[l] tends to be velarised, apical as opposed to laminal, and produced with a low jaw, and these features are connected

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ABSTRACT

[l] has three fairly general distinguishing articulatory features where it differs from the otherwise related coronals [t], [d], [n], and [s]: It tends to be velarised, to be apical more often in contrast to laminal, and to be produced with a low mandibular position. These characteristics seem to be common enough globally to raise the question if there may be a connection between them. We propose that these features are connected, with the following causal chain: the lateral transverse compression gesture makes the tongue longer and vertically thicker and causes the tendency of velarisation; to avoid velarisation, the jaw is lowered; a lower jaw is connected with a higher frequency of apical as contrasted to laminal gestures.

1. INTRODUCTION

The front coronals [t d n l s r] of a certain language are often described as sharing the same articulation place or gesture. From a phonological point of view this generalisation may often be justified. However, the detailed front tongue gestures of most of these sounds tend to differ intralingually, according to an interlingually widespread pattern [1], [2], [3], [4]. This pattern reflects general, sound-specific production conditions. The conditions for some of these coronals are well known in general terms. Thus, [s] demands a front tongue groove and an air jet hitting the front incisors, and a small interincisor distance; also, in trilled [r], the front tongue vibrations, caused by the interplay of aerodynamic and organic factors, demand a highly specific front tongue shape and position, and absence of muscular tension in the tongue tip [3], [4], [5].

Due to these conditions, the jaw position is generally high in [s] and low in [r]. In addition, both [s] and [r] are never or very seldom dental in a strict sense – i. e. produced with front tongue contact with the upper front incisors. In contrast, especially [t] and [d] but also [n] and to some extent [l] occur as strictly dental. Thus, e. g. [3] found that Swedish /t/ was constantly dental in the strict tense among ten speakers, whereas /d/ and /l/ varied between dental and alveolar. Furthermore, there seems to be a global tendency that [t] and [d] are often dental while [n] and [l] are produced a bit further back in the same languages or dialects. This pattern is found among the 29 described languages in Handbook of the IPA[6]: In 19 cases, [t d n l] are all classified in the same articulation place column, but in 10 cases, [t] and [d] are described as dental but [n] or [l] or both as alveolar. In no case are [t] and [d] classified as produced further back than [n] and [l]. Presumably, not all contributors of the Handbook - like many other phoneticians – have paid adequate attention to the dental-alveolar distinction. Therefore, the tendency in this small sample will probably come out even stronger when this distinction is generally attended to. Today, it is often impossible to decide from published descriptions if coronals are dental or alveolar [7, p. 76]. Thus, much research is needed in order to elucidate such detailed production aspects of coronals, and also of several other speech sounds. Those close articulatory studies are needed also to promote the development of physiologically realistic, three-dimensional articulatory models like that of Wilhelms-Tricarico [8]. With also such an aim, we are planning to continue to study coronal consonant production with several methods including EPG, articulography, and MRI. Preparing for this, we have been searching for patterns among facts known today in this area. The rest of this article is an outcome of this activity, concerning the lateral [l].

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2. [l] TENDS TO BE VELARISED, APICAL, AND LOW MANDIBULAR

[l] has three fairly general distinguishing articulatory features where it differs from the otherwise related coronals [t], [d], [n], and [s]: It tends to be velarised, to be apical more often in contrast to laminal, and to be produced with a low mandibular target. These characteristics are not ubiquitous but seem to be common enough globally to raise the question if there may be a connection between them. Since these features are found in [l] but not in [t d n s], it is natural to hypothesise that they are caused by the specific lateral articulatory gesture. We propose that these features are connected, mainly with the following causal chain: the lateral transverse tongue compression gesture makes the tongue longer and vertically thicker and causes the tendency of velarisation; to avoid velarisation, the jaw is lowered; a lower jaw is connected with a higher frequency of apical as contrasted to laminal gestures. The rest of this article will first present data that support the claim that these features seem to be common and then discuss the proposed explanatory hypothesis.

3. SUPPORT FOR THE STATEMENTS THAT [l] TENDS TO BE VELARISED, APICAL AS OPPOSED TO LAMINAL, AND LOW MANDIBULAR

3.1 VELARISATION

Unlike other coronals, [l] is velarised in conspicuously many languages. (Most data in this paragraph are from [9].) Best known is English. British English has generally a dark [l] allophone before all consonants except [j], and before pauses. In American English, [l] is often velarised in all positions. A pattern similar to British English is found also in Dutch and Portuguese. In some languages, the [l] velarisation is reported to appear in positions next to back vowels – e. g. in Finnish and Turkish. Also several Slavic languages have velarised [l], as well as Albanian. In contrast, it is generally not the case that other front coronals are described as velarised in languages with a velarised [l].

3.2 THE APICAL AS OPPOSED TO LAMINAL CONTACT

Both Bladon & Nolan [10] and Dart [1], [2] have found that [l] has a specific, strong tendency to be apical as opposed to laminal, unlike all other front coronals in their databases. According to Dart [1], [2], this tendency was strong also in French, where a general tendency for the other front coronals was a laminal gesture - in agreement with traditional descriptions of this language. Her material included 20 American English and 21 French speakers. The Bladon & Nolan study concerned 8 British English speakers. Since the detailed gestures of coronals varies strongly between speakers of the same dialect [1], [2], the large numbers of subjects in these studies underline the significance of this [l] feature. No explanation for the striking [l] pattern is proposed by Bladon & Nolan [10], whereas Dart suggests [1, p. 34] that it might be ”easier to make the lateral escape channel when the body of the tongue is lower than the tip”.

3.3 THE LOWERING OF THE JAW

For VCV syllables, Keating et al. [11] have shown that both English and Swedish speakers have a significantly lower jaw in [l] than in [t d s]. In Swedish, [l] jaw position was also significantly lower than in [n], while [l] and [n] were similar in English. In addition, we have observed a striking, low mandibular [l] pattern unlike that of other coronals in trajectories registered by Selspot for a large material of Swedish phrases, spoken by about 20 speakers.

4. DISCUSSION

It has now been shown that [l] differs from the otherwise related coronals [t], [d], [n], and [s] by its probably general tendency to be velarised, to be apical more often in contrast to laminal, and to be produced with a low mandibular target. This constellation of features does not seem to be due to chance. Thus, it is tempting to try to find a common cause of this highly specific pattern of detailed articulatory characteristics. We will now argue that there is such a cause, and that the features are interconnected in a specific way.

The lateral openings of [l] are to a great extent created by the activity of the internal, transverse lingual muscle, which pulls the lingual margins in a medial direction. The sagittal extent of the tongue that is involved has not been extensively studied. However, the variation appears to be great, to judge from some published data on Catalan, German, and English in Recasens et al. [12], [13] and Narayanan et al. [14]. Thus, the tongue contact area varies from one with lateral wings on both sides covering the

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whole palatal region, in addition to a connecting medial alveolar or dental obstacle, to a completely wingless pattern with only alveolar or dental contact. In a large Swedish material, an [l] contact pattern with long lateral wings dominated strongly [3], [4].

Since the tongue volume is essentially constant and the position of the front tongue is not changed much in [l] compared to the other front coronals, this transverse tongue compression causes an expansion of the posterior tongue parts in [l] and thus tends to create a secondary constriction - velarisation or pharyngealisation. Such gestures have been shown on some X-ray and MRI registrations, e. g. in Narayanan et al. [14]. Evidently, this lateral transverse compression gesture proceeds in a scalar, non-categorical fashion. This is argued by Recasens et al. [13] and may also easily be felt by proprioception. Also the front part of the tongue may get vertically thicker. We hypothesise that non-velarised [l] is produced within a range near one end and velarised [l] within a range nearer to the other end of a scale of varying degree of rear tongue bulging. A higher degree of activity in the transverse muscle causes a more pronounced rear tongue gesture. This means that a tendency to be velarised is inherent in [l]. The individual variation of anatomic proportions is great. Accordingly, in some speakers or group of speakers, conditions may be more favourable for this global tendency to get a manifest acoustic-perceptual effect.

We propose that in several languages, the perceptual effect of this velarisation tendency is accepted and [ɫ] is the prototype, while in others it is not accepted. In order to avoid it, a jaw lowering seems to be a natural manoeuvre. This lowering may also be connected with a possible vertical thickening of the front tongue and with a goal to facilitate the lateral escape of air. Our hypothesis may be strengthened or refuted by studying the correlation in a number of languages between mandibular position and the presence of velarisation in [l].

Traditionally, this lateral quality modification is called velarisation. However, traces from MRI registrations by Narayanan et al. [14] indicate that the “velarisation” gesture may be velar and superiorly pharyngeal equally often. Probably there are also gestures in between, along a continuous scale. Velarisation and pharyngealisation have a similar acoustic-perceptual effect, denoted by [ɫ] in the IPA alphabet.

We hypothesise that when the jaw position in a front coronal is low, there will be a tendency for an apical as opposed to a laminal gesture. The explanation of this is that a lower jaw position is connected with a lower front tongue position. Since the distance between the front tongue and the oral ceiling is thus relatively large, a coronal constriction is connected with a greater lifting of the front tongue and thus with an apical contact. Accordingly, since [l] has a low jaw position, it tends to be apical.

This hypothesis of a connection between the jaw position and the detailed front tongue gesture gets independent support from data on [s]: Since this sound demands a small interincisor distance, its jaw position is high, and also its tongue body position. Consequently, the lifting of the front tongue is small, causing a tendency that the blade makes the contact. This hypothesis is supported by large proportions of laminal as contrasted to apical [s] gestures in British English [10] and American English and French [1], [2].

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