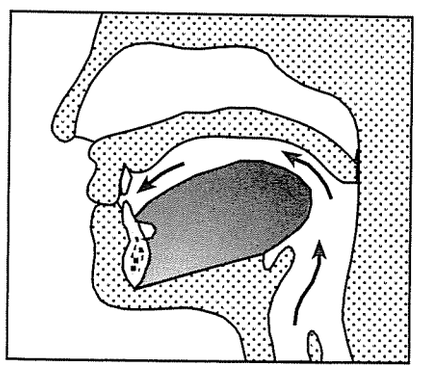

Fig. 33. *Section of* /p,b/.

a point behind the lips (as for a following /t/) or has been diverted through the nose by the lowering of the soft palate (as for /m/); when a lateral sound follows, the airstream will have a lateral escape round the point of alveolar closure.

In those cases where a bilabial plosive precedes a labiodental sound (/f,v/), as in *cup-full, obvious*, the stop is often made by a labiodental rather than a bilabial closure, in anticipation of the following fricative articulation, thus [ˈkʌp̪fʊl], [ˈɒb̪vɪəs]. Tongue movements involved in vowels or consonants adjacent to the bilabial stop are made independently of the lip closure, e.g. the /ɔ:/ tongue position is maintained through the /b/ closure in *four balls* and the /l/ alveolar contact through the /p/ closure in *helpless*.

(3) *Variants*—No important variants of /b/ occur, except in respect of the amount of voicing in initial and final positions, full voicing in either position being rare. On the other hand, some speakers may also devoice in intervocalic positions, particularly across word boundaries. In the same way, the amount of aspiration given to /p/ varies between speakers, though the accented form will always tend to be more strongly aspirated than the unaccented form (see §9.2.1).

(4) *Chief sources*—PresE /p/ and /b/ develop regularly from the same OE phonemes (single and geminated) and from French /p/ and /b/. In some cases /b/ derives from earlier /p/, e.g. *lobster, pebble*, and /p/ from earlier /b/, e.g. *pudding, purse, gossip*.

(5) *Advice to foreign learners*—See general remarks in §§9.2.1 (7), 9.2.4 (7), and examples for practice in (1) of this section. Most languages have some sort of /p,b/ although they are notably absent in Vietnamese, and Arabic has no /b/.

9.2.6 Alveolar Plosives /t,d/

(1) *Examples*

/t/—*voiceless* (regularly spelt <t> or <tt>; sometimes with <th>, e.g. 'thyme, posthumous', and in many names, e.g. 'Thames, Thomas'; also <ed> in verbal past tenses and participles after voiceless consonants other than /t/, e.g. 'jumped, looked, laughed, guessed, pushed'. Note silent <t> in 'castle, hasten, soften, Christmas, mortgage'. Note also /ts/ as <z> <tz><zz> in 'scherzo, schizophrenia, quartz, blitz, pizza, intermezzo').

accented, aspirated—take, tall, tone, attend, obtain; try, between, tune
accented after /s/, *unaspirated*—steak, stall, stone (but see §5.3.4)
weakly accented, relatively unaspirated—butter, letter, after, taxation, phonetic; entry, antler, outward
syllable-final (often with no audible release)—beat, boat, late, past, sent, halt, tuft
followed by another plosive with no audible release—outpost, hatpin, football, catgut, white tie, that dog, white chalk, great joke
with homorganic nasal release—cotton, button, eaten, not now
nasal release, followed by /m/—nutmeg, utmost, that man[18]
with homorganic lateral release—little, cattle, atlas, at least

[18] If the alveolar plosive is articulated as such. See §9.2.8 and §12.4.5.

/d/—*voiced* (regularly spelt <d>, <dd>. Note elision of /d/ in 'sandwich, handsome, landscape, grandfather etc.')

word-initial, partially devoiced—do, dog, double, date; dry, dwindle, duke
between voiced sounds, voiced—leader, order, adorn, hiding, London, elder, under, middle, sundry, fiddler, endways
final, fully devoiced—bid, mad, road, rubbed, bend, old, loved, bathed, raised, judged
followed by another plosive, with no audible release—head boy, head girl, bad pain, red car, good dog, bedtime, good judge, good cheese
with homorganic nasal release—sudden, madness, red nose
nasal release followed by /m/—admit, road map
with homorganic lateral release—middle, padlock, headless, badly, good luck

Compare

/t/, /d/—town, down; latter, ladder; water, warder; written, ridden; metal, medal; fated, faded; sat, sad; wrote, road; kilt, killed; bent, bend; train, drain; twin, dwindle; tune, dune
/t/, /θ/—tin, thin; taught, thought; eater, ether; fort, fourth; tent, tenth; welt, wealth
/d/, /ð/—dough, though; day, they; den, then; udder, other; loading, loathing; breed, breathe; side, scythe

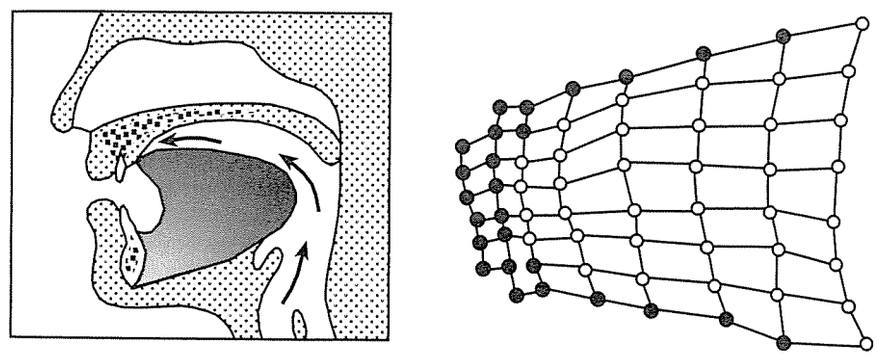

Fig. 34. *Section and palatogram of* /t,d/.

(2) *Description*—The soft palate being raised and the nasal resonator shut off, the primary obstacle to the airstream is usually formed by a closure made between the tip and rims of the tongue and the upper alveolar ridge and side teeth (although in a minority of speakers the blade of the tongue rather than the tip may be used).[19] Lung air is compressed behind this closure, during which stage

[19] Bladon and Nolan (1977)

the vocal folds are wide apart for /t/, but may vibrate for all or part of the compression stage for /d/ according to its situation in the utterance. The lip position for /t/ and /d/ will be conditioned by that of the adjacent sounds, especially that of a following vowel or semi-vowel, e.g. spread lips for /t/ in *teeth*, anticipatory lip rounding for /t/ in *tooth, twice*. The air escapes with force upon the sudden separation of the alveolar closure, unless the airstream has been blocked by a second closure either behind the alveolars (as for /k/) or forward of the alveolars (as for /p/), or unless it has been diverted through the nose by the lowering of the soft palate (as for /n/); if the release is lateral, only part of the alveolar obstruction is removed, the tongue-tip contact remaining. Nasal plosion will be heard in sequences of /t/ or /d/ plus /n/ and lateral plosion will be heard in sequences of /t/ or /d/ plus /l/.

The alveolar stop contact is particularly sensitive to the influence of the place of articulation of a following consonant. Thus, followed by /r/ as in *try, dry*, the contact will be post-alveolar [t̠,d̠] and followed by a /θ,ð/ as in *eighth, not that*, the contact will be dental [t̪,d̪]. In addition, word-final /t,d/ assimilate readily to /p,k/ and /b,g/, when followed by word-initial bilabial and velar consonants (see §12.4.5).The instability of alveolar articulations is further demonstrated by the ease with which /t/ or /d/ may be elided in consonantal clusters (see §10.8 for examples within words and §12.4.6 for examples at word boundaries).

(3) *Variants*—In addition to the general plosive variations commented on in §§9.2.1, 9.2.3, it should be noted that /t,d/ are especially liable to affrication and even replacement by the equivalent fricative in weakly accented situations, e.g. *time* [tˢaɪm], *important* [ɪmˈpɔːtˢənt].

Increasingly, /t/ in syllable-final positions is reinforced or replaced by a glottal closure unless a vowel or syllabic /n̩/ or /l̩/ follows, e.g. *late, want, cricket, outright, chutney*. (But even before a following vowel the use of [ʔ] for word-final /t/ before a following vowel is now acceptable as a form of London Regional RP (Estuary English), e.g. in *get off, got it, right order*.) An alternative pronunciation, voicing of /t/ to [d], is increasingly reported for a minority of RP speakers, e.g. in *British, hot enough, not unusual, fat or thin*.

Some RP speakers will also use [ʔ] to realize /t/ when syllabic [n̩] follows, e.g. *cotton, certain*. But the use of [ʔ] for /t/ preceding syllabic [l̩], and, more particularly in unaccented intervocalic word-medial positions, is typical of regional varieties of English (e.g. those of Cockney and Glasgow), as in *kettle, butter, later*; such pronunciations are not even acceptable as part of London Regional RP. (See §9.2.8 for further detail on [ʔ].)

The amount of aspiration associated with /p,t,k/ varies considerably across dialects, some, like Irish English and Welsh English, having more aspiration than RP, others, like Lancashire, having very little aspiration. Scottish English generally has little aspiration also, although in the Western Highlands, where Gaelic influence is strong, there is very strong aspiration. In General American /t/ in unaccented intervocalic positions (post-accentual) is generally realized as a tap [ɾ], e.g. in *butter, latter, put it*; for some speakers the closure may be long enough to produce neutralization with /d/. Similar realizations may be heard in South African English and in southern Irish English. Also in the unaccented intervocalic position following a short vowel and across a word boundary, /t/ may be realized as [ɹ] in a number of urban varieties of south Lancashire and west

Yorkshire, e.g. *get off* [geˈɹɒf]; in the same position in Cockney /t/ may be realized as a tap [ɾ] as an alternative to [ʔ]. In Indian English and among speakers of ethnic Indian origin /t/ will generally be realized as [ʈ].

(4) *Chief sources*—PresE /t/ and /d/ derive from the same phonemes of OE (single and geminated) and from French introductions with /t/ and /d/. Some words, now spelt with <th> and pronounced with /θ/, had /t/ until eModE, e.g. *throne, orthography, diphthong, authority*. There are, in addition, many cases in PresE of established elision of an earlier /t/ or /d/, e.g. in *castle, hasten, Christmas, often, fasten, Wednesday, handsome*, in which words the /t/ or /d/ was probably sounded up to the seventeenth century. In other cases /t, d/ have been added to earlier French stems ending in /n/, e.g. *peasant, parchment, sound, astound*, and to certain English and French words after a voiceless fricative, e.g. *against, amongst, graft*. It should also be noted that the past tense and participle termination <ed> (earlier [əd]) of weak verbs assimilated to /t/ following voiceless consonants—other than /t/—on the loss of the intervening weak vowel, e.g. *wrapped, missed, annexed, pierced, blessed* etc.

(5) *Advice to foreign learners*—In addition to the general remarks in §9.2.1, 9.2.3, and the examples for practice given in (1) of this section, it is to be emphasized for foreign learners that the general articulation of /t,d/ is an alveolar one, made with the tongue tip raised. The corresponding phonemes of many other languages, e.g. Arabic, French, Italian, Portuguese, Spanish, have a dental rather than an alveolar point of contact. Those learners who carry over from their own language a dental articulation should practise the slightly affricated forms of /t,d/, i.e. [tˢ] [dᶻ] in words such as *time, day*. If the closure point remains dental, the affrication produced will be clearly of the [tᶿ], [dᵟ] type. Those learners who, in their own language, have two varieties of stop closure made with the tongue tip, e.g. speakers of Indian languages, having dental and post-alveolar or retroflex varieties, should, if aiming at a British pronunciation, avoid using their retroflexed plosives in English, since these sound over-retracted to the English ear (unless of course they are aiming only at Minimum General Intelligibility as in §13.6); similarly they should also avoid using their dental /t,d/ for English /θ,ð/. Learners are often prone to omit /t,d/ before /s,z/ when followed by another consonant; this particularly applies to sequences where *is* is reduced by elision and assimilation to /s/, as in *it's, what's, that's* in, for example, *it's true, what's that, that's normal*, which should not be pronounced as /ɪs ˈtruː/, /wɒs ˈðæt/, /ðæs ˈnɔːməl/.

9.2.7 Velar Plosives /k,g/

(1) *Examples*
/k/—*voiceless*

k—king, kept, kettle, revoke, break, walk, bank, sky, monk, turkey
c—carpet, cord, caught, crew, clique, disc, maniac, alcohol, circus
cc—accused, occur, accommodation, account, occupy, occasion
q, qu, cqu—cheque, conquer, unique, bouquet, liquor, mosquito, racquet
(<qu> = /kw/ in 'quiet, quilt, queer, quest' and <cqu> = /kw/ in 'acquire')

ch—stomach, chemist, choir, chorus, chaos, echo, orchid, stomach, chemist, character
ck—chicken, neck, buttocks, hemlock, mackerel, creaky, tacky

(*Note* silent <c>or<k>in 'muscle, knew, knit'.)

accented, aspirated—come, car, kin, incur, according; cry, clean, quick, queue
accented after /s/, *unaspirated*—scum, scar, skin (but see §5.3.4)
weakly accented, relatively unaspirated—income, baker, talking, biscuit, anchor; secret, duckling, equal, dockyard
syllable-final (often with no audible release)—leak, duck, rock, choke, bank, bulk, desk
followed by another plosive, with no audible release—locked, blackboard, thick dust, black cat, dark grey, deckchair, lockjaw
nasal release, followed by nasal consonant—acknowledge, dark night, thicken (sometimes /ˈθɪkŋ/), black magic
lateral release, followed by lateral consonant—buckle, clean, close, blackleg

/g/—*voiced*

g—go, gourd, good, geese, grow, glum, agree, congratulate, dragon
gg—egg, waggon (also wagon), aggravate, aggressive
gh—ghost, dinghy, ghastly, spaghetti
gu, gue—rogue, guilt, vague, guitar, guy, guard, guess, league

(*Note* silent <g> silent in 'gnaw, gnat, diaphragm, sign, reign'.)

word-initial, partially devoiced—go, geese, guess, girl; glass, grass
between voiced sounds, voiced—eager, hunger, figure, ago, begin, eagle, juggling, angry, anguish, argue
word-final, fully devoiced—dog, leg, rogue, vague
followed by another plosive, with no audible release—rugby, begged, bagpipes, wagtail, big game, eggcup, big jaw, big chin
nasal release, followed by nasal consonant—dogma, ignore, quagmire, big man, drag-net, organ grinder
lateral release, followed by lateral consonant—bugle, struggle, glow, wriggling, dog lead

Compare

/k/, /g/—cap, gap; coat, goat; clue, glue; decree, degree;
bicker, bigger; stacker, stagger; lacked, lagged; ankle, angle; hackle, haggle; pick, pig; back, bag; duck, dug; crate, great

(2) *Description*—The soft palate being raised and the nasal resonator shut off, the primary obstacle to the airstream is formed by a closure made between the back of the tongue and the soft palate. Lung air is compressed behind this closure, during which stage the vocal folds are wide apart for /k/, but may vibrate

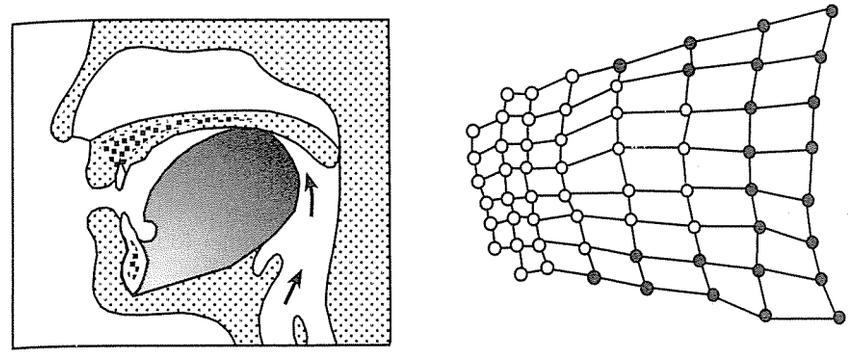

Fig. 35. *Section and palatogram of* /k,g/ + /iː/.

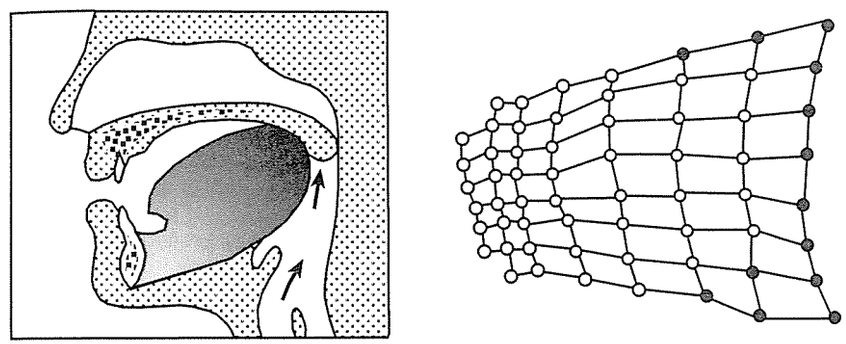

Fig. 36. *Section and palatogram of* /k,g/ + /ɑː/.

for all or part of the compression stage for /g/ according to its situation in the utterance. The lip position will be conditioned by that of adjacent sounds, especially following vowels or semi-vowels, e.g. spread lips for the plosives in *keen, geese*, and somewhat rounded lips for the plosives in *cool, goose, quick*. The air escapes with force upon the sudden separation of the linguo-velar closure, unless the airstream has been blocked by a second closure forward of the velum (as for /p/ or /t/), or has been diverted through the nose by the lowering of the soft palate (as for /ŋ/); when a lateral sound follows, the airstream will have a lateral escape round the point of alveolar closure.

The velar stop contact is particularly sensitive to the nature of an adjacent vowel (especially a following vowel). Thus, when a front vowel follows, e.g. /iː/ in *key, geese*, the contact will be made on the most forward part of the soft palate and may even overlap on to the hard palate; when a back vowel follows, e.g./ɒ/ in *cot, gone, calm*, the contact on the soft palate will be correspondingly retracted; a contact in the central region of the soft palate is made when a vowel of a central type follows, e.g. /ʌ/ or /ɜː/ as in *come, gun, girl* (see Figs. 35, 36).

(3) *Variants*—The actual extent of advancement or retraction of the velar closure will depend upon the exact quality of the vowels of an individual; if /iː/ has a very front and tense articulation, the /k,g/ closures will in turn be near palatal, i.e. [c,ɟ] (noted by John Wallis in the seventeenth century as <ky, gy>), whereas, if /ɒ/ is of the most back and open variety, the velar closure will be of the most retracted kind. (For other variations affecting all plosives, see §§9.2.1, 9.2.3.) Since the initial clusters /kl,gl/, as in *clean, glean*, are not in opposition with /tl,dl/ which do not occur initially, a substitution of /tl,dl/ for /kl,gl/ in such positions may occasionally be heard both in RP and in other forms of English.

(4) *Chief sources*—PresE /k,g/ derive from the same phonemes in OE (in single and geminated forms) and in French introductions. Some English forms with /k/ (spelt with <c> or <ck>) as in *pocket, carpenter*, derive not from the affricates usual in Central French (*pochette, charpentier*) but from the plosive equivalents of northern French dialects. Again, some early French borrowings with <qu> retain the original /kw/ pronunciation, e.g. *quit, squadron*, where modern French has lost the /w/ element (cf. the later borrowing *bouquet*). Occasionally, a learned *c* spelling has been introduced with a resultant /k/ pronunciation, e.g. *perfect, subject* (note that in *victuals*, despite the introduction of a <c> in the spelling, no /k/ is pronounced). The phoneme /g/ is sometimes spelt <gu> before <e, i> in words of English origin, e.g. *guest, guilt*, by analogy with words of central French origin such as *guide, guerdon*. /k,g/ initially before /n/ (*know, gnaw*) were finally lost late in the seventeenth century; /g/ following /n/ was lost in the south of England, e.g. in *sing, rung* etc., in the seventeenth century, though it is kept intervocalically in certain words, e.g. *finger, longer, single*, and in all positions in many dialects of the north-west Midlands (see §9.6.3 for the origins of /ŋ/).

(5) *Advice to foreign learners*—Note the general remarks in §§9.2.1, 9.2.3, and the examples for practice given in (1) of this section. French learners should be particularly careful not to over-palatalize /k,g/ both before and after front vowels; Spanish learners should avoid reducing intervocalic /g/ to a fricative [ɣ] or pronouncing initial /g/ (especially before a back vowel) as [gw] or [w].

9.2.8 **Glottal Plosive** [ʔ]

(1) *Description*—In the case of the glottal plosive (stop), the obstruction to the airstream is formed by the closure of the vocal folds, thereby interrupting the passage of air into the supraglottal organs. The air pressure below the glottis is released by the sudden separation of the vocal folds. The compression stage of its articulation consists of silence, its presence being perceived auditorily by the sudden cessation of the preceding sound or by the sudden onset (often with an accompanying strong breath effort) of the following sound. The plosive is voiceless, there being no vibration of the vocal cords. Because the position of the vocal folds is not that associated with other voiceless sounds (i.e. with wide open vocal cords), an alternative viewpoint regards [ʔ] as neither voiceless nor voiced. Nevertheless where [ʔ] substitutes for /p,t,k/ in English, it has the usual effect of voiceless plosives in shortening preceding vowels. The articulation of [ʔ] must be distinguished from that type of glottalization or laryngealization which involves

tension in the laryngeal region and either an excessively slow rate of vibration of the vocal folds ('creaky voice') or a vibration of the false vocal folds situated just above the true vocal folds ('ventricular voice' or 'harsh voice').[20] In the production of these latter sounds, often heard in the lowest pitches of intonation and associated with weak intensity (though sometimes with muscular tension, e.g. at the lower level of the fall–rise tone) or on almost any pitch level in certain affected voice qualities, there is no total closure of the vocal folds. Nor is there compression between the glottal and oral closures which would produce ejectives (see §4.3.9).

It is clear from the description given above that there is no acoustic manifestation of the glottal plosive other than the abrupt cessation or onset of the adjacent sounds.

(2) *Usage*—The glottal plosive, though frequently used by RP speakers, is not a significant sound in the RP system. A distinction must be made between (a) the regular occurrence of glottal reinforcement in RP, (b) extended use of reinforcement in RP, (c) use of glottal replacement in RP, and (d) more extensive use of glottal replacement in other dialects.

(a) *Regular glottal reinforcement in RP*[21]—[ʔ] serves regularly for many RP speakers as a syllable boundary marker, when the initial sound of the second syllable is a vowel. Thus, a hiatus of vowels belonging to different syllables (especially when the second vowel is accented), may in careful speech be separated by [ʔ] instead of being joined by a vocalic glide, e.g. *co-operate, geometry, reaction* [kəʊˈɒpəreɪt, dʒiˈɒmətrɪ, riːˈækʃən], and even when the second vowel is weakly accented, e.g. *day after day* [deɪ ʔɑftəˈdeɪ]. This usage of [ʔ] is extended amongst careful speakers to those cases where there is a possibility of an intrusive /r/ (see §12.4.7) at a point of vowel hiatus, e.g. in *law and order, drama and music*; the glottal marker is in turn applied by some speakers (and in the teaching of singing) in cases where a regular linking /r/ is permissible, e.g. in *later on, far off, four aces*.

Finally, any initial accented vowel may be reinforced by a preceding glottal stop when particular emphasis is placed on the word, whatever the preceding sound, e.g. in *It's* [ʔ] *empty, I haven't seen* [ʔ] *anybody, She's* [ʔ] *awfully good*; or again, any vowel, initial in an accented morpheme, may receive this glottal reinforcement, e.g. It's *un* [ʔ] *eatable, such dis* [ʔ] *order*.

(b) *Extended glottal reinforcement in RP*—As was pointed out in §9.2.4, in RP (although not in Refined RP) /p,t,k/ and also /tʃ/ may be reinforced by a glottal closure which generally precedes it. The closing and release of such a glottal closure take place just before the closures for the mouth closure, so that phonetically the glottal closure and the oral closure are in a sequence just like other sequences of plosives. As such the closing stage of the oral closure and the release stage of the glottal closure are masked in the overlapping of the two closures. This type of reinforcement occurs in syllable-final position where a vowel, nasal, or lateral precedes and where a pause or a consonant follows (and,

[20] Catford (1964, 1977), Laver (1980)

[21] Christophersen (1952), O'Connor (1952), Andrésen (1958, 1968), Higginbottom (1965), Roach (1973)

for /tʃ/, where a vowel follows as well). Reinforcement is more likely to occur at the end of an accented syllable. Some examples where glottal reinforcement may occur are: for /p/, *reap, limp, help, apt, stop me*; for /t/, *beat, bent, melt, atlas, at last*; for /k/, *beak, bank, baulk, chocolate, back down*; for /tʃ/, *rich, bench, searched, teaching, wretched, search me, reach it.*

(c) *Glottal replacement in RP*—Some RP speakers replace syllable-final /p,t,k/ by [ʔ] when a consonant follows, no oral closure being made. Such a glottal closure most commonly replaces /t/ when the following consonant is homorganic, i.e. /t,d,tʃ,dʒ,n,l,r/ as in *that table, get down, that chair, great joke, witness, not now, Scotland, at least, that ring* but [ʔ] is also heard for /t/ before other non-syllabic consonants, e.g. in *football, gatepost, cat-call, catgut, not mine, nutmeg, Catford, not for me, not very, what thing, out there, outset, great zeal, nutshell, outright, cart-wheel, not yet, not here, boathouse*. Some RP speakers may also replace the first (plosive) element of the affricate /tʃ/ e.g. in *coach, much, catch, couch*. Use of [ʔ] to replace /t/ in other positions, i.e. before the syllabic [n̩] and [l̩] and before words beginning with vowels was until recently stigmatized as non-RP but is now acceptable in London Regional RP, e.g. in *cotton, little, eat an apple, bat and ball*. Use of [ʔ] for /t/ word-medially intervocalically, as in *water*, remains stigmatized as non-RP.

The replacement of final /p,k/ by [ʔ] is much less frequent among RP speakers and occurs only when the following consonant is homorganic, e.g. *soap powder, cap badge, back garden, bookcase.*

(d) *Glottal replacement in other dialects*—In some dialects (particularly Cockney) glottal replacement occurs in the same positions as RP, although more frequently, but also occurs in a wider number of contexts. Word-medially and intervocalically a /t/ following an accented vowel may be replaced by [ʔ], e.g. in *daughter, butter, Saturday, Waterloo, writing, potato* [pəˈtæɪʔə], *salty, wanted*. In rapid speech the glottal closure is likely to be very weak, so that the /t/ in such positions may border on being elided.

In Cockney glottal replacements of /p,k/ also occur in similar situations, e.g. in *supper, paper, cup of tea* [kʌʔə ˈtˢəɪ], *lucky, joker, he doesn't like it* [əɪdə̃uʔˈlɑɪʔɪʔ], but there appears to be a greater tendency to retain a bilabial or velar closure. In cases of /-mpl,-ntl,-ŋkl/, as in *simple, mental, uncle*, if the nasal consonant is articulated, the [ʔ] used for /p,t,k/ is likely to be accompanied by the already formed bilabial, alveolar, or velar closure: if, however, as often happens in Cockney speech, /-ɪm,-en,-ʌŋ,/ are realized as [ĩ,ẽ,ʌ̃], the following stop may be only glottal. [ʔ] may also occasionally replace the fricative /f/ in Cockney, especially in the phrase *half a*, e.g. *half a minute* [ɑːʔ ə ˈmɪnɪʔ]. It should also be noted that, initial /h/ often being elided, vowels thus rendered initial may have glottal emphatic reinforcement applied to them, especially in hiatus with a preceding vowel, e.g. *I hate him* [ɑɪ ˈʔæɪ ʔɪm], *we haven't* [wi ˈʔævnʔ].

Glottal replacement and glottal reinforcement are used in similar ways in East Anglia, Bristol, Glaswegian and Tyneside,[22] intervocalic (post-accentual) replacement being generally marked as characteristic of broad varieties of accents (sometimes referred to as 'basilectal'). Tyneside is unique in realizing glottal

[22] Wells (1982)

reinforcement in intervocalic positions by post-glottalization, e.g. *water* [watʔə], *keeper* [kiːpʔə], *speaker* [spiːkʔə].

(3) *History*—Since it would appear that [ʔ] has never been a significant sound in English, it is not to be expected that its stylistic use should have been described in detail by the early grammarians. It is, however, mentioned in the seventeenth century[23] as a feature of the onset of initial vowels and, in works dealing with singing technique, has traditionally been described as the 'hard attack'. But the substitution of [ʔ] for a voiceless plosive in regional speech is not explicitly mentioned until the nineteenth century and it is only in recent years that the phenomenon of reinforcement has been explicitly noted. Lack of descriptive evidence concerning this non-significant sound is not, however, a reason for assuming that [ʔ] is a feature of only recent occurrence in English speech. But the fact that glottal reinforcement and glottal replacement are generally absent from Australian English, which shares many features with Cockney and hence might be assumed to have been derived principally from earlier London speech, might suggest that the glottal characteristics of Cockney have arisen in the last 200 years.

(4) *Advice to foreign learners*—Many languages use [ʔ] to re-inforce word-initial vowels but some do this much more regularly and frequently than English, e.g. German. Speakers should therefore generally avoid this type of re-inforcement. They should also be aware that use of glottal replacement between vowels, either within words or across word boundaries, is more typical of London Regional RP (Estuary English) than of General RP.

9.3 *Affricates*

(1) *Definition*—The term 'affricate' denotes a concept which is primarily of phonetic importance. Any plosive whose release stage is performed in such a way that considerable friction occurs approximately at the point where the plosive stop is made, may be called 'affricative'. In English, apart from the exceptional affrication mentioned in §9.2.3(6), only /t,d/ may have this type of release, namely in /tʃ,dʒ,tr,dr,ts,dz,tθ,dð/.

(2) *Phonemic status*—From a functional or distributional point of view these compound sounds may be considered either as single phonemic entities or as sequences of two phonemes. The choice of phonemic solution will depend upon the purpose of the analysis, but the following factors may be taken into account:

(a) *The distribution of the sound sequence*, in particular in the following positions: word-initial, word-final, and word-medial with different syllable assignments. A sound sequence which has a general distribution and shows an opposition in word-medial position between CLOSE-KNIT realizations and DISJUNCT realizations (i.e. with the elements in separate syllables or morphemes) may be treated as a complex phonemic entity.

[23] Abercrombie (1948)

	Word-initial	*Word-final*	*Word-medial close-knit*	*Word-medial disjunct*
/tʃ/	chap	patch	butcher	lightship
/dʒ/	jam	badge	aged	
/tr/	tram		mattress	footrest
/dr/	dram		tawdry	handrail
/ts/		cats	curtsey (?)	outset
/dz/		roads	Pudsey (?)	
/tθ/		eighth		
/dð/		(width)		

Table 11. *Distribution of homorganic sequences of plosive plus fricative*

Table 11 shows that /tʃ,dʒ/ best fulfil these conditions, occurring in all positions with a medial distinction between close-knit and disjunct. /tr,dr/ also have a distinction between close-knit and disjunct in medial position but do not occur in final position. /ts,dz/ do not occur initially (except in rare foreign words) and only doubtfully in close-knit medial situations. /tθ,dð/ have an occurrence restricted to the final position in very few words.

Close-knit and disjunct sequences of /t,d/ plus /ʃ,ʒ/ or /r/ involve different phonetic characteristics. In the case of /t/ plus /ʃ/, and /d/ plus /ʒ/, the fricative is shorter in close-knit sequences: thus the friction in *butcher* is of shorter duration that the friction in *lightship*. For sequences /t/ or /d/ plus /r/, the /r/ is fricative (although of course made in a different position from /ʃ,ʒ/) in close-knit sequences but approximant in disjunct sequences: additionally the /r/ is devoiced following /t/.[24] Thus the /r/ in *mattress* is fricative and voiceless while the /r/ in *footrest* is approximant and voiced. Medial close-knit sequences can be regarded as involving the two sounds within one syllable[25] while the disjunct sequence involves a syllable boundary between the two sounds.

(b) *Possibilities of commutation of the elements.*

(i) The elements of /tʃ/ may be commutated within the same syllable as follows: word-initially, the stop, commutates only with zero, cf. *chip, ship* while the fricative commutates with /r,j,w/ and zero, cf. *chip, trip, twin, tune, tin*; word-finally the stop commutates with /l/ or zero, cf. *watch, Welsh, was* while the fricative commutates with /s/ or zero, cf. *catch, cats, cat*; and word-medially the stop commutates with zero, cf. *matches, mashes* while the fricative commutates with

[24] The different length of friction as between the fricative element of an affricate and a fricative following a plosive is shown by a comparison of the affricated /t/ in *cat* [kætˢ] and the longer friction of the plural form *cats* /kæts/ or between *ratchet* /rætʃɪt/ and *rat shit* /ræt ʃɪt/. Dialectal affrication of /t,d/ is, however, more common initially (where /t,d/ + /s,z/ is rare) than finally, being inhibited in final positions by the risk of confusion with the inflected forms

[25] In words like *mattress* /tr/ may be analyzed as one complex unit having ambisyllabic status (see §5.5.2)

/r/ or zero, cf. *enchants, entrance* (v.), *marcher, martyr* (syllable boundaries are assumed to occur in the following words: *welshing, pinching, outward, atlas, chutney*).

The elements of /dʒ/ have a more restricted possibility of commutation owing to the rarity of syllable initial /ʒ/. Word-initially only the fricative commutates, with /r,j,w/ and zero, cf. *jest, dressed, dune, dwell, dam*; word-finally again only the fricative commutates, with /z/ or zero, cf. *hedge, heads, head*; word-medially the stop commutates with zero, cf. *ledger, leisure*, and the fricative commutates with /r/ and zero, cf. *orgy, Audrey, larger, larder*.

Thus the possibilities of commutation are restricted in the case of the elements of /tʃ/ to zero (and occasionally /l/) for the stop, and to zero, /r,w/ and /s/, according to the situation, for the fricative. The commutability of the elements of /dʒ/ is also restricted, i.e. with zero in the case of the stop, and with zero, /r,j,w/ or /z/, according to the situation, in the fricative. Moreover, /tʃ/ is in opposition to /dʒ/ as a complex in all positions (see §9.3.1 for examples).

(ii) /tr,dr/, on the other hand, have considerable possibilities of commutation especially in the first element: in the case of /tr/, cf. *try, cry, pry, fry, rye; true, shrew, drew, grew, threw, brew; tree, three, tea; trill, chill, twill; troop, tune; train, chain*; in the case of /dr/, cf. *drew, true, crew, grew, brew, threw, shrew, rue, do, due, Jew; dry, fry, pry* etc.

On the basis of commutability, therefore, /tr,dr/ are more reasonably to be considered as consisting of separable elements than /tʃ,dʒ/.

(c) *Glottalization*—/tʃ/ is liable to glottal reinforcement before vowels as in [tiʔtʃɪŋ] where /p,t,k/ are, within RP, generally subject to reinforcement only when a consonant follows; and to glottal replacement of the [t] element alone as in [kəuʔʃ]. Both facts suggest that the [ʃ] element of /tʃ/ is in some sense the 'following consonant' which allows glottalization of the preceding [t]. Contrary to sections (a) and (b) above, section (c) argues for an analysis of [tʃ] as always a sequence of [t] + [ʃ].

(d) *Native speakers' reaction*—It seems that the native speaker does not regard /tʃ,dʒ/ as composite sounds, i.e. composed of distinctive elements. He is likely, for instance, to consider that *chip, catch*, consist of three parts in the same way as *tip, ship*, or *cat, cash*; or again, *jam, badge*, as structures equivalent to *dam, bad*. (It is, of course, true that PresE /tʃ,dʒ/ derive in many cases from earlier (OE or OF) plosives [c] or [ɟ], as well as from a coalescence of /t/ or /d/+/j/—see §9.3.1—but this is irrelevant in any consideration of the present structure of the language.) On the other hand, /tr,dr/ are not normally regarded as anything but sequences of /t,d/+/r/ and, in many dialects where the /r/ has a tap or trill realization, there is no question of affrication.

(e) *Speech errors*—Any of the elements of a consonantal cluster may be involved in a speech error, e.g. *play the game* →/peɪ ðə ˋgleɪm/, *came to a stop* →/skeɪm tu ə ˋstɒp/ (Sometimes an error will involve a transposition, sometimes just an addition). In this respect /tr,dr/ behave like clusters, e.g. *caught the tram* →/krɔːt ðə ˋtæm/, whereas /tʃ,dʒ/ are never involved in such errors; we do not, for example, get errors like *ring the changes* →/trɪŋ ðə ˋʃeɪndʒɪz/.[26]

[26] Fromkin (1971)

(f) *Conclusion*—The criteria above on balance clearly suggest taking /tʃ,dʒ/ as phonemic affricates (despite the contrary evidence from glottalization). On the other hand, of the other phonetic affricates only /tr,dr/ have some evidence favouring a uniphonemic analysis (i.e. the distinction between close-knit and disjunct), but even for these sequences the evidence is nowhere near as strong as for /tʃ,dʒ/. Accordingly, only /tʃ,dʒ/ are here analyzed as unit phonemes.

(3) *Acoustic features*—The acoustic features of affricates are those appropriate to stops (see §9.2.2) and fricatives (see §9.4.1). Since, however, the release stage is fricative, the most essential perceptual cues will be provided by the transition between the preceding vowel and the stop and by the explosive onset of the friction. Nevertheless, in the case of /tʃ,dʒ/, the transition will not necessarily be that which is typical of the alveolar plosives, since the stops of /tʃ,dʒ/ will be of a palatalized type; alternatively there may, in the case of /tʃ,dʒ/, be a brief intervening friction of the alveolar /s,z/ type before the [ʃ,ʒ] elements proper.[27]

9.3.1 Palato-alveolar Affricates[28] /tʃ,dʒ/

(1) *Examples*
/tʃ/—*voiceless*

ch—chain, choose, chunk, leech, pinch, achieve, rich, attach, much
tch—watch, fetch, wretched, aitch (the letter 'h'), bitch, butcher
ti—question, suggestion, navigation etc.
tu—nature, statue, furniture, virtuous, century, actual

(*Note* 'righteous, cello, concerto'.)

word-initial—cheese, chain, charge, charm, choke, cheer
word-medial (intervocalic)—feature, richer, wretched, orchard, butcher, nature, merchant
(consonant preceding)—gesture, posture, mischief, juncture, capture, lecture, pilchard, culture, adventure
word-final—wretch, catch, larch, porch, much, coach
(consonant preceding)—inch, conch, bench, branch, filch, mulch

/dʒ/—*voiced*

j—jam, jaw, job, juice, major, pyjamas, enjoy, eject, jostle
g—gem, magic, pigeon, fragile, cage, imagine, village

[27] Strevens (1960)
[28] In the latest versions of the chart of the International Phonetic Alphabet (see Table 1) the fricatives [ʃ,ʒ], and hence by implication the affricates [tʃ,dʒ], are labelled 'post-alveolar'. In this book the former label 'palato-alveolar' is retained as more closely indicating the palatalized alveolar articulation of these sounds. The term 'post-alveolar' is kept for RP /r/ (= [ɹ]) which is simply labelled 'alveolar' on the new chart (see further under §9.7.2)

dg—midget, lodge, judge, edge, fridge, badge, budge
dj—adjacent, adjective, adjunct, adjacent

(*Note* 'soldier, suggest, exaggerate, grandeur, arduous'.)

word-initial—gin, jest, jar, jaunt, Jew, jerk, joke, joist, jeer
word-medial (intervocalic)—midget, ledger, margin, fragile, urgent, orgy, adjacent, agenda, major
(consonant preceding)—avenger, danger, stringent, soldier, Belgian, bulges, object
word-final—ridge, edge, large, dodge, judge, huge, age, doge, gouge
(consonant preceding)—bilge, bulge, hinge, sponge, change

Compare

/tʃ/, /dʒ/—chin, gin; chest, jest; choose, Jews; choke, joke; cheer, jeer; catches, cadges; nature, major; a venture, avenger; riches, ridges; leech, liege; larch, large; perch, purge; lunch, lunge; cinch, singe; beseech, besiege

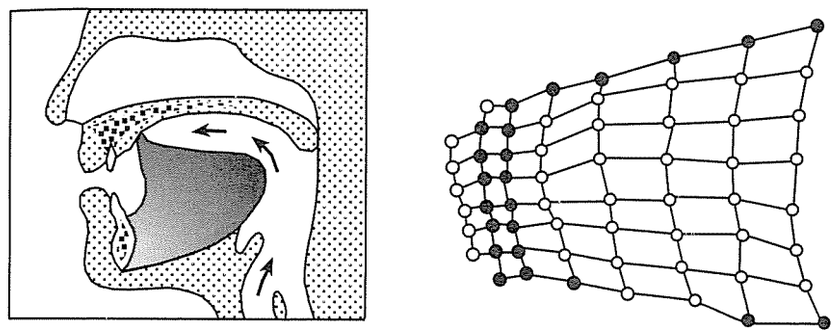

Fig. 37. *Section and palatogram of* /tr,dr/.

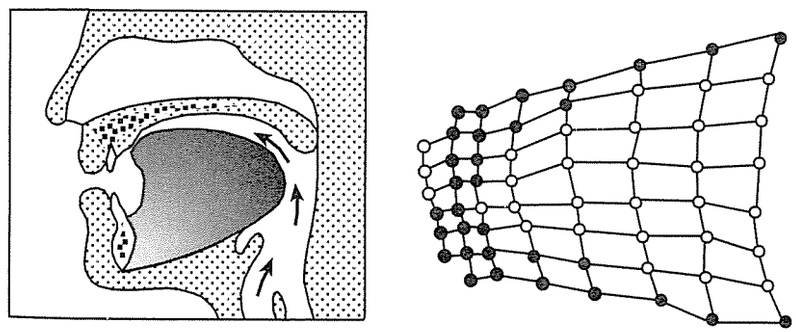

Fig. 38. *Section and palatogram of stop phase of* /tʃ,dʒ/.

(2) *Description*—The soft palate being raised and the nasal resonator shut off, the obstacle to the airstream is formed by a closure made between the tip, blade, and rims of the tongue and the upper alveolar ridge and side teeth. At the same time, the front of the tongue is raised towards the hard palate in readiness for the fricative release. The closure is released slowly, the air escaping in a diffuse manner over the whole of the central surface of the tongue with friction occurring between the blade/front region of the tongue and the alveolar/front palatal section of the roof of the mouth. During both stop and fricative stages, the vocal folds are wide apart for /tʃ/, but may be vibrating for all or part of /dʒ/ according to the situation in the utterance. (/dʒ/ shares the features of devoicing in initial and final positions exhibited by plosives, see §9.2.1(4), and fricatives, see §9.4(3). /tʃ,dʒ/ differ from plosives in that they never lose their fricative release stage. The lip position will be conditioned by that of adjacent sounds, especially that of a following vowel (cf. the greater lip-rounding of /tʃ/ in *choose* in relation to that of *cheese*), though with some speakers a certain amount of lip protrusion is always present.

In addition, it should be noted that the voiceless /tʃ/, when final in a syllable has the same effect of reducing the length of preceding sounds as was noted for /p,t,k/ (see §9.2.1(5)); comparatively full length of preceding sounds is retained before /dʒ/. This effect must be taken as the primary perceptual cue to the /tʃ/–/dʒ/ opposition in final positions.

(3) *Variants*—No important variants of /tʃ,dʒ/ occur, except in the matter of the degree of lip-rounding used. Some very careful speakers, however, use /t/ and /d/+/j/ in words which otherwise frequently have /tʃ/ or /dʒ/ e.g. *gesture, culture, virtue, statue, righteous, fortune, literature, question, posture, Christian, soldier, grandeur*. Potential oppositions between medial /tʃ,dʒ/ and /tj,dj/ are rare, but compare *verger* with /dʒ/, and *verdure* with /dj/. In the case of /t,d/+<u>, both the palato-alveolar affricate and /t/ or /d/+/j/ may be heard, e.g. in *actual, punctual, mutual, obituary, individual, gradual, educate*. Some speakers omit the stop element in the clusters /ntʃ,ndʒ/ in word-final positions as in *pinch, French, lunch, branch, paunch, hinge, revenge, challenge, strange, scrounge* etc., and also medially as in *pinching, luncheon, avenger, danger* etc.

(4) *Chief sources*—PresE /tʃ,dʒ/ derive from: early OE [c] and [ɟ] (*child, chin, kitchen, teach, church, edge, bridge*), this change being accomplished by the late OE period; OF [tʃ,dʒ] (*chief, chair, chamber, choice, merchant, branch, judge, major, age, village, change*); a coalescence of medial /tj/ or /dj/ (*nature, virtue, question, creature, grandeur, soldier*)—this latter change was not general until the early eighteenth century; a number of eighteenth-century coalesced forms have now reverted to a stop +/j/ or [ɪ] sequence, e.g. *piteous, bestial, tedious, odious*.

(5) *Acquisition by native learners*—The affricates /tʃ,dʒ/ are, along with the fricatives and /r/, among the consonants which are acquired later rather than earlier (often not until the age of four). It might be expected that, being composed of a homorganic sequence of plosive plus fricative, their acquisition would depend on the prior acquisition of the plosives and fricatives of which they are composed. However, this does not always seem to be the case; in particular the fricative /ʒ/ may be of later occurrence than the affricate /dʒ/, perhaps due to its comparative low frequency of occurrence in the adult language. Like most consonants the affricates are used first in syllable-initial positions, and are often omitted in final position in early words. Before they are correctly produced in initial position, they are frequently replaced by /t,d/.

(6) *Advice to foreign learners*—Some languages do not have /tʃ,dʒ/, e.g. French and Portuguese, and will replace them with /ʃ,ʒ/, or, in the case of Greek which has no /ʃ,ʒ/ either, with the affricates /ts,dz/. Good starting points for learners from such languages are the clusters /tj,dj/; moving the tongue forward while producing these sequences will often produce the required effect. Learners from some other languages (especially Scandinavians) are apt to articulate /tʃ,dʒ/ with too much lip spreading and overpalatalization, producing sounds resembling [tç,dʝ]; these, too, should move the tongue forward. Some languages have only /tʃ/, e.g. Arabic, German, Russian, and Spanish, and replace the one with the other; weakening /tʃ/ will generally produce /dʒ/ in such cases. Particular attention should also be paid to the shortening of sounds preceding syllable final /tʃ/, the examples in (1) of this section providing practice for this feature. In sequences of two affricates like *which chair, Dutch cheese, large jar*, it is acceptable to omit the plosive element of the first affricate, e.g. /wɪʃ ˈtʃeə/, /dʌʃ ˈtʃiːz/, /lɑːʒ ˈdʒaː/; however it is not acceptable to omit the fricative element.

Although only /tʃ,dʒ/ are here considered as unit phonemes, special attention should nevertheless be given to the sequences /tr,dr/ (see Fig. 37) because of the nature of the retracted [t̠,d̠] used before /r/, the friction associated with the /r/ in these sequences, and the devoicing of /r/ following /t/. Foreign learners should take care not to confuse /tʃ/ and /tr/ and /dʒ/ and /dr/ as in the minimal pairs *cheese, trees; chip, trip; chap, trap; chew, true; chain, drain* and *jest, dressed; jaw, draw; Jew, drew; jam, dram*.

9.4 *Fricatives*

In the articulation of a fricative consonant, two organs are brought and held sufficiently close together for the escaping airstream to produce local air turbulence; fricatives are, therefore, like plosives and affricates, characterized by a noise component. This turbulence may or may not be accompanied by voice. There is an on- or off-glide in respect of an adjacent sound (manifested acoustically by formant transitions), most appreciable if the adjacent sound is a vowel.

The RP fricative phonemes comprise four pairs /f,v,θ,ð,s,z,ʃ,ʒ/ and /h/. [x], a voiceless velar fricative, occurs exceptionally in some speakers' pronunciation of Scottish words such as *loch*; for [ɸ,β,s,z,x,ɣ] occurring as the fricative element of affricated plosives, see §9.2.4(6), and for the fricative allophones of /r,l,j,w/, see §9.7.

Table 12 illustrates oppositions, especially between members of the fricative pairs, in word-initial, word-medial, and word-final positions.

These oppositions may be realized by means of one or several of the following phonetic features:

(1) *Place of articulation*—/f,v/—labiodental; /θ,ð/—dental; /s,z/—alveolar; /ʃ,ʒ/—palato-alveolar; /h/—glottal. Such a series must be considered to be relatively complex. The existence, in particular, of place oppositions between the dental, alveolar, and palato-alveolar areas of articulation necessitates a precision of artic-

	Initial	*Medial*	*Final*
f	feel	proofing	leaf
v	veal	proving	leave
θ	thigh	earthy, ether	wreath
ð	thy	worthy, either	wreathe
s	seal	racer	peace
z	zeal	razor	peas
ʃ	sheet	fission, Confucian	niche
ʒ	gigolo	vision, confusion	rouge
h	heat	behave	

Table 12. *Fricatives in different word positions*

ulation in English which is not required in many other languages. Thus, for example, the lack of palato-alveolar fricative phonemes in Spanish permits the retraction of articulations in the alveolar region (e.g. /s/), whereas the absence in French and many other languages of dental fricative phonemes allows a dentalized quality in the alveolar articulations, which if introduced into English, is liable to cause confusion with /θ,ð/ or to produce a 'lisping' fricative which is considered socially undesirable. This reflects the fact that [s,z], whether alveolar or dental, are made with a configuration of the tongue which allows the air to escape along a groove, whereas /θ,ð/ use a flatter configuration where the air escapes through a slit. /ʃ,ʒ/ are made with flat blade and tip but with grooving further back, although even this grooving is not as deep as that for /s,z/.[29] These difference in configuration are at least as important as the difference places of articulation.

(2) Force of articulation—Within the four pairs, /f,θ,s,ʃ/ tend to be pronounced with relatively more muscular energy and stronger breath force than /v,ð,z,ʒ/;[30] the former are FORTIS, the latter LENIS. /h/ is normally fortis in character, but may have a lenis allophone (see §9.4.6).

(3) *Voicing*—Like the voiced plosives and affricates, /v,ð,z,ʒ/ tend to be fully voiced only when they occur between voiced sounds, e.g. in *cover, other, easy, leisure, a van, all that, by the zoo*. In initial and (especially) in final positions, the voiced fricatives may be partially or almost completely devoiced,[31] e.g. initially in *van, that, zoo* (i.e. with silence preceding) only the latter part of the friction is likely to be voiced, and finally in *leave, breathe, peas, rouge* /ru:ʒ/ (i.e. with silence following) the friction is typically voiceless, though the consonant remains lenis—[v̥,ð̥,z̥,ʒ̥]. Additionally, some devoicing of the voiced series may even occur in intervocalic position. The voiceless series remains completely voiceless in all positions. /h/, however, occurring only in word-initial and word-medial situations, though voiceless in an initial position, may have some voicing medially between voiced sounds, e.g. *anyhow*.

[29] Stone (1990), Stone *et al.* (1992)
[30] Subtelny *et al.* (1966), Malécot (1968)
[31] Haggard (1978), Docherty (1992)

(4) *Length*—When /f,θ,s,ʃ,v,ð,z,ʒ/ occur finally, the perception of voiceless or voiced consonants is largely determined by the length of the sounds which precede them.[32] /f,θ,s,ʃ/ have the effect of reducing the length of the preceding vowel (particularly a long vowel or diphthong) and of /l,m,n/ interposed between the vowel and the fricative, cf. *fife, loath, place, leash, self, fence* with *five, loathe, plays, (liege), selves, fens* etc. The same reduction in the length of vowels, nasals and laterals is operative when the voiceless fricatives occur in a medial position, cf. *proofing, proving; earthy, worthy; racer, razor; fission, vision*. While they shorten the vowels and continuant consonants which precede them, voiceless fricatives are themselves longer than their voiced equivalents.[33]

Summary—The RP fricatives may, therefore, be said to be phonetically distinguished:

(a) by means of a five-term series in respect of place of articulation—labio-dental v. dental v. alveolar v. palato-alveolar v. glottal, and
(b) at each of the first four points of articulation, by a complex of factors including force of articulation (which applies in all positions), voicing (which applies principally word-medially between voiced sounds), and by the length of preceding vowels, consonants and laterals within the same syllable.

(5) *Advice to foreign learners*—A distinction between five places of articulation is rare in the world's languages[34] and learners will have to spend some effort to get the articulation at each place correct. Particular attention needs to be given to the precision of articulation required for the distinctions among dental, alveolar and palato-alveolar fricatives. Advice is given under each place of articulation below.

Learners should not attempt to rely only on voicing to make distinctions between the various pairs, but concentrate on the strength of the friction and the correct reductions in the length of vowels before the voiceless series. Additionally, many languages only have strong fricatives like [s] and [f], e.g. Malay, Norwegian and Thai, and learners from such backgrounds have to learn to produce a second series by weakening their articulation.

9.4.1 Acoustic Features of English Fricatives

In acoustic terms,[35] our perception of the various types of fricative (whose characteristic feature is a continuous noise component) appears to depend upon the following factors (for spectrograms, see Fig. 32):

[32] Denes (1955), Wiik (1965)
[33] Subtelny *et al.* (1966), Malécot (1968)
[34] Maddieson (1984: 43) found only 3.5% of the 317 languages in his survey had 11 or more fricatives
[35] Hughes and Halle (1956), Strevens (1960), Jongman (1989), Amerman and Parnell (1992), Scully *et al.* (1992), Stevens *et al.* (1992)

(1) *Extent and position of noise component*—Continuous noise in the spectrum is appropriate to articulatory friction regions:

alveolars	3,600–8,000 cps
palato-alveolars	2,000–7,000 cps
labiodentals	1,500–7,000 cps
dentals	1,400–8,000 cps
glottal	500–6,500 cps

(2) *Intensity of noise component*—/s,ʃ/ have relatively high intensity; /f,θ,h/ relatively low intensity. The voiced series has an overall lower intensity than that of the voiceless series.

(3) *Low frequency component*—The voiced series may have a periodic low frequency component (voicing) which is absent in the voiceless series.[36] Voicing may also manifest itself in more extensive transitions of the first formant adjacent to voiced fricatives.[37]

(4) *Formant transitions*—Especially in the case of the low intensity labiodentals and dentals, much information regarding place of articulation comes from the nature of the adjacent vocalic glide. In the case of /h/ (often an anticipatory voiceless version of the following vowel), the spectral pattern is likely to mirror the formant structure of the following vowel.

(5) *Duration of fricative noise*—The friction of the voiced series is shorter than that of the voiceless series.

9.4.2 Acquisition of Fricatives by Native Learners

The fricatives constitute the largest area of difficulty for native learners in the area of consonant acquisition. The distinction of five places of articulation is particularly difficult: three of the places (dental, alveolar, palato-alveolar) depend on different and delicate adjustments of the tip/blade of the tongue and it is in this area that most of the difficulty occurs. The first fricative (generally /f/ or /s/) occurs later than plosives and nasals and, unlike them, may occur at first just as frequently in medial or final position as in initial position. The /s/ will often be misarticulated, sometimes only slightly, sometimes to the extent of being a lateral fricative [ɬ]. The distinction between the three apical/laminal pairs will. for many children, not be complete and/or correctly articulated until the age of five or six. The voiceless members of the pairs are generally acquired before the voiced members; this may be due to their higher frequency of occurrence in the adult language or to the greater perceptibility of the stronger friction in the voiceless series. Before any fricatives have been acquired, they may be replaced in initial position by the corresponding plosives, i.e. /f,v/→/p,b/, and /θ,ð,s,z,ʃ,ʒ/→/t,d/. Once /f/ and /s/ have been acquired, the voiced series may continue to be replaced by plosives, while /θ,ʃ/ are replaced by /s/. The glottal

[36] Stevens *et al.* (1992) found that an interval of at last 60 ms was necessary for an intervocalic fricative to be perceived as voiceless

[37] Stevens *et al.* (1992)

fricative /h/ (which of course is not paired) is very variable in acquisition, reflecting its varying presence in the fricative systems of different dialects and hence in the speech with which a child is surrounded.

9.4.3 Labiodental Fricatives /f,v/

(1) *Examples*
/f/—*voiceless*

f—fork, friend, frame, funnel, fake, fat, fetish, fill, four, fog, fool
ff—off, stuff, giraffe, cliff, afford, offend, coffee, suffer, effort, daffodil
ph—physics, phonetics, diaphragm, epitaph, photograph
gh—enough, rough, cough, draught, laugh

(Note *'sapphire'.)*

word-initial—feet, fit, fat, father, fool, fail, photo
word-medial—affair, defend, offer, tougher, loafer, suffer, selfish, comfort
word-final—leaf, laugh, cough, stuff, roof, loaf, strife
in word-initial clusters—fry, fly, few, sphere
in word-final clusters—/fθ(s)/ fifth(s), /ft(s)/ raft(s), /mf(s)/ triumph(s)[38] /lf(s)/ wolf('s), /lft/ engulfed, /lfθ(s)/ twelfth(s), /fn(z,d)/ soften (s,ed), /fl(z,d)/ baffle(s,ed), /fs/ coughs

/v/—*voiced*

v—vine, vote, view, veal, veer, savage, seven, deliver, clever, ever, river, novel
ve—live, active, wave, love, dove, glove, save
(*Note* 'of', 'nephew' and slang 'civvy, bovver, navvy'.)
word-initial—veal, vex, vat, vast, vain, vice, voice
word-medial—ever, nephew, over, silver, cover, event, canvas
word-final—leave, give, have, of, move, dove, grove
in word-initial clusters—/vj/ view
in word-final clusters—/vz/ loaves, /vd/ loved, /vn(z)/ oven(s), /lv(z,d)/ solve(s,d), /vl(z,d)/ grovel(s,ed) etc.

Compare

/f/, /v/—fine, vine; fat, vat; few, view; offer, hover; surface, service; laugher, larva; camphor, canvas; leaf, leave; proof, prove; safes, saves.

(2) *Description*—The soft palate being raised and the nasal resonator shut off, the inner surface of the lower lip makes a light contact with the edge of the upper teeth, so that the escaping air produces friction. The actual point of contact will vary somewhat according to the adjacent sound, e.g. in the case of a back strongly rounded vowel or of a bilabial plosive (*fool, roof, obvious*), the contact on the lower lip tends to be more retracted than in the case of a front spread vowel (*feel, leaf*). For /f/, the friction is voiceless, whereas there may be some vocal fold

[38] An epenthetic /p/ may be inserted, thus /ˈtraɪʌmpfs/. Cf. §9.4.5(3) and §10.8(3)

vibration accompanying /v/, according to its situation (see §9.4(3) above). The tongue position of an adjacent vowel will persist or be anticipated during the labiodental friction; in the case of intervocalic /f,v/, the tongue will articulate independently for the vowels or, if the vowels are similar, e.g. in *stiffest, giving*, will retain its position during the labiodental friction.

(3) *Variants*—No important articulatory variants for /f,v/ occur among RP speakers, although word-final /v/ may change to /f/ before a voiceless consonant initial in the following word, e.g. regularly in *have to* and more rarely in such sequences as *love to, have some* (see §12.4.3) or may, in familiar speech, be elided in the case of the unaccented form of *of, have*, e.g. in a *lot of money, I could have bought it* /ə lɒt ə ˈmʌnɪ, aɪ kəd ə ˈbɔːt ɪt/, where /ə/ is phonetically equivalent to the unaccented form of *are, a* (see §12.2).[39] In south-west England speech, the voiceless /f/ is often replaced by /v/ in word-initial position (e.g. in *fox, family, fourth*).

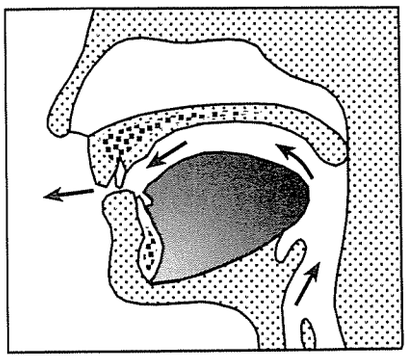

Fig. 39. *Section of* /f,v/.

(4) *Chief sources*—PresE /f/ derives from OE initial and final [f] (*foot, fowl, free, thief, leaf, wife*) and from OF [f] (*fine, fruit, profit, chief*). The spelling <ph> next to <th> (as in *diphthong*) was pronounced with /p/ rather than /f/ in eModE, and often spelt with <p>; such a pronunciation with a bilabial plosive is still widely heard. An earlier final [x] following a rounded vowel gave [f] by late ME (*dwarf, laugh, rough, cough*); in words such as *plough, dough, bough*, the PresE pronunciation derives from the inflected form in which [x] has been lost, as also in the final [xt] sequence (*ought, thought*). An irregular change [u]>[v]>[f] has taken place in the word *lieutenant*, though the regular development /l(j)uːˈtenənt/ is used in American English. The increasing use of /f/ in *nephew* is a spelling pronunciation, instead of the earlier, regular /v/.

PresE /v/ derives from OE /f/=[v] between voiced sounds (*love, devil, wolves, wives, driven*), from SW dialect initial OE [v] for [f] (*vat, vixen, vane*) and from OF [v] (*vain, very, cover, serve*).

[39] Note the accepted forms of *man-of-war, tug-of-war, o'clock, will-o'-the-wisp*, with /ə/ rather than /əv/ for *of*

(5) *Advice to foreign learners*—Some learners (particularly Indians) use too weak a contact for /v/, so that the friction is lost, giving the labiodental approximant [ʋ]; others (particularly Germans and Hungarians) use bilabial friction [β] instead of the labiodental sound. In both of these cases, there is a tendency to use the same sound for both /v/ and /w/. Care should, therefore, be taken to distinguish pairs such as *vine, wine; verse, worse; vest, west* etc., using friction between the lower lip and upper teeth for /v/. Many languages have only /f/, e.g. Cantonese and Malay, and need to attain /v/ by weakening the friction and paying attention to the length of preceding vowels.

9.4.4 Dental Fricatives /θ,ð/

(1) *Examples*
/θ/—*voiceless* (always spelt <th>)

word-initial—thief, thick, thatch, thong, thought, thumb
word-medial—ether, ethics, lethal, method, author, anthem, lengthy, atheist, athletic, deathly, worthless
word-final—heath, smith, breath, path, cloth, earth, fourth, oath
in word-initial clusters—three, throw, thew, thwart
in word-final clusters—/θt/ earthed, /θs/ mouth's, /pθ(s)/ depth(s), /tθ(s)/ eighth(s), /fθ(s)/ fifth(s), /ksθ(s)/ sixth(s), /mθ/ warmth,[40] /nθ(s)/ month(s), /lfθ(s)/ twelfth(s), /ŋkθ(s)/ length(s), /lθ(s)/ health('s), /θl(z)/ Ethel('s), /θn/ earthen

/ð/—*voiced* (always spelt <th>)

word-initial—there, this, then, the, though, thy, they
word-medial—breathing, leather, gather, father, mother, northerly, southern, worthy, either, although
word-final—seethe, with, soothe, lathe, clothe, writhe, mouth (v.)
in word-final[41] *clusters*—/ðm(z)/ rhythm(s), /ðn(z)/ southern('s), /ðl(z)/ betrothal(s), /ðz/ clothes, /ðd/ writhed, /dð/ width (alternatively /wɪtθ/)

Compare

/θ/,/ð/—thigh, thy; ether, breather; earthy, worthy; wreath, wreathe; mouth, mouth (v.); oath, clothe.
/θ/,/s/—thick, sick; thought, sort; thumb, sum; mouth, mouse; worth, worse
/θ/,/t/—thick, tick; thought, taught; three, tree; heath, heat; both, boat; fourth, fort
/ð/,/z/—seethe, seas; lathe, laze; clothe, close (v.); breathe, breeze
/ð/,/d/—then, den; though, dough; there, dare; other, udder; worthy, wordy; seethe, seed; writhe, ride

(2) *Description*—The soft palate being raised and the nasal resonator shut off, the tip and rims of the tongue make a light contact with the edge and inner

[40] An epenthetic /p/ may be inserted, thus /wɔːmpθ/, Cf. §9.4.5(3) and §10.8(3)
[41] /ð/ does not occur in word-initial clusters

surface of the upper incisors and a firmer contact with the upper side teeth, so that the air escaping between the forward surface of the tongue and the incisors causes friction (such friction often being very weak in the case of /ð/). With some speakers, the tongue tip may protrude between the teeth; this is a commom type of articulation in American English. The tongue being relatively flat, the aperture through which the air escapes is in the nature of a slit rather than a groove, which produces fricative noise at a lower frequency than that associated with /s,z/. For /θ/ the friction is voiceless, whereas for /ð/ there may be some vocal fold vibration according to its situation (see §9.4(3) above). The lip position will depend upon the adjacent vowel, e.g. being spread for *thief, heath, these* etc., and somewhat rounded for *thought, truth, soothe* etc.

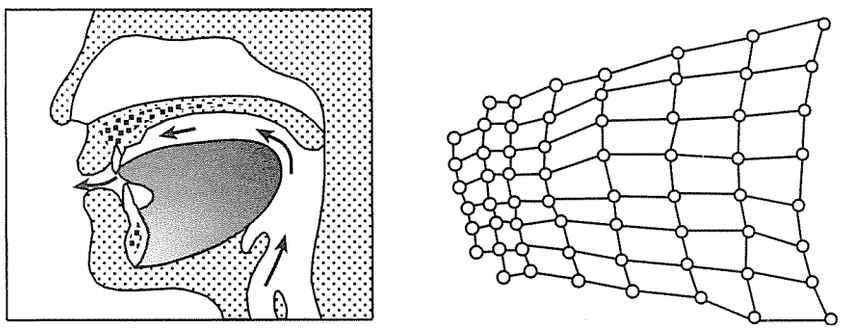

Fig. 40. *Section and palatogram of* /θ,ð/.

(3) *Variants*—No important RP variants of /θ,ð/ occur. Since /θ,ð/ offer difficulties of articulation when followed by /s,z/, they are sometimes elided in clusters, e.g. *clothes* /kləʊz/, *months* /mʌns/, or /mʌnts/. In sequences of the type /s,z/ followed by unaccented /ð/, as in *Is there any?, What's the time?*, the preceding alveolar articulation may influence the dental fricative in rapid speech—/ˈɪz zər enɪ, wɒts zə ˈtaɪm/. Again, in Cockney and in Southern American, the dental articulation may be replaced by labiodental, e.g. *throw it, Smith* /ˈfrəʊ ɪt, smɪf/, *mother, breathe in* /ˈmʌvə, briːv ˈɪn/. In these areas other alveolar articulations may also be heard for the weak /ð/, e.g. *all the way* /ɔːl də ˈweɪ/, *in the morning* /ɪn nə ˈmɔːnɪn/. In Southern Irish speech /θ,ð/ are often realized as dental plosives [t̪,d̪] but this does not generally lead to neutralization with /t,d/.

(4) *Chief sources*—PresE /θ/ derives from initial and final (including morpheme-final) OE [θ] (*think, throat, bath, tooth, earthly, worthless*), from OF [ð] (*faith*), from learned Greek forms (*theory, thesis*), and others which until ModE commonly had /t/ (*catholic, authority, theatre*).

PresE /ð/ derives from OE /θ/=[ð] between voiced sounds (*other, feather, breathes*). Note that of the English words where there is initial /ð/ rather than /θ/ (which is to be expected from the OE forms), e.g. *the, this, then, that, than, they* etc., most are words which are frequently medial and unaccented in an utterance.

(5) *Advice to foreign learners*—Most learners will have an L1 which does not have /θ,ð/ (although Arabic and European Spanish speakers do) and will usually

replace them with /t,d/, two exceptions being French and German which are more likely to replace by /s,z/, and Hindi speakers who use their /t̪,d̪/. Such pronunciations are to be avoided if at all possible. In particular, those words with /ð/ which are normally unaccented, e.g. *the, than, they* etc. should not be pronounced with /d/. The difficulty of /θ,ð/ lies not so much in their articulation, which most learners can perform correctly in isolation, as in their combination with other fricatives, especially /s/ and /z/. Learners should, therefore, practise with drills containing such combinations involving rapid tongue glides, e.g. /s+θ/ *this thing*, /k+θ/ *sixth*, /z+θ/ *his thumb*, /s+ð/ *pass the salt*, /z+ð/ *is this it?*, /θ+s/ *fifths*, /θ+s+ð/ *Smith's there*, /ð+z+ð/ *soothes them* etc., /s,z/ preceding /θ,ð/ in sequences like *what's that, is this, nice thing* should not be assimilated to /θ,ð/.

9.4.5 Alveolar Fricatives /s,z/

(1) *Examples*
/s/—*voiceless*

s, se—so, single, sun, saw, bus, gas, stay, skin, snow, tense, lapse, goose
ss—pass, kiss, class, cross, discuss, assist, cassette, embarrass, essential, waitress
c,ce—receive, decide, exercise, council, niece, science, licence, advice, sauce
sc—science, descend, acquiesce, scent, obscene
x (=/ks/)—axe, climax, six, axle, reflex

(*Note* ˈpsychology, answer, sword, psalm, castle, etc.)

word-initial—cease, sat, sample, soon, soap, sign, soil
word-medial—pieces, losses, essay, axes, concert, escape, pencil, whisper, wrestler, excite, useless
word-final—niece, farce, pass, puss, goose, famous, dose, ice, mouse, fierce, scarce
in word-initial clusters—/sp/ spare, /st/ stain, /sk/ scarce, /sm/ smoke, /sn/ snake, /sl/ slow, /sf/ sphere, /sw/ swear, /spl/ splice, /spr/ spray, /spj/ spume, /str/ stray, /stj/ stew, /skr/ scream, /skj/ skewer, /skw/square
in word-final clusters—/sp(s,t)/, gasp(s,ed), /st(s)/ rest(s), /sk(s,t)/ ask(s,ed), /sm/ lissom, /sn(z)/ listen(s), /sns/ licence, /sl(z)/ muscle(s), /ns(t)/ mince(d), /nsl(z)/ pencil(s), /lst/ whilst, /snt/ decent, /ps(t)/ lapse(d), /mps(t)/ glimpse(d), /lps/ helps, /ts/ cats, /kts/ acts, /pts/ opts, /lts/ faults, /nts/ tents, /ls/ pulse, /fts/ drafts, /ks(t)/ tax(ed), /ŋks/ thanks, /lks/ milks, /mfs/ nymphs, /fs/ laughs, /θs/ fourths, /fθs/ fifths, /fθs/ twelfths, /nθs/ months, /ksθ(s)/ sixth(s), /tθs/ eighths, /dst/ midst, /mpts/ prompts, /stl(z)/ pistol(s), /tns/ pittance, /dns/ riddance, /vns/ grievance, /ʃns/ patience etc.

/z/—*voiced*

s,se—bars, dogs, plays, news, rose, please, cruise, choose, praise, bosom, prison
ss—scissors, possess, dessert, dissolve
z—zoo, zeal, zero, zip, quiz, wizard

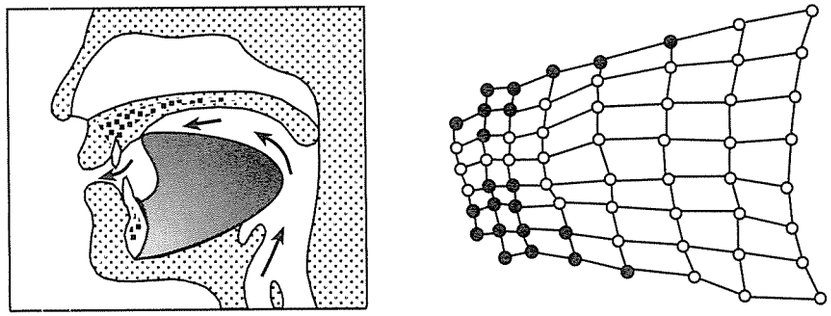

Fig. 41. *Section and palatogram of* /s,z/.

zz—dizzy, blizzard, buzz, buzzard, dazzle, jazz, nuzzle
x (=/gz/)—exact, anxiety, exaggerate, exempt, exhaust, exist, auxiliary

(*Note* 'xerox, xylophone, xenophobia'.)

word-initial—zeal, zest, zinc, zoo, zone, zero
word-medial—easy, hesitate, bazaar, bosom, hawser, lazy, thousand, palsy, pansy, husband
word-final—fees, is, says, as, was, ooze, does, butchers, gaze, rose, cows, noise, ears, airs, tours
in word-final clusters[42]—/bz/ ribs, /dz/ heads, /gz/ legs, /mz/ limbs, /nz(d)/ cleanse(d), /ndz/ hands, /ŋz/ rings, /lz/ holes, /vs/ caves, /ldz/ holds, /lvz/ valves, /lbz/ bulbs, /lmz/ films, /lnz/ kilns /ðz/ clothes, /zm(z)/ prism(s), /zn(z,d)/ emprison(s,ed), /zl(z,d)/ puzzle(s,d), /zd/ raised, /zml/ dismal, /plz/ apples, /blz/ bubbles /tlz/ battles, /dlz/ saddles, /klz/ buckles, /glz/ eagles, /tʃlz/ Rachel's, /dʒlz/ cudgels, /mlz/ camels, /nlz/ channels, /θlz/ Ethel's, /slz/ thistles, /vlz/ evils, /flz/ ruffles, /ʃlz/ officials, /tnz/ kittens, /dnz/ saddens, /fnz/ orphans, /vnz/ ovens, /snz/ hastens, /ʃnz/ oceans, /ʒnz/ visions, /ðnz/ heathens, /znt/ present, /mplz/ samples, /mblz/ symbols, /zndz/ thousands, /ndlz/ sandals, /ntlz/ lentils, /ŋklz/ uncles, /ŋglz/ angles, /stlz/ pastels, /mzlz/ damsels etc.

Compare

/s/, /z/—seal, zeal: sink, zinc; passing, parsing; fussy, fuzzy; racer, razor; peace, peas; loose, lose; use (n.), use (v.); gross, grows; place, plays; ice, eyes; house (n.), house (v.); scarce, scares; pence, pens; false, falls

(2) *Description*[43]—The soft palate being raised and the nasal resonator shut off, the blade (or the tip and blade)[44] of the tongue makes a light contact with the upper alveolar ridge, and the side rims of the tongue make a close contact with the upper side teeth. The airstream escapes by means of a narrow groove (cf. the slit associated with /θ,ð/ described in §9.4.4) in the centre of the tongue and causes friction between the tongue and the alveolar ridge. There is very little opening between the teeth. For /s/ the friction is voiceless, whereas for /z/ there may be some vocal fold vibration, according to its situation (see §9.4(3) above). The lip position will depend upon the adjacent vowel, e.g. spread for *see, zeal, piece, bees* etc., and somewhat rounded for *soon, zoo, loose, lose* etc. Some speakers make a light additional contact between the lower lip and the upper teeth, thus giving the sounds a secondary labiodental quality. A lisp, i.e. a substitution of /θ,ð/ for /s,z/ or a strongly dentalized version of /s,z/, is a common speech defect.

(3) *Variants*—Apart from the articulatory variants mentioned above, which are individual rather than social or regional, the voiceless /s/ is often replaced in word-initial position (e.g. in *seven, six, serve*) in south-west England by /z/. Before /r/, the approximation of the tongue to the alveolar ridge may be more retracted, e.g. in *horse-riding, newsreel.* Word final /s,z/ exhibit a readiness to assimilate before /ʃ,j/ (see §12.4.5).

Few RP speakers regularly maintain the distinction between /ns/ and /nts/ which is widespread in regional speech, e.g. distinguishing the final clusters in *mince–mints, tense–tents, assistance–assistants, dance–plants*, /nts/ tending to be used in all cases. This PLOSIVE EPENTHESIS, the insertion of /t/ between /n/ and /s/, results from the raising of the soft palate before the oral closure for /n/ is relaxed for the fricative /s/. Similarly, when /m/ or /ŋ/ precedes the /s/, an epenthetic plosive homorganic with the nasal may occur, e.g. *Samson* /ˈsæmsən/ → /ˈsæmpsən/, *Kingston* /ˈkɪŋstən/ → /ˈkɪŋkstən/, such variation being reflected in the spellings of proper names such as *Sam(p)son* and *Sim(p)son.*[45] /nz/ and /ndz/ are more frequently kept distinct by most RP speakers, e.g. in *wins–winds, tens–tends, fines–finds*, except in the most rapid speech when the /d/ may be elided.

Alternative pronunciations for words beginning /str-/ are commonly heard with /ʃtr-/, in, for example, *strawberries, string, strap*. This is evidently the influence of the retracted nature of the /t/ before the /r/.

(4) *Chief sources*—PresE /s/ derives from OE [s,ss] (*soon, sun, kiss, mice, wasp*) and from OF [s] (*sudden, strange, lesson, beast, pace, false*).

PresE /z/ derives from OE /s/=[z] between voiced sounds (*rise, wise, thousand, wisdom*) and from OF [z] (*zeal, easy, dozen, cause*). In addition, the weak termination [əs] gives [z], on the loss of [ə] by eModE, when following a voiced sound (*loves, dogs, lands, stones*); where the vowel is retained—as /ɪ/ or /ə/ in PresE—(after /s,z,ʃ,ʒ,tʃ,dʒ/), the [z] fricative form is also used in the weak ending (*passes, roses, rushes, touches, pages*). In the same way, words like *is, as, was, has, his*, which occur most commonly in weakly accented positions, were pronounced with final [z] by eModE. In French words, an earlier [s] occurring medially between

[42] /z/ does not occur in an initial cluster apart from /zj/ in *zeugma* and *Zeus* (in which /zjugmə/ and /zjus/ alternate with /zugmə/ and /zus/).
[43] See Stone (1990) for the grooving of /sz/
[44] Bladon and Nolan (1977) found a majority of speakers using a blade articulation
[45] Similar epenthesis may occasionally take place in sequences of nasals + other voiceless fricatives. The epenthetic plosive is always homorganic with the nasal., e.g. *confusion* /kəmpˈfjuʒn/, *convert* /kəmbˈvɜːt/ (= [kəŋbvɜːt], *anthem* /æntθəm/ (=[ænt̪θəm]), *mansion* /mæntʃən/

weakly accented and strongly accented syllables often > [z] (*resemble, possess, observe, disease, exact*); but many exceptions occur, perhaps for reasons of analogy of the spelling pronunciation or because the [s] is felt to belong to a separable prefix or to be initial in a common word preceded by a separable prefix (e.g. *assist, excite, dishonest, research*). In words where the medial fricative, especially final in the prefix *dis-*, precedes a voiced consonant, both /s/ and /z/ are heard, e.g. in *disdain, disgust*.

(5) *Advice for foreign learners*—In many languages, especially those where no dental fricatives exist, /s,z/ are articulated nearer to the teeth than the English varieties. Such a dentalized articulation is to be avoided in English because of the danger of confusion with /θ,ð/ (both in terms of the phonemic opposition involved and of the difficulties of alveolar/dental clusters). The more retracted articulation for /s,z/ should be practised in opposition with /θ,ð/ in pairs such as: *sing, thing; sort, thought; close* (v.), *clothe; sees, seethe; mouse, mouth; use* (n.), *youth*. On the other hand, those whose /s,z/ are often too retracted for English, e.g. Greeks, should practise oppositions between /s,z/ and /ʃ,ʒ/: *sin, shin; sort, short; lasses, lashes; Caesar, seizure; leased, leashed; mess, mesh*.

A large number of languages have /s/ but no /z/, e.g. Cantonese and Spanish. Learners from such backgrounds need to attain /z/ by a process of weakening and making vowels shorter before /s/, this being particularly important because /s,z/ occur so frequently in final positions. Hindi speakers have neither /s/ nor /z/; they should avoid substituting /ʃ,tʃ,dʒ/ and need to learn the tongue-tip articulation as completely new.

9.4.6 Palato-alveolar Fricatives /ʃ,ʒ/

(1) *Examples*
/ʃ/—voiceless

sh—shoe, shed, shape, sham, sheep, wish, finish, brush, washer, ashes, publisher
ch, chs—machine, chef, fuchsia, brochure, parachute, sachet, chateau, chalet
s, ss +u—sure, sugar, censure, assure
-ti-, -si-, -sci-, -ci-, -ce—nation, mansion, mission, conscience, special, appreciate, ocean

(*Note* 'schedule, fascist, conscientious, luxury' (<x>=/kʃ/).)

word-initial—sheet, shed, shop, sugar, charade, shout
word-medial—Asia, bishop, ashore, mission, luscious, bushel, cushion, rashly, machine
word-final—dish, cash, wash, push, douche, rush, finish, ruche
in word-initial clusters[46]—/ʃr/ shrink
in word-final clusters—/lʃ(t)/ welsh(ed), /ʃn(z,d)/, fashion(s,ed), /ʃnt(s)/ patient(s), /nʃn(z,d)/[47] mention(s,ed), /ʃt/ pushed, /ʃl̩z,d)/ marshal(s,led); where

[46] (tʃ/, /dʒ/, having been treated as single complex phonemic entities, are not considered here as initial or final clusters

[47] An epenthetic /t/ may be inserted, thus /ˈmentʃn(z,d)/. See §9.4.5(3) and §10.8(3)

/n/ precedes final /tʃ/, e.g. in bench, lunch, some speakers use a final cluster /nʃ/, without the [t] stop.

/ʒ/—voiced

g—gigolo, genre
si—vision, allusion, conclusion, occasion, division
s, z, ss +u—measure, casual, usually, closure, leisure, measure, pleasure, seizure, azure, issue, tissue
ge—beige, fuselage, dressage, garage, massage, sabotage, bourgeois, blancmange (=/blə`mɒnʒ/) (alternative pronunciations with /dʒ/ are generally possible)

(*Note* 'regime'.)

word-initial—(in French loan words) gigolo, gigue, jabot, genre
word-medial—pleasure, leisure, usual, confusion, decision
word-final—prestige, barrage, rouge, beige, garage
in word-initial clusters—does not occur
in word-final clusters—/ʒn(z)/ vision(s), /ʒd/ camouflaged, /nʒd/ arrange(d)

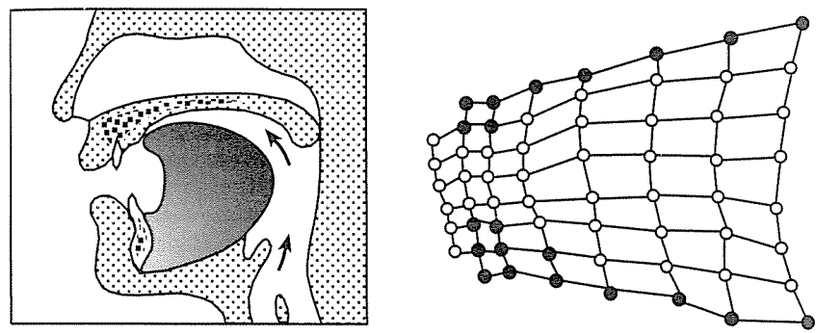

Fig. 42. *Section and palatogram of* /ʃ,ʒ/.

Compare

/ʃ/,/tʃ/—sheep, cheap; shore, chore; shoes, choose; leash, leech; dish, ditch; wash, watch
/ʒ/,/dʒ/—leisure, ledger; vision, pigeon
/ʃ/,/ʒ/—Aleutian (when pronounced /ə`luːʃn/), allusion; Confucian (when pronounced /kən`fjuːʃn/, confusion.

(2) *Description*[48]—The soft palate being raised and the nasal resonator shut off, the tip and blade of the tongue make a light contact with the alveolar ridge, the front of the tongue being raised at the same time in the direction of the hard palate and the side rims of the tongue being in contact with the upper side teeth.

[48] See Stone (1990) for the grooving of /ʃ,ʒ/.

The escape of air is diffuse (compared with that of /s,z/), the friction occurring between a more extensive area of the tongue and the roof of the mouth. The articulation is also laxer than that of /s,z/ and what grooving there is is further back than that for /s,z/.[49] The palatalization effect (i.e. the [i]-ness caused by the raising of the front of the tongue) is less marked than in sounds of the [ʃ,ʒ] type in some other languages, indicating either that the front raising is less close or that the tongue as a whole is slightly more retracted. In the case of /ʃ/, the friction is voiceless, whereas for /ʒ/ there may be some vocal fold vibration according to its situation (see §9.4(3)). Some speakers use slight lip-rounding for /ʃ,ʒ/ in all positions; for others, lip-rounding is an effect of the adjacent vowel, e.g /ʃ/ of *shoe* tends to be lip-rounded, whereas /ʃ/ of *she* has neutral or spread lips.

(3) *Variants*—Apart from the degree of palatalization or lip-rounding used, no important articulatory variants occur. Medially in certain words, however, /ʃ,ʒ/ are not used by all speakers:

(a) especially before /uː/ or /ʊ/, there is often variation between /ʃ,ʒ/ and /s,z/+/j/, e.g. in *issue, sexual, tissue, inertia, seizure, casual, usual, azure* (cf. *assume* with /sj/ and *assure* with /ʃ/);

(b) a similar variation between /ʃ/ or /s/+/ɪ/ (or/j/)+vowel, e.g. *ratio, appreciate, negotiate*;

(c) the sequence /s,z/+/ɪ/ (or /j/)+ vowel is more commonly kept in words such as *hosier, axiom, gymnasium, Parisian* (note American English /pəˋrɪʒn/) and especially before the /ə/ comparative adjectival inflexion, e.g. *easier, lazier*;

(d) the lack of words distinguishable by /ʃ/ and /ʒ/ results in possible alternations between /ʃ/ and /ʒ/, e.g. in *Asia, Persia, transition, version*. In word-final position, where /ʒ/ exists only in comparatively recent French loanwords, e.g. *beige, rouge, prestige, garage* etc., a variant with /dʒ/ is always possible and is felt to be the fully anglicized form. It will be seen that /ʒ/, rare initially in a word, replaceable by /dʒ/ finally and sometimes varying with /ʃ/ medially, has a particularly weak 'functional load' in English.

(4) *Chief sources*—PresE /ʃ/ derives from OE [ʃ], earlier OE [s]+[k] or [c] (*ship, shadow, bishop, fish, English*); from OF palatalized [s] (*cushion, cash, radish, finish*); from a coalescence of /s/+/j/ or /ɪ/ finalized in the seventeenth century (*sure, sugar, ambition, ocean, special, patient*)—note that in the seventeenth and eighteenth centuries, several words at present with /sjuː/ were pronounced with /ʃ/ (*suit, supreme, assume*); from French /ʃ/ in words adopted after earlier French /tʃ/ had given /ʃ/ (*chemise, chic, machine, charlatan, moustache*).

PresE /ʒ/ derives from a coalescence of /z/+/j/ or /ɪ/ finalized in the seventeenth century (*occasion, measure, treasure, usual*), /ʒ/ being considered for a long time as a foreign sound; from French /ʒ/ in words adopted after earlier French /dʒ/ had given /ʒ/ (*prestige, rouge, beige, bijou*)—many of these words still retaining a foreign flavour.

(5) *Advice to foreign learners*—Many languages do not possess palato-alveolar fricatives, e.g. Cantonese, Greek, and Spanish; others have only /ʃ/. The usual substitutes are /s,z/, although Hindi speakers substitute /dʒ/. Good results can generally be achieved by starting from /sj, zj/ and fronting the tongue. The weak character of /ʒ/ should be taught, although oppositions between /ʃ/ and /ʒ/ are rare.

Other languages have fricatives in this region but of a more strongly palatalized kind, e.g. German; a slight retraction of the tongue will often suitably 'darken' the quality of the friction.

[49] See §9.4 (1) above

9.4.7 Glottal Fricative /h/

(1) *Examples*—(Spelt <h> but note 'who, whom, whose, whore, whole'.) (*Note* <h> is not pronounced initially in *hour, honest, honour, heir, heiress*, medially in words such as *exhaust, exhilarate, exhibit, vehicle, vehement*, and in some final suffixes, e.g. *shepherd, Durham, Clapham* etc.)

word-initial—heat, hen, ham, hot, horse, who, hate, hoe, high, how, here, hair, halo, halibut, halo
word-medial—ahead, behave, perhaps, behind, spearhead, anyhow, manhood, abhor, adhere

Compare

/h/+ vowel, initial vowel—heat, eat; hill, ill; hedge, edge; harbour, arbor; haul, all; hate, eight; hold, old; hear, ear

(2) *Description*—Since English /h/ occurs only in syllable-initial, pre-vocalic positions, it may be regarded as a strong, voiceless onset of the vowel in question. The air is expelled from the lungs with considerable pressure, causing some friction throughout the vocal tract, the upper part of which is shaped in readiness for the articulation of the following vowel (i.e. as regards the position of the tongue, lips, soft palate, and the configuration of the pharynx). Thus differing types of friction (patterns of resonance) will be heard for /h/ in the sequences /hiː/, /hɑː/, /huː/. With the onset of the vocal fold vibration of the vowel, the air pressure is reduced. There is no distinctive voiceless/voiced opposition such as characterizes the other English fricatives.

(3) *Variants*—Although /h/ functions in English essentially as a voiceless syllable-initial phoneme (in the same way that /ŋ/ occurs only in syllable-final positions), a few speakers use a voiced (or slightly voiced) allophone medially between voiced sounds when initial in an accented syllable, e.g. in words such as *ahead, perhaps, behind*, and less frequently in an unaccented syllable, e.g. in *anyhow*. In such pronunciations, the strong airstream of /h/ is accompanied by vocal fold vibration, the result being a kind of breathy vowel or voiced glottal fricative [ɦ].

In basilectal forms of most accents in England and Wales,[50] and in Australia, /h/ is lost, so that no distinction is made between RP minimal pairs such as *hill,*

[50] See Trudgill (1999)

ill; high, eye; hair, air. Usually in such speech, the /h/ words will behave as if they had an initial vowel, e.g. *a hill* /ən ˈɪl/, *the house* /ðiː ˈaʊs/, but sometimes a trace of the boundary marking function of /h/ will be shown in the use of [ʔ], or at least a weak glottal constriction, e.g. *a hill* [ə ˈʔɪl], *the hospital* [ðə ˈʔɒspɪtl]. Overcorrections may also occur whereby forms of the article used before a vowel are not used and a weak glottal stop or glottal fricative is inserted, e.g. *an egg* [ə ˈʔeg] or [ə ˈʰeg], *the end* [ðə ˈʔend] or [ðə ˈʰend].

Such loss of /h/ is usually considered characteristic of uneducated speech, but certain function words (especially *have, has, had*, pronouns and pronominal adjectives) frequently lose /h/ in RP in unaccented, non-initial, situations in connected speech (see §11.3), e.g. *he pushed him on his back* /hiː pʊʃt ɪm ɒn ɪz ˈbæk/, *I could have hit her* /aɪ kəd əv ˈhɪt ə/.

Some older RP speakers treat an unaccented syllable beginning with an <h>, as in *historical, hotel, hysterical, hysterectomy*, as if it belonged to the special group *hour, honest* etc., i.e. without an initial /h/, e.g. *an historical novel*. Pronunciations with initial /h/ are, however, commoner, e.g. *a historical novel*. (For /h/+/j,w/, see §9.7.3.)

(4) *Chief sources*—OE had /h/ (=[h], [x], or [ç]), not only initially in a syllable before a vowel, but also in initial clusters, e.g. /hn/ (*hnutu*), /hl/ (*hlaf*), /hr/ (*hreosan*), /hw/ (*hweol*), where the realizations may have been [n̥,l̥,r̥,w̥] or [xn,xl,xr,xw]; also in medial and post-vocalic positions, with palatal or velar fricative realizations, e.g. *hliehhan, ahte, heah*. Of these occurrences, PresE retains only initial /h/ before a vowel (see §9.7.5 for possible /hw/), e.g. *home, high, help, horse* etc. In addition, a new initial /h/ was introduced into English in some French words of Germanic origin, e.g. *hardy, haste, herald*, and also in a large number of French words of Latin origin, e.g. *herb, horror, habit, harass, heretic, hospital, host, humour* etc. In the case of this latter group, spelling with <h>, both in OF and ME, was erratic, probably representing an /h/-less pronunciation. In certain words (*hour, heir, heiress, honour, honest*), the /h/-less pronunciation has been kept despite the general adoption of the spelling <h>. In most other cases, the letter <h> began to be pronounced in late ME in these words of Latin (via French) origin, though in some the spelling <h> was not sounded as late as the eighteenth and nineteenth centuries, e.g. *herb, hospital, humble, humour*.

The general elision of /h/ in weak pronouns and auxiliary verbs probably dates at least from eModE, whereas the loss of /h/ in accented words, as in much regional speech in England and Wales, has existed for at least two centuries and has always been considered a vulgarism.

(5) *Advice to foreign learners*—Many languages do not possess a phoneme of the /h/ type. Speakers of these languages should, in learning English, practise the examples given in (1) above, making a correct distinction between words with initial /h/+ vowel and those with initial vowel, e.g. *hill, ill* etc.; they should also learn to elide the /h/ of *he, him, his, her, have, had, has*, when these words occur in weakly accented, non-initial, positions in the utterance.

Those learners who in their own language have no /h/ but do have a /x/, e.g. Spaniards and Greeks, should avoid using any velar friction in English, and should practise the English /h/ as a voiceless onset to the following vowel.

9.5 *Voiced and Voiceless as Phonological Categories*

It will be seen from the from the preceding sections that in various ways the members of the class /p,t,k,f,θ,s,ʃ,tʃ/behave similarly to each other and differently from their counterparts in the class /b,d,g,v,ð,z,ʒ,dʒ/. This difference has generally been labelled as one of voicing; however, it will also have been seen that the realization of the distinction between the two classes varies according to position. To summarize, (i) members of the voiceless series are indeed voiceless in all positions while those in the voiced series are potentially fully voiced only in word-medial positions between voiced sounds and are regularly devoiced in word-initial and word-final positions; (ii) the voiceless series /p,t,k/ are aspirated in syllable-initial positions (particularly in accented syllables), while voiced /b,d,g/ are unaspirated; (iii) the voiceless series cause a reduction in length in preceding vowels, nasals, and laterals while the voiced series has no such effect; (iv) the voiceless series are generally longer than their voiced counterparts; (v) the voiceless series are made with greater muscular effort and breath-force (and hence are referred to as fortis while the voiced series are made with lesser effort and force (and are referred to as lenis).

Class B: Sonorants

Although voiceless fricative allophones of the following consonants occur, their most common realizations are voiced and non-fricative.

9.6 *Nasals*

(1) *Articulatory features*—Nasal consonants resemble oral plosives in that a total closure is made within the mouth; they differ from such plosives in that the soft palate is in its lowered position, allowing an escape of air into the nasal cavity and giving the sound the special resonance provided by the naso-pharyngeal cavity. Since the airstream may escape freely through the nose, nasal consonants are continuants; they differ, however, from continuants such as fricatives in that no audible friction is produced and from the fact that they are usually voiced, without significant voiced/voiceless oppositions. In many respects, therefore, being normally frictionless continuants, they resemble vowel-type sounds.

(2) *Acoustic features*[51]—Voiced nasal consonants have no noise component such as results from the burst of plosives or the friction of fricatives, nor the silence gap associated with plosives. Moreover the weak intensity of nasals (particularly in non-syllabic positions) and the considerable damping caused by the soft walls of the nasal cavity generally makes any formant structure difficult to identify. The key acoustic feature of all nasals is a low frequency 'murmur' below 500 Hz which precedes transitions to following sounds and follows transitions from preceding sounds. Moreover there is generally an absence of energy

[51] Liberman *et al.* (1954) and Malécot (1956)

around 1,000 Hz. Place of articulation is identifiable by the direction of the transitions to and from F2 and F3, these being the same as for the homorganic plosives (see §9.2.2(3)), i.e. minus transitions for /m/, slight plus transitions for /n/, and plus transition of F2 and minus transition of F3 for /ŋ/. More recent research has identified a key characteristic of labial vs alveolar nasals as being the relative proportion of energy present in two spectral bands ('barks'), 395–770 Hz for the labials and 1,265–2310 Hz for the alveolars.[52] Spectrograms of /m,n,ŋ/ in *ram, ran, rang* are shown in Fig. 43.

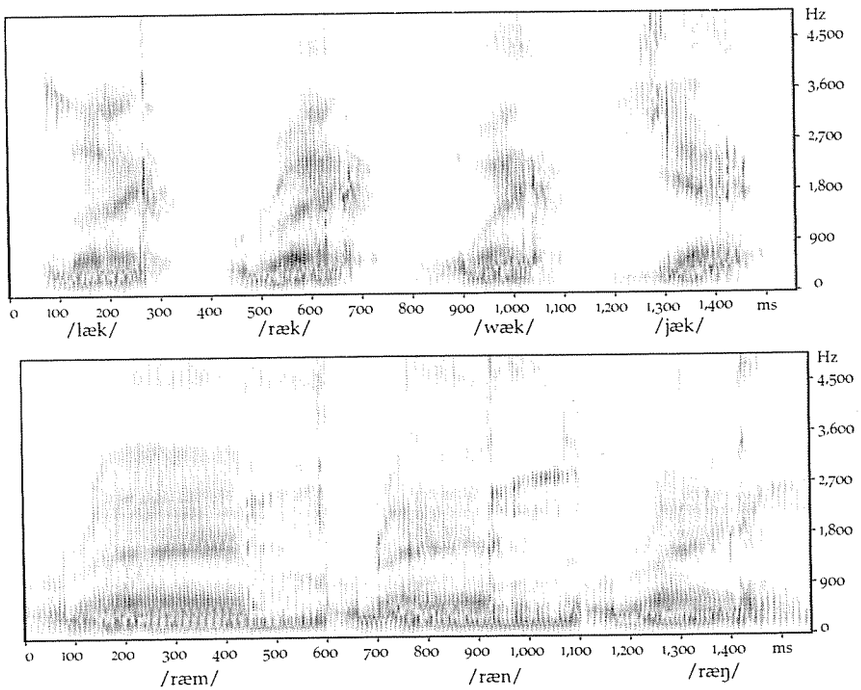

Fig. 43. *Spectrograms of* /læk/, /ræk/, /wæk/, /jæk/ *and of* /ræm/, /ræn/, /ræŋ/, *as spoken by a male speaker of RP.*

(3) *The English nasal consonants—*

(a) Three nasal phonemes correspond to the three oral plosive areas of articulation: *bilabial* /m/–/p,b/; *alveolar* /n/–/t,d/; *velar* /ŋ/–/k,g/. If, in the articulation of a nasal consonant, the nasal passage is blocked as, for instance, often happens during a cold, /m,n,ŋ,/ will be realized as /b,d,g/, e.g. *morning* /ˈbɔːdɪg/, *some nice*

[52] Kurowski and Blumstein (1984), Repp (1986), Kurowski (1989), Harrington (1994), Ohde (1994)

lemons /səb ˈdaɪs ˈlebədz/. Oppositions amongst the nasals may be illustrated as follows:

	Bilabial /m/	*Alveolar* /n/	*Velar* /ŋ/
Initial	might	night	—
Medial	simmer	sinner	singer
Final	sum	sun	sung

It will be seen that, since /ŋ/ does not occur initially in a word or morpheme, a complete series of oppositions is found only where the nasals occur in post-vocalic positions in the same syllable or morpheme.

(b) The vocalic nature of the nasals is underlined by the fact that they readily perform the syllabic function of vowels: most often /n/, e.g. *mutton* [ˈmʌtn̩]; less commonly /m/ e.g. *rhythm* [ˈrɪðm̩]; occasionally, with some speakers, /ŋ/, e.g. *bacon* [ˈbeɪkŋ̍].

(c) Although no opposition occurs between voiced and voiceless nasals in English, a somewhat devoiced allophone of /m/ and /n/ may be heard when a voiceless consonant precedes, e.g. *smoke, smart, topmost; snake, sneeze, chutney.* The distribution of /ŋ/ being restricted, it is only rarely—in a syllabic situation as in *bacon*—that a voiceless consonant precedes, with the consequent partial devoicing.

(4) *Acquisition of nasals by native learners*—Bilabial and alveolar nasals, along with plosives, are among the most frequent sounds in children's pre-linguistic babbling, and regularly occur in their first words. The velar nasal /ŋ/, limited in adult words to syllable-final position, is acquired later but is nevertheless among the first sounds to occur in post-vocalic positions. Voiceless bilabial and alveolar nasals can be heard in the speech of some children, replacing the clusters /sm-/ and /sn-/ of the adult language, e.g. *sneeze* [n̥iː], *smile* [m̥aɪl].

9.6.1 Bilabial Nasal /m/

(1) *Examples*

m—morning, moon, gum, simple, number, amber, famine, damage, woman
mm—summer, dimmer, dimming, committee, immense, immoral, programme, ammonite
mb—comb, bomb, lamb, climb, crumb, womb, plumber, numb

(*Note* 'autumn'.)

word-initial—meal, mat, march, move, mirth, make, mouse
following word-initial /s/—smack, smock, smite, smoke, smear
word-medial—demon, glimmer, lemon, salmon, among, gloomy, summer, sermon, commit, omen; jumper, timber, empty, comfort, hamlet, simple, symbol, dismal, camel, dimly, asthma
word-final—seem, lamb, harm, warm, tomb, game; (in final clusters) worms, harmed, film(s), warmth, glimpse, prompt(s), nymph(s); (syllabic) rhythm(s), prism(s), lissom

(2) *Description*—The lips form a closure as for /p,b/; the soft palate is lowered, adding the resonance of the nasal cavity to those of the pharynx and the mouth chamber closed by the lips; the tongue will generally anticipate or retain the position of the adjacent vowel or /l/. Except when partially devoiced by a preceding voiceless consonant, e.g. initially—*smoke*, medially—*topmost*, finally—*happen*, /m/ is voiced. (Normal breathing through the nose with the lips closed may be described as a weak [m̥]; where, because of some organic defect, such as cleft palate, the nasal cavity cannot be shut off, /p/ may be realized as [m̥] and /b/ as [m].) When followed by a labiodental sound /f,v/, the front closure may be labiodental [ɱ] rather than bilabial, e.g. in *nymph, comfort, triumph, come first, circumvent, warm vest*. Additionally pronunciations of *infant, enforce, unforced* etc. with assimilation of [n] to [ɱ] can be regarded as having an allophone of /m/.

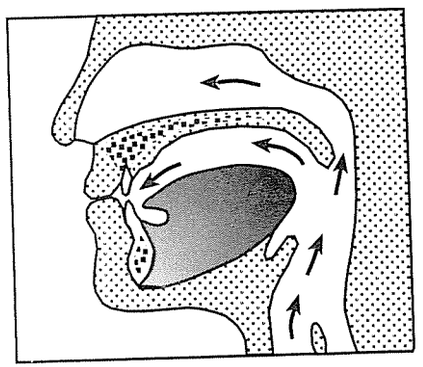

Fig. 44. *Section of* /m/.

In connected speech /m/ frequently results from a final /n/ of the citation form before a following bilabial, e.g. *one mile* /wʌm ˈmaɪl/, *more and more* /mɔːr əm ˈmɔː/, *ten pairs* /tem ˈpeəz/, *gone back* /gɒm ˈbæk/; sometimes /m/ is a realization of word-final /ən/ or /n̩/ following /p/ or /b/, e.g. *happen* /ˈhæpm̩/, *ribbon* /ˈrɪbm̩/, or, in context, *cap and gown* /kæp m̩ ˈgaʊn/ (see §12.4.5).

(3) *Variants*—There are no important regional or social variants of /m/ articulations.

(4) *Chief sources*—PresE /m/ derives from OE [m], [mm] (*man, hammer, swim, home*)—note [b] of [mb] was lost in word-final positions in ME in words such as *climb, lamb*, though kept medially as in *timber*, or inserted as in *thimble, bramble, slumber* before /l/ and /r/; from OF [m] (*master, family, solemn, sum*).

(5) *Advice to foreign learners*—This phoneme should present no difficulty.

9.6.2 Alveolar Nasal /n/

(1) *Examples*

n—now, noon, number, nonce, new, keen, barn, bend, bent
nn—funny, sinning, sinner, connect, annoy, innocent, innate, inn, innuendo
gn—gnaw, gnash, gnu, gnat, sign, campaign, champagne, reign, alignment

kn—know, knee, knife, knob, knot, knowledge, acknowledge, knuckle, knickers
pn—pneumonia, pneumatic

(*Note* 'rendez-vous' /ˈrɒndeɪvu.)

word-initial—neat, knit, net, gnat, knot, gnaw, none, nurse, name, know, near
following word-initial /s/—sneeze, snatch, snore, snug, snake, snow, sneer
word-medial—dinner, many, hornet, monitor, annoy; wonder, hunter, unless, unrest, answer, pansy, infant, invoice; chutney, madness, amnesty, walnut, fastener, evening
word-final—mean, pen, gone, soon, learn, melon, down, coin; pint(s), pond(s), inch, hinge, final(s), pence, pens, month(s), kiln(s), rental(s), bundle(s), pencil(s), against
syllabic /n/—cotton, sudden, often (=/ɒfn̩/), oven, earthen, southern, listen, dozen, mission, vision; maddening (or with non-syllabic /n/), reasonable (or with non-syllabic /n/ or /ən/), ordinary (or with non-syllabic /n/ or /ən/ or /ɪn/), southerner (or with /ən/)

(2) *Description*—The tongue forms a closure with the teeth ridge and upper side teeth as for /t,d/; the soft palate is lowered, adding the resonance of the nasal cavity to those of the pharynx and of that part of the mouth chamber behind the alveolar closure; the lip position will depend upon that of adjacent vowels, e.g. spread lips in *neat, keen*; neutrally open lips in *snarl, barn*; somewhat rounded lips in *noon, soon*. Except when partially devoiced by a preceding voiceless consonant, e.g. initially—*snug*, medially—*chutney*, finally—*cotton*, /n/ is voiced. (Where, because of an organic defect, such as cleft palate, the nasal cavity cannot be shut off, /t/ may be realized as [n̥] and /d/ as [n].) The place of articulation of /n/ is particularly liable to be influenced by that of the following consonant, e.g. when followed by a labiodental sound /f,v/, as in *infant, invoice, on fire, in vain*, /n/ may be realized as [ɱ]—and thus strictly speaking to be regarded as an allophone of the /m/ phoneme (see §9.6.1 above); /n/ before dental sounds /θ,ð/ is realized with a lingua-dental closure [n̪], as in *tenth, when they*—and sometimes when following /θ,ð/ (*earthen, southern*); before /r/, /n/ may have a post-alveolar contact, as in *unrest, Henry*; in addition, in context, word-final /n/ frequently assimilates to a following word-initial bilabial or velar consonant, being realized as /m/ or /ŋ/, e.g. *ten people, ten boys, ten men*, where the final /n/ of *ten* may assimilate to /m/, and *ten cups, ten girls*, where the final /n/ of *ten* may assimilate to /ŋ/ (see §12.4.5).

(3) *Variants*—There are no important regional or social variants of /n/ articulations.

(4) *Chief sources*—PresE /n/ derives from OE [n,nn] (*name, many, man, spin*); from OE [hn], [xn] or [n̥] (*nut*)—by the twelfth century; from OE [kn,gn] (*know, knit, gnaw, gnat*)—by the late seventeenth century; from OF [n] (*noble, dinner, plain*); from OF palatal [ɲ] (*sign, reign, line, mountain, onion*). Note that sometimes earlier [n]>[nt,nd] (*pheasant, tyrant, ancient, sound, pound*); and that sometimes [n] of the indefinite article has become affixed to a noun beginning with a vowel (*newt, nickname*), or initial [n] of a noun has been lost through transference to the preceding indefinite article form (*adder, apron, umpire*).

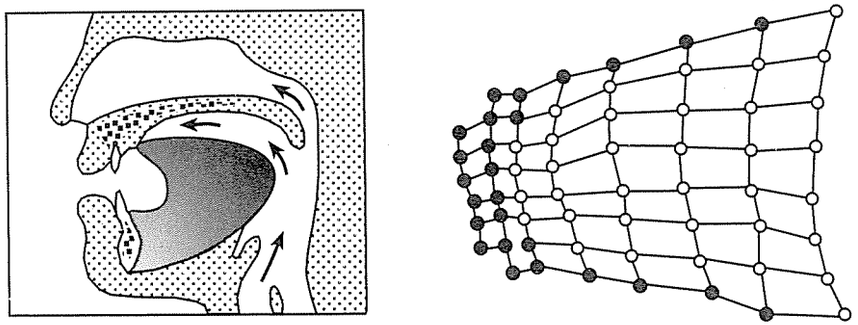

Fig. 45. *Section and palatogram of* /n/.

(5) *Advice to foreign learners*—Care should be taken that /n/, like /t,d/, is normally given an alveolar rather than a dental articulation (see practice examples in (1) above).

9.6.3 Velar Nasal /ŋ/

(1) *Examples*

ng—sing, singer, singing, longing, tongue
n +/k,g/)—sink, anxious, uncle, ankle, bangle, income
word-medial—singer, hanger, longing, anxiety
word-medial +/g/—finger, anger, angry, hunger, strongest, language, single, angle, England, bungle, nightingale
word-medial +/k/—tinker, anchor, banquet, monkey, donkey, conquer, wrinkle, ankle, uncle, anxious
word-final—sing(s), hang(s, ed), wrong(s, ed), tongue(s, ed), among
word-final +/k/—sink(s), rank(s, ed), conch (sometimes /kɒŋk/), chunk(s), monk(s), distinct, amongst (or with /ŋst/), strength (with /ŋkθ/, /ŋθ/, or sometimes /nθ/)
word-final syllabic—(occasionally) bacon, taken, thicken, blacken, organ /ŋ/, or less commonly /n/, in words such as—income, conclude, encourage, concrete, bronchitis, engage, enquiry

Compare

/ŋ/, /—sing, sin; rang, ran; hanged, hand; sung, sun; mounting, mountain; gong, gone; robbing, robin
/ŋ/, /ŋk/—thing, think; rang, rank; sung, sunk; singing, sinking; hanger, hanker

(2) *Description*—A closure is formed in the mouth between the back of the tongue and the velum as for /k,g/ (the point of closure will depend on the type of vowel preceding, the contact being more advanced in *sing* than in *song*); the soft palate is lowered, adding the resonance of the nasal cavity to that of the pharynx and that small part of the mouth chamber behind the velar closure; the lip position will depend upon that of the preceding vowel, being somewhat spread in *sing* and relatively open in *song*. /ŋ/ is normally voiced, except for partial devoicing in the possible, though uncommon, case of syllabic /ŋ/ in words such as *bacon, thicken*. (Where, because of an organic defect, such as cleft palate, the nasal cavity cannot be shut off, /k/ may be realized as /ŋ̊/ and /g/ as [ŋ].) Word-final /ŋ/ may result in context from citation forms of /n/, e.g. *ten cups* (see §12.4.5). Except in assimilations /ŋ/ occurs usually after the short vowels /ɪ,æ,ɒ,ʌ/; rarely after /e/.

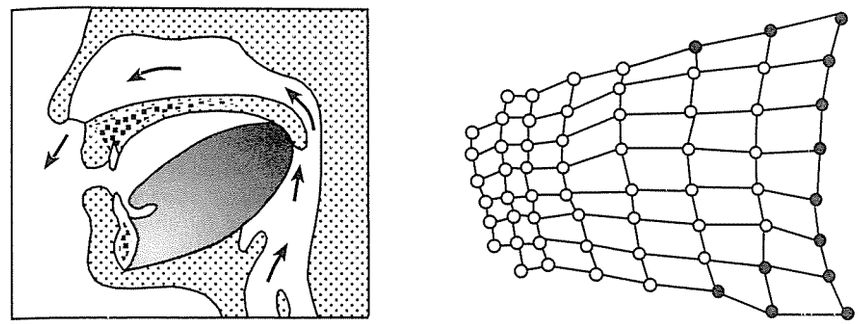

Fig. 46. *Section and palatogram of* /ŋ/ *in sang.*

(3) *Variants*—Earlier [ŋg] forms are retained, instead of RP /ŋ/, in many regional types of speech, notably in the north-west Midlands (e.g. Staffordshire, Derbyshire, Cheshire, and south Lancashire), e.g. *singing* [ˈsɪŋgɪŋg] for RP /ˈsɪŋɪŋ/. If /g/ is always pronounced in such situations, [ŋ] must be counted an allophone of /n/ rather than a separate phoneme.

In most regions where /n/ and /ŋ/ are in contrast (*sin, sing* being distinguished only by the final nasal), the *-ing* of the present participle varies between /ɪn/ and /ɪŋ/, such variation being dependent on both social and stylistic factors. /ɪn/ is used consistently by speakers at the lower end of the socio-economic spectrum and /ɪŋ/ at the top end, whereas speakers in intermediate classes often vary stylistically, using /ɪŋ/ in more formal speech (e.g. when reading aloud).[53]

In Cockney, in which /ŋ/ is phonemic (cf. *sin, sing*), the word *-thing* in compounds is often pronounced /-fɪŋk/ e.g. in *something, anything, nothing*; the verbal termination *-ing* may be /-ɪŋ/ or /-ɪn/ without /k/.

(4) *Chief sources*—PresE /ŋ/ occurs in words of OE origin (*sing, hunger, thank, tongue*) or of OF origin (*frank, rank, conquer, language*), following a short vowel. So long as [ŋ] occurred only before /k,g/, the nasal was an allophone of /n/. But with the loss of /g/ in the sequence [ŋg], /ŋ/ gained a phonemic significance, based on oppositions of the *sing, sin* type. Although loss of /g/ in [ŋg] may have occurred in popular dialects in late ME, it seems that the plosive (and allophonic

[53] See e.g. Trudgill (1974, 1999)

nature of [ŋ]) was retained in educated speech until the end of the sixteenth century. At first, in the late sixteenth and early seventeenth centuries, /g/ was elided only before consonants, the loss of /g/ in final [ŋg] before a vowel or a pause becoming general during the seventeenth century.

The pronunciation /-ɪn/ for the termination *-ing*, common in the sixteenth and seventeenth centuries, became a general feature of fashionable speech in the eighteenth century and has been retained today as a characteristic of an archaic form of RP (e.g. in *huntin', shootin', and fishin'*). It is to be noted that the sequence [ŋk] has not lost the plosive element and [ŋ] in such a situation could still be treated as an allophone of /n/, were it not for the emergence of /ŋ/ as a phoneme as a result of the reduction of [ŋg]>/ŋ/. The very restricted distribution of /ŋ/ in PresE is, therefore, imposed by the circumstances of its development.

(5) *Advice to foreign learners*—Many languages do not have /ŋ/ or have it only before /k,g/. Those learners whose own language has [ŋ] only as an allophone of /n/ before /k,g/, e.g. Arabic, Hindi, German, and Spanish, should avoid using /g/ (or more rarely [k]) in those cases where /ŋ/ occurs in English without a following plosive, especially in sequences where final /ŋ/ is followed by a vowel, e.g. in *singing, reading out, a long essay*. In practising, the nasal /ŋ/ should be given exaggerated length and sequences such as /ŋiːˌŋɑː/ repeated in order to obtain a succession of nasal + vowel without a plosive. Some other learners may substitute palatal /ɲ/, e.g. French and Spanish; while this does not lead to unintelligibility, it does give a strong foreign accent and should be avoided.

9.7 *Oral Approximants*

For this group of phonemes the airstream escapes through a relatively narrow aperture in the mouth without friction but with voice (apart from the allophones mentioned below). In many respects their articulatory and/or acoustic characteristics are sufficiently different to need a separate description under each phoneme. Nevertheless their distributional characteristics are very similar: (i) they appear in consonantal clusters in similar ways (a consonant plus /l,r,w,j/ is one of the two common types of two-consonant cluster (see §10.9.(1)) which occur syllable-initially in English (as in *play, broad, queen, pure*) the other being /s/ plus consonant); (ii) when they occur in such clusters they are all similarly devoiced if the preceding consonant is voiceless (e.g. /p,t,k/ produce devoicing in *clay, crawl, queer*, and *cure*).

9.7.1 Lateral Approximant /l/

(1) *Examples*

l—leave, droplet, deal, fault, middle, symbol, italic, polish, balance, salad, talent
ll—allow, collide, illegal, million, balloon, intelligent, parallel

(*Note* silent <l> in 'talk, would, could, should, half, calm, salmon, folk etc.'.) Note also divergent British and American spelling in 'travel(l)ing, dial(l)ing, signal(l)ing etc.

(a) *Clear* [l] (before vowels and /j/)
word-initial—leave, let, lock, look, late, loud, leer, lewd
in word-initial clusters—blow, glad, splice
word-medial—silly, yellow, alloy, collar, caller, pulley, foolish, sullen, sailor, island, oily, million, failure, allow, select; medley, ugly, nobly, gimlet, inlay, bachelor, specially (with [l] or [əl])
word-final, before following vowel or /j/—feel it, fall out, all over, will you

(b) *Devoiced clear* [l̥]:

Fully devoiced clear [ɬ] (following voiceless plosives in accented syllables)—play, please, plant, apply, aplomb, clean, close, climb, click, acclimatize
Partially devoiced [l̥] (following voiceless plosives in unaccented syllables or across syllable boundaries)—placebo, aptly, butler, antler, ghastly, short loan, simplest, couplet, rope ladder, hopeless, sprinkler, clarinet, clandestine, dark lake
Partially devoiced [l̥] (following voiceless fricatives)—sloppy, slow, slink, gas leak, fling, flow, flick, flak, half life, earthly, wash load

(c) *Dark* [ɫ] (in all other positions)

word-final, after vowel—feel, fill, fell, canal, snarl, doll, call, bull, pool, dull, pearl, pale, pole, pile, owl, oil, royal, real, cruel
after vowel, before consonant—help, bulb, salt, cold, milk, filch, bilge, film, kiln, self, solve, health, else, bills; alpine, elbow, halter, elder, alchemy, almost, illness, alphabet, silver, wealthy, although, ulcer, palsy, Welsh, always
syllabic [ɫ̩]—table, middle, eagle, cudgel, camel, final, quarrel (or with [əɫ]), oval, easel, usual, spaniel (or with [-jəɫ]), equal, tumble, fondle, angle, doubled, tables, measles, finally (or with [-əl-]; cf. 'finely' with [l])
syllabic [ɫ̩], *partially devoiced following voiceless consonant*—apple, little, buckle, satchel, awful, parcel, special, simple, mantle, uncle, sinful, pistol (cf. gambling [l] or [ɫ] vs gambolling [ɫ̩])
variations in inflected forms of verbs having [ɫ̩] *in the uninflected form*—[ɫ̩], or [əl] (more rarely [l])—pommelling, tunnelling, cudgeling; [l] (more rarely [ɫ̩] or [əl])—fondling, doubling, circling, wriggling, settling, coupling, whistling, puzzling, scuffling, shovelling. Some speakers have minimal pairs dependent on the presence of clear [l] or syllabic dark [ɫ̩] or even non-syllabic dark [ɫ], cf. *coupling* [ˈkʌplɪŋ] (connecting device) vs [ˈkʌpɫ̩ŋ] or [ˈkʌpɫɪŋ] (joining); *gambling* [ˈgæmblɪŋ] vs *gambolling* [ˈgambɫ̩ŋ] or [ˈgæmbɫɪŋ]; *codling* [ˈkɒdlɪŋ] vs *coddling* [ˈkɒdɫ̩ŋ] or [ˈkɒdɫɪŋ].
possible syllabic [ɫ] occurring in pre-accentual positions or rarely in accented syllables—fallacious, believe, select, bullish, building (this last possibly with a clear syllabic [l̩].

(2) *Description*[54]

(a) *Articulatory and distributional features*—The soft palate being in its raised position, shutting off the nasal resonator, the tip of the tongue is in contact with

[54] See Stone (1990), Stone *et al.* (1992) for the articulation of /l/

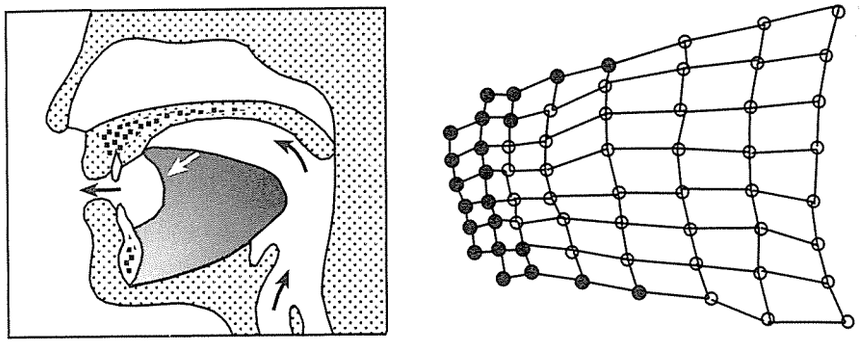

Fig. 47. *Section and palatogram of clear* [l].

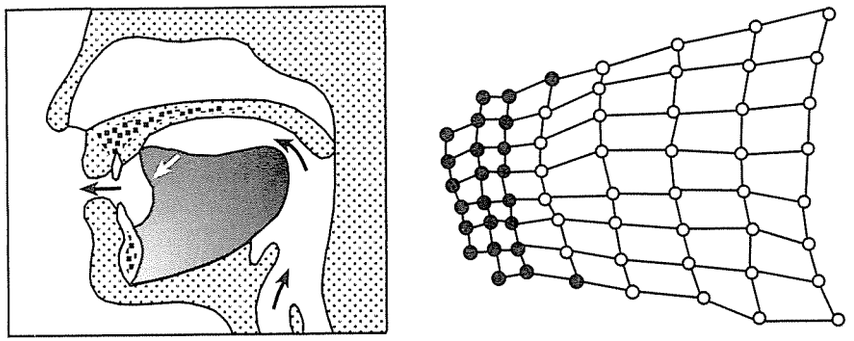

Fig. 48. *Section and palatogram of dark* [ɬ].

the upper teeth ridge, allowing the air to escape on both sides or, in the case of a unilateral tongue-rim closure on the upper side teeth, on one side. For clear [l], the front of the tongue is raised in the direction of the hard palate at the same time as the tip contact is made, thus giving a front vowel resonance to the consonant; this resonance is often of the [ë] type, but may be closer or more open according to the following vowel, cf. *leap, loop*. For dark [ɬ], the tip contact is again made on the teeth ridge, the front of the tongue being somewhat depressed and the back raised in the direction of the soft palate, giving a back vowel (or velorized) resonance; this resonance is often of the type [ö] or [ɤ]. The lips' position is influenced by the nature of the adjacent vowel, cf. *leap, feel* (with spread lips), loop, pool (with somewhat rounded lips); in the case of [ɬ], and especially [ɬ̪], there is, with some speakers, always a tendency to lip-rounding. Both [l] and [ɬ] are voiced except when the preceding consonant is voiceless.

The actual point of contact of the tongue for [ɬ] is conditioned by the place of articulation of the following consonant; thus, in *health, will they*, the [ɬ] has a dental contact (to a lesser extent, a preceding /θ,ð/ may cause a dental articulation [l̪], e.g. in *a month late, with love*); or, in *already, ultra, all dry*, the contact

for [ɬ] is likely to be post-alveolar. [ɬ] may also be strongly nasalized by a following nasal consonant, e.g. *elm, kiln*.

The velarization of [ɬ] often has the effect of retracting and lowering slightly the articulation of a preceding front vowel, e.g. *feel, fill, fell, canal*; in the case of /iː/+[ɬ], a central glide between the vowel and [ɬ] is often noticeable, and the [ɪ] element of /eɪ,aɪ,ɔɪ/ tends to be obscured, e.g. in *pail, pile, oil*. /uː/ before [ɬ] tends to be more monophthongal and nearer to C[u].

(b) *Acoustic features*[55]—The English voiced lateral is similar to nasals and /r/ in its low intensity and hence a formant structure is often only weakly apparent. There is a 'murmur' below 500 Hz (similar to nasals but of even lower intensity) which is generally considered as F1, and an F2 commonly in the range 900–1,600 Hz, a value at the low end of this range indicating a dark [ɬ]. Transitions to and from vowels are generally slower than those for nasals although faster than those for glides. A duration for [ɬ] of > 50–60 ms produces an effect of syllabicity. Spectrograms of clear [l] and dark [ɬ] are shown in Fig. 43.

(3) *Variants*—The RP distribution of [l] and [ɬ] may be said to be: [l] when a vowel or /j/ follows and [ɬ] in all other positions. In word-final positions following a consonant (*fiddle, final, parcel*), syllabic dark [ɬ̩] occurs. When an affix beginning with a vowel is added or the next word begins with a vowel, (*fiddling, fiddle it, finally, parcel of books*), the lateral may remain as dark and may remain syllabic or become non-syllabic; alternatively, the lateral may become clear, in which case it is usually non-syllabic. The lateral is less likely to become clear in those cases where the following word begins with an accented syllable, where a [ʔ] may intervene, as in *real ale* [riːɬ ˈʔeɪɬ], cf. *real estate* [ˈriːl esteɪt].

Variations in the quality of the back vowel resonance associated with [ɬ] are, however, to be found among RP speakers, with a range extending from [ö], [ʊ], or [ɤ] to [ɔ̈] or [ʌ̈]; lip positions, too, vary from neutral to loose rounding. In some speech, notably that of London and the surrounding areas,[56] the tongue-tip contact for [ɬ] is omitted, this allophone of /l/ being realized as a vowel (vocoid) in the region of [ö] with weak lip-rounding or as [ɤ] with neutral or weakly spread lips, thus *sell* [seö] or [seɤ], *fall* [fɔö] or [fɔɤ], *table* [ˈtæɪbö] or [ˈtæɪbɤ]. In such speech, the lowering of /iː/ and /uː/ before [ö] is so marked that *meal, mill*, and *pool, pull*, may become homophonous or distinguished merely by the length of the central syllabic vowel element, i.e. [mɪˑö] vs [mɪö], [pʊˑö] vs [pʊö]; other confusions are likely, e.g. *rail* (RP [reɪɬ], Cockney [ræö]) and *row* (RP [rəʊ], Cockney [ræö]), *dole* (RP [dəʊɬ], Cockney [dɒö]), and *doll* (RP [dɒɬ], Cockney [dɒö]). Realizations of syllabic [ɬ] as a vowel are not, however, confined to Cockney; many RP speakers and especially those of London Regional RP (= Estuary English) will use [ö] for [ɬ] in words such as *beautiful, careful, people, table* etc., i.e. especially when a consonant involving a labial articulation precedes; they will, moreover, not recognize such a vocalic allophone as unusual when they hear it. The use of a vocalic allophone seems somewhat less usual in RP when other consonants precede, e.g. in *uncle, Ethel, parcel, special, spaniel*, and is

[55] O'Connor *et al.* (1957), Lisker (1957b), Dalston (1975)

[56] See Sivertsen (1960), Wells (1982), Trudgill (1999)

particularly avoided, as a childish pronunciation, after alveolar plosives, e.g. *little, middle*, where the consonants are regularly released laterally. On the other hand, in an artificial or somewhat precious style of speaking, [l] may be used for [ɬ].

In other dialects of English the RP distribution of [l] and [ɬ] may not obtain. In General American, in Standard Scottish English, in Australian, and in New Zealand English, as well as in large parts of the north of England (e.g. Manchester) and North Wales, dark [ɬ] may occur in all positions. In southern Irish English, in West Indian English, as well as in South Wales and on Tyneside, clear [l] may occur in all positions. Note, too, that American English has syllabic [ɬ̩] in words such as *fertile, futile, missile, reptile* etc., where RP retains a prominent preceding vowel [-aɪɬ]; a reduction of the vowel, similar to the present American form, occurred in seventeenth-century British English.

(4) *Chief sources*—PresE /l/ derives from OE [l,ll] (*land, climb, all, tell, apple*), from OE [hl], [xl] or [l̩] (*loaf, ladder*)—since OE front vowels tended to be diphthongized before /l/, it seems likely that /l/ in such a position was velarized in OE as it is today; from OF [l] (*lamp, close, colour, veal, able*). In many cases pre-consonantal [ɬ], especially after back or open vowels, was vocalized to [ʊ] (*walk, talk, half, folk*) in the early fifteenth century, such a pronunciation being commonly shown by the seventeenth-century grammarians; but in some cases (*halt, salt, malt*), it has been retained; in others, an /l/ has been re-introduced in spelling and pronunciation (*fault, falcon, emerald, soldier, realm*) or merely in the spelling (*calm, palm, balm*). The loss of /l/ in *could, should, would* occurred in eModE.

(5) *Acquisition of /l/ by native learners*—The lateral /l/, along with /j/ and /w/ but not /r/, is usually among the first sounds added to the nasals and plosives of children's early words. It is only rarely a problem in acquisition, and is regularly present by the age of 3;6. For a short period before its acquisition it may be replaced by /j/. Dark [ɬ] may often be replaced by vocalic [ʊ], this tendency being reinforced by the same tendency in adult English in those accents mentioned above. A voiceless [ɬ] may sometimes be heard in children's speech as a replacement for the initial clusters /sl-/ and /fl-/, e.g. *sleeve* [ɬiː], *fling* [ɬɪŋ].

(6) *Advice to foreign learners*—Few foreign learners will possess in their own language [l] and [ɬ] sounds with the RP distribution and many will have only clear [l], e.g. French, German, Hindi, and Spanish. It is true that, since there is no phonemic opposition between [l] and [ɬ] in English, learners will be perfectly intelligible if they use only [l]. But those whose English otherwise conforms to an RP pattern should learn to make the dark [ɬ]. In the articulation of [ɬ] there should be no 'curling back' of the tongue, as is so often advised in books on English. To overcome such a habit already acquired, the tongue-tip may be gripped between the teeth during practice. The essential feature of [ɬ] may be said to be the accompanying weakly rounded [o] or [o̜] quality; learners should, therefore, begin by pronouncing a vowel of the [o] or [ɔ] type for the syllabic [ɬ] in words such as *bubble, people, awful*, i.e. where a labial consonant precedes [ɬ], thus—[ˈbʌbo], [ˈpiːpo], [ˈɔːfo]. A pure vowel of this kind is likely to occur in their own language. Such a pronunciation will come near to that used by many English speakers (see (3) above). The same sound sequence should then be attempted with the tongue-tip touching the upper teeth ridge, thus producing a lateral sound with the correct velarized quality. The relationship of [ɬ] and [o] can further be

established by practising the alternation of [o]–[ɬ]–[o]–[ɬ], only the tongue-tip moving and the [o] resonance continuing. The [ɬ] thus achieved should then be used in the examples of [ɬ] given in (1) above, first the syllabic cases and then the non-syllabic.

Foreign learners from some language backgrounds, in particular Slav languages, may use an over-velarized lateral in pre-vocalic positions. This should be particularly avoided, as such over-velarization is not even typical of those varieties of English which have a dark [ɬ] in all positions.

Care should also be taken to use a sufficiently devoiced [l̥] after accented (aspirated) /p,k/. Accented /p,k/ are distinguished from /b,g/ mainly by their aspiration; it is important that this aspiration cue should be made clear in the sequences /pl,kl/ by the voicelessness of the /l/. If this is not done, a word such as *plot*, pronounced with a fully voiced /l/, may be understood as *blot*. Pairs for practice, relying largely for the opposition on voiceless vs voiced [l], are: *plot, blot; plead, bleed; plight, blight; clad, glad; class, glass; clean, glean; clue, glue.*

9.7.2 Post-alveolar Approximant /r/

(1) *Examples*

r—red, round, ripe, raw, rude, rope, rule
rr—carry, arrive, arrogant, correct, arrest, narrative, barrister
wr—write, wrote, wrinkle, wriggle, wrist, wreath, wrong
rh—rhythm, rhyme, rhinoceros, rheumatism, rhetoric, rhododendron
word-initial—reed, rag, raw, rude, rut, road, royal, rear
word-medial, intervocalic—mirror, very, arrow, sorry, hurry, furry, arrive, diary, dowry, dairy, eery, fury
word-final (/r/-link with following word beginning with a vowel (see §12.4.7))—far away, poor old man, once and for all, here at last, there are two
in consonantal clusters
(following voiceless accented plosive = fully devoiced [ɹ̥])—price, proud, tree, try, cream, crow; expression, surprise, attract, extremely, decree
(following voiceless fricative, unaccented voiceless plosive, or accented voiceless plosive preceded by /s/ in the same syllable = somewhat devoiced [ɹ])—fry, afraid, throw, thrive, shrink, shrug; apron, mattress, nitrate, buckram, cockroach; sprint, sprat, street, strain, scream, scrape, history /ˈhɪstrɪ/
(following voiced consonant in the same syllable = [ɹ]-fricative after /d/)—brief, bright, dress, dry, dream, boundary, address, tawdry, grey, grow; umbrella, address, agree, hungry; comrade, sovereign, general, miserable
words containing more than one /r/—brewery, library, retrograde, rarer, treasury, gregarious, procrastinate

Compare

/r/, /l/—raft, laughed; rush, lush; red, led; right, light; pirate, pilot; sherry, Shelley; two rocks, two locks; crash, clash; pray, play; fry, fly; grew, glue; bright, blight
/tr/, /dr/—trip, drip; trench, drench; tram, dram; trunk, drunk; troop, droop; try, dry

/tr/, /tʃ/—trees, cheese; trip, chip; trap, chap; true, chew; train, chain
/dr/, /dʒ/—drill, gill; dressed, jest; draw, jaw; drew, Jew; dram, jam; drear, jeer; Drury, jury

(2) *Description*

(a) *Articulatory and distributional features*—The most common allophone of RP /r/ is a voiced post-alveolar approximant [ɹ]. The soft palate being raised and the nasal resonator shut off, the tip of the tongue is held in a position near to, but not touching, the rear part of the upper teeth ridge; the back rims of the tongue are touching the upper molars; the central part of the tongue is lowered, with a general contraction of the tongue, so that the effect of the tongue position is one of hollowing and slight retroflexion of the tip. The airstream is thus allowed to escape freely, without friction, over the centre part of the tongue. The lip position is determined largely by that of the following vowel, e.g. *reach* with neutral to spread lips, *root* with rounded lips. This allophone of the RP phoneme is, therefore, phonetically vowel-like, but, having a non-central situation in the syllable, it functions as a consonant.

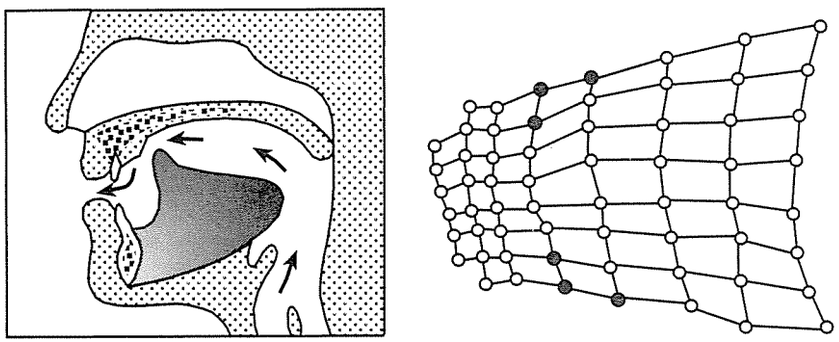

Fig. 49. *Section and palatogram of* /r/ = [ɹ].

RP /r/ occurs only before a vowel, the above description being applicable to the realizations: syllable-initially before a vowel; following a voiced consonant (except /d/), either in a syllable-initial cluster or at word or syllable boundaries; word-final /r/ linking with an initial vowel in the following word (see §12.4.7). This limited distribution applies also to other non-rhotic accents (see §7.4).

When /d/ precedes /r/, the allophone of /r/ is fricative, the /d/ closure being post-alveolar and its release slow enough to produce friction, e.g. in *drive, tawdry* and, in rapid speech, at syllable or word boundaries, e.g. *headrest, bedroom, wide road*.

A completely devoiced fricative [ɻ̊] may be heard following accented /p,t,k/, e.g. *price, try, cream, oppress, attract, across*. A partially devoiced variety of /r/ occurs: when /r/ follows an unaccented voiceless plosive initial in a syllable and, in rapid speech, at syllable boundaries, e.g. *upright, apron, paltry, nitrate, beetroot, cockroach, acrobat*; in the syllable-initial sequences /spr-,str-,skr-/, e.g. *spring, string, scream*; and after other voiceless consonants in unaccented syllables, e.g. *fry, thrive, shrink*. Slight devoicing may also occur, in rapid speech, following these latter voiceless fricatives, when they are unaccented and final in the preceding syllable, e.g. *belfry, saffron, necessary* /ˈnesəsrɪ/, *surf riding, birthright, horse race, cockroach, mushroom*.

(b) *Acoustic features*[57] The voiced post-alveolar approximant /r/ has a formant structure like vowels but, like the nasals and /l/, this structure is only weakly apparent. F1 is between 120 and 600 Hz, the lower the frequency the greater the perceived impression of lip-rounding; F2 is between 700 and 1,200 Hz; F3 is notable by being very close to F2. However, since the steady-state formants are likely to be very weak, /r/ is more easily identifiable on spectrograms by its steeply rising transitions (for F1, F2, F3 and F4) to a following vowel. See spectrograms in Fig. 43.

(3) *Variants*—There are more phonetic variants of the /r/ phoneme than of any other English consonant. In Refined RP, the approximant variety [ɹ] may be replaced by an alveolar tap [ɾ] in intervocalic positions, e.g. *very, sorry, marry, Mary, forever,* following /θ,ð/, e.g. *three, forthright, with respect*, and also, with some speakers, after other consonants, especially /b,g/, e.g. *bright, grow*. In the case of intervocalic [ɾ], a single tap is made by the tip of the tongue on the alveolar ridge, the side rims usually making a light contact with the upper molars. The articulation of [ɾ] differs from that of /d/ in that the contact for [ɾ] is of shorter duration and less complete than that of /d/, the central hollowing of the tongue typical of [ɹ] being retained; *carry* with [ɾ] and *caddie* with /d/ are, therefore, phonetically distinct. In the case of [ɾ] following /θ,ð/, a tap is made by the tongue-tip on the teeth ridge as the tongue is withdrawn from its dental position; again, the contact is of very brief duration and some tongue hollowing is retained.

In RP, too, the degree of labialization varies considerably. Although for perhaps the majority of RP speakers the lip position of /r/ is determined by that of the following vowel, some speakers labialize /r/ whatever the following vowel. In some extreme cases, lip-rounding is accompanied by no articulation of the forward part of the tongue, so that /r/ is replaced by /w/ and homophones of the type *wed, red*, are produced. Alternatively, a labiodental approximant [ʋ] may be heard as a realization of /r/ or even for both /r/ and /w/. Pronounciations of this sort were a fashionable affectation in the nineteenth and even early twentieth century. Although now generally regarded as a speech defect, they still (at least in England) seem more prevalent among those educated at major public schools.

A lingual trill (or roll) [r] may also be heard amongst RP speakers, but usually only in highly stylized speech, e.g. in declamatory verse-speaking. This trill, i.e. a rapid succession of taps by the tip of the tongue on the alveolar ridge, is often considered typical of some Scottish types of English, though a single tap or the approximant [ɹ] are more common. A tap is also the regular realization of /r/ in Liverpool and Newcastle.

A uvular articulation, either a trill [ʀ] or a fricative [ʁ], may be heard in the extreme north-east of England and also among some lowland Scottish speakers and as a defective substitution for [ɹ].

[57] O'Connor *et al.* (1957)

In some dialects the degree of retroflexion of the tongue for [ɹ] may be greater than in RP—[t], e.g. in the speech of the south-west of England and some American English. The retroflexion of the tongue may anticipate the consonant and colour the preceding vowel articulation; such 'r-coloured' vowels may occur in this type of speech in words such as *bird, farm, lord*. A perceptual effect similar to retroflexion is often achieved by a bunching of the front and central parts of the tongue towards the roof of the mouth.[58] In this type of articulation the tip of the tongue is not retrolexed but approaches the base of the teeth.

/r/ differs in various types of English not only in its phonetic realization but also in its distribution. Many dialects of English, including General American, most types of Irish English, Standard Scottish English, and much of the rural south and south-west of England, retain the earlier post-vocalic (both pre-consonantal and pre-pausal) usage of /r/, distinguishing between RP homophones such as *pour, paw; court, caught*. (Some older RP speakers still retain a vocalic element representing the former /r/, keeping *pour* /pɔə/ distinct from *paw* /pɔː/.) The quality of the post-vocalic /r/ used will correspond to the types given above according to the region. A retroflexed continuant, of somewhat greater duration than the pre- or post-vocalic form, may also have syllabic function, e.g. in *water, father, ladder, paper* etc. For the use of word-final, post-vocalic /r/ as a linking form in RP, see §12.4.7.

The /ə/ in the sequence of /ər/ is frequently reduced in rapid speech by the elision of the schwa. This may leave non-syllabic /r/ pre-vocalically or it may result in a syllabic /r/. Both are possible in *conference, misery, camera, reverie, malingerer, binary, commentary, memory, victory*. The elision of both /r/ and /ə/ in *library* has similar effects. A similar elision of /ə/ can take place in the sequence /rə/ and this may result in the introduction of pre-consonantal /r/ into RP; the elision of /r/ in *parrot, barrel* may leave syllabic or non-syllabic /r/ (see further under §10.8).

(4) *Chief sources*—PresE /r/ derives from OE [r,rr] (*rise, rope, green, nearer*)—with later loss in post-vocalic positions (*horse, four*); OE [hr], [xr] or [r̥] (*ring, roof*)—[h] or the voiceless nature of [r] being lost by early ME; OE [wr] (*wrap, write, wrest, wretch*)—[w] being commonly omitted in the sixteenth century and generally by the late seventeenth, producing homophones with *rap, rite, rest, retch*; from OF [r] (*rule, remain, fruit, very*)—with later loss in post-vocalic positions (*arm, poor*). It is likely that the quality of /r/ in OE and ME was that of a linguo-alveolar trill or tap as described in (3) above. Its vibratory nature is described by writers of the sixteenth and seventeenth centuries, but /r/ had for some time exerted an influence on the preceding vowel and an [ə] resonance is identified in the sixteenth century. By the seventeenth century it is probable that the trill or tap was used only before vowels and that the approximant [ɹ] occurred, with or without friction, finally and before consonants. The change from a fricative to a non-fricative [ɹ], then to [ə], and finally to disappearance or merging with a preceding vowel in post-vocalic positions is a natural sequence. Its loss in post-vocalic positions in educated speech of the south-east of England is likely to have taken place by the end of the eighteenth century—considerably

[58] See Hagiwara (1995)

earlier in unaccented syllables and more generally in popular speech. As has been stated above, total loss of earlier post-vocalic /r/ is restricted socially and regionally even today.

(5) *Acquisition of* /r/ *by native learners*—The post-alveolar approximant, unlike the other approximants, is commonly a late acquisition, often not being contrastive until the age of 5;0. It is frequently replaced by /w/ and even when a contrast between /r/ and /w/ is present, the /r/ may have an incorrect articulation, commonly [ʊ].

(6) *Advice to foreign learners*—RP /r/ has a quality which is rarely encountered in other languages, the usual approximant variety having much in common with a vowel. Any strongly rolled *r*-sound, whether lingual or uvular, is not acceptable in RP, although it is not a question of loss of intelligibility through phonemic confusion. A weak tongue tip tap is the least objectionable substitution for RP [ɹ]; but a uvular sound, trill or fricative, as so often used by French or German learners, is generally taken as a characteristic of a marked foreign accent, despite the fact that a uvular sound is not unknown in English regional speech. It is also important that those whose own *r*-sound is of the uvular type should not make a double articulation—uvular and post-alveolar at the same time.

A foreign learner should, therefore, try to abandon his own prejudices as to what an /r/ sound should be and approach the RP [ɹ] as if it were a vowel. Any central vowel, either English /ə/ or RP /ɜː/ or a similar vowel in the learner's own language, may be used as a starting point. An approximation to the correct quality can then be achieved by maintaining the vowel sound while curling the tip of the tongue backwards. This sound can then be linked to the following vowel in a word. It is important that [ɹ] should be made unusually long in this position until the tongue articulation is established, e.g. [ɹːed].

Alternatively, practice may start from /ʒ/, in the articulation of which the tongue has a position somewhat similar to that of [ɹ], although the sound is fricative, the narrowing between tongue and roof of the mouth made too far forward, and the tongue hollowing and lateral contraction missing. From the /ʒ/ position, the tongue should be retracted, hollowed, and slightly lowered, so that the friction is lost. With both methods, it is often helpful to hold the jaws widely separated and the lips somewhat rounded. The post-alveolar affricates /tr,dr/ may also be related to /tʃ,dʒ/, applying the same principles of retraction as just described (see also §9.3.1).

Examples for practice should be chosen according to the degree of difficulty and the phonetic nature of the /r/ allophone used. Thus, the fricative variety of the second element of the affricates /tr,dr/ may be the first to be practised (to establish the post-alveolar position), but the sequence /str-/ will give greater difficulty; intervocalic [ɹ] usually presents relatively little difficulty, especially as a one-tap [ɾ] is always permissible; the approximant in initial position may be the most troublesome articulation of all.

Learners should not be misled by the spelling into pronouncing the letter <r> in pre-consonantal and pre-pausal positions. In words such as *car, arm, horse, hurt* etc., the <r> may be taken as a sign indicating length of the preceding vowel, and in *fear, there, tour* etc, as a sign of the [ə] element of the diphthong. Nevertheless, in connected speech, the final linking /r/ form should normally be used. (See examples for practice in (1) above.)

As in the case of /l/, it should be remembered that in the sequences /pr-,br-,tr-, dr-,kr-,gr-/ the oppositions between voiceless and voiced plosives are indicated mainly by the degree of voicing in the following /r/. Thus, /pr-,tr-,kr-/ should have [ɹ̥], especially when accented, if they are not to be confused with /br-,dr-,gr-/; cf. pairs such as *pray, bray; try, dry; crow, grow*.

Many languages, including Japanese, Chinese, Tagalog, and some Bantu languages, have no distinction between /l/ and /r/. This contrast is often difficult to establish, the problem being as much perceptual as productive. Any attempt to teach the correct articulation of the sounds should therefore go hand in hand with drills to reinforce correct recognition.

9.7.3 Palatal and Labial-velar Approximants (or Semi-vowels)

(1) *Articulatory and distributional features*—A semi-vowel is a rapid vocalic glide onto a syllabic sound of greater steady duration. In English the semi-vowels /j/ and /w/ glide from positions of approximately /i:/ (with spread or neutral lips) and /u:/ (with rounded lips) respectively, e.g. in *year, west, inward, spaniel* [ˈspænjɨ]. The actual point at which the essential vocalic glide begins depends on the nature of the following sound, e.g. the glide of /j/ to /i:/ in *yeast* has a closer beginning than that of /j/ to /ɒ/ in *yacht*, and the starting-point of /w/ before /u:/ in *woo* is closer than that before /ɒ/ in *what*. When /j/ is followed by a back close vowel as in *you*, or /w/ by a front close vowel as in *we*, the starting-points need not be as close as in *yeast* and *woo*, since in the first cases the glide is essentially of a front to back (or vice versa) direction, rather than a movement of close to more open, as in the latter cases. In English, however, it is never necessary for the starting point of /j/+/i:/ or /w/+/u:/ to be so close that it falls within the fricative region beyond the vowel area, since English /i:/ and /u:/ are both sufficiently relaxed for a perceptible non-fricative glide to be made from a closer position within the vowel area.

Despite the fact that semi-vowels are, in phonetic terms, generally vocalic, they are treated within the consonant class, mainly because their **function** is consonantal rather than vowel-like, i.e. they have a marginal rather than a central situation in the syllable. /j/ and /w/ occur in the onset position of syllables either singly or as part of a consonantal cluster (see §8.2 for the treatment of the final [ɪ] and [ʊ] elements of English diphthongs as an integral part of the diphthongal glide, rather than as separable—consonantal—/j/ and /w/ occurring in the coda). Their consonantal function is emphasized by the fact that the articles have their pre-consonantal form when followed by /j/ and /w/, i.e. *the yard, a yacht, the west, a wasp*, with /ðə/ or /ə/ rather than with /ðiː/ or /ən/. Moreover, the allophones of /j/ and /w/ following a voiceless consonant are voiceless and fricative, as in *cue, quick* [kj̊uː], [kw̥ɪk], i.e. they fall within a phonetic definition of a consonant.

(2) *Acoustic features*[59]—Since /j/ and /w/ are vocalic glides (except in the case of the fricative allophones mentioned above), they may be expected to have acoustic features similar to those of vowels, i.e. a characteristic two- or three-

[59] O'Connor, *et al.* (1957)

formant structure similar to that of /i:/ or /u:/. In fact, as for vowels, two formants are sufficient for good recognition. Compared with /r,l/, the steady state of the semi-vowels is even shorter, e.g. of the order of 30 ms. F1 starting-point of the glide is that of /i:/ or /u:/, i.e. about 240 Hz; F2 has a starting-point within the range 2,280–3,600 Hz for /j/, depending on the following vowel, and within the range 360–840 Hz for /w/, depending on the following vowel. The transition duration of F2 is of the order of 50–100 ms for both /j/ and /w/. with that of F1 of the same or shorter duration. Spectrograms of /j,w/ are shown in Fig. 43.

9.7.4 Unrounded Palatal Approximant /j/

(1) *Examples*

y—yes, yacht, young, yours, yeast, year, yak, yearn, beyond, lawyer
i—spaniel /ˈspænjəl/, brilliant /ˈbrɪljənt/, senior /ˈsiːnjə/, onion, familiar /fəˈmɪljə/, behaviour, view, saviour, opinion
u—(as part of [juː]) use, muse, opulent, presume, congratulate, nebulous
ue—avenue, revue, revenue, argue, subdue, barbecue, pursue
ew,eu—(as part of [juː]) new, mildew, nephew, spew, feud, adieu, eulogy

(*Note* 'beauty, you'.)

word-initial—yield, yes, yard, yacht, yawn, union, young, yearn, yokel, year, Europe
following accented /p,t,k,h/ (*only before* /uː,ʊə/)= [ç]—pew, tune, queue, cure, pure, huge; accuse, secure, peculiar, attuned
following /sp,st,sk/, *voiceless fricatives, or unaccented* /p,t,k/=slightly devoiced [j̥]—spurious, stew, askew; enthusiasm, refuse; opulent, spatula, oculist; help you, kick you
following voiced consonant =[j]—beauty, duty, music, new, value, view; abuse, endure, argue, manure, onion, failure, familiar, residue, senior, behaviour

(2) *Description*—The vocalic allophones of RP /j/ are articulated by the tongue assuming the position for a close-mid to close vowel front (depending on the degree of openness of the following sound) and moving away immediately to the position of the following sound; the lips are generally neutral or spread, but anticipate the lip rounding of the following vowel in cases such as *you, yawn* etc. When /j/ follows a voiceless consonant, devoicing takes place; when /j/ follows accented /p,t,k,h/, the devoicing is complete, with the result that a voiceless palatal fricative [ç] is produced. (In these cases, it is the friction rather than the glide which identifies the phoneme.)

When /j/ is the final element of accented clusters, only /uː/, /ʊə/ or sometimes /ɔː/ may follow /j/ (*pew, cure*); in unaccented clusters, /j/ may be followed by /uː,ʊ,ʊə/ or /ə/ (*argue, opulent, tenure, senior*). The sequence /h/+/j/ as in *hue* /hjuː/ [hçuː] may coalesce into [ç] giving [çuː]. Such a realization entails oppositions between /i/, /h/, and [ç], raising the possibility of phonemic status for [ç]—*you, who, hue*. The number of words offering the sequence /h/+/j/→ [ç] is, however, restricted (e.g. *hew, hue, human, humour*), and alternative pronunciations with

/h/+/j/ or /h/+[ç] (on the pattern of /p,t,k/+/j/) are possible. [ç] is, therefore, more conveniently treated as a realization of /h/+/j/.

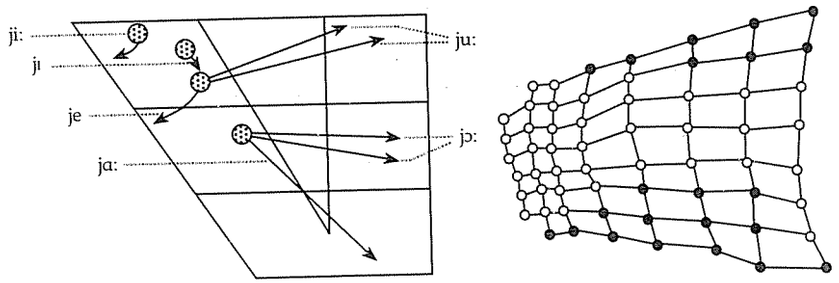

Fig. 50. *Vowel diagram and palatogram for /j/.*

(3) *Variants*—In many cases of RP /j/+/u:/, an alternative pronunciation without /j/ exists (and is extended further in American English). Earlier /ju:/ or /ɪu/ sequences (see §8.9.10) have regularly been reduced to /u:/ in PresE after /tʃ,dʒ,r/, and /l/ preceded by a consonant; /ju:/ is retained after plosives, nasals, /f/, /v/, and /h/ (*pew, beauty, queue, argue, tune, dune, few, view, nephew, huge*), and when /l/ is preceded by an accented vowel (*value, curlew*); but in other cases, more variation is possible, both /u:/ and /ju:/ being heard, e.g. in *absolute(ly), lute, salute, revolution, enthusiasm, pursuit, assume, suit, suet, suitable, superstition, supermarket, consume, presume* etc, though /u:/ grows increasingly common in such words, being the more common after /l/ and /s/ in an accented syllable whilst /ju:/ remains predominant after /θ,z/. Increasingly, pronunciations without /j/ are also heard following /n/ in accented syllables, e.g. *neutral, news*. In General American /j/ is regularly absent following /t,d/, e.g. *tune, tunic, dune, duty*, while in East Anglia /j/ may be dropped following all consonants, e.g. *beauty, music, view, argue*. The sequence /h/+/j/ is reduced to /j/ alone in some accents, e.g. in much of Wales.

Unaccented sequences of /tj,dj,sj,zj/ coalesced in an earlier state of the language into /tʃ,dʒ,ʃ,ʒ/ (see §§9.3.1, 9.4.5). In some cases, e.g. *statue, residue, issue, seizure, Christian, immediate, educate, gratitude, usual, visual, Jesuit*, both forms may now be heard, the pronunciation with /tj,dj,sj,zj/ being characteristic of careful speech; on the other hand, the occasionally heard coalesced forms in the onset of accented syllables, e.g. /ʃ,ʒ/ in *assume, presume* are regarded as non-RP. Such coalescences also occur in rapid, familiar, speech, at word boundaries, e.g. in *not yet, would you, this year, sees you* (§12.4.5).

In unaccented syllables there is often variation between /jə/ and /ɪə/, e.g. in *immediate, India, audience, tedious, idiot, hideous*. In the cases involving a preceding alveolar plosive where the /jə/ form may be regarded as the primary one, this form may occasionally be further reduced to /tʃ,dʒ/ in rapid speech, e.g. /ɪˈmi:dɪət, ɪˈmi:djət, ɪˈmi:dʒət/. In cases such as *Romania, Bohemia, Australia, morphia*, /ɪə/ tends to be retained in careful speech, as well as in those suffixes where /ə/ has a separable morphemic value, e.g. in *easier, heavier* (see §8.12.1 for those sequences of [ɪ] plus [ə] which are better regarded as bisyllabic).

A junctural [ʲ] glide may sometimes be heard between /i:,ɪ,eɪ,aɪ,ɔɪ/ and a following vowel, e.g. *seeing* [ˈsi:ʲɪŋ]; *saying* [ˈseʲɪŋ], *sighing* [ˈsaʲɪŋ], *enjoy it* [enˈdʒɔʲɪt], *see ants* [si:ˈʲænts], *say all* [seˈʲɔ:l], *my aunt* [maɪˈʲɑ:nt], *toy arm* [tɔɪˈʲɑ:m], resulting from the relatively close quality given to /i:/ and [ɪ] and the subsequent glide to the following, more open, vowel. However, such a glide is rarely equivalent in nature to a phonemic /j/, the finishing point of the diphthong not being sufficiently prominent, nor the glide being long enough. The difference between phonemic /j/ and junctural [ʲ] can be seen in the opposition between *my ear* /maɪ ˈɪə/ (= [maɪ ˈʲɪə]) and *my year* /maɪ ˈjɪə/ (= [maɪ ˈjɪə]), and *we earn* /wi ˈɜ:n/, (= [wi: ˈʲɜ:n]) and *we yearn* /wi ˈjɜ:n/ (= [wi ˈjɜ:n]). A junctural [ʲ] always has the alternative of a glottal stop, e.g. [maɪ ˈʔɪə] and [wi ˈʔɜ:n] (see §9.2.8).

(4) *Chief sources*—PresE /j/ derives from OE [j] (itself deriving from a palatalized form of [g]) (*yard, year, yield, yoke, young*). PresE /j/ (+/u:/) also derives from ME [ɪu,eu] (see §8.9.10) and from loss of syllabic value of [ɪ] before another vowel in unaccented situations, e.g. in words of French origin such as *opinion, familiar, onion, William, pavilion*, where the <i> had at an earlier stage represented the palatal nature of French /ɲ,ʎ/.

(5) *Acquisition of /j/ by native learners*—The palatal approximant, along with /l/ and /w/, is usually among the first consonants added to the plosives and nasals of children's first words. It is only rarely a problem in acquisition, and is regularly present by 3;6.

(6) *Advice to foreign learners*—RP /j/ presents little difficulty except where it occurs before a following close front vowel, as in *yeast, yield, Yiddish, year*, where there may be a tendency to omit the /j/ altogether. In such cases it can be helpful to make the learner say an additional [i:] instead of the [j] at the beginning of the word, e.g. [i:i:st], [i:i:ld], [i:ɪdɪʃ], [i:ɪə] and then gradually shorten the [i:]. Spanish learners should avoid using a palatal plosive [ɟ] in accented syllables, e.g. in *yes, young* [ɟes, ɟʌŋ]. Speakers of languages like French having unaspirated /p,t,k/ should be sure to correctly devoice a following /j/, e.g. in *pew, tune, queue*.

9.7.5 Labial-velar Approximant /w/

(1) *Examples*

w—west, weather, wink, wit, wet, wagon, walk, wood, swoon, sweep
wh—which, what, where, when, whether, while, wheel, whisper, whistle, white, whisky, whist
u (following <*q,g,s*>)—quick, quiet, queen, colloquial, conquer, adequate, language, penguin, linguist, sanguine, anguish, persuade, suede, suite

(*Note* 'one, once, choir'.)

word-initial = [w]—weed, wet, wag, wasp, wood, womb, one, word, wave, woke, wire, weird, wear
following accented /t, k/= [ʍ]—twig, twelve, twin, twice, queen, quell, quick, quite, quaint, acquaint
following /sk/, *accented voiceless fricative or in unaccented syllable following* /p,t,k/= slightly devoiced [w̥]—square, squash, squirrel; thwart, swim, swear, swoon; upward, outward, equal; pump water, that word, take one

intervocalic, or following voiced consonant = [w]—away, aware, inward, always, language; dwindle, dwarf, guano
possible oppositions /w/, /ʍ/—witch, which; weather, whether; wine, whine; Wales, whales; wear, where

Compare

/w/, /v/—west, vest; wine, vine; worse, verse; wail, veil; weir, veer

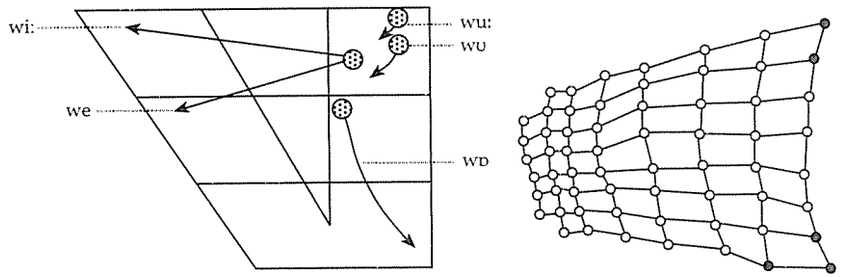

Fig. 51. *Vowel diagram and palatogram for* /w/.

(2) *Description*—The vocalic allophones of RP /w/ are articulated by the tongue assuming the position for a back close-mid to close vowel (depending upon the degree of openness of the following sound) and moving away immediately to the position of the following sound; the lips are rounded (more closely when followed by /u:,ʊ/ or /ɔ:/ than when preceding a more open or front vowel—cf. *woo, wood, war*, with *what, west, we*; in those cases where /w/ precedes /u:/, the lip-rounding for /w/ is closer and more energetic than that associated with /u:/, permitting a distinction between a pair such as *ooze, woos*). This is an example of double articulation, the approximation of the articulators at the bilabial and velar places of articulation constituting two strictures of equal rank. The soft palate is raised and the vocal folds vibrate; but when /w/ follows a voiceless consonant, devoicing takes place: when /w/ follows accented /t,k/, the devoicing is complete =[ʍ], a voiceless labial-velar fricative—the friction being bilabial. In this latter case, it is the bilabial friction rather than the glide which identifies the phoneme; words such as *swoop, swoon*, are distinguished from *soup, soon*, not only by the stronger lip action associated with /w/ but also by its devoiced friction.

Consonants preceding /w/, especially initially in an accented syllable, will be lip-rounded in anticipation of /w/, e.g. in *twist, queen, swing, language, conquest*; such rounding occurs to a lesser extent at syllable or word boundaries, e.g. in *onward, bindweed, front wheel, this one*.

(3) *Variants*—The main variant, both in RP and in other types of British English, concerns the pronunciation of the spelling <wh>. Among careful RP speakers and regularly in several regional types of speech, e.g. in Scottish English, words such as *when* are pronounced with the voiceless labial-velar fricative [ʍ]. In such speech, which contains oppositions of the kind *wine, whine*, shown in (1) above, /ʍ/ has phonemic status. Among RP speakers the use of /ʍ/ as a phoneme has declined rapidly (though it is often taught as the correct form in verse-speaking). Even if /ʍ/ does occur distinctively in any idiolect, it may nevertheless be interpreted phonemically as /h/+/w/ (cf. the treatment of [ç] in §9.7.4.(2)). The fact that the stock of words in which /ʍ/ may occur (e.g. *whale, what, wheel, when, where, whet, which, whig, whin, whine, whirr, whist, whit, why*) is greater than those in which [ç] may occur, does not of itself provide sufficient argument for a monophonemic rather than a biphonemic solution.

A junctural [ʷ] glide may sometimes be heard between /u:,ʊ,əʊ,aʊ/ and a following vowel, e.g. *doing* [ˈduːʷɪŋ], *following* [ˈfɒləʊʷɪŋ], *allow it* [əˈlaʊ ʷɪt], *who asked* [huː ˈʷɑst], *follow on* [fɒləʊ ˈʷɒn], resulting from the relatively close quality given to /u:/ or [ʊ] and the subsequent glide to the following, more open, vowel. However, such a glide is rarely equivalent in nature to a phonemic /w/, the finishing point of the vowel not being sufficiently prominent, nor the glide long enough. The difference between phonemic /w/ and junctural [ʷ] can be seen in the opposition between *two-eyed* [tuː ˈʷaɪd] and *too wide* [tuː ˈwaɪd] and between *no air* [nəʊ ˈʷeə] and *no wear* [nəʊ ˈweə]. A junctural [ʷ] always has the alternative of a glottal stop, e.g. [tuː ˈʔaɪd] and [nəʊ ˈʔeə] (see §9.2.8).

(4) *Chief sources*—PresE /w/ derives from OE [w] (*way, wolf, wash, widow, twin, dwarf*); from OF [w]—a northern French form, where Mod French has /g/ (*wage, ward, warrant, war*); from an earlier French [u] preceded by a velar plosive and followed by another vowel (*squire, squirrel, squadron*). In many cases an earlier [w] has been lost (*so, such, thong, two, sword, answer*) during the ME or eModE periods. [w] in the cluster [wr] (*write, wreck, wrist*) was finally lost in the late seventeenth century.

PresE /ʍ/ derives from OE [hw], [xw] or [w̥] (spelt <hw> in OE) (*whale, wheel, where, when, which, whistle*). [hw] or [ʍ] finally merged with /w/ in educated southern speech in the late eighteenth century, although still deplored by normative elocutionists; /w/ occurs for [hw] much earlier—probably in ME—however, in popular speech. The reduction of [hw] to /w/ is parallel to that of [hr,hn,hl] to /r,n,l/; the relatively smaller number of French words entering the language with /w/ (compared with the numerous examples with initial /r,n,l/) may be a reason for the longer persistence of a /hw/–/w/ opposition, the imbalance between the voiceless and voiced varieties being not so marked as in the case of /hr,hn,hl/vs /r,n,l/.

In the case of *who, whom, whose*, it is the [w] element which has been lost (probably by the eModE period), due to a merging of the [w] with the following, similar, /u:/. The addition of initial /w/ in *one, once* (cf. *alone*), occurred from late ME onwards in popular speech, existed alongside [o:n,o:ns] forms in eModE, and was finally adopted as regular by the end of the seventeenth century.

(5) *Acquisition of* /w/ *by native learners*—The labial-velar approximant is often the first approximant to be acquired, following fairly rapidly on the prior acquisition of nasals and plosives. It rarely presents a problem, and is usually present by at least 3;0.

(6) *Advice to foreign learners*—It is important that the vocalic allophone of /w/ should not be replaced by a consonantal sound, i.e. either a voiced bilabial fricative [β] (as in Hungarian), or a voiced labiodental fricative [v] (as in German), or a labiodental approximant [ʋ], in which there is a loose approximation (without friction) between the lower lip and the upper teeth (as in Hindi).

All such substitutions will be interpreted by the English ear as /v/. The learner should protrude and round his lips, ensuring that the teeth play no part in the articulation; if necessary, in practice, an energetically rounded full [u:] vowel should be used, e.g. *wine* being pronounced as [u:aɪn], and a clear distinction being made between this word and *vine* (see examples in (1) above). The same protruded and rounded lip action (and absence of lower teeth contact) applies to the voiceless allophone [ʍ], as in *quite, twin* etc. As in the case of the voiceless allophones of /l,r,j/, it is important that /w/ should be devoiced, especially after accented /t,k/, despite the fact that there are no exact pairs depending on the opposition [dw,gw]–[tʍ,kʍ], cf. *dwell, twelve; distinguish, relinquish; dwindle, twin; Gwen, quench.*

9.8 *Frequency of Occurrence of RP Consonants*

As a class, the alveolar phonemes emerge as those which occur most frequently in English, this being a generalization which appears to be applicable to many languages. The text frequencies of English consonants as given in Fry (1947) are shown in Table 13.

	%		%
n	7.58	b	1.97
t	6.42	f	1.79
d	5.14	p	1.78
s	4.81	h	1.46
l	3.66	ŋ	1.15
ð	3.56	g	1.05
r	3.51	ʃ	0.96
m	3.22	j	0.88
k	3.09	dʒ	0.60
w	2.81	tʃ	0.41
z	2.46	θ	0.37
v	2.00	ʒ	0.10
Total all consonants: 60.78 %			

Table 13. *Text frequencies of consonants in RP**
** (From Fry (1947). Revised percentages (supplied by G. Perren) for /t/, /d/, and /r/ are included.*

The frequencies of consonants shown in Table 13 and in other studies of text frequencies[60] show their rank order of occurrence falling into five groups:

[60] In addition to Fry (1954) see also Carterette and Jones (1974), Mines *et al.* (1978), Knowles (1987)

(i) /n,t,d,s,l,r/ (with /r/ much more frequent in General American because of its occurrence of pre-consonantal and pre-pausal positions);
(ii) /ð,k,m,w,z/;
(iii) /p,b/;
(iv) /f,v,h,j,g,ŋ/;
(v) /θ,ʃ,ʒ,tʃ,dʒ/.

As is to be expected from its historical origins and its restricted contextual distribution, /ʒ/ regularly occupies the lowest position. In any general text frequency count such as this, the order obtained will reflect the occurrence of 'common' words such as *the, that, which* etc., giving preponderance to /ð,w/, for example, as against /θ,j/.

There are notable discrepancies between the occurrence of voiceless and voiced members of homorganic pairs of phonemes: thus, /s,ð,k/ occur more frequently than their counterparts. Discrepancy in general frequency of occurrence is, however, less important, as far as oppositional significance is concerned, than the frequency of minimal pairs, the so-called FUNCTIONAL LOAD of contrasts. By this measure the contrasts of /θ/ vs /ð/ and /ʃ/ vs /ʒ/ carry a very low functional load, with minimal pairs being almost non-existent (*high* vs *thy*, *ether* vs *either*, *teeth* vs *teethe*, *Aleutian* vs *allusion*, *illusion* vs *Illuyshin*, *leash* vs *liege*, *Confucian* vs *confusion*).