

Palatalisation and velar-to-dental changes in velar + lateral clusters: the role of stop burst duration in German and Italian listeners

In velar + lateral onset clusters, sound change has led to two types of change: (1) to the palatalisation of the lateral approximant (/kl,gl/ > /kj,gj/) in a variety of languages, most notably in Romance, with a possible subsequent generalisation onto all complex onset cluster involving the lateral, or (2) to a change in place of articulation from velar to alveolar-dental while preserving the lateral (/kl,gl/ > /tl,dl/), also in a wide variety of languages world-wide, among them Germanic dialects.

The origin of the palatalisation process has long been sought in articulation: the velar stop and the following alveolar lateral would assimilate to each other in place of articulation, minimising the effort of fully articulating the two consecutive gestures for the two sounds. A similar explanation has been proposed for the velar-to-dental sound change. Recent articulatory research on /kl,gl/ clusters has shown, however, that, unlike in intervocalic contexts, the velar stop does not display any closure fronting in the onset cluster, thereby disproving the articulatory origin of the palatalisation.

On the acoustic side, a recent study by the author found resemblances between the formant transitions of /kl, gl/ and /kj, gj/ during the first part of the approximant, but not so in clusters with labial stops. This resemblance, it is hypothesised, could be due to the fact that the stop burst's quality is that of a lateral fricative, since double velar-alveolar articulations have been observed in /kl,gl/-clusters in a variety of languages.

The present study tests the hypothesis that this lateral fricative-like stop burst can be perceptually assimilated to a palatal element. Two groups of German and Italian listeners, respectively, were presented with /kl/ and /gl/-onset clusters, whose stop bursts had been varied in duration ranging from 10msec to 150msec for /kl/ and 10msec to 120msec for /gl/. Subjects were asked to identify what they heard in a forced choice test among the possible answers /kl ~ gl/, /kj ~ gj/, and /tl ~ dl/. Both the onset clusters alone and the same clusters followed by the vowel /a/ were presented in consecutive tests. It was predicted that German listeners, whose language comprises aspirated voiceless stops, would be more attentive to stop place information conveyed by the burst and identify /kl/ clusters with short durations as /tl/ whereas Italian listeners, whose language has unaspirated voiceless stops, would rather opt for palatalisation when misidentifying a /kl/ stimulus with longer burst durations.

Overall, German listeners showed misidentification of /kl/-clusters as /tl/ as expected (identification at chance level with /kl/, 30-40% with /kla/). Identification of strongly aspirated /kl/ as /kj/ occurred when burst duration exceeded 90 msec. Italian listeners, however, hardly showed any misidentifications of /kl/ as /kj/, perhaps due to the strong phonological distinction of /kl/ and /kj/-clusters in the language. On the other hand, this finding disproves any alleged lingering after-effect of the sound change in the language. Overall correct identification of the /kl/ cluster in Italian listeners was, however, below chance level for most burst durations except for the range of 30-50 msec, which is natural for a language with unaspirated stops. In such cases, the cluster was heard as /tl/. Subjects of both groups reported in post-test interviews that some stimuli identified as /tl/ were actually heard as dental fricatives by the Italian listeners, and as labial fricatives by the German listeners.

The results showed a strong voicing asymmetry, for voiced clusters were almost always correctly identified by the two groups, except for the 10msec stop burst duration which were often heard by both groups as /dl/ (Italian 67% (/gl/) and 40% (/gla/), Germans 63% (/gl/) and 27% (/gla/)). It thus seems that the voiced friction burst is rather assimilated to the lateral approximant, while the voiceless friction burst leads to the perception of a fricative. Moreover, the presence of a prevoiced portion in the voiced stop may have contributed to the correct identification of the cluster.