7. Glottalized Consonants

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1. Introduction

In this chapter the distribution of consonants whose production involves certain special actions of the larynx will be discussed. In the great majority of consonant sounds, the vocal folds inside the larynx are either open so that air from the lungs can freely flow into the mouth, or they are brought close together so that air flowing between them causes them to vibrate, producing the effect called **voicing** (as discussed in chapters 1, 4 and 5). All languages have some sounds which are voiceless, that is, are produced with open vocal folds, and some which are voiced. In addition to these two settings there are other, less commonly used adjustments of the larynx involving either a tighter constriction of the vocal folds and/or a movement of the larynx a short distance up or down in the throat. Consonants with these characteristics are known as **glottalized** (from the word *glottis*, the name given to the space between the vocal folds).

The glottalized consonants can be conveniently grouped into three classes. The first of these classes most typically involves a complete closure of the vocal folds followed by an upward movement of the larynx. If these movements are made at the same time as a closure in the mouth is maintained as for a stop, the air in the space between the closed vocal folds and the mouth closure will be compressed as the distance between the two closures is reduced. When the mouth closure is released a characteristically sharp explosive noise is created. Stops of this kind are known as **ejective stops**. They are written in phonetic notation with a raised apostrophe after the symbol that is employed to represent the mouth action; thus /p'/ represents a bilabial ejective stop, /k'/ a velar ejective stop, and so on. For example, Wintu (Penutian; California) has word-roots such as

/p'at-/ 'fishtail' and /k'il-/ 'hail' contrasting with /pat-/ 'mountain lion' and /kil-/ 'liver'. The ejective mechanism is also often used in producing affricates, as in the Chulupí (Mataco-Guaicuru; Paraguay) word for 'milk' /ts'oʔs/, and more rarely for producing fricatives. Tlingit (Na-Dene; Alaska) is among the relatively few languages with ejective fricatives, as in the word /s'aaw/ 'crab'.

The second group of glottalized consonants are stops in which the critical movement of the larynx is downward rather than upward. If the downward movement is sufficiently vigorous, air will briefly flow into rather than out of the mouth when the mouth closure is released. Because of this possibility of inward air flow, this class of sounds is known as **implosives**. Most typically the vocal folds are in the voicing position in the production of sounds of this group, but they may be more tightly closed. The phonetic symbols for these sounds are the letters used for voiced stops modified by the addition of a hook to the right at the top, as in /ɓ, ɗ, ɠ/. For example, in Murle (Surmic, Nilo-Saharan; southern Sudan) the word for 'crocodile' is /aɠul/. Similar sounds are often referred to as "pre-glottalized voiced stops" by linguists working on Asian and Pacific languages.

The third group of glottalized consonants are **glottalized resonants**. Resonant (also known as sonorant) consonants are those produced with an unimpeded flow of air through the mouth or the nose, such as those at the beginning of the English words *lot, not, rot, yacht*. Consonants of this general type are usually voiced in the normal manner, but they can be produced with a closer constriction of the vocal folds which interrupts or modifies the normal voicing. Glottalized resonants are often symbolized with a following apostrophe in the same way as ejectives. For example, in Yapese (Austronesian; Micronesia) the word for 'sick' begins with a glottalized bilabial nasal and can be written /m'aar/. However, glottalized resonants are not

produced with either a raising movement of the larynx or a lowering movement of the larynx.

As with any grouping into categories, some difficult decisions have to be made about which cases to include or exclude. For example, stops which are described as having a closure of the glottis accompanying the closure in the mouth but which lack the larynx raising characteristic of an ejective stop have been grouped together with ejectives. For this reason Yurok (Algic; California) is among the languages included in the survey as having ejectives, even though the glottalized stops in this language do not seem to require larynx raising. Korean is also included because it has a set of consonants that seem to be produced with a closer than usual vocal fold position, although they are not otherwise reminiscent of ejectives. This series of consonants, written with doubled letters in the Korean orthography, is often called “fortis” in the literature on Korean. It should thus be borne in mind that the terms **ejective** and **implosive** are being used here to refer to somewhat more inclusive classes of consonants than is traditional in the phonetic literature.

In order to show the co-occurrence patterns between the classes of glottalized consonants, a quite complex categorization scheme for languages with these consonants has been adopted. Languages with ejectives only, with implosives only and with glottalized resonants only each form a separate category. Those whose consonant inventories include members of more than one of these classes of consonants are divided into those with only ejectives and implosives, those with only ejectives and glottalized resonants, those with only implosives and glottalized resonants, and those with all three classes of glottalized consonants. Languages with no glottalized consonants of any sort form the first class of languages shown on the map.

@	1. No glottalized consonants	412

@	2.	Ejectives only	57
@	3.	Implosives only	55
@	4.	Glottalized resonants only	3
@	5.	Ejectives and implosives	13
@	6.	Ejectives and glottalized resonants	19
@	7.	Implosives and glottalized resonants	4
@	8.	Ejectives, implosives and glottalized resonants	3
		total	566

Two types of consonants which might have been included are not counted among the glottalized consonants. The first is the consonant known as the **glottal stop**, for which the phonetic symbol is /ʔ/. This is the result of a brief closure of the vocal folds without any accompanying movement of the tongue, lips, or other speech organs. This sound is familiar as a marker of the colloquial English of London, where it occurs in place of the sound /t/ between a stressed and an unstressed syllable in words such as *letter* and *little*. In other languages a glottal stop is used to keep certain adjacent vowels clearly separate from each other, as in German *geübt* /gəʔypt/ 'practiced'. The glottal stop occurs in many languages — in fact in a much larger number of languages than the glottalized consonants which are the focus of this chapter — as a full member of the set of consonants. For example, in Hausa, the main language of northern Nigeria and much of the eastern Sahel region of Africa, /saaʔàa/ 'hour' is a quite different word from /saatàa/ 'theft'. Glottal stops may also occur with what are called "secondary articulations" such as labialization, so that /ʔʷ/ has a similar modification to that found in /kʷ/; similarly for palatalized /ʔʲ/. The sound /ʔʷ/ is obviously quite similar to the glottalized resonant /w'/, and either of these sounds might be analyzed as a sequence of two consonants, /ʔ/ and /w/. Arguments must be sought to determine which of the potential interpretations yields

a more satisfactory overall view of the language's structure. Because it has a contrastive glottal stop and other palatalized consonants, Hausa is here interpreted as having a palatalized glottal stop rather than a glottalized palatal resonant; thus the word for 'daughter', orthographic *'ya,* is interpreted as /ʔʲaa/ rather than /j'aa/.

The second excluded class is what are known as **breathy voiced consonants**; these have a special position of the vocal folds in which they are a little wider apart than the position for normal voicing. Hindi is the best known language with such sounds. Neither glottal stops nor breathy voiced consonants have traditionally been viewed as belonging to the class of glottalized consonants.

2. Co-occurrence in inventories

At least some glottalized consonants occur in the consonant inventories of 154 of the 566 languages surveyed for this chapter, that is, in a little over a quarter of the languages (27.2%). Among the three classes of these consonants as defined above, ejectives are more widely found than implosives, and glottalized resonants are the least widespread. Ejectives or ejective-like consonants occur in 92 (16.3%) languages in the survey, implosives or implosive-like consonants occur in 75 (13.3%), and glottalized resonants in just 29 (5.1%). Table 1 highlights the patterns of occurrence and co-occurrence among the three classes of glottalized consonants in languages having sounds in one or more of these classes, omitting only the handful which have only glottalized resonants.

Table 1. Co-occurrences of glottalized consonants of the three classes (3 languages with glottalized resonants only not included)

	no Resonants	with Resonants
Ejectives, no Implosives	57	19

Implosives, no Ejectives	55	4
Ejectives and Implosives	13	3

These figures show that there is a very strong association between the occurrence of the ejective and the glottalized resonant classes in a consonant inventory, and a much weaker association between either of these classes and implosives. An overwhelming majority (135 out of 151) of the languages in the survey with implosives or with ejectives do not include members of the other class in their consonant inventories; on the other hand, a majority (22 out of 29) of the languages with glottalized resonants also have ejectives.

3. Geographical distribution

The geographical distribution of glottalized consonants is strongly regional. They are absent from most of western Eurasia, rarely found in northern Asia, the South Asian subcontinent, island Asia, and New Guinea, and are entirely unknown in Australian languages.

Ejectives are found most especially in the Americas, as well as in the more easterly and southern regions of Africa and in the Caucasus. Well-known languages of the Americas with ejectives include Cochabamba Quechua (Quechuan; Bolivia), Yucatec (Mayan; Mexico), and Navajo (Athapaskan; Arizona and New Mexico). They are particularly found along the Andean cordillera in the south, in Mexico and Guatemala, and in the more northwesterly parts of North America. Most strikingly, the consonant inventories of almost all the diverse indigenous languages of northern California, Oregon and Washington, British Columbia, the Yukon, and Alaska include ejectives. The occurrence of ejective-like consonants in Soqotri (Semitic; Yemen) is associated with the African area, in which these consonants occur, which includes other Semitic languages in nearby Ethiopia and Eritrea such as Amharic and Tigre. The

dense cluster of languages in the Caucasus with ejectives includes languages of four different families, Kartvelian (e.g. Georgian), Northwest Caucasian (e.g. Kabardian), Nakh-Daghestanian (e.g. Ingush, Lak, Archi), and Indo-European in the form of Eastern Armenian. The three languages with ejectives shown outside these areas are Korean, Itelmen (Chukotko-Kamchatkan; Siberia) and Yapese. The Korean consonants in question are not true ejectives, but those in Itelmen and Yapese are, showing that consonants of this type can occasionally develop in geographical isolation.

Languages with implosives are primarily found in Africa outside the northernmost tier, and in Southeast Asia. A few cases occur in the Americas and elsewhere. The African languages with implosives as their only class of glottalized consonants are found across the "middle belt" from the west to the east of the continent, and include languages of three main families, Niger-Congo (e.g. Kpelle, Gwari, Kisi), Nilo-Saharan (e.g. Maasai, Murle, Yulu) and the Chadic branch of Afro-Asiatic (e.g. Ngizim, Kera). The major area within which languages having both ejectives and implosives are found is eastern and southern Africa, and a high proportion (11 out of 16) of the languages in which the two types co-occur come from this broad region. These languages are drawn from all four of the major language families of Africa, namely Niger-Congo (e.g. Zulu), Afro-Asiatic (e.g. Kotoko, Hamer, Dahalo), Nilo-Saharan (e.g. Ik, Komo) and Khoisan (e.g. Deti). The Southeast Asian area within which implosive-like consonants occur includes members of the Tai-Kadai (e.g. Sui, Lakkia) and Austro-Asiatic (e.g. Pacoh, Vietnamese) families. Implosives, alone and in co-occurrence with ejectives, therefore display a primarily areal rather than genealogical pattern of distribution.

Glottalized resonants occur most often in the languages of the Americas. Of the 29 languages in the survey with consonants of this class, 20 are found in the Americas, and of these, 16 are found in North America north of 34° N and west of 75° W.

Several distinct families, including Salishan (Squamish, Lushootseed), Wakashan (Kwakw'ala, Nuuchahnulth), Keresan (Acoma), Algic (Yurok), and Na-Dene (Slave), are represented. In the overall sample, glottalized resonants are found in only two of the African-area languages with ejectives (!Xóõ and Soqotri), and in none of those in the Caucasus. The areal restriction suggests that the association between glottalized resonants and ejectives might best be viewed as a result of overlapping patterns of spread in a single area, and not as the consequence of any particular linguistic dependence between the occurrence of these two classes of consonants.

4. Discussion

Because their production involves a more intricate coordination of the actions of the larynx with the actions of the articulators in the mouth than many of the more common sounds, glottalized consonants are usually regarded as being inherently complex sounds. As noted in chapter 1, a general principle has been proposed according to which more complex consonants are predicted to be more likely to occur in languages with larger numbers of contrasting consonants (the size principle). We can see that this prediction is generally supported by comparing the maps in this chapter and in chapter 1. Table 2 summarizes the distribution of languages with glottalized consonants across the five classes of consonant inventory size established in that chapter.

Table 2. Languages with glottalized consonants, by consonant inventory size

Consonant inventory size class	percent with glottalized C's
small	8.7%
moderately small	10.7%
average	21.5%
moderately large	39.3%

large	66.7%

The table shows the percentage of the languages falling within each consonant inventory size class which have one or more glottalized consonants among the consonants constituting their inventory. Only a few of the languages with small consonant inventories have any glottalized consonants, whereas two-thirds of those with large inventories include one or more glottalized consonants, and the proportion increases with each increase in overall inventory size. Thus the predictions of the size principle are strongly supported by these data, as well by related data to be presented in chapter 19.