

CHAPTER EIGHT

The Organs of Speech - German Consonant Articulation

In the last chapter IPA transcription was introduced and a very brief account of the production of speech sounds was given. In this chapter the functions of the speech organs will be described more fully, after which the German consonants will be described in terms of how and where they are actually formed. German vowels will be described in the following chapter.

The organs of speech and their functions

The **lungs** provide the flow of air without which audible speech is impossible. The **muscles of the rib-cage** control that flow of air. The air passes from the lungs through the **windpipe (trachea)** to the **larynx**. The larynx and its function were described in chapter 7. Figure 8.1 shows the vocal organs above the larynx. The **pharynx** is the area between the nasal cavity and the larynx. In German no sounds are actually articulated in the pharynx, which serves as a conduit for air and as a resonance chamber.

Most articulatory activity takes place in the mouth. The parts of the mouth which are relevant to our discussion are the **lips**, the **tongue**, the **upper teeth** and the various parts of the roof of the mouth. By far the most flexible of these parts of the mouth is the tongue, so, not surprisingly, the tongue is involved in most vocal activity. For our purposes the tongue can be divided into two parts - the **apex**, or tip, and the **dorsum**, roughly the rest of it. These two parts of the tongue can be touched against other parts of the mouth or can be put in close proximity to other parts of the mouth to produce certain speech sounds. The tongue also serves to regulate the size and shape of the vocal tract, thus governing the size and shape of a resonance chamber.

Speech sounds are conventionally divided into categories - consonants and vowels¹ - depending on the degree of obstruction of the passage of air involved in the articulation of the respective sounds. Consonants involve relatively great obstruction of the passage of air, and vowels involve relatively little obstruction. Notice the word *relatively*. Much in linguistics is relative, and clearly defined boundaries are a rare luxury. Thus there are some sounds which have some of the properties of both consonants and vowels, while others are clearly consonants or vowels.

¹The actual technical terms are *contoids* for consonant-like sounds and *vocoids* for vowel-like sounds, but the more conventional terms *consonants* and *vowels* will serve our purposes.

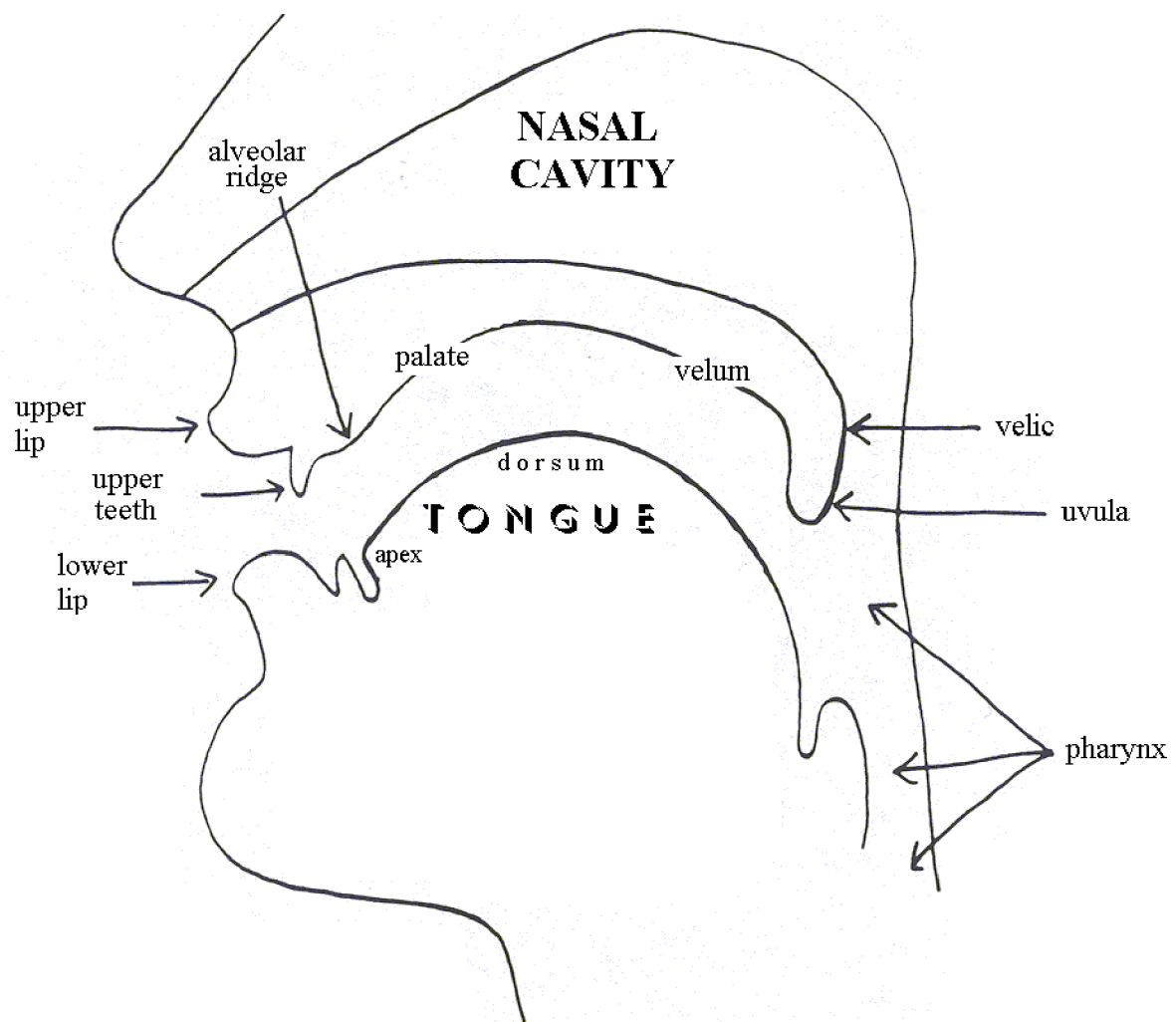


Figure 8.1 - The Organs of Speech above the Larynx

If the flow of air is cut off completely during the articulation of a consonant, a short silence results. Speech sounds which involve the complete stoppage of the air flow are conventionally referred to as **stops**. The German consonants [p, b, t, d, k, g] are stops because they all involve the temporary cessation of air flow. If, on the other hand, the passage through which the air flows is not closed completely but is narrowed enough for audible friction to occur, we speak of the sounds which result as **fricatives**. The German consonants [f, v, s, z, ʃ, ʒ, ç, x, h] are fricatives. The opposition stop vs. fricative is referred to as **manner of articulation**. One useful way to describe the consonants of German is in terms of **manner of articulation**, i.e. whether they are stops or fricatives.

The physical point at which the air is stopped or restricted in its flow is also relevant to the description of speech sounds. This is referred to as the **position of articulation**. To describe a position of articulation adequately we must divide the upper vocal tract into two groups of speech organs, **articulators** and **points of articulation**. The articulators are the speech organs along the **lower** periphery of the vocal tract, specifically the two parts of the tongue (**apex** and **dorsum**) and the **lower lip**. The points of articulation are the speech organs along the **upper** periphery of the vocal tract. These are the **upper lip**, the **upper teeth**, the **alveolar ridge**, which is the gum ridge just behind and above the upper teeth, the **palate**, which is the area of the roof of the mouth immediately behind the alveolar ridge, the **velum**, which is the back of the roof of the mouth, and the **uvula**, which is the pendant-shaped piece of flesh which hangs down in the back of the throat. It should be mentioned at this point that there are, of course, no clear divisions between the apex and the dorsum, or between the alveolar ridge and the palate, or between the palate and the velum. The whole upper area of the speech tract is a continuum, which means that the number of sounds which can be articulated there is infinite. The same is true of the tongue. Nevertheless, as we shall see later, there are reasons to divide up the speech tract as we have done here, but it should be borne in mind that the divisions are approximate only.

When the position of articulation of a consonant sound is being described it is conventional to present the description in the order **articulator + point of articulation**. The terms used are reproduced in Figure 8.2, on the next page.

In addition to describing German consonants in terms of **manner** and **position** of articulation, we must also mention whether the vocal cords vibrate or not. The vocal cords do **not** vibrate during the articulation of the stops [p, t, k, ʔ] nor during the articulation of the fricatives [f, s, ʃ, ç, x, h]. The vocal cords vibrate during the articulation of all other consonant sounds.

Finally we must describe whether the velic is in an open or closed position. The **velic** is a moveable flap of flesh at the back of the roof of the mouth. If it is moved back so that it presses against the back of the **nasal passage**, then all air used in speech flows through the mouth, but if it is moved forward, some air passes through the nose. If the velic is open and air flows through the nose, the resultant sounds are **nasals**. The German consonants [m, n, ŋ] are nasal consonants. All other German consonants are articulated with a closed velic, and all air flows through the mouth, the **oral** cavity. These consonants are thus called **oral** consonants.

Most German consonants can be more or less exhaustively described in terms of point of articulation, manner of articulation, voicing and nasality. The three which cannot are on the borderline between consonants and vowels. These are [l, j, ɻ]. [l] is a voiced alveolar **lateral**, which means that the tip of the tongue is placed against the alveolar ridge and the tongue is spread

	Noun	Adjective	Compounding Form
Articulator	lower lip apex dorsum	labial apical dorsal	labio- apico- dorso-
Point of Articulation	upper lip upper teeth alveolar ridge palate velum uvula	labial dental alveolar palatal velar uvular ²	
Compounding form of <i>articulator</i> + adjectival form of <i>point of articulation</i> = position of articulation, e.g.:			
	labio-dental	[f, v]	
	apico-alveolar	[t, d, n, s, z]	
	dorso-velar	[k, g, x]	
	labio-labial (= bilabial)	[p, b, m]	
	dorso-palatal	[ʃ, ʒ, ʧ]	
	dorso-uvular	[ʀ]	

Figure 8.2

Figure 8.3 is a schematic diagram of German consonant articulation.

	Labial*	Apico-Alveolar	Dorso-Palatal	Dorso-Velar	Dorso-Uvular	Glottal
stops						
voiceless	p	t		k		ʔ
voiced	b	d		g		
fricatives						
voiceless	f	s	ʃ ʧ	x		h
voiced	v	z	ʒ		ʀ	
nasals	m	n		ŋ		
lateral		l				
semivowel			j			

(* Labial includes **bilabial** [p,b,m] and **labio-dental** [f,v])

Legend: **position of articulation** horizontally

manner of articulation (stop ≠ fricative), **nasal**, **lateral** and **semivowel** vertically
voiced versus voiceless is indicated only for stops and fricatives (i.e. **obstruents**), since all nasals, liquids and semivowels are inherently **voiced**.

Figure 8.3 - German consonants in terms of features of articulation.

²See also Moulton (1962), chapter 2.

quite widely, so that the air must escape around the edges of the tongue. It is not a stop, because the air continues to flow, and it is not a fricative because no friction is audible. It is called a lateral because the tongue is in a lateral position. [j] is the consonantal equivalent of the vowel **i**, involving placing the tongue in a position similar to that required for [ç]. It is conventionally referred to as a **semivowel**, since it has both vocalic and consonantal properties. [ɣ] is even more vowel-like and will be described with the vowels.

It is necessary to distinguish between [ç] and [ʃ], both of which are voiceless dorso-palatal fricatives. Figure 8.3 does not distinguish them. The basic difference between the two from the hearer's point of view is the amount of noise they make. [ʃ] is much louder than [ç]. In fact, the German [ʃ] is also louder than its English counterpart. The reasons for the noise differential lie in the articulation of the sounds. Both [ç] and [ʃ] are articulated by putting the dorsum of the tongue close to the palate and pushing air through the space between the two. For [ç] the opening is a shallow slit, for [ʃ] it is a deep groove. [ç] is thus referred to as a **slit** fricative and [ʃ] is a **groove** fricative. Another difference which contributes to the noise differential is the fact that [ʃ] is spoken with rounded, protruded lips, whereas [ç] is spoken with spread lips³. We can thus distinguish [ʃ] and [ç] by describing [ʃ] as a voiceless dorso-palatal groove fricative (with lip-rounding) and by describing [ç] as a voiceless dorso-palatal slit fricative (without lip rounding).

Consonant Classes

The consonants of German, or of any other language, can be grouped together into various classes and sub-classes. Figure 8.3 shows some of those classes. German has five **labial** consonants, for instance. German has six **alveolars**. German has three **nasals**, one **lateral**, one **uvular** etc. There are also some other classes, some of which are confined to consonants only and some of which also include vowels.

Obstruents

The stops and fricatives are referred to collectively as **obstruents**. The common feature of obstruents seems to be that they are inherently neither voiced nor voiceless.

Liquids

[l] and [r] are classed together as **liquids**. In some languages, like German, [r] can also be classified as an obstruent, since it is a voiced fricative. In English, **r** is not an obstruent, since it is neither a stop nor a fricative.

Sonorants

Semivowels, nasals, liquids and vowels are referred to collectively as **sonorants**. **Sonorant vs. obstruent** is thus another binary division among speech sounds, similar to, but not identical with, the opposition **consonant vs. vowel**.

³You can check this by looking in a mirror and pronouncing *dich* and *Tisch*. For *dich* the lips should be spread almost into a smiling position and most of your teeth should be visible. For *Tisch* you should end with your lips protruded and rounded.