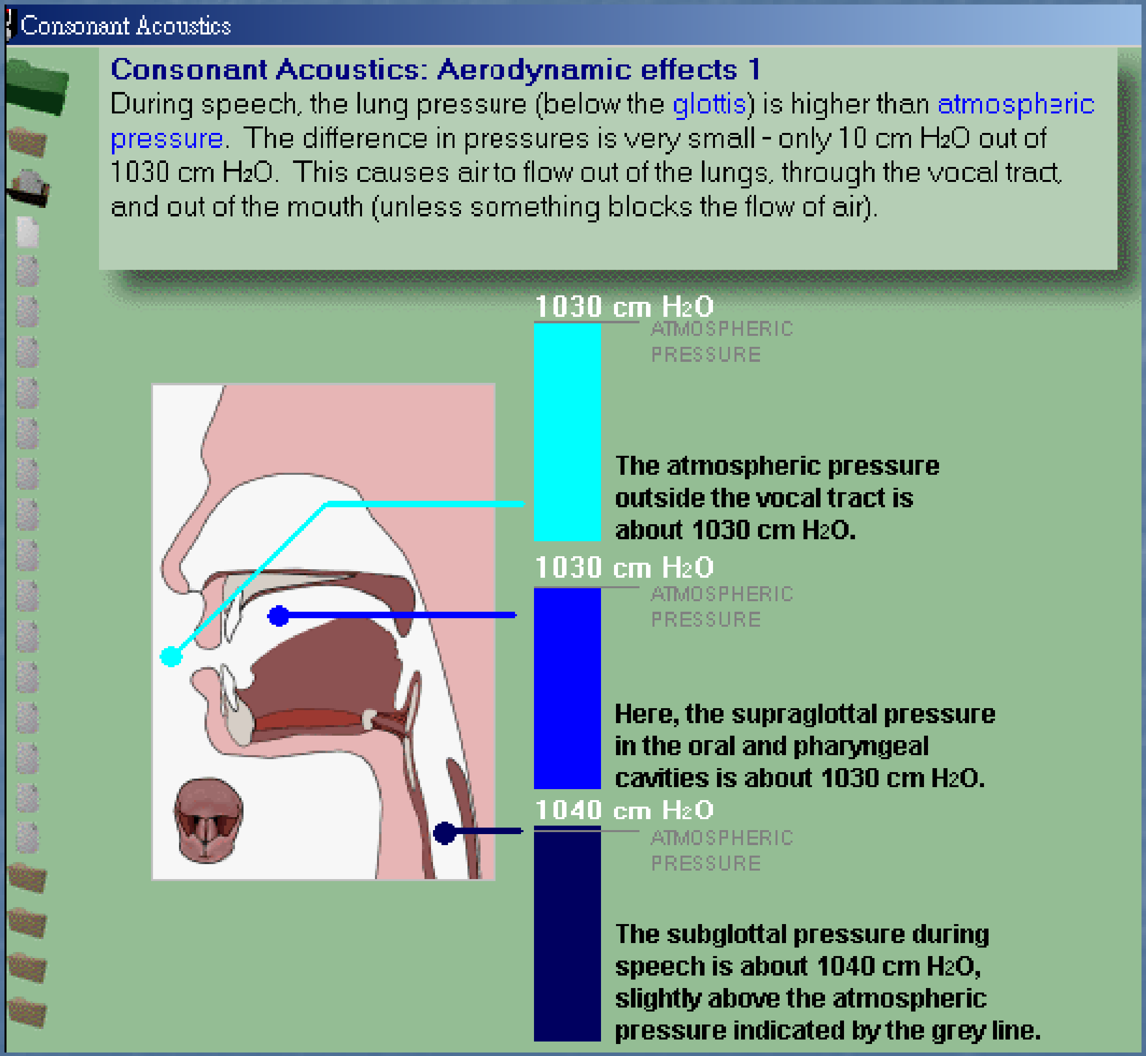
Chapter 6

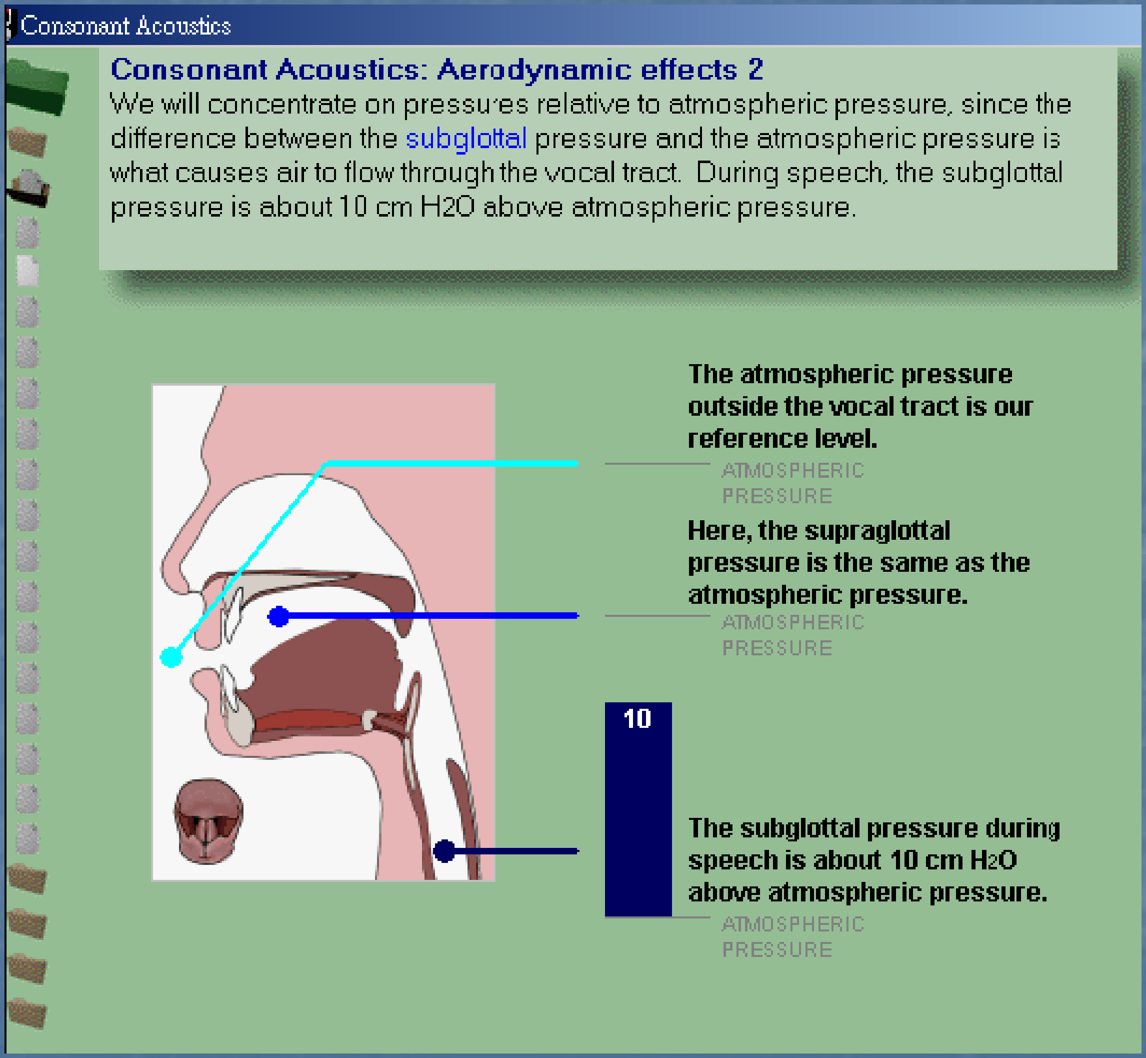
Airstream Mechanisms and Phonation Types

The general concept



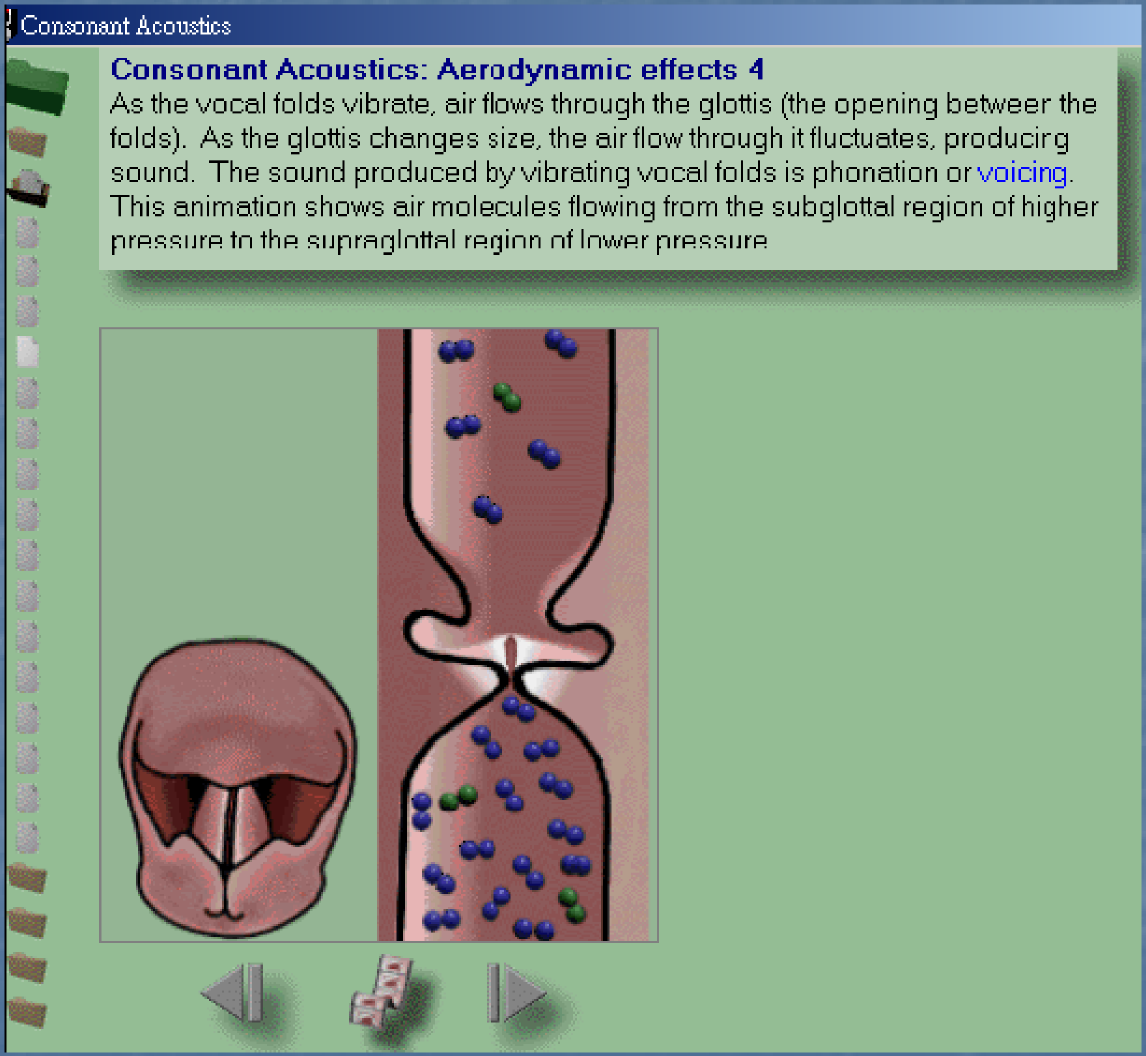
What happens when we pronounce a sound?

The general concept



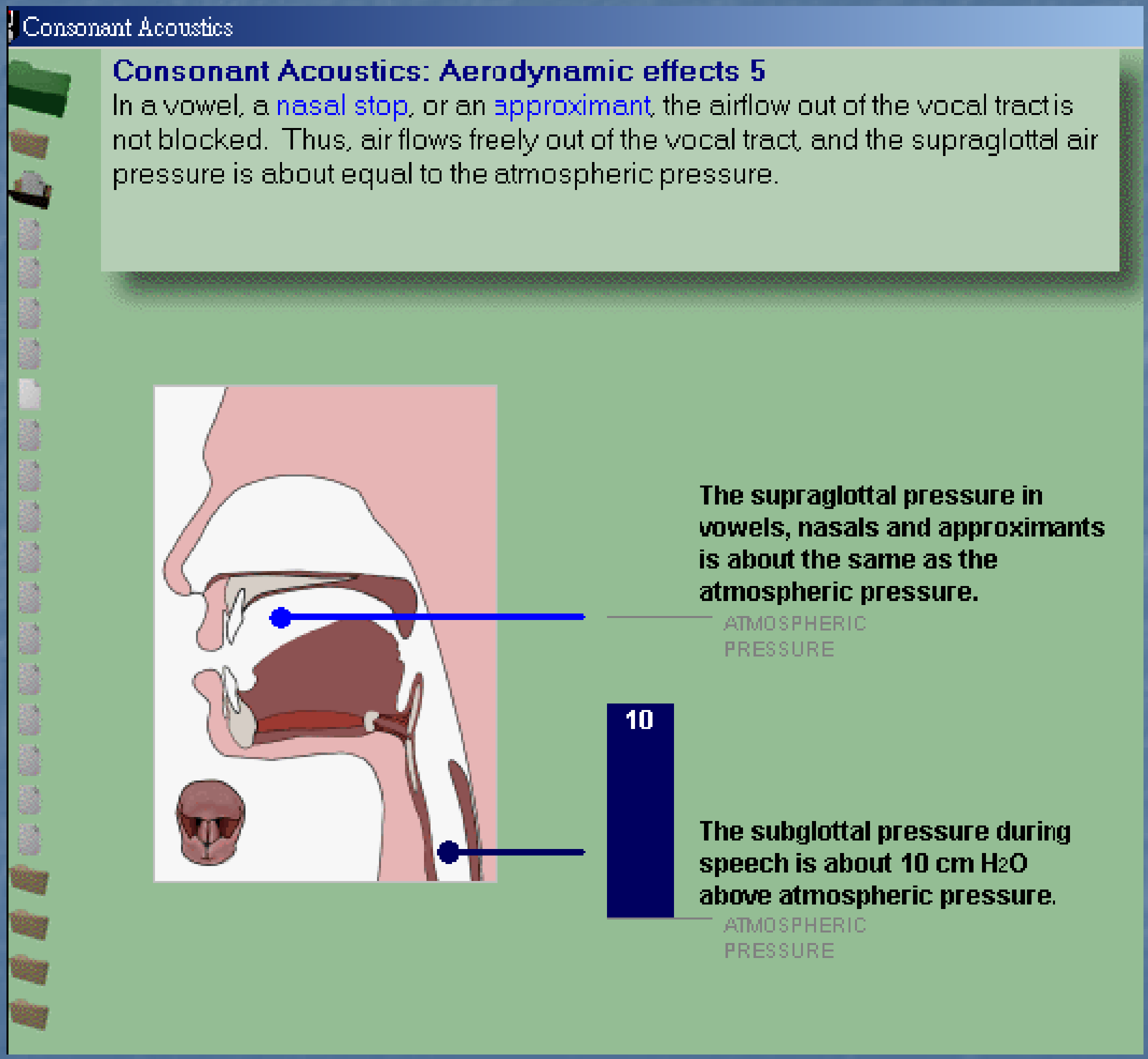
That means that we “exhale” 10 cm H_2O when we pronounce a sound.

The general concept



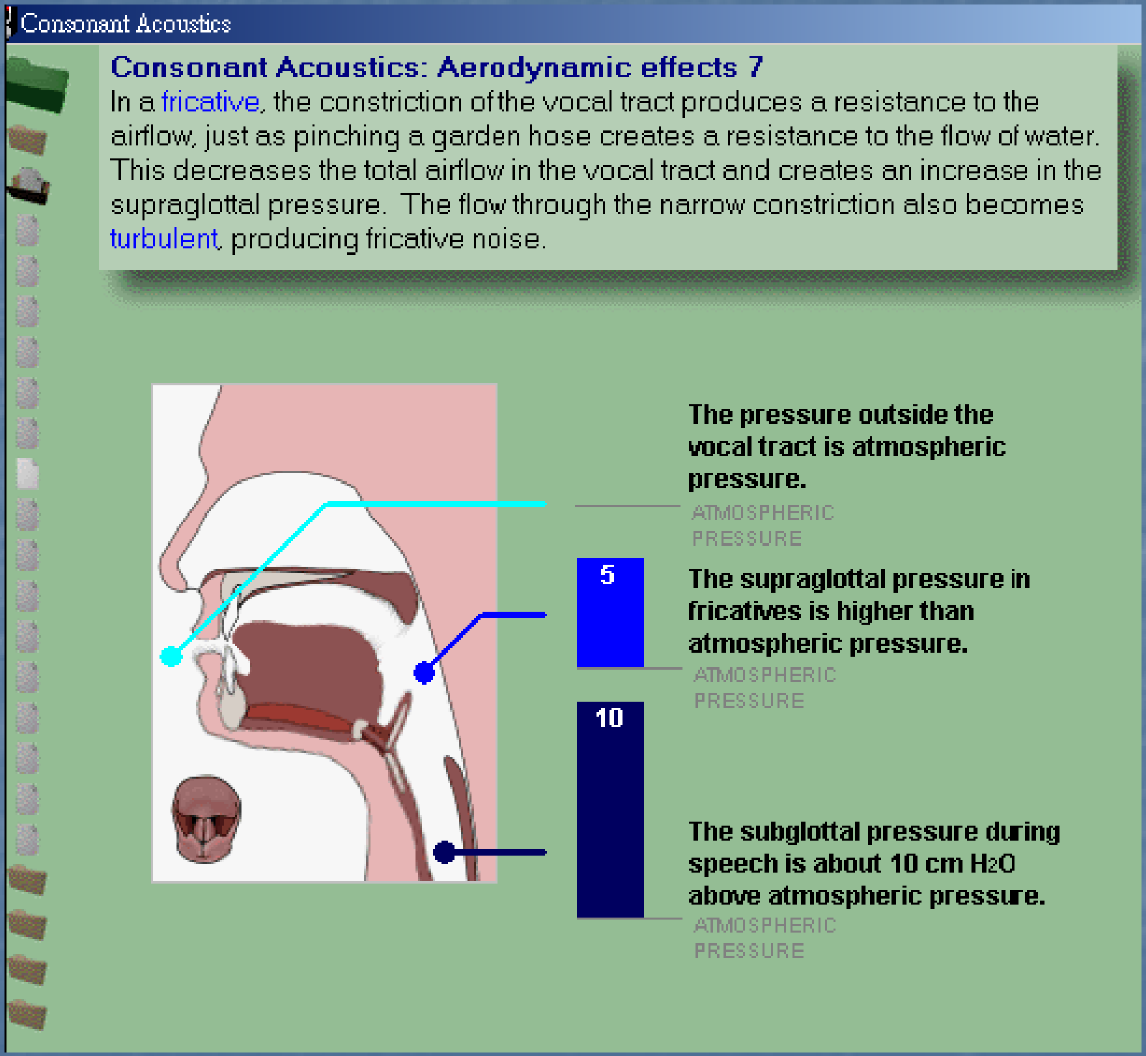
This shows that how the air goes through the vocal folds.

The general concept



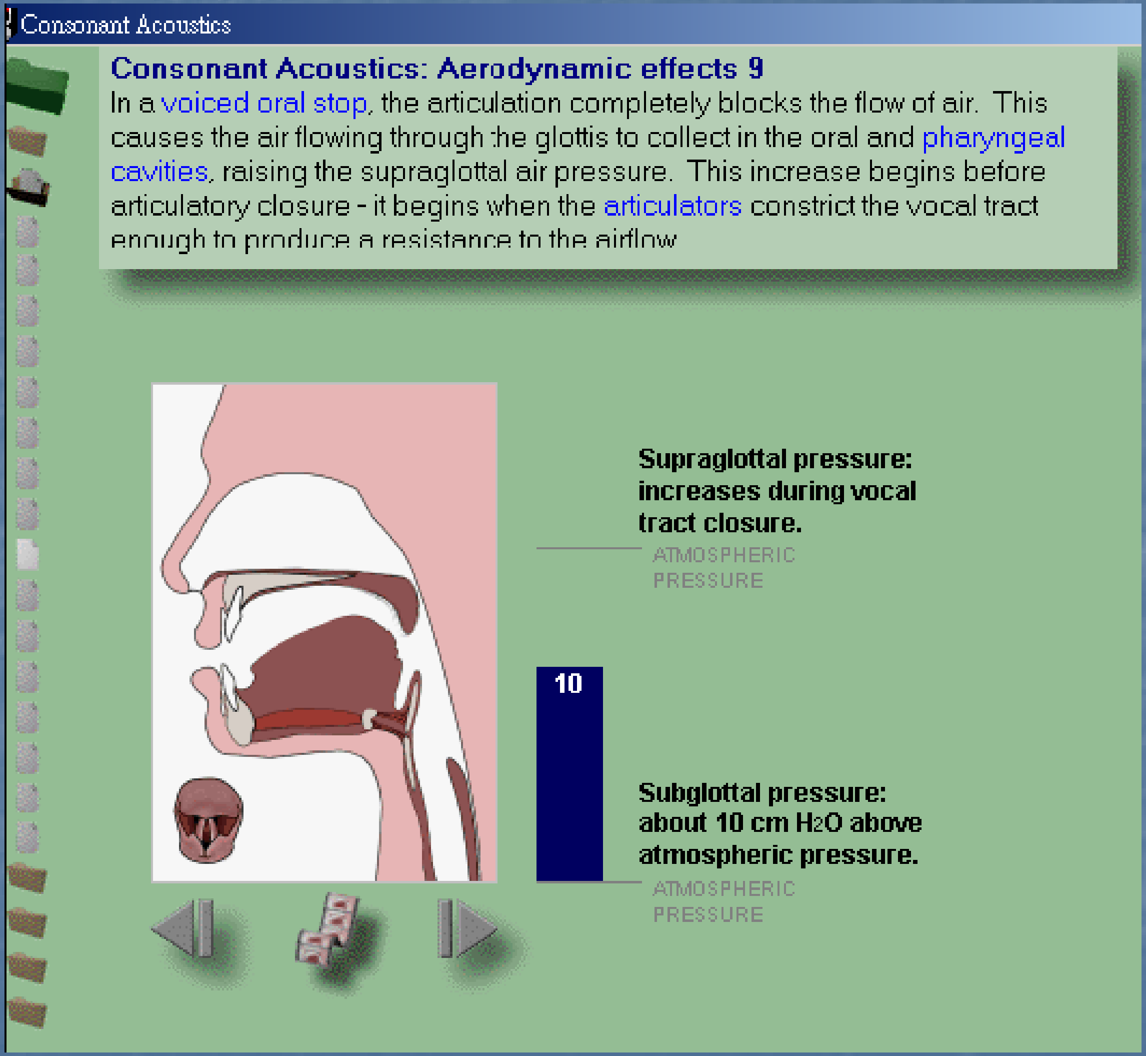
What about the nasal stop sound?

The general concept



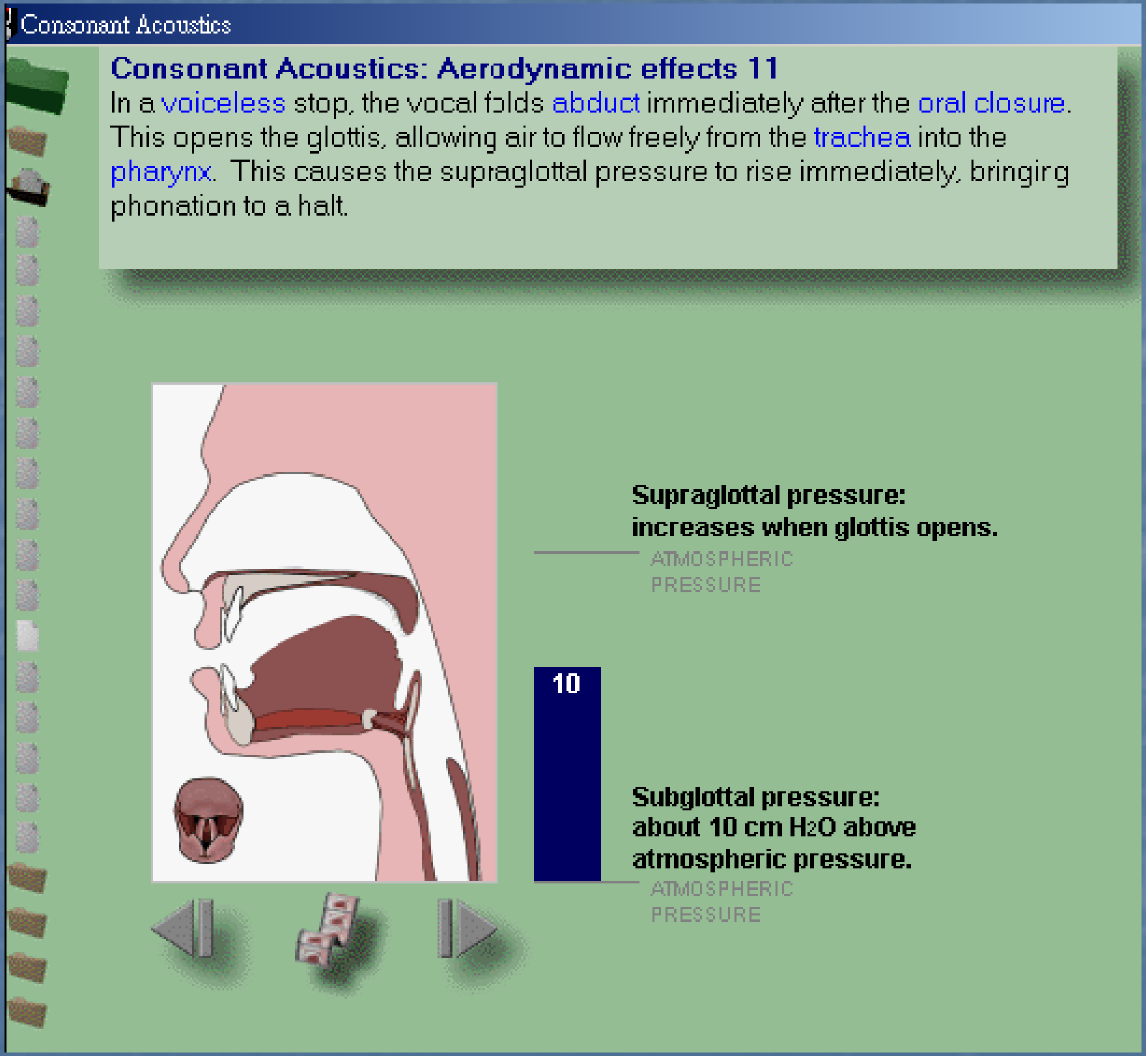
What about the fricative sound?

The general concept



What about the voiced consonants?

The general concept



What about the voiceless consonants?

The general concept

Consonant Acoustics

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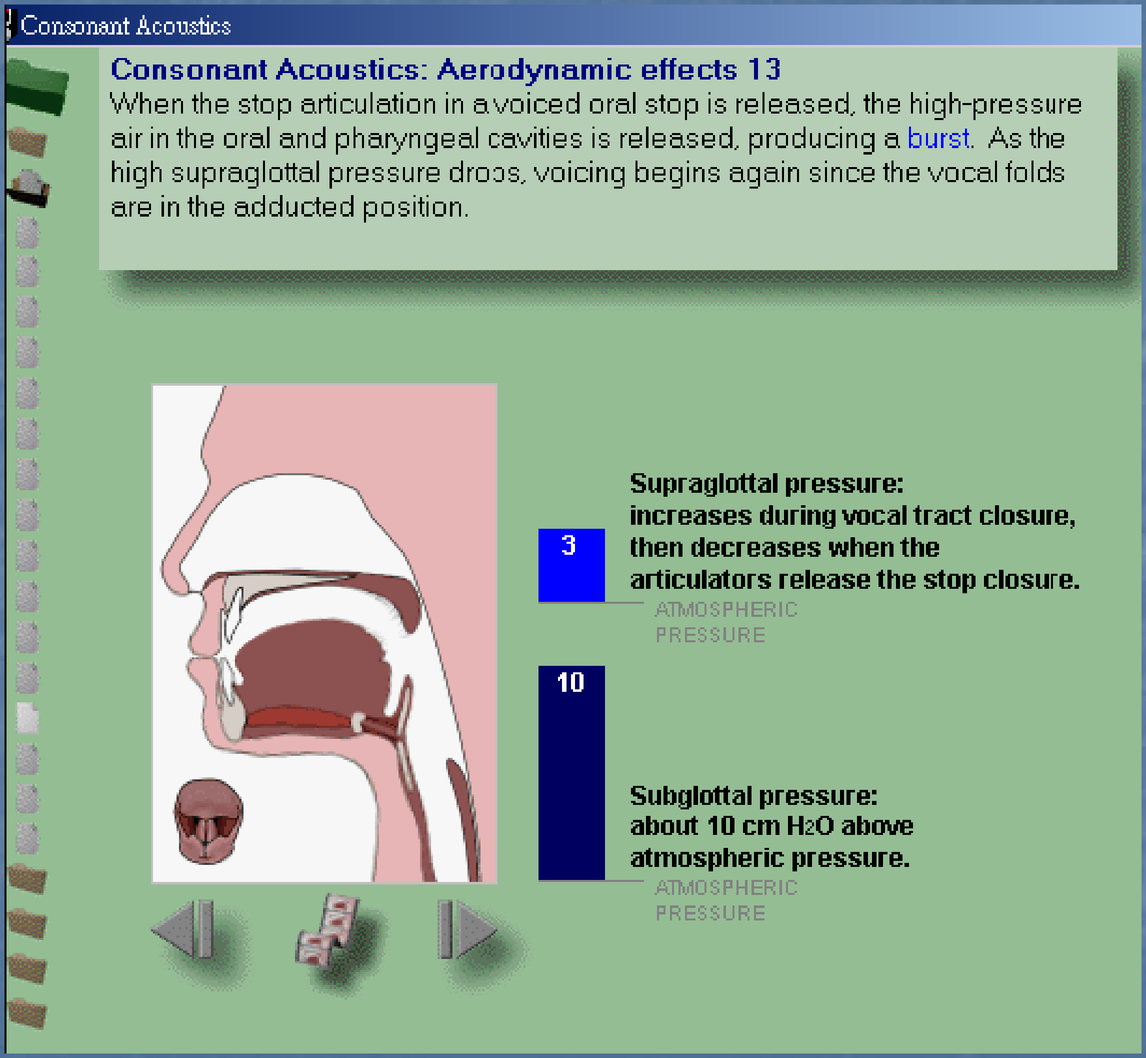
Notes:

Constriction of the vocal tract affects airflow through the vocal tract and voicing:

- Constricting the vocal tract reduces the amount of air that can flow through the vocal tract from the lungs. Constricting the vocal tract creates a supraglottal pressure build-up.
- Fricatives are produced when the airflow through the vocal tract is highly constricted.
- Constricting the vocal tract decreases the amplitude of vibration of the vocal folds by raising the supraglottal pressure.

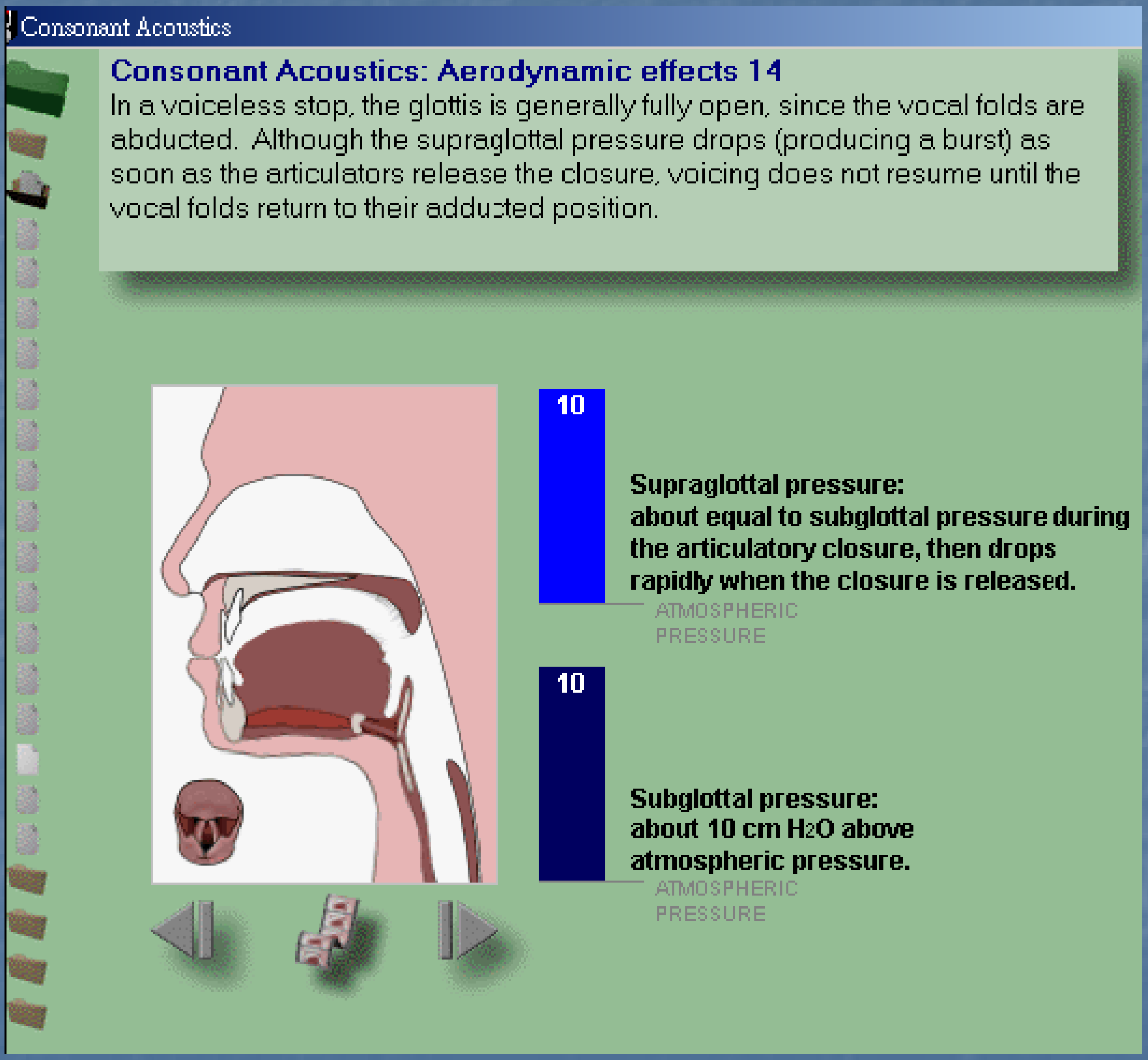
What about the voiceless consonants?

The general concept



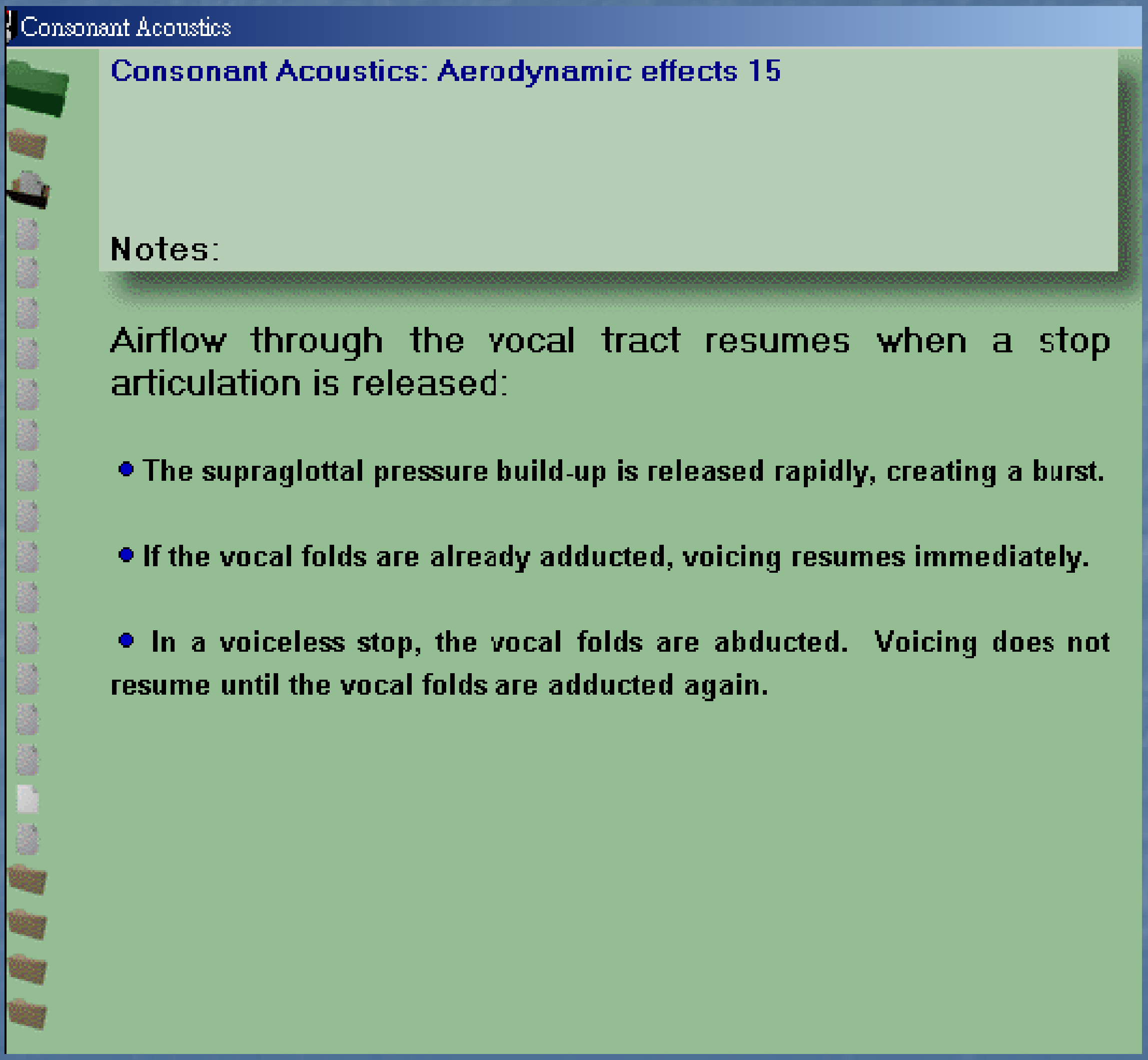
What about the stop consonants?

The general concept



What about the voiceless stop consonants?

The general concept



What about the voiceless stop consonants?

Voice onset time (VOT)

1. For voiceless plosive consonants, vocal vibration is stopped for a period that is a little longer than the hold phase, so that there is still no vocal fold vibration around the moment of release and possibly for a further brief time afterwards. This delay, measured from the start of the explosion to the point where vocal fold vibration begins, is called the Voice Onset Time (VOT).

2. The VOT is expressed in milliseconds (1 ms = 1,000th of a second). The listener use the VOT to categorize the plosive they are hearing as voiceless or voiced.

Examples on Thai

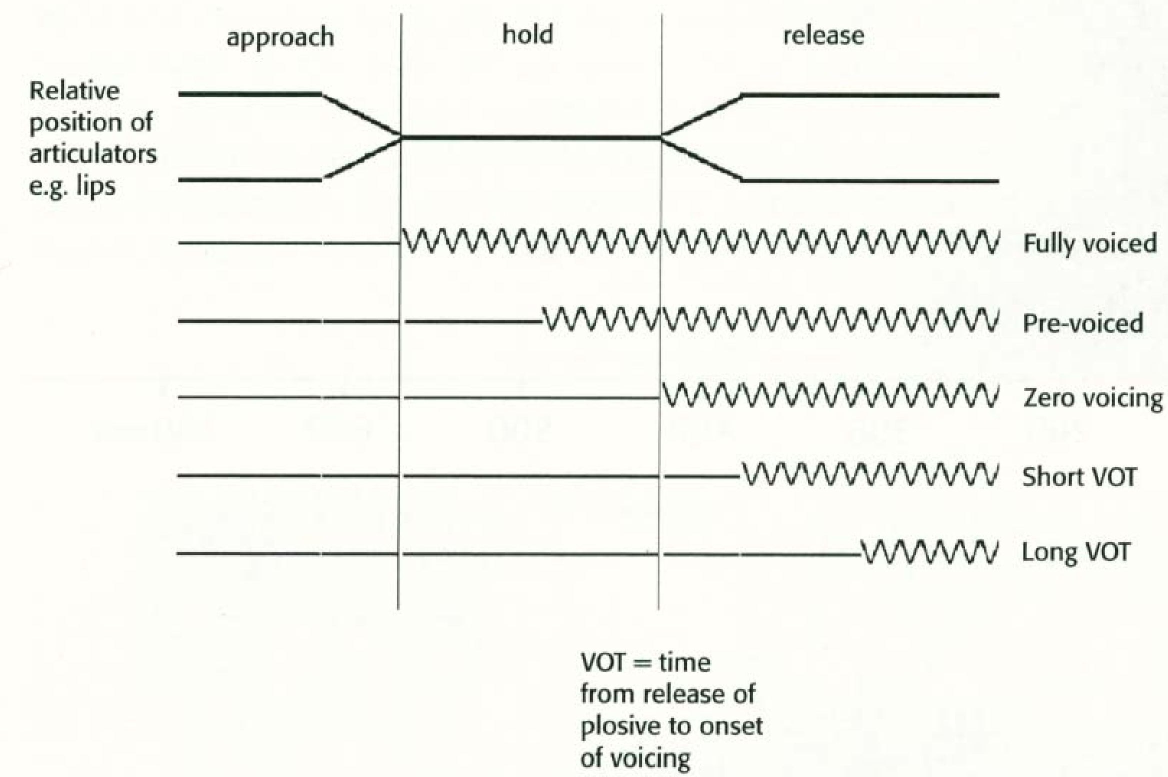


FIGURE 6.3
Schematic parametric representation of the three phases of plosive production, with five different VOT possibilities.

Fully voiced
Short VOT (10 ms or so: voiceless unaspirated)
Long VOT (very long VOT: 50 ms or more – strongly aspirated)
[ba] (crazy) [pa] (aunt) [p^{h}a] (cloth)
[d□□a] (to curse) [t□□a] (eye) [t□□^{h}a] (landing place) *(Thai)*

Examples on French and English

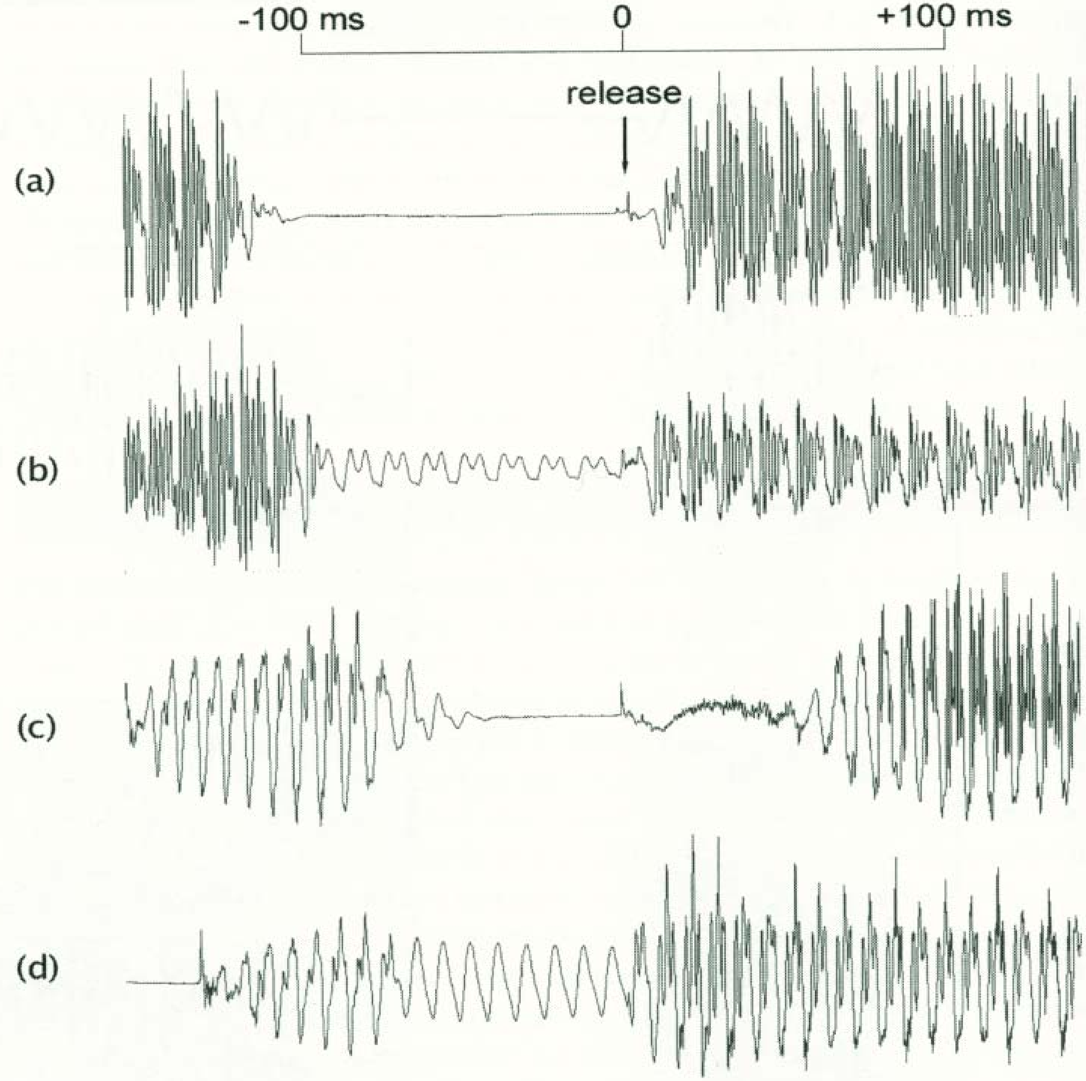


FIGURE 6.2
Waveforms showing intervocalic plosives in French and English, aligned by moment of release. The words are French (a) *apart*, (b) *abeille*, and English (c) *apart*, (d) *obey*. In this context the voiced plosives show voicing throughout the hold phase in both languages.

Examples on Sindhi

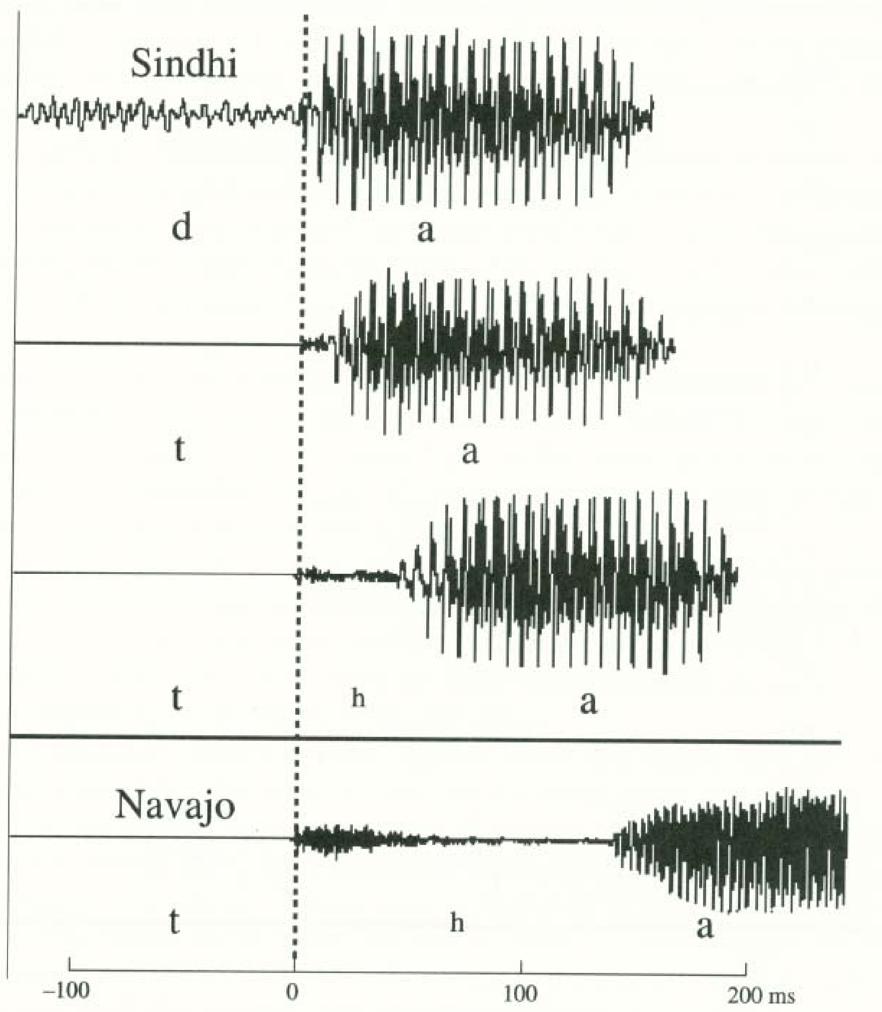


FIGURE 6.5 Waveforms showing stops with different degrees of voicing and aspiration.

Examples on English

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Bilabial	[ba]	[pa]	[p^{h}a]
Alveolar	[da]	[ta]	[t^{h}a]
Velar	[ga]	[ka]	[k^{h}a]