Gemination as non-local lengthening

Affricates and geminates both have discrepancies in linear order between their surface and underlying forms. Affricates consist of a stop closure preceding a fricative release on the surface, but these stop and fricative components can behave as if they are unordered underlyingly (Lombardi 1990). Geminate consonants consist of one long closure preceding a single release on the surface, even though they are represented with two ordered timing slots underlyingly (e.g. Hayes 1986). In this paper, I address both discrepancies by examining the behavior of affricates under gemination. The data, from a phonetic study of Hungarian, seem to provide additional evidence for an unordered representation of affricates. The same data, however, pose serious problems for the timing slot representation of geminates, and I argue that gemination is best represented as lengthening, not as association to multiple timing slots.

Certain affixes in Hungarian trigger gemination of a root-final consonant. One example is the instrumental case suffix: [tʃɔp-pal] 'faucet-INSTR', [tʃɔt-tal] 'buckle-INSTR', [vɔʃ-ʃal] 'iron-INSTR', etc. When the root-final consonant is an affricate, as in [kɔtʃ] 'fringe', gemination could theoretically give rise to four alternatives: doubling [tʃtʃ], lengthened stop and fricative parts [ttʃʃ], lengthened fricative part only [tʃʃ], or lengthened stop part only [ttʃ].

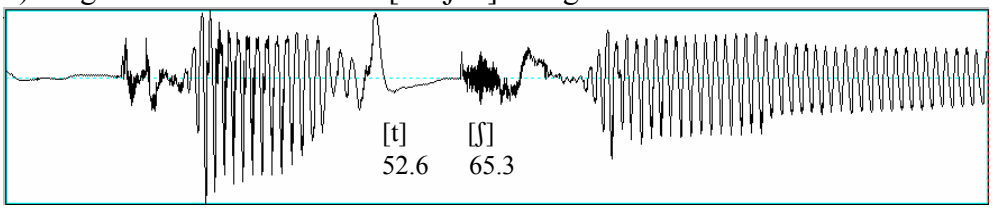
The phonetic data presented here (3 speakers, 248 tokens each) show that only the latter alternative is realized. Geminated affricates always consist of a single stop closure and a single fricative release, and the contrast with singleton affricates is made by lengthening the stop closure duration, never the fricative duration (1, 2). Furthermore, the overall ratio of stop closure duration in singleton-geminate affricates mimics that of plain stops (3). Thus despite the fact that the triggering environment for gemination lies on the right side of the affricate (i.e. adjacent to the fricative part), it is the left side of the affricate which undergoes a change, which seems to support a representation whereby the stop and fricative parts are unordered.

A traditional analysis of the gemination process in Hungarian would propose that the instrumental suffix is listed in the lexicon with an empty timing slot, e.g. /-Cal/. Autosegmental spreading from adjacent segments fills the slot with features, effectively "doubling" the consonant. Combining an ordered representation of affricates with the traditional analysis yields the wrong result: the rightmost part spreads, yielding *[tʃʃ] (4). But an unordered representation of affricates fares no better: whether we propose that the stop part, the fricative part, or both parts spread to the empty timing slot, the resulting surface form is incorrect (5). Therefore, I argue that the timing slot analysis cannot be the correct one for affixal gemination.

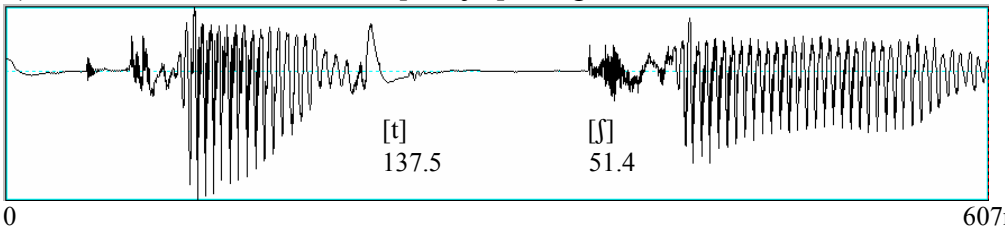
Instead, I will defend the idea of gemination as lengthening, not doubling, of singletons. Expanding on an earlier proposal that consonants possess two distinct components of closure and release (Steriade 1993, 1994), I claim that lengthening preferentially targets the closure (6), not the release, because it provides the fewest cues to the consonant's identity. Altering the closure ensures that the contrast between singleton and geminate is one of duration only. The same idea explains why simple consonants do not exhibit multiple releases in affixal gemination.

This analysis of gemination allows us to revisit the idea of unordered stop and fricative components in affricates. Are they truly unordered, or are there actually non-local processes that target a stop closure even if it means "skipping" over a release? Phonetic measurements of words ending in stop-fricative clusters in Hungarian (such as [tɔpʃ] 'applause') show that at least some of them geminate by lengthening the stop ([tɔp:ʃal] 'applause-INSTR') instead of the fricative. Even in a non-affricate environment, then, the process of gemination can preferentially target a stop, suggesting that it may be a fundamentally non-local process.

1) Singleton affricate: *kacson* ['kɔtʃon] 'fringe-SUPERESSIVE'



2) Geminate affricate: *kaccsal* ['kɔt:ʃal] 'fringe-INSTRUMENTAL'

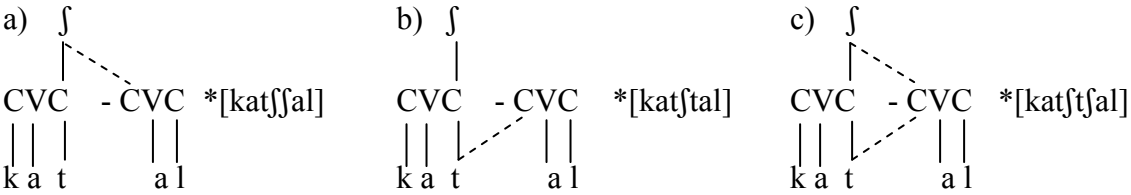


3) Average duration in milliseconds (preliminary results from one speaker)

	Stops (n=13)	Fricatives (n=25)	Affricates (n=31)	
			Stop	Frication
Single	82.9	129.6	52.9	70.1
Geminate	124.1	164.3	82.1	70.5
Ratio	*1.5 to 1*	*1.3 to 1*	*1.5 to 1*	*1 to 1*

4) Timing slot analysis, with ordered representation of affricates

5) Timing slot analysis, with unordered representation of affricates



6) Lengthening analysis

Singleton

t Closure aperture: Complete	ʃ Release aperture: Partial (fricated)

Geminate

t Closure aperture: Complete	ʃ Release aperture: Partial (fricated)

duration→