

On the cross-linguistic dispreference of voiced sibilant affricates

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Goal:

The goal of this paper is twofold. First, it will be shown that several typologically unrelated languages share the tendency to avoid voiced sibilant affricates. Second, this tendency will be explained by appealing to the phonetic properties of these affricates.

Evidence:

As far as the first goal is concerned, it will be shown that in several Slavic as well as in Germanic, Bantu and other languages, a phonemic gap is attested: voiced coronal affricates do not occur while their voiceless counterparts do. In several of these inventories, stops and fricatives create a contrast with respect to voicing as well, see examples in (1).

The avoidance of voiced affricates is also supported by phonological processes in which the existing voiced affricates change to other sounds, especially voiced fricatives, see examples in (2).

Explaining the avoidance of voiced affricates is a challenge for any phonological theory. Several phonological approaches to voicing contrasts, including those dealing with features, are not able to account for this gap; see e.g. Lombardi (1994, 1999), Iverson & Salmons (1995, 2003), Steriade (1997), Avery & Idsardi (2001), Wetzels & Mascaro (2001), Kehrein (2002).

The present study seeks to explain why fricatives and stops often maintain a voicing contrast while affricates tend to avoid it. It will be argued that articulatory and especially aerodynamic differences between stops and fricatives on the one hand, and affricates on the other, are responsible for the voicing disparities between them.

First, it will be shown that in general, voiced segments are articulatorily more complex than their voiceless counterparts due to additional articulatory movements required for the cavity enlargement. These include e.g. tissue compliance, muscularly actuated enlargement of the supraglottal cavity, the opening of the velopharyngeal port as well as jaw movements, see Westbury (1983).

Second, it will be shown that for the production of voiced sibilant fricatives, conflicting but also very precise aerodynamic requirements for maintaining voicing frication have to be met, see Ohala (1983). In the case of affricates, it is argued that the aerodynamic requirements for voicing frication are even more complex due to different conditions accompanying the stop release.

My conclusions are supported by the results of an acoustic-aerodynamic experiment in which voiced affricates were compared to voiceless ones as well as to voiceless and voiced coronal fricatives and stops. Four speakers participated in this experiment. The acoustic parameters included: (i) duration of fricatives; (ii) duration of stop phase and release phase, (iii) duration of stop and frication phase. The airflow parameters comprised (i) airflow and (ii) air pressure in stops, fricatives and affricates.

The results show that voiced affricates have a significantly shorter frication phase than their voiceless counterparts as well as fricatives. Air pressure and air flow appears to be higher in the frication phase of the voiced affricates than in single voiced fricatives, which indicates that the former are apt to undergo devoicing more easily than the latter.

Conclusion:

This paper shows that voiced sibilant affricates are avoided cross-linguistically. This tendency is argued to be attributed not only to the inherent properties of voicing, but also to the articulatory-aerodynamic complexity of affricates, as supported by experimental results.

(1) Phonemic inventories

Czech

	dental/alveolar		palatoalveolar		palatal	
fricative	s	z	ʃ	ʒ		
affricate	t͡s		t͡ʃ			
stop	t	d			c	j

Russian

	dental				retroflex		palatoalveolar	
fricative	ɣ	ʒ	ɣʲ	ʒʲ	ʂ	ʐ	ʃʲ	(ʒʲ)
affricate	t͡ɕ						t͡ʃʲ	
stop	t̚	d̚	t̚ʲ	d̚ʲ				

(2)

- a. $\widehat{tʃ}, \widehat{dʒ} \rightarrow ʃ, ʒ / _ \#$ Florentine Italian Giannelli & Savoia (1979)
- b. $\widehat{dʒ} \rightarrow j / _ \#$ Haitian Creole Tinelli (1981)
- c. $\widehat{dʒ} \rightarrow z / V _ V$ Chitwan Tharu Leal (1972)

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