CHAPTER ELEVEN

The Phoneme

By now we should be familiar with describing sounds according to where and how they are articulated. We know that German [p] is a voiceless bilabial stop. We know that German [b] is a voiced bilabial stop. There is, however, a lot more to the description of [p] than what we have just said. Try the following experiment.

Light a match and hold it in front of your mouth (approximately 10 centimetres - 4 inches - away). Say the German word *Bass*. The flame should flicker a bit and then steady. Now say the German word *Pass*. This time the flame should go out. This is a dimension which we have not yet discussed. Obviously it is not enough to describe [p] as a voiceless bilabial stop. There is something else we must add. We must add that [p] is accompanied by enough air to blow out a match. [b], on the other hand, is not. The extra puff of air which accompanies [p] is called **aspiration**. [p] is aspirated, and [b] is not. Therefore a proper description of [p] should include the fact that it is aspirated, and a proper description of [b] should include the fact that it is not aspirated. But is [p] **always** aspirated? Try the following experiment.

Light another match. Again hold the match in front of your mouth, but this time say *Spaß*. The match should waver as it did for *Bass*, but it should not go out. Say *Pass* and the flame will go out. This indicates that German *p* is not always aspirated, specifically not after [ʃ].

Now let us look at the final sound of the German word *ab*. Despite the fact that it is spelled with a "b", this sound is pronounced as if the word were spelled *ap* or *app*. One of the spelling rules that non-native speakers must learn when they acquire German is that word-final *b* is pronounced as if it were *p*, just as word-final *d* is pronounced as if it were *t* and word-final *g* is pronounced as if it were *k*. If you light a match and hold it in front of your mouth and say *ab* you might get three different results. The flame may go out, or it may flicker and steady, or it might continue to burn with no apparent effect from having a word spoken at it, i.e. the match might react as if the word *Pass* had been spoken (flame goes out), or it might react as if *Bass* or *Spaß* had been spoken (flame wavers and steadies) or it might react in a way different from either of these.

Let us designate a puff of breath, or aspiration, with a superscripted [h], [ʰ]. A superscripted [h] is chosen because [h] is, phonetically, a puff of breath. The version of *p* which blows out a match, as in *Pass,* then, is [pʰ]. The *p* which does not blow out a match, as in *Spaß*, will be

represented simply as [p]. And the *p* which has no effect whatsoever on the match we will represent as [p̚]. The reason this last version of *p* has no effect is that the lips are kept together at the end of the word. Therefore no aspiration can escape, as for [pʰ], and, in fact, no air at all escapes, as it would for [p]. The *p* simply is not released. We thus have three phonetically quite different ways of pronouncing the entity which is spelled in German as *p* or, at the ends of words, as *b*. In some languages these three phonetically quite different sounds would be felt to be three entirely different entities, yet in German they are all perceived to be somehow the same thing, as opposed to, say, [b] in *Bass*. Speakers of German somehow **know** that the [pʰ] of *Pass* and the [p] of *Spaß* and the [pʰ], [p] or, as the case may be, [p̚] of *ab* are all somehow the same thing. We, as linguists, must not only record the fact that these three different p-like sounds are phonetically quite different, we must also record the fact that, in German at least, they are perceived by the speakers of the language to be somehow the same.

What we are dealing with here is the difference between a *physical* and a *psychological* reality. There is a very real physical difference between [pʰ], [p] and [p̚], but speakers of German systematically ignore this difference. On the other hand, there is very little physical difference between [b] and [p] (only the vibration of the vocal cords), yet this difference is recognised by speakers of German. [b], on the one hand, and the various varieties of *p*, on the other, are felt by German speakers to represent two different basic units. We will call these units *phonemes*. We will represent phonemes by putting them between slant lines (/ /). /p/ thus represents the psychological reality which is realised physically as [pʰ], [p] or [p̚]. Here we are clearly dealing with a difference between the physical world and the mental world. [p] is susceptible to physical measurement. /p/ is not. /p/ exists in the minds of the speaker and the hearer of German. [p], or [pʰ], is a one-time event. /p/ is ***abstract***, [p] is ***concrete***; specifically, [pʰ], [p] and [p̚] are concrete realisations of the abstraction /p/. Abstractions and their concrete realisations will show up in other areas of linguistics as well as in phonology. In this case the abstraction, represented between slant lines, (/ /) is called a **phoneme**. The phonemes are the abstract entities of which the various perceptibly different sounds are concrete realisations. It is the concrete realisations which are represented between square brackets ([ ]). Those things represented between [ ] are one-time events. The concrete realisations of the abstract **phonemes** are called **allophones**. We can thus say in a description of German that the German phoneme /p/ has (at least) three allophones: [pʰ], [p] and [p̚].

Let us look at another voiceless stop. The words *Kiel* and *kahl* both begin with /k/, but phonetically the two *k*-sounds are quite different. The initial sound of *Kiel* is articulated much further forward than the initial sound of *kahl*. The first sound of *Kiel* is articulated at the same point as the [ç] of *ich*, i.e. it is a palatal sound. The *k* of *kahl* is articulated much further back in the mouth. It is a true velar sound. In some languages these two different *k*-like sounds would be felt to be two different psychological entities, but not in German. (Nor in English, for that matter - the palatalised [kʲ] of *Kiel* is phonetically about the same as the *k* of English *keep*, and the velar [k] of *kahl* is about the same as the *c* of English *Carl*.) There are at least two allophones of German /k/, a palatalised [kʲ] and a non-palatalised [k].

Why are some rather considerable phonetic differences ignored by speakers and hearers of German and why are others not ignored? This is a difficult question to answer, as are many questions in linguistics which begin with "Why?", but the fact is that speakers and hearers of German **systematically** and **consistently** ignore certain phonetic differences and systematically and consistently do not ignore others. In other words, some phonetically quite different sounds are perceived to be somehow the same, and other phonetically different

sounds are perceived not to be the same. The difference between the two sets of sounds lies in their ability to distinguish meaning.

Speakers and hearers of German know that /b/ and /p/ are not the same because they know that *Pass* and *Bass* are different words. All that is different is the initial sound - everything else is the same. Therefore the difference between /p/ and /b/ is meaning-distinguishing. We have already seen that the association between sound and meaning is arbitrary - sounds have no inherent meaning. The set of sounds in a language which can, however, *distinguish* meaning is the set of phonemes of that language. What this means is that there is a set of entities in the sound system of a language. Replacing one of these entities with another in a given sequence will change the meaning of that sequence, as substituting /b/ for /p/ in *Pass* changes the meaning.

Phonetics is interested in saying as much as possible about individual occurrences of speech sounds. *Phonemics*, or *phonology*, as it is also called, is interested not in great phonetic detail but rather in isolating the set of phonemes of a language and describing them. The phonemes will have phonetically different variants - allophones. These must also be described and their distribution must be accounted for.

When trying to isolate the phonemes of a language, linguists use a method called the **minimal pairs test**. A minimal pair is a pair of utterances which differ by only one element. /pas/ and /bas/ are a minimal pair because they differ by only one phoneme. /ˈkasə/ and /ˈgasə/ are a minimal pair. Finding a minimal pair, i.e. two utterances which differ from each other by only one element of sound and which *mean different things*, establishes that the two sounds in question are different phonemes. Substituting one phoneme for another will cause a change in meaning. Substituting one allophone of one phoneme for another allophone of the same phoneme in a phonetic sequence will never result in another word. It will result in a distorted pronunciation, perhaps one which is so distorted as to be unrecognisable, but it will never result in an utterance with a different meaning. For example, substituting the aspirated [pʰ] of /pas/ (phonetically [pʰas]) for the unaspirated [p] of /ʃpɑs/ ([ʃpɑːs]) results in [ʃpʰɑːs], a somewhat comical version of /ʃpɑs/, but still understandable as *Spaß*.

What may at first glance seem to be two different phonemes because of gross phonetic differences may in fact turn out to be allophones of the same phoneme, and two sounds distinguished from each other by what to our ears may seem to be relatively minor differences may turn out to be different phonemes. For instance, English and German have a phonemic contrast /b/ ≠ /v/. Both languages have /b/ and /v/, which can easily be shown to be different phonemes by the minimal pairs test: English *beer - veer*, German *Bass - was*. Spanish also has [b] and a v-like sound which is not exactly like English and German [v], but is close enough to be heard by us as "the same". The IPA represents the Spanish voiced bilabial fricative as [β]. Now, in Spanish [b] and [β] are allophones of the same phoneme. Since Spanish has these two (to us) distinct sounds, and also because the Spanish alphabet uses the symbols *b* and *v*, it is natural for English and German speakers to assume that Spanish is like English and German. But it isn't. Conducting the minimal pairs test on [b] and [β] in Spanish never results in a change of meaning. It never results in *anything*, because [b] and [β] never occur in the same phonetic environment in Spanish. A minimal pair cannot be found. But words can be found which can be pronounced in two different ways. The Spanish word for "cow" is spelled *vaca*. Pronounced in isolation it is [ˈbaka]. The definite article for feminine nouns in Spanish is *la*. *Vaca* is a feminine noun. When the sequence *la vaca* is spoken, it is [laˈβaka]. The Spanish word *bandera* means "banner". In isolation this is pronounced [banˈdera]. With the article *la*

the phrase is pronounced [laβan'dera]. The spelling therefore does not determine the pronunciation. What determines the choice of [b] or [β] is the immediate phonetic environment. At the beginning of a so-called "breath group" - a word spoken in isolation or a group of words spoken together after a pause - /b/ is always [b]. Between vowels /b/ is always [β]. Thus *vaca* and *bandera* spoken in isolation will begin with [b]. When the /b/ of *vaca* and *bandera* is preceded by the definite article /la/ the /b/ is between vowels and must therefore be pronounced [β]. The two different allophones therefore never occur in the same immediate phonetic environment. This mutual exclusivity of phonetic environments is known as **complementary distribution**. Complementary distribution is an extremely important notion in linguistics.

Complementary distribution is one of the things which linguists look for when trying to group what might be allophones of one phoneme together. German [pʰ] and [p] are in complementary distribution at the beginnings of words and after [ʃ]. [p] (without aspiration) never occurs at the beginnings of words before vowels, and [pʰ] never occurs after [ʃ]. Similarly, [kʲ] and [k] are in complementary distribution because [kʲ] **always** occurs before /i/ and [k] never does, but [k] always occurs before /a/ and [kʲ] never does. Similarly Spanish [b] and [β] are in complementary distribution. If two sounds are in complementary distribution, then the chances are pretty good that they are allophones of the same phoneme.

Another sort of distribution linguists look for is **free variation**. In free variation any one of two or more variants (allophones) may be chosen in a particular environment. The allophones of /p/ are in free variation at the ends of words. Any of [pʰ], [p] and [p̚] may be chosen. The meaning is not affected. All three are "heard" the same way and the speaker cannot predict which allophone he/she will use in any given instance. It simply does not matter which allophone is used in that particular environment.

Finally linguists look for **phonetic similarity**. For two sounds to be grouped together they must have certain phonetic features in common - enough to make it intuitively credible that they belong together. The three allophones of /p/ are all voiceless bilabial stops. Spanish [b] and [β] are both voiced bilabial sounds. German [kʲ] and [k] are both voiceless stops articulated in the back of the mouth. They are physically some distance apart, it is true, but there is no other voiceless stop phoneme articulated between them. All three of these cases are instances of phonetic similarity. It is, of course, possible to have complementary distribution without phonetic similarity. In German, [h] and [ŋ] are in complementary distribution. [h] occurs only at the beginnings of words and between vowels when the stress is on the immediately **following** vowel. [ŋ] never occurs at the beginnings of words, it occurs between vowels only when some **preceding** vowel is stressed (i.e. never when the immediately following vowel is stressed), and it occurs at the ends of words. This is perfect complementary distribution, but it is doubtful that any linguist would claim that [h] and [ŋ] are allophones of one phoneme. They are phonetically too dissimilar. [h] is a voiceless glottal oral fricative - all air passes through the mouth. [ŋ] is a voiced velar nasal stop - all air passes through the nose. Every articulatory feature is different. Therefore no phonetic similarity exists. Consequently /h/ and /ŋ/ must be analysed as different phonemes.

Applying the minimal pairs test to the German sounds which we have been transcribing phonetically will result in twenty consonants and eighteen or nineteen vowels. The consonant and vowel phonemes of German will be the subject of the next chapter.