

4. Voicing in Plosives and Fricatives

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1. Introduction

As noted in chapter 5, one of the major ways that consonants differ from each other is in the accompanying action of the larynx, with the most typical larynx settings being one which allows air to flow freely between the vocal folds vs. one in which the vocal folds vibrate to produce regular voicing. One aspect of this opposition between voiced and voiceless consonants is discussed in chapter 5. In this chapter the distribution of a contrast between voiced and voiceless counterparts in the two major classes of consonants within which this contrast commonly occurs will be discussed. These two classes of consonants are the plosives and fricatives. **Plosives** are the kinds of sounds usually associated with the letters *p, t, k; b, d, g*, in which air flow from the lungs is interrupted by a complete closure being made in the mouth. **Fricatives** are the kinds of sounds usually associated with letters such as *f, s; v, z*, in which the air passes through a narrow constriction that causes the air to flow turbulently and thus create a noisy sound. The other classes of consonants which are found in the majority of languages (nasals, "liquids" and vowel-like approximants) are voiced in the overwhelming majority of cases.

Voiceless plosive and fricative consonants occur in more languages than voiced ones, but voiced types are nonetheless relatively common. How frequent it is for a contrast between voiced and voiceless plosives and fricatives to occur in languages and how such contrasts are distributed will be the focus of this chapter. A language will only be counted as having a contrast between voiced and voiceless plosives or fricatives if there is a pair of sounds in which the place of articulation and all other principal characteristics of the pair apart from the voicing

category are the same. Thus, for English a pair of words such as *rope* and *robe* are sufficient to establish that English has contrastive voicing in plosives, since the final consonants in these two words are both bilabial plosives and they differ in one being voiceless and the other voiced. Similarly, the pair of words *rice* and *rise* are sufficient to show that English has a voicing contrast in fricatives, since the final consonants in these two words are both alveolar fricatives which differ in voicing. English in fact has three pairs of contrasting plosives and four pairs of contrasting fricatives. The language Chickasaw (Muskogean; Alabama and Mississippi) has three voiceless plosives (bilabial, dental and velar in place), but has only one voiced one, the bilabial, written /b/. This, however, is sufficient for this language to be counted as having a voicing contrast in plosives. On the other hand Seneca (Iroquoian; New York State) is reported as having the two voiceless plosives /t, k/, which are articulated at alveolar and velar places, and a voiced bilabial plosive, /b/. This language is not counted as having a contrast of voicing in its plosives since there is no voiced/voiceless pair at any one place of articulation. Canela-Krahô (Ge-Kaingang; Brazil) is reported to have one voiceless fricative, which is velar in place, and two voiced fricatives, written /v, z/, which are pronounced at the labio-dental and alveolar places. Therefore this language is not counted as having a voicing contrast in fricatives, since there is no pair of voiced and voiceless fricatives made at the same place.

@	1. No voicing contrast	181
@	2. Voicing contrast in plosives alone	189
@	3. Voicing contrast in fricatives alone	38
@	4. Voicing contrast in both plosives and fricatives	158
	total	566

2. Geographical distribution of voicing contrasts

About a third of the languages surveyed for this chapter (32.0%) have **no voicing contrast in either plosives or fricatives**, as this has been defined above. The largest concentration of these occurs in Australia, where the great majority of the languages have only voiceless plosives and lack fricatives altogether (see chapter 18). A substantial number of languages in the Americas also fall into this class but in these cases there are usually both plosives and fricatives present in the consonant inventories. One typical example is Zuni (isolate; New Mexico), which has several voiceless members of both the plosive and fricative consonant classes but no voiced members of either of these classes. Canela-Krahô, mentioned above, is a less typical case since it has both voiced and voiceless fricatives but nonetheless lacks contrast. Some of the languages in Africa and the Pacific islands which fall into this class have both voiced and voiceless plosives but the voiced members of the class are prenasalized, that is, they begin with a part during which air is flowing out through the nasal passage. An example is Paamese (Oceanic; Vanuatu). This has the voiceless plosives /p, t, k/ but their voiced counterparts are only heard with a nasal onset as part of the prenasalized voiced plosives, so there is no straightforward contrast of voicing in plosives in this language. Absence of any voicing contrast also occurs sporadically in East Asia.

Approximately another third (33.4%) of the languages surveyed have **a voicing contrast in plosives but not in fricatives**. This type is dominant in the most southerly parts of Asia, where it is typical of the Dravidian languages as well as languages from other families, and is prevalent in New Guinea. It is also well-represented in Africa and the Americas, but is largely absent from Europe and western Asia. These languages most typically have some fricatives but only voiceless ones. An African example is Yoruba (Defoid, Niger-Congo; southeastern Nigeria), which has three contrasting pairs of voiced and voiceless plosives, as

well as three voiceless fricatives. Chickasaw, mentioned earlier, also belongs in this group although it has only the one contrasting plosive pair. It has four voiceless fricatives but no voiced ones. Ika (Chibchan; Colombia) and Murle (Surmic, Nilo-Saharan; Ethiopia) are unusual members of the group since they are reported as having only voiced fricatives, which therefore do not contrast with voiceless counterparts. Huave (Huavean; Oaxaca, Mexico) is reported to have some voiceless and some voiced fricatives, but no pairs at the same place of articulation, so this language also belongs in this group.

Another substantial group of languages has a **voiced/voiceless contrast in both plosives and fricatives**. This group amounts to 28.1% of the total, so it has slightly fewer members than the two previously described. Languages of this group are dominant in Europe and western Asia and also very common in Africa, but are quite rare outside these areas of the Old World. Most of the principal languages of European colonialism such as Portuguese, English, French and Russian, now widely used outside their original homelands, belong to this group, and their influence on indigenous languages in areas of their spread is likely to "recruit" progressively more languages into the group (if the indigenous languages are not simply replaced). Note that Spanish is not treated as having a voicing contrast in plosives since the sounds written with the letters *b*, *d*, *g* are not pronounced as plosives in most of their occurrences in speech but as voiced fricatives or approximants. Spanish therefore belongs to the final group of languages in this classification, those with a voicing contrast in fricatives but not in plosives.

Only a relatively small proportion of the languages, 6.7% of the total, have a **voicing contrast in fricatives but not in plosives**. These languages do not show much tendency to cluster geographically except for a small group in the western subarctic zone, where this pattern is found in the Eskimo-Aleut languages as well as in some of the adjacent Na-Dene languages. Siberian

Yupik (Eskimo–Aleut; Siberia), for example, has three contrasting voiced/voiceless pairs of fricatives, but no voiced plosives. Other examples of this group include Tsou, UMBundu, and Mesa Grande Diegueño. Tsou (Austronesian; Taiwan) has the contrasting fricative pairs /f, v/ and /s, z/ but only /p, t, k/ in its set of plosives. Tsou does, however, have the implosives /ɓ, ɗ/, discussed in chapter 7. UMBundu (Bantu; Angola–Namibia border) has the fricative pair /f, v/ in contrast but the only voiced stops in the language are prenasalized plosives. Mesa Grande Diegueño (Yuman; California) has five voiceless fricatives and six voiceless plosives, but the only direct voicing contrast it has comes in the pair of lateral fricatives (see chapter 8).

3. Discussion

When numbers are pooled across the four categories of languages discussed in the chapter, we see that a voicing contrast in plosives is considerably more common than a voicing contrast in fricatives. In all, 347 or 61.3% of the languages in the survey have a voiced/voiceless contrast between at least one pair of plosives either with or without any contrast in voicing among fricatives. Only 196 or 34.5% have a voicing contrast between at least one pair of fricatives, either with or without any contrast in voicing among plosives.

Since there are so many more languages in which a fricative voicing contrast occurs in combination with a plosive voicing contrast than those in which it occurs alone, this suggests that there is some preference for constructing languages in a way that makes fricative voicing "parasitic" on plosive voicing. We can use the overall frequencies to calculate what numbers would be expected in our sample if plosive voicing and fricative voicing were independently distributed. These calculations show that about 120 languages would be expected to have the combination of the two voicing contrasts, and about 78 would be expected to have a fricative voicing

contrast alone. These numbers are sufficiently different from the observed totals of 158 and 38 to show that the occurrence of fricative voicing is significantly dependent on the presence of plosive voicing in the same language. At the same time, however, the occurrence of a fricative voicing contrast does show a decided geographical limitation, being especially an Old World phenomenon, and very largely absent from the Americas, Australia and New Guinea, nor even particularly frequent in South and East Asia. Co-occurrence of voicing contrasts in both plosives and fricatives might therefore be largely due to an areal spread of fricative voicing in the languages of the Old World.