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From apical [r] to uvular [ʀ]: what the apico-dorsal *r* in Montreal French reveals about abrupt sound changes

Yves Charles Morin
(Université de Montréal)

Abstract

This article re-examines the various models and empirical bases for the dorsalization of apical rhotics at the light of relatively recent observations made by Santerre (1982) by means of x-ray motion pictures, bringing new evidence that this change need not necessarily be abrupt, as often claimed (cf. Bloomfield 1933), but may involve gradual changes in the relative strength of primary and secondary articulations of the rhotic, as hypothesized much earlier by Jespersen (1889). Santerre's study also supports Jespersen's claim that a uvular fricative/approximant [ʁ] develops earlier in the dorsalization process, while the uvular trilled [ʀ] appears later as a reinforced variant of this fricative/approximant [ʁ], probably on social and communicative grounds. Santerre's study of a single Montreal informant was conducted in the years 1970 at a time when a radical evolution from apical to dorsal articulation was under way in that city – an evolution well documented in a series of sociolinguistic studies (cf. Clermont & Cedergren 1979; Sankoff & Blondeau 2007), which conclude that this development is strongly conditioned by social factors and represents the spread across the linguistic community of a socially prestigious norm. The change observed by Santerre involves a classic form of lenition in syllable-final position that need not have been triggered by social factors. On the other hand, and contrary to implicit claims in Jespersen's hypothesis, the dorsalization in other contexts does not develop at the same pace. One may hypothesize that dorsalization normally begins in word-final or preconsonantal position and is later generalized elsewhere, a process that might be sensitive to social factors. Imperfect learning by children during the early stages of acquisition – not examined in this article – may have been another factor responsible for the rapid spread of dorsalization in Montreal, as hypothesized by Passy (1891a) for similar changes in Europe, who argues that the child's immature uvular rhotic, normally abandoned in the later stages of acquisition, may be retained when it becomes socially valued in the community.

1 Introduction

Early descriptions of the phonetic evolution of languages typically distinguished between three main types of sound change: "organic", "imitative/acoustic" and "external" as in Sweet (1874: 162, 1888: 17):[1]

[1] Sweet modified his terminology in 1888, when he introduced the term "acoustic" as an interchangeable equivalent for "imitative", and modified his use of the term "inorganic", so that "inorganic" as used in 1874 corresponds to "external" in 1888, whereas "inorganic" was extended in 1888 to cover both "imitative/acoustic" and "external" changes. This allowed him to oppose in 1888 "internal changes" (defined as being either "organic" or "imitative/acoustic" changes) to "external changes".

> «Organic changes are those which are the direct result of certain tendencies of the organs of speech […]. Imitative changes are the result of an unsuccessful attempt at imitation. Inorganic [= 1888 "external"] changes, lastly, are caused by purely external causes, and have nothing to do either with organic weakening or with unsuccessful imitation» Sweet (1874: 7).

The neogrammarian concept of gradual sound change as proceeding by imperceptible degrees across generations falls into the first category. Abrupt changes, such as metathesis or switch that cannot result from the gradual displacement of the point of articulation, such as that of dorso-velar [x] to labio-dental [f] in *enough*, on the other hand qualify as "imitative". Imitative changes are assumed to be initiated by children during acquisition as the result of producing sounds acoustically identical or very close to that of the adults through different articulatory means, however.

The distinction between organic and imitative changes was intimately related to assumptions on the source of the change and the moment of its inception in the speaker's life. According to Sweet, the child would usually acquire a sound system which coincides mostly with that of his primary caretaker, both acoustically and articulatorily, and only rarely depart from it as a result of imperfect imitation. Such departures occur necessarily during the initial period of acquisition; on the other hand organics changes are initiated later in the speaker's life:

> «From the fact that all sounds are originally acquired by imitation of the mother and nurse we are apt to assume that all sound change is due to imitation, but a little consideration will show that this is not the case […] The real explanation of such changes as those cited above is that the sounds were acquired properly by imitation, and then modified by the speaker himself, either from carelessness or indolence» Sweet (1874: 7).

Passy (1891:20, 24, 230-233) strongly argued against Sweet's position and claimed that past the initial period of acquisition in childhood, the sound system of individual speakers is relatively fixed and remains stable. Both organic and imitative sound changes could only come about as a result of imperfect learning, according to him.

Passy's point of view did not prevail. The Anglo-Saxon scholarly tradition maintained Sweet's distinction between these two kinds of changes, now usually referred to under the names of "gradual" vs. "abrupt" changes, and – at least implicitly – endorsed his thesis that gradual changes develop relatively late during the lifetime of the speaker unlike abrupt changes which occur during the initial period of acquisition. The shift of apical trilled [r] to uvular trilled [ʀ] that took place in many European languages between the seventeenth and nineteenth centuries is one of the changes most often presented as a paradigmatic case of abrupt change (from Sweet 1888: 25 §93, to Hock & Joseph 1996: 133).

The French scholarly tradition, as a rule, did not did not draw such a sharp distinction and typically assumed that regular sound changes must have been gradual, and in particular considered the shift of apical trilled [r] to uvular trilled [ʀ] in French to be such, leading Millet (1926) to present subtle justifications for that stance, as we will see later.

Recent sociolinguistic studies examined the shift of apical [r] to uvular [ʀ] – or more precisely the dorsalization of rhotics, i.e. the shift from coronal [r]/[ɾ] to dorsal [ʀ]/[ʁ]/[ʁ̟] – in linguistic communities where it appears as a "change from above", i.e. resulting from the adoption or generalization of a socially more prestigious norm, a change where the abruptness of the process is thus not a major concern. Sankoff & Blondeau (2007) analyzed the dorsalization of rhotics in the French of Montreal between 1971 and 1995 and concluded (although their corpus did not allow for direct observation) that it was likely that children acquired early the rhotic of their primary caretaker, and that the shift from coronal to dorsal

articulation occurred later, mostly in later childhood or early adolescence (pp. 577, 580), and that in their corpus «most individual speakers followed across time were stable after the critical period, with phonological patterns set by the end of adolescence» (p. 560); only a «sizeable minority, however, made substantial changes» (p. 560), acquiring or generalizing the dorsal norm later during their lifespan.

Some relatively recent x-ray cinematographic observations of one speaker of Montreal French allowed Santerre (1982, 1989) to bring new evidence supporting the hypothesis that the dorsalization of rhotics need not be abrupt, but may involve gradual changes in the relative strength of primary and secondary articulations of the rhotic, as presented much earlier by Jespersen (1889).

This article re-examines the various models and empirical bases for the dorsalization of apical rhotics at the light of the new observations made by Santerre (1982), completed by those by Charbonneau (1971), at a time when the dorsal rhotic was less frequent in Montreal. It also examines what evidence there is for Jespersen's thesis that trilled uvular [ʀ] is not a regular phonetic outcome of the dorsalization of apical trills, as commonly assumed, but a socially motivated adaptation of [ʁ] or [ʁ̞]. For Jespersen the fricative [ʁ] and/or approximant [ʁ̞] appear early in the process of dorsalization and are not later developments of trilled [ʀ], as commonly assumed.

2 On the abrupt or gradual nature of the change [r] > [ʀ]

2.1 Bloomfield 1933

Leonard Bloomfield, in a relatively short paragraph of his treatise on general linguistics, argued that some sound changes should be given a status quite different from that of the gradual phonetic changes neo-grammarians had been mostly concerned with. He took the mutation of apical [r] into uvular [ʀ] as an uncontroversial instance of a change that could only be abrupt.

> «Certain linguistic changes which are usually described as sound-change, do not come under the definition of phonetic change as a gradual alteration of phonemic units. In various parts of Europe, for instance, the old tongue-tip trill [r] has been replaced, in modern times, by a uvular trill. This has happened in North-Umbrian English, in Danish and southern Norwegian and Swedish, and in the more citified types of French (especially in Paris) and Dutch-German. Aside from its spread by borrowing, the new habit, in whatever times and places it may first have arisen, could have originated only as a sudden replacement of one trill by another. A replacement of this sort is surely different from the gradual and imperceptible alterations of phonetic change» (Bloomfield 1933: 390, § 21.10).

Bloomfield's view now appears to be quite common, at least in the Anglo-Saxon scholarly tradition, where the mutation of apical [r] into uvular [ʀ] is regularly presented as the epitome of an abrupt change. For instance, according to Labov (1981: 304) «the shift of apical to uvular (r) throughout Western Europe» is a typical case of «discontinuous shifts», and, commenting on Labov's discussion, Janson (1983: 20) adds: «[Labov] points to a shift that cannot be effected gradually, since it is phonetically discontinuous. (Cf. also Milroy 1997, Phillips 2006: 32 for similar formulations; and Hock & Joseph 1986: 133 for a textbook example).

Bloomfield's interpretation was not isolated and had already been expressed long before, in particular by Sweet (1888: 25 §93). One may nonetheless surmise that Bloomfield's endorsement was instrumental in its generalized adoption – which did not really extend to the

French tradition, where most scholars appear never to have questioned the possibility for this change to be phonetically gradual, although not necessarily so.

2.2 Before Bloomfield

Bloomfield's view was not universally held when he published his work. Some forty years earlier, the Danish scholar Jespersen (1889: 73-75) exposed in great detail his ideas on the nature of the shift from apical [r] to uvular [ʀ] in European languages:[2]

> «My own theory which I venture here to set forth without any learned apparatus, thinking that common sense speaks in favour of it, is this: {βr} [= r] claims a great expenditure of breath; it is not easy to produce a distinct trill when speaking in an undertone. […] The boisterous {βr} [= r] then came naturally into disuse because of the difficulty of trilling it properly, and this happened spontaneously wherever the same social circumstances favoured it; there was no necessity for borrowing this pronunciation from foreigners as it would present itself as a matter of course. The principal result was {β2} [= ɹ]; this sound, still kept as the normal *r* in English and Faeroic, has been a common one in France in the sixteenth and seventeenth centuries, as is shown by the transition from [r] to *s* or rather [z] in words as *chaise* and in many names of places such as *Ozoir*; the transition to [đ] [= ð] is also found.
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> But {β2} [= ɹ] rarely subsists except where it is formed comparatively far back ({f} [= alveolar] or even {g} [= post-alveolar]). Another element, which had formerly but a subordinate part to play, now comes to the front: I mean the raising of the back of the tongue which is necessary to produce {βr} [= r], as the foremost part of the tongue must be made as thin and slender as possible in order to render the vibrations easy. This back element is scarcely noticed in {βr} [= r], and probably the distance between the tongue and the palate is often more than 3 [= approximant stricture]; but when no trilling is produced, it is apt to become {γ2} [= ɣ/ʁ]; in course of time, then, the {β2} [= the coronal articulation] gets superfluous and is dropped. But along with this {β2} [= ɹ] or {γ2} [= ɣ/ʁ] […], the original {βr} [= r] was kept up and used whenever a loud and distinct utterance was required. This was at first – and is still to a great extent – done quite unconsciously; […] Where, however, {β2} [= ɹ] is not preserved so distinctly as in English, the back element being predominant, and more still where the point action has been entirely superseded, the want of a trill to give the {γ2} [= ɣ/ʁ] force as an *r* is most easily supplied by letting the uvula vibrate. There is already some tendency towards adding a uvular trill to back open consonants, as shown in Berlin pronunciation of [q] [= ɣ] in *wage* and [x] in *wache* and in Dutch [q] [= ɣ] in *goed* and [x] in *schep,* which are generally {γ2$_j$ δ0$_r$} [= ʁ̟ (velar trill)]; but of course this tendency is much stronger in a {γ2} [= ɣ/ʁ] which is co-ordinate with a {βr} [= r]. Where the parents speak {γ2} [= ɣ/ʁ] within four walls and {βr} [= r] in exceptional cases, their children will easily acquire {γ2} [= ɣ/ʁ] as the ordinary sound and {γ2 δ0$_r$} [= ʁ] as an emphatic form» (Jespersen 1889: 73-75).

Jespersen's account of the evolution of [r] to [ʀ] relies on his general conception of phonetic change as being variable, allowing earlier articulations of a sound to be preserved as social or communicative variants of the new one. Analyzing the apical trilled [r] as multiply-articulated, with a primary apical articulation and a secondary dorsal articulation, as he does, the different steps of the evolution are as follows: (1) untrilling of [r] to [ɹ],[3] the later

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[2] I enclose the author's original analphabetic description between braces. Phonetic transcriptions between simple square brackets are those of the author. Transcriptions following the sign '=' (usually between square brackets) represent my own tentative interpretation of the author's description, *relative to the topic under discussion*, or the current IPA symbols when the author's are different.

[3] Jespersen's interpretation of the sibilant [z] in sixteenth-century French (which survives in ModFr. *chaise* < OFr. *cheeire*), as reflecting the intermediate step [ɹ] between OFr. [r] and ModFr. [ʁ] and [ʀ], is not historically sustainable, however. Sibilant reflexes of OFr. [r]

preserving the secondary dorsal articulation of its ancestor, thus more accurately transcribed as [ɹˠ] or [ɹᵡ], (2) loss of the primary apical articulation of [ɹˠ]/[ɹᵡ] and concomitant promotion of the dorsal articulation, (3) retrilling of [ʁ] to (fully trilled) [ʀ]. The last step must be understood as a socially motivated adaptation of [ʁ] to mimic the trills of the early social and communicative variant [r] used throughout until then.

Evolution	unmarked variant	marked variant
initial stage	[rˠ]/[rᵡ]	
1. untrilling	[ɹˠ]/[ɹᵡ]	[rˠ]/[rᵡ]
2. loss of primary articulation	[ɣ]/[ʁ]	[rˠ]/[rᵡ]
3. adaptation of the marked variant	[ɣ]/[ʁ]	[ʀ]

In Jespersen's analysis, the development of a fricative [ʁ] in French (perhaps also realized as an approximant [ʁ̞]) was prior to that of trilled [ʀ], a sequence of events which he claims is compatible with his observations on the then current articulations of French rhotics:

> «in Parisian French {γ2$_{k}$} [= ʁ] or rather {γ2$_{j,k}$} [= ʁ̞] is, as far as I have been able to hear, much more frequent than any trilled sound ({βr} [= r] or {δ0$_{r}$} [= ʀ]); only it must be noted that in speaking emphatically or passionately the want of a more distinct sound is easily and naturally remedied by trilling the uvula, the result being {γ2$_{k}$ δ0$_{r}$}[= ʀ]» (Jespersen 1889: 107).

Two years later, in his influential thesis on the nature of phonetic changes, Paul Passy examined Jespersen's analysis of the dorsalization of rhotics in European languages. Although he concluded that it had been abrupt in most of these languages, he was not opposed to the idea that the shift from [r] to [ʀ] could have resulted from a gradual series of changes: «Le changement de [r] en [ʀ] qui est ordinairement direct, peut bien quelquefois être graduel» [the shift from [r] to [ʀ], which normally is abrupt, may in some cases be gradual] (Passy 1891a: 158, § 361). Passy even supported the possibility for [r] to become a doubly articulated trilled [rˠ] (with both apical and velar trills) or [rᴿ].[4] Unlike Bloomfield, who presented the abruptness of the change as an articulatory necessity, Passy's arguments (1891a: 152, § 340; 158, § 361) are empirical. He argues for its abruptness by observing that in linguistic communities using an apical trill, children would often render it as a uvular trill during the early stages of acquisition, without there being gradual minute changes across generations. Most children would eventually master the delicate mechanisms for the production of apical trills and conform to the adult norm. If for some reasons, the immature variant becomes socially valued, it would spread easily throughout the community, as there is less pressure for children to give it up. Passy noticed that in French cities, and even more so in Paris, children would as a rule adopt the dominant urban uvular [ʀ], even when raised by adults using the apical [r].[5]

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only developed in intervocalic position. The modern uvular rhotics [ʀ], [ʁ] or [ʁ̞] of Standard French reflect the regular phonetic development of word-initial [r] and intervocalic geminated [-rr-], where that change did not take place.

4 Passy credited Jespersen for the description of a rhotic of that sort in some Jutland dialects of Danish. (I have not yet been able to trace where the Danish scholar discussed this articulation, however.)

5 One must certainly assume these adults to have been recent immigrants from rural areas – where apical [r] was then largely dominant in France – or had strong ties with such areas.

At the beginning of the twentieth century, Rousselot, the founder of the French school of phonetics, had no doubt whatsoever about the gradual evolution from [r] to [ʀ] in Gallo-Romance dialects. In his seminal work on linguistic change, Rousselot (1891: 233) hypothesized that [ʀ] was an intermediate stage in one of the two evolutionary paths leading to the complete loss of apical [r]:

> «[L]a langue est sollicitée dans deux sens opposés. Ou bien la pointe retombe sur le plancher de la bouche en faisant entendre les sons intermédiaires *r̝, z, ẓ* […]. Ou bien la racine se porte vers le palais, et l'on a les sons intermédiaires *ṙ, r̂, ĉ, h*.» (Rousselot 1891: 233).
>
> [The tongue is acted upon in two opposite directions. Either the apex lowers onto the mouth floor, which produces the intermediate sounds [ɾ̝, z, ð]. Or the tongue root tongue raises toward the palate, giving the intermediate sounds [ʀ, ʁ, ħ, h].]

Unlike Jespersen, Rousselot considered that all the intermediate stages involved in the gradual change from [r] to [ʀ] could be trilled: «L'*r* est un son vibrant qui peut se produire tout le long du canal vocal, des lèvres à l'isthme du gosier: de là ses nombreuses variétés» [The *r* sound is a trill that can be articulated at any point along the vocal tract, from the lips to the isthmus of fauces: hence the large number of its varieties] (Rousselot & Laclotte 1902: 56). When he later examined the evolution of rhotics in Paris, Rousselot concluded that the apical rhotic underwent both of the evolutionary paths he discussed earlier, albeit in different social classes. The low-class reflexes [ð] or [z] did not survive, however, and were replaced by the uvular rhotic initiated by the dominant classes:

> «L'*r* grasseyée dérive de l'*r* dentale par un abaissement, qui a été progressif, de la pointe de la langue derrière les dents inférieures avec une élévation compensatoire du dos de la langue. […] L'évolution, qui a donné l'*r* parisienne, a commencé par la confusion de cette consonne avec *z*. On constate ce phénomène […] au XVI[e] siècle à Paris, chez les femmes de petites conditions […], dans le peuple […]. Vers 1620, cette mode avait disparu, semble-t-il, à Paris […]. Dans la réalité, à cette date, la nouvelle *r* devait être constituée, par l'application de la pointe de la langue sur le plancher de la bouche, et la mise en vibration des parties molles de l'isthme du gosier» (Rousselot 1911: 173, 175).
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> [A uvular [ʀ] develops from a dental [r] through progressive lowering of the tongue apex toward the back of the lower teeth with compensatory raising of the back of the tongue. […] The evolution which lead to the Parisian uvular rhotic, began with the merging of the dental rhotic with *z*. This confusion could be observed in the sixteenth century in Paris among women of modest condition and low-class people. By 1620, this fashion had apparently disappeared in Paris. In reality, at that moment, the new rhotic must have emerged, articulated with the apex of the tongue resting onto the mouth floor and the soft tissues of the isthmus of fauces set into vibration.]

In his 1919 lessons at the *Institut catholique,* as reported by Millet (1926: 33, note 1), Rousselot interpreted the development of the uvular rhotic as a social reaction, probably against the merging of [r] with [z]: «Le *z* est une *r* manquée: en s'efforçant de retrouver l'*r* au XVI[e] siècle, les Parisiens ont articulé *ṙ* grasseyée, le dos de la langue et non la pointe ayant remonté vers le palais.» [The *z* reflex is a 'missed' rhotic: as they strove to regain the rhotic, Parisians articulated a uvular [ʀ] when the dorsum of the tongue, instead of the apex, rose toward the palate.]

Although Rousselot held that the shift from [r] to [ʀ] in French resulted from progressive changes in the articulatory gestures of the rhotic,[6] he was not able to illustrate the intermediate

[6] Much later, Haden (1955) challenged «Rousselot's theory of the gradual shift from [r] to [ʀ]» on empirical grounds. Haden's arguments, however, are flawed by his assumption that the reflexes of intervocalic Romance -RR- and -R- merged in French before the Old French

steps between the trilled apical [r] and the trilled uvular [ʀ]. Yet, there should have been some. The tongue must be held close enough to the upper surface of the vocal tract for trilling to be sustained (Ladefoged & Maddieson 1996: 219), thus under the hypothesis of a gradual change, as soon as the tongue apex lowers somewhat, its trilling ceases relatively soon, and, at that moment, the tongue dorsum is still too remote from the uvular region to allow for a uvular trill. One must therefore hypothesize a stricture sufficient to sustain some trilling in the vocal tract somewhere between the alveolar ridges and the soft palatal if, as hypothesized by Rousselot, the rhotic never ceased to be trilled during the shift from [r] to [ʀ].

Adrien Millet, a disciple of Rousselot, claimed to have found evidence for the missing link. He published in 1931 an extensive study on the rhotics in Berry, a province in the center of France, where he was able to observe the then on-going change from apical [r] to uvular [ʀ] and document it in details. The new experimental techniques developed by Rousselot allowed him to distinguish and modelize two varieties of coronal trills, the common «rolled» apical variety, with occluded contacts, and a «semi-rolled» variety, described as a lateral trill with fricative contacts (1931: 56, 110):[7] «la pointe linguale s'est relâchée, et les bords latéraux du muscle interviennent seuls dans la production du roulement» [the apex does not reach the ridge and only the lateral edges are active in producing the trill]. This lateral trill is presented as the link toward the uvular trill.

His observations, however, did not allow him to report any incremental changes in the articulation of rhotics in the lifetime of his Berrichon fellow countrymen, as the theory of progressive incremental changes would have let him expect. The uvular articulation was indeed slowly gaining ground among the adult population, yet it would appear spontaneously during the early stages of acquisition in the speech of children born and raised in families where parents and often also older children used apical trills. This speech impediment, as it was considered by families – at least in the early periods – was endemic in the years 1890. It reached epidemic proportion after 1915 in the more densely populated Sens-Beaujeu area.

The ideological stand against discontinuous change (or 'spontaneous' change as they were also called), was such that Millet felt he had to revise the concept of 'progressive' change, to accommodate the Berrichon evolution:

> «L'*ṙ* grasseyée qui se déclare présentement sur la contrée représente donc l'éclosion, sous une forme originale, de tendances morales, sociales et physiologiques préparées dès longtemps […]; du terme initial au terme final, la série phonétique est ininterrompue: […] le grasseyement témoigne d'un fléchissement général et progressif de l'avant-langue dans *toutes* les positions de la vibrante» (Millet 1931: 175).
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> «Le grasseyement n'est pas né spontanément; il était en puissance chez les parents et s'est déclaré chez l'enfant au moment où celui-ci est entré en possession de la langue» (Millet 1931: 177).
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> [Hence, the uvular [ʀ] currently developing in this area represents the completion, in an innovative way, of moral, social and physiological tendencies long under way […]; from its inception to its

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period (Haden 1955: 507). That this cannot be the case is evidenced by the maintenance of a distinction between their reflexes in many dialects of Gallo-Romance as recently as the beginning of the twentieth century (cf. Haudricourt & Juilland [1]1949: 56-59, [2]1970: 66-68). In particular, the distinction was still found in Haut-Berry as described by Millet (1926) – whose work was quoted, but obviously insufficiently examined, by Haden (1955: 504, note 4).

[7] The exact interpretation of Millet's terminology is often difficult. Page 56, the trill contacts of the rolled variety are said to be «des battements occlusifs» [fully occluded contacts] and those of the semi-rolled variety «des battements constrictifs» [incompletely occluded contacts with friction]; page 110, the two varieties of trills are respectively called «*r* roulée explosive» and «*r* semi-roulée occlusive ou fricative».

completion, the sequence of phonetic steps is uninterrupted: […] the uvular articulation is the telltale sign of the general and progressive decline of the action of the front part of the tongue in *all* of the contexts where trills could appear.

The uvular articulation did not arise spontaneously; it was an underlying potentiality in the parents' speech habits that materialized in the child's skills when he began to acquire his language.]

2.3 After Bloomfield

From this period on, little discussion on the matter appeared in French scholarly work, until Dauzat (1950), whose stand appears to reflect the common consensus that the change in French must have been a gradual shift that conformed to the neo-grammarian model:

L'évolution a dû être progressive, en ce sens qu'il se développa d'abord probablement un *r* mixte [=r^{R}] (comme celui qu'a observé l'abbé Rousselot dans l'Angoumois)[8] pour l'articulation duquel une vibration dorsale renforçait la vibration apicale; ensuite, la pointe de la langue est retombée et la vibration dorsale s'est seule maintenue. De toute façon c'est l'*r* implosif (final et devant consonne) qui dut être atteint d'abord» (Dauzat 1950: 95).

[The evolution must have been gradual, in so far as there first developed a mixed [r^{R}] (similar to that observed by l'abbé Rousselot in Angoumois) articulated with a dorsal trill reinforcing the dental trill; later on, the apex lowered and the dorsal trill alone was retained. In any case, this change probably affected syllable-final *r* first (either word-final or before a consonant).]

Dauzat's model for the gradual change is essentially the theoretical model proposed by Passy for the gradual dorsalization of rhotics (Passy 1891a: 158, § 361) who claimed, however, that rhotics in the major languages of Europe did not develop according to that model. There is no discussion nor mention of Passy's ideas in Dauzat's presentation.

Straka (1965: 596) also supported the thesis that the change from [r] to [ʀ] may result from gradual phonetic changes, and offers as an allegedly representative example of such gradual evolution that described by Millet for Berrichon. The source of uvular [ʀ] in Standard French, however, would be quite different. This articulation would have resulted from an unsuccessful deliberate attempt by privileged classes to produce a non-native apical trill.

«[A]u XVII^{e} siècle, sous l'influence de l'écriture et des grammairiens, on s'efforcera de restituer les *r* amuïes et de ne pas prononcer *z* à la place de *r,* mais dans les classes supérieures de la société où cet effort sera pourtant le plus développé et conscient, on n'y arrivera pas et l'insuffisance du mouvement articulatoire de toute la partie antérieure de la langue […] fera naître une nouvelle *r* dorso-vélaire grâce à des battements au niveau du voile où les sujets parlants […] les déplaceront inconsciemment de façon mécanique» (Straka 1965: 599).

[During the seventeenth century, under the influence of spelling and grammarians, French speakers strove to reintroduce previously lost rhotics and refrain from articulating them as [z] [in environments where rhotics had taken that value]; in higher social classes, this effort – no matter how heightened and conscious it was – did not meet with success: their limited dexterity in articulating sounds with the anterior part of the tongue […] is the source of this new dorsal rhotic, born from the desire by such speakers to produce a vibrating sound, whose point of articulation they mechanically and unconsciously translated to their velar-uvular region.]

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[8] I have not been able to find where Rousselot would have described the doubly articulated rhotic in Angoumois adduced by Dauzat in support of the gradual nature of the evolution of [r] to [ʀ]. In any case, Rousselot could only have reported a relatively recent change, limited to some specific areas or social classes, as he regularly described rhotics used in this region as simple apical trills (Rousselot 1891: 26, 181).

Straka's thesis is based on his personal views on the evolution of French rhotics, according to which *all* coda rhotics would have been deleted before the end of the thirteenth century in *all* northern Gallo-Romance dialects, while intervocalic rhotics (whether they reflected former simple or geminated rhotics) would have eventually been weakened to *z* (or sometimes to *l*). As appears in the previous quote, this scholar argued that seventeenth-century Standard French underwent a drastic learned phonetic "redesign" of its lexicon based on the conventional spelling. The redesign would have successfully reintegrated most of the coda rhotics that had been lost centuries ago, with the exception of the endings *-er* and *-ier* of infinitives and most nouns and adjectives – a restoration which eventually spilled over from the Standard language into other northern Gallo-Romance dialects. The redesign also targeted apical [r] as the pronunciation to be given to all the earlier rhotics written *r* or *rr* in the conventional spelling, which the privileged classes, however, rendered as uvular [ʀ]. Many aspects of this thesis are difficult to understand. In particular, Straka's account imply that word-initial and post-consonantal rhotics did not undergo any change between the Old French period and the seventeenth century; as a consequence, rhotics in these two contexts should still have been articulated as apical trills during the seventeenth century, just as they were in Old French. In other words, the privileged classes should have had no problem generalizing apical trills to other contexts (coda or intervocalic position), had they wished to do so. Straka must eventually have realized the flaw in this analysis, which is no longer entertained in a later work (Straka 1990: 29b).

2.4 Two different propositions for the gradual change from [r] to [ʀ]

Two different models are thus conceivable for the gradual change from [r] to [ʀ]: one in which it results from a progressive movement of the point of articulation along the roof of the mouth, from apico-coronal to dorso-uvular, more or less as proposed by Rousselot and his followers, and a second where it results from the reduction of the apico-coronal articulation of a doubly-articulated apical trill, as proposed by Passy, Dauzat and Jespersen. In Passy-Dauzat's model, the trill was preserved during the whole evolutive process. In Jespersen's model, the rhotic was first untrilled as [ɹ^{ɤ}]; and possibly regained some moderate trilling when it reached the velar or uvular stages.[9] The ultimate fully trilled stage [ʀ], developed later as a social variant used for specific stylistic uses.

3 The articulation of French dorso-uvular rhotics

There is considerable variation and controversy in the precise points and manners of articulation attributed to French dorso-uvular rhotics. Its moving articulator is usually assumed to be the back of the tongue, hence its description as a 'dorsal' rhotic, but sometimes also the root of the tongue. Its articulatory target region has variously been identified as velar, uvular or pharyngeal, and is often termed 'uvular' – as is done here – without commitment as to its precise position. Three manners of articulation are also often distinguished: fricative, approximant and trill.

3.1 Point of articulation

The precise target articulatory region of the dorsal rhotic is not an issue for the present study. Many studies simply note that it is relatively variable:

[9] Cf. § 3.2 for a discussion on the relation between trilled and velar fricatives.

> «Il est classique d'enseigner que l'*r* postérieur, suivant la zone d'articulation, est dit pharyngal, uvulaire ou dorsal.[10] Le premier a son point d'articulation au niveau de la base de la langue» (Borel-Maisonny 1942: 220).
>
> [It is commonly taught that dorsal *r,* depending on its point of articulation, is said to be pharyngeal, uvular, or velar. The former is articulated at the basis of the tongue.]

The following lines present a rapid survey of the experimental studies that contributed to the discussion.

A pharyngeal articulation has been proposed by Grammont in 1933, and perhaps as early as 1914 in the first edition of his treatise on the pronunciation of French (which I was unable to consult, however): «l'*r* pharyngal. […] son point d'articulation est fixe et reculé jusqu'aux piliers postérieurs du pharynx; ces derniers se rapprochent légèrement, et le souffle qui traverse la glotte ainsi rétrécie met en vibration leur partie inférieure» [as for the pharyngeal rhotic, its point of articulation is fixed and pulled back toward the posterior faucial pillars; they move slightly toward each other and their lower part is set into vibrations by the air flowing out of the constricted glottis] (Grammont 1933, ^{3}1946: 72-74), which was however contested by Chlumský who argued that the pharyngeal articulation is only a secondary articulation automatically added to the primary uvular articulation when one strongly articulates the rhotic: «Quant à l'*r* pharyngal p. 74, il n'est pas nécessaire d'en faire une classe à part; ce n'est qu'un mouvement secondaire qui s'ajoute à l'articulation principale, mouvement naturel, dû à l'excès de la force» [the pharyngeal rhotic need not be construed as a class by itself; it only has a secondary constriction added to the primary articulation, naturally occurring when strength is increased] (Chlumský 1935: 90). Chlumský also contested the accuracy of Grammont's description for what the latter called the 'dorsal' (i.e. 'velar', in the context where Grammont used this term) articulation and argued on the basis of his own x-ray radiographies that they must equally be viewed as uvular, albeit 'soft' (by which he most certainly means 'approximant'):

> «Pour l'*r* uvulaire et pour l'*r* appelé dorsal par M. G. (mieux l'*r uvulaire* doux), j'ai des données intéressantes et précises, fournies par les rayons X pour deux prononciations parisiennes, celle de M. Bochet et celle de M. Pauphilet. a) la constatation la plus curieuse c'est que, pour ces deux sons, le voile du palais descend pour rapprocher la luette du dos postérieur de la langue sans toutefois perdre le contact avec la paroi du pharynx. (Ce fait est très important en faisant voir que la collaboration du voile du palais et notamment de la luette se produit dans les deux cas et qu'on a raison de conserver le terme uvulaire aussi pour la nuance douce de l'*r,* courante à Paris). b) Le dos de la langue, allant simultanément à la rencontre de la luette, s'élève pour les deux *r:* toutefois il s'élève moins pour l'*r* uvulaire doux (= l'*r* dorsal de M. G.), justement parce que cet *r* est plus faible» (Chlumský 1935: 90).
>
> [With respect to the uvular rhotic and the rhotic that Maurice Grammont called "dorsal" (for which a better term would be "soft uvular rhotic"), I have interesting and precise x-ray images of the speech of two Parisians, Mr. Bochet and Mr. Pauphilet, showing (a) that, quite curiously, the velum lowers to bring the uvula closer to the tongue dorsum for either of them, without the latter ever losing contact with the pharyngeal wall (an important fact to stress, as it shows that the velum and with it the uvula are involved in the production of either sound, justifying thus that one should retain the term "uvular" for the soft rhotic commonly used in Paris as well); and (b) that simultaneously the tongue dorsum rises to meet the uvula for either rhotic, although it rises less for the soft uvular rhotic (= Grammont's "dorsal" rhotic), precisely because it is weaker.]

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[10] The term 'dorsal' is often found in the French tradition to refer to the 'velar' articulatory target region, as appears here.

Chlumský felt it likely that varieties described as 'velar' and 'pharyngeal' both corresponded to the same basic uvular articulation with various degrees of coarticulation. In particular, he concluded that the term 'velar' (or 'dorsal') was most often used to refer to an untrilled uvular rhotic.

Newly developed 9-inch image-intensifiers that made it possible to include the posterior regions of the vocal tract at the same time as the anterior ones in the frames of an x-ray film, allowed Delattre (1969, 1971) to examine and compare the pharyngeal gestures of consonants in a wide variety of languages and concluded that all French dorsal rhotics should actually be described as pharyngeal consonants, with secondary velar or uvular co-articulations and/or trills:

> «En termes articulatoires, c'est donc le vif recul de la racine de la langue et la réduction de la cavité pharyngale qui sont à la source de la perception du /R/. Les battements de la luette ou les bruits de friction qui les accompagnent parfois ne sont que secondaires. Ils augmentent la perceptibilité de cette consonne – c'est pourquoi ils s'emploient souvent dans l'insistance – mais ils ne sont pas essentiels» (Delattre 1969: 18).
>
> [In terms of articulatory gestures, one may conclude that the sharp withdrawal of the tongue root toward the pharynx and the reduction of the pharyngeal cavity are the primary sources for the perceived acoustic features of the dorsal rhotic. The uvular trills or the fricative noise that sometimes accompany them are secondary. Their presence increases the perceptibily of the rhotic – which explains why they are often used in emphatic speech – but they are not essential.]

In their description of French vowels and consonants, Bothorel *et al.* (1986) noted that an equal number of their four subjects articulated theirs rhotics in the uvular and in the velar regions (p. 229); the authors gave no indication as to whether the rhotics were trilled or not – one may probably assume they were not.[11]

3.2 Manner of articulation

On the other hand, it is not indifferent to determine, if possible, which manners of articulation characterized the rhotics when they first acquired their dorsal articulation as a mean to evaluate the different models of evolution that have been proposed.

The three main different manners of articulation most frequently mentioned for the dorsal rhotic are the trilled [ʀ], the fricative [ʁ] and the approximant [ʁ̞] (sometimes referred to as 'vocalized *r*' and/or noted [ɻ̞] or [ɚ̞] – or even not noted at all).

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[11] Their observations are based on the x-ray films of four subjects recorded in 1980 at the University of Strasbourg. Two tokens of *r* were examined for each of the subjects, all of them in syllable onsets. The four subjects were young native speakers of French, aged 23 to 26, without «regional accent». Three of them, including the two that articulated velar rhotics, were born in Alsace (Hoenheim, Bas-Rhin and Mulhouse, Haut-Rhin) or Germany (Fribourg-en-Brisgau). The published x-ray tracings (pp. 216-217) made by transparency on enlargers suggest some variability between velar and uvular articulations for the two subjects for whom velar rhotics were reported. One of the two rhotics produced by Subject 1 actually appears to be palatal, and the second, uvular; the palatal variant does not present the pharyngeal bulge that characterizes French dorsal rhotics according to Delattre (1969, 1971). The two rhotics produced by Subject 3, do appear to be velar; it is interesting to note that she articulates her velar rhotic significantly further back than her velar stop [k] in *coup* (p. 181). Her velar articulation, as appears in the tracings on page 217, corresponds precisely to that given by Delattre (1969, first line of figure 7) for an articulation which he claims is quite infrequent in France.

The approximant variety has been identified relatively late. One had to wait until 1930 for phoneticians to mention it (Durand 1930: 253-256, 1936: 268, Borel-Maisonny 1942: 229, 231).[12] Its late discovery does not necessarily mean that it was then a recent development, as it is often claimed to be. The approximant variety has essentially been observed in word-final position, but it may actually also be an initial part of post-vocalic trilled or fricative rhotics, which could thus be represented as [ɻ͡ʀ] and [ɻ͡ʁ].

The treatment of French post-vocalic rhotics when they are borrowed in Vietnamese illustrates quite well their composite nature. Thus, French *fourchette* [fuɻ͡ʁˈʃɛt] 'fork' is adapted in Vietnamese as *phuốc-sét* or *phuộc-sét,* i.e., ignoring the tones, [ˌfu͡əkˈʂɛt], where the approximant part [ɻ] of the French rhotic is adapted as the final glide of the Vietnamese diphthong [u͡ə] and its fricative part [ʁ] as Vietnamese [k]. In word-final position, where the French rhotic is now often reduced to its approximant, the rhotic is simply interpreted as the final glide of a diphthong, as in *cours* [kuɻ] 'course' > Viet. *cua* [ku͡ə], without trace of uvular stricture, which would normally have surfaced as [k] in Vietnamese, where a consonant is allowed in word-final position, e.g. in Viet. *cuốc* [ku͡ək] < French *course* [kuɻ͡ʁs] 'race'.[13]

In acoustic terms, one could perhaps interpret the approximant [ɻ] in the composite segment [ɻ͡ʁ] as reflecting the formant transitions between a vowel and the loci of the following rhotic. Symmetrical formant transitions are also observed between a rhotic and a following vowel (cf. Delattre 1969: 12), which however do not appear to have a similar interpretation. Furthermore, the formant transitions alone probably cannot explain why the approximant [ɻ] is more easily perceived before a consonant or in word-final position. The composite segment [ɻ͡ʁ] may actually reflect the composite movement of the tongue itself, as observed by Delattre (1969, 1971), which begins as a movement of the tongue root backwards, followed by an upward movement toward the uvula (cf. Ladefoged & Maddieson 1996: 225 in support of this interpretation). In any case, the notion of a transition toward the loci of a following consonant becomes somewhat preposterous when that consonant ceases to be articulated.

In their classification of the different manners of articulation, Ladefoged & Maddieson (1996: 371) make a three-way major distinction between 'stricture', 'tap' and 'trill', in which sounds with stricture are further distinguished between 'stops', 'fricatives', 'approximants'

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[12] Durand occasionally transcribed it as [ə̯]. Borel-Maisonny examined the presence of «constriction» – presumably a stricture narrow enough to provoke an audible turbulent airstream – and wrongly concluded that a rhotic with a lower degree of stricture was not pronounced, albeit as a lengthening of the preceding vowel: «[l'*r*] manifeste donc son existence par de la durée dans l'allongement de la voyelle et non par un son propre. En fait on ne l'a pas prononcé du tout; il n'existait que dans la pensée du sujet parlant, réduit à l'état de conscience phonologique» [the rhotic was realized as a lengthening of the vowel and not as a sound in itself. In fact, it was not pronounced at all, and existed only in the speaker's mind as a phonological latent entity].

[13] The French final [s] of *course* has been suppressed in the adaptation to conform to Vietnamese syllabic templates as the result of the preconsonantal French rhotic being adapted as Vietnamese [k]. Before vowels the French rhotic is usually adapted as [ɽ] in Vietnamese, e.g. *virus* [viɻ͡ʁys] > *vi-ruýt* [ˌviˈɽu̯it] ~ *vi-rút* [ˌviˈɽut]. One exceptionally finds traces of [ɻ] attached to a preceding vowel, as in *courroie* [kuɻ͡ʁwa] > *cua-roa* [ˌkuəˈɽu̯a] or *cu-roa* [ˌkuˈɽu̯a] (but cf. *Darwin* [ɗaɻ͡ʁwin] > *Đắc-uyn* ~ *Đạc-uyn* [ˌɗɑkˈu̯in]). In Khmer, where the adaptation patterns of French rhotics are similar to those of Vietnamese (cf. *tour, bourse* > Khmer [tu͡ə], [ɓu͡ək]), the reinterpretation of [ɻ] as an off-glide after high vowels is relatively more frequent, cf. *direct* [diɻ͡ʁɛkt] > Khmer [ˌɗiəˈrɛk], *courrier* > [ˌku͡əˌriːˈi̯e] vs. *virus* [viɻ͡ʁys] > [ˌɓiˈrih].

and ‘vowels’. The articulation of velar and uvular fricatives, however, may also involve some relatively moderate trills. As noted by these authors «[t]here is, however, a complication in the case of uvular fricatives in that the shape of the vocal tract may be such that the uvula vibrates» (Ladefoged & Maddieson 1996: 167). In a similar way, Delattre noted that the uvular ɣ̇ (ġain) of Arabic, usually described as a simple fricative, was articulated with a slight uvular trill by his Lebanese subject and was thus similar to the uvular fricative rhotic of his French subject: «Both are voiced, both reach their maximal degree of constriction in the high pharynx, both use light, intermittent uvula trills with moderations, and both are perceived primarily by a rise in the 1st formant transition (except after /a/) and a fall in the 2nd formant transition, which correlate with a volume decrease in the pharyngeal cavity (except after /a/) and a volume increase in the mouth cavity» (Delattre 1971: 148-149). According to Jespersen, as we have seen, velar fricative [ɣ] is not uncommonly accompanied with (probably moderate) velar trills, as he noted in Berlin German and Dutch. Straka (1965b: 42-43) presents drawings made from x-ray films where he would have observed vibrations of both the back of the tongue and the soft palate for the articulation of the modern French dorsal rhotic.

The two-way distinction between ‘trill’ and ‘fricative’ may thus not be totally clear-cut for velar and uvular consonants. I will assume in the following discussion that a ‘uvular trilled rhotic’ is a consonant clearly identifiable as a trill and produced without major fricative noise and that for a ‘uvular fricative rhotic’, on the other hand, the impression of fricative noise dominates, while any accompanying vibrations, if any, are moderate, as in Delattre’s description above.

4 The discovery of French uvular rhotics

There is no consensus on the period when articulating dorsal rhotics ceased to be an occasional speech impediment limited to some individuals and became the norm of some social groups in France (cf. Wollock 1982). Estimates range from the seventeenth to the eighteenth centuries.[14]

The existence of a uvular norm in French was clearly established at the end of the eighteenth century. Volney (1795: 29, 1819: 100) – who was quite fluent in Arabic (as spoken in Alexandria and Syria, where he had lived several years before he devised his phonetic alphabet) – identified the Parisian uvular rhotic with the Arabic fricative ɣ̇ (ġain), and made no mention of a strong trill for that articulation.[15] This appears to offer prima facie evidence for Jespersen hypothesis that a fricative/approximant [ʁ] developed before the uvular trilled [ʀ], although one should be weary to jump to this conclusion on that single piece of evidence. The other early explicit descriptions of a uvular articulation for rhotics during the nineteenth

[14] New explorers in the domain regularly come up with ‘scoops’ challenging these estimates, and claim, for example, that they found evidence that «uvular *r* was current in the thirteenth century» (Gess 1999: 261 — but see Nyrop 1899: 287, §355 for an earlier assessment).

[15] Volney reported elsewhere that the apical rhotics found in most European languages were trilled (1819: 81). When he examined the respective points of articulation of the velar fricative [ɣ] (e.g., as in Greek) and the uvular fricative [ʁ], he described the latter as being that used for gargling: «le contact se fait entre le voile du palais et le dos de la langue vers sa racine: les deux organes sont disposés comme pour l’acte que nous appelons *se gargariser*» [the contact is made between the velum and the dorsum of the tongue near to its root; these two organs assume the position used for what we call *gargling*] (1819: 100); this description specifically refers to the relative position of the tongue and the roof of the mouth, not to the vibrations that accompany gargling.

century presented it as a speech impediment of a few individuals who failed to acquire the traditional apical [r], but provided enough information to allow one to conclude that in some cases the uvular articulation was learned through imitation of socially influential figures. Fournier de Pescay (1817: 312) distinguished two qualities of uvular articulations, which one cannot automatically equate with the distinction between trilled [ʀ] and fricative/approximant [ʁ], however. The less noisy («moins bruyante») of the two appears to be a social norm the author said was expanding as a fashionable trend in some ill-defined social classes. Colombat (1831: 58) – later endorsed by Mennechet (1855: 105) – conceded that this usage was not improper for young ladies.

By the end of that century not only was the uvular articulation an indisputable feature of some varieties of French (although still often stigmatized), but a distinction between a trilled uvular [ʀ] and a fricative/approximant [ʁ] in French began to be reported by some phoneticians (Bell 1896, Jespersen 1889, Passy 1887) in the wake of the growing interest in the classification of sounds in the world's languages. At the same time, there appeared a clear social cleavage between the two variants.[16] As uvular trilled [ʀ] began to be accepted as a legitimate variant of apical [r] among the dominant classes in France, uvular fricative/approximant [ʁ] was being stigmatized. The roles would eventually reverse, perhaps in the middle of the twentieth century, when uvular fricative [ʁ] gained social acceptance, while simultaneously trilled rhotics, both apical [r] and uvular [ʀ], were disparaged.

As we have seen, Jespersen considered that trilled [ʀ] did not result from a regular phonetic evolution, but developed out of a social need to replicate the trills of apical [r] in the stylistic contexts where the latter had long been preserved, with younger speakers no longer able to articulate the traditional apical rhotic. Alternatively, one may think that the strong trills automatically came out in stylistic contexts in which speakers were expected to hyperarticulate, simply because of the anatomy of the vocal tract, as noted by Ladefoged and Maddieson. Koschwitz (1893: 61) observed that Bishop Maurice d'Hulst (one of the rare personalities born and raised in Paris who were interviewed by the German scholar in his studies on «Parisian French») used a fricative/approximant [ʁ] in his spontaneous speech and trilled uvular [ʀ] in his reading style, which sides with Jespersen's hypothesis.

Passy (1892), in apparent contradiction with Jespersen's model, makes it appear that fricative/approximant [ʁ] was a recent development that barely began to develop in the «pronunciation of the younger generation of Parisians» and that it was not yet socially acceptable:

> «§ 214. […] **ʁ** is the Arabic *ghain* in *ghabara* ʁɑbɑrɑ 'dust', and the Danish *r* in *ro* ʁoʔ. In the pronunciation of the younger generation of Parisians **ʀ** is frequently replaced by **ʁ**, thus: *rare* ʁɑːʁ, *poutre* putʁ [=putχ]. This pronunciation is considered incorrect, and is often termed *grasseyement*, the name originally given to **ʀ** to distinguish it from **r**. This **ʁ** differs slightly from the Danish *r* and from the Arabic *gh*» (Passy ³1892, quoted from the 1907 English translation).

The idea that deviations from the dominant norm found in colloquial, popular and familiar styles – particularly those of the younger generation – are later developments from that norm probably reflect a commonly held ideological bias. There is little reason to doubt Passy's impression that that feature was more noticeable among some of the young Parisians and that it was its higher frequency in their usage that was stigmatized. There are more reasons to doubt, however, that it was exclusive to the young and could not equally be heard in the

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[16] Bell's (1896) interpretation of the difference as regional, with non-trilled [ʁ] being used in Paris and [ʀ] outside, is unlikely, and may reflect the linguistic insecurity of his non-Parisians informants when they were observed.

normal uncontrolled discourse of other Parisians. Bishop Maurice d'Hulst could not have been the only high-class middle-aged Parisian to use it. In other words, fricative/approximant [ʁ] may well have been the earlier common usage, albeit limited to normal uncontrolled discourse, before trilled [ʀ] became a socially legitimate substitute for [r] in formal discourses (public interventions, speeches, debates, preaches, theater, songs…). This new status as a stylistic variant for formal discourses would promote it as an internalized subjective norm of the dominant classes, as reported by Passy in his descriptions intended for the teaching of French, but it certainly was only one among the many variants used spontaneously.

5 Multi-articulated rhotics

There are remarkably few experimental observations of apical rhotics that would lend support to the hypothesis that they usually or occasionally are doubly articulated, as postulated in the models for the gradual change from [r] to [ʀ].

Recent imaging technologies (x-ray radiography and cinematography, ultrasound…) made it possible to have a better understanding of the articulatory gestures involved in the production of rhotics, but most of the recent studies have restricted their observations to modern non-apical reflexes of the earlier traditional European apical rhotics. In many of them, non-apical rhotics with multiple articulations have been identified. Thus Chlumský (1935: 90) was able to observe a pharyngeal secondary articulation in some realizations of French uvular trilled [ʀ], as did Simard (1985: 100) in one variety of Québec French. Straka (1965b: 42-43) reported the existence of doubly articulated velar and uvular trills in French, as well as doubly articulated uvular and pharyngeal trills in Arabic and some other Gallo-Romance dialect.[17] Recent studies by Scobbie and his colleagues (Scobbie & Stuart-Smith & Eleanor Lawson 2008; Scobbie & Sebregts & Stuart-Smith 2009; Scobbie & Sebregts 2011) on Dutch and Scottish make it abundantly clear that multiple articulations are common among non-apical rhotics – which makes one suspect that this might equally be true of apical rhotics.

Without precise observations on the latter, however, it is difficult to reconstruct the stages through which apical rhotics may have progressively turned into uvular ones. The only relevant experimental observations I was able to gather were x-ray cinematographic studies on Laurentian French conducted in the sixties and seventies, which are unfortunately relatively incomplete. Most x-ray cinematographic studies on this variety of French could not

[17] Straka (1965b: 43) described this rhotic as a «*r* radical pharyngal» [radico-pharyngeal rhotic] used in the «français dialectal [du] Massif Central», for which he used the symbol *r̂*. The only Gallo-Romance dialect spoken in Massif Central I know of where such a pharyngeal rhotic has been documented is that described by Straka & Nauton (1947: 209-212) and Nauton (1974: 189-190). All of the tracings of the radiographs used by Straka & Nauton to illustrate the rhotic, however, show the complete absence of uvular articulation; and the authors wrote accordingly: «[l]es radiographies font voir que pour *r̂*, contrairement à *ṙ* [= ʀ], le voile du palais, avec la luette, sont nettement relevés et ne participent pas à l'articulation» [Radiographs show that unlike what was observed for [ʀ], the velum and uvula for *r̂* are markedly raised and do not contribute to its articulation as such]. They explicitly said that this sound was not actually trilled: «la constriction [pharyngale] est même trop large pour que les vibrations caractéristiques des *r* puissent se produire. Voilà pourquoi ce son fait le plus souvent l'impression d'une simple fricative très râclée, et non pas d'une vibrante; s'il y a quelquefois des vibrations (battements), elles se produisent entre les piliers du voile du palais et la racine de la langue» [the degree of pharyngeal stricture is actually too large for characteristic rhotic trills to be produced. This is why it most often sounds like a strong raspy fricative 'scrape' and not like a trill; if there are some contacts, they are produced between the faucial pillars and the tongue root.]

be used, however, as they either did not provide information on the articulation of rhotics[18] or have been conducted on subjects who articulated uvular rhotics.[19]

Some very useful information, however, can be found in the work of Charbonneau (1971). His study, which focused primarily on the articulatory characteristics of nasal vowels in Montreal French, only provided tangential observations on apical rhotics, and can be best understood in the light of a later investigation by Santerre (1982), probably the only study specifically geared to examining the secondary articulations of apical rhotics. Santerre's pilot study of a single Montreal informant was conducted in the seventies at a time when a radical evolution from an apical to a dorsal articulation was under way in that city (cf. Sankoff & Blondeau 2007), making it somewhat difficult to decide whether the secondary articulations he was able to observe can be understood as a contributing factor for the change or the result of the on-going change itself.

6 The shift of apical to dorsal rhotics in Montréal ca 1970

Both apical and uvular varieties of rhotics have coexisted for a long time in Laurentian French, albeit in different areas, and still do to some extent. Some authors claimed that the distinction can be traced back to the origin of the early settlers in the French colony (cf. Poirier 1984: 75). Be as it may, the first relatively dependable study (Vinay 1950) indicates that during the middle of the twentieth century, the apical variant was largely dominant in Montreal's hinterland, but already being replaced in the city itself, probably through

[18] In particular, Rochette & Grégoire (1983); Gendron's (1966) early radiographic study did not present x-ray photographs of rhotics either.

[19] Simard (1985) experimental observations are limited to rhotics in syllable onsets; his subject, born in 1950 in Warwick (Eastern Townships) and aged 23 when he was recorded, articulated uvular rhotics. Laurent Santerre's thesis (1971, cf. p. 8) is based on the speech of three male Montrealers, one educated speaker (a student at the Université de Montréal, 22 years) and two working class speakers (a fireman, 27 years, and a cashier in a chain store, 35 years). The experimenter did not draw sketches of the vocal tract observable on the x-ray films of the third subject, which were used as «control». It appears that the other two speakers used uvular rhotics in word-final position (the author explicitly used the term "uvular", pp. 277ss, 386ss, 421ss, 549ss; or gave an articulatory description showing that the rhotic was uvular, pp. 508ss, 565ss; elsewhere he used the phonetic symbol [ʀ], pp. 489ss, 512ss, which cannot be taken as an indication, however, that the author intended to signal a uvular articulation, as he also used it for other rhotics, *viz.* for the syllable-final rhotic of American English, p. 509, and for apical trills, p. 520). In his latter works, he used /ʀ/ as the cover term for 'rhotic', a graphic usage that can also be found in the work of his students. In his thesis dedicated to the articulatory analysis of Montreal vowels, Laurent Santerre was relatively silent on consonants, besides remarks he made *en passant* for specific cases when he described a vowel followed by a rhotic. Neither does one find discussions in this thesis on the variability in the use of rhotics in Montreal, nor why he chose informants that were not really representative of Montreal dominant usage at that time, at least with respect to rhotics. The only allusion to such variation appears in one remark: «Dans la bouche d'un grand nombre des Montréalais, les [ʀ] finals posent un problème […] En effet, un même sujet peut faire à l'occasion un [ʀ] apical, ou uvulaire, ou le remplacer par [j]» [In the mouth of a large percentage of Montrealers, word-final rhotics are problematic […] in so far as a given subject may occasionally articulate an apical or a uvular rhotic, or replace it with a yod] (p. 520).

immigration of speakers from regions where the uvular variant was dominant.[20] In the early seventies, Clermont & Cedergren (1979) observed that the apical variant was still used by some 87% of the Montrealers over 35 years of age in their sample, but by less than 25% for those between 15 and 30 (and 10% between 15 and 20). [21]

In his 1982 study, Santerre alluded to the existence of an x-ray cinematographic corpus he specifically tailored for the description of Montreal rhotic «dans toutes les positions possibles» [in all possible contexts] (Santerre 1982: 91). His study examined the characteristics of rhotics in word-initial position (one token), in preconsonantal position (one token in word-internal position and two tokens in word-final position followed by a consonant in connected speech), and five tokens of word-final rhotics in utterance-final position, all from the same speaker, a delivery driver,[22] aged 30 (no information on the date when the data was recorded – probably in the seventies). The same data was presented in less detail and with some minor changes in a later paper (Santerre 1989: 743-744). No one knows what happened to this corpus.

The research presented by this author pertains to the general problem of the variability in the place of articulation of rhotics in Montreal French in relation with the on-going change from apical to uvular articulations. The presentation is so constructed as to document the range of specific articulations assumed by the rhotic in different contexts for this particular speaker, taken to be representative of the usage of a large number of Montrealers: «Le locuteur que j'ai filmé n'est pas un Montréalais marginal et il ne fait pas exception; quand on l'écoute, sa prononciation n'est ni plus ni moins transparente que celle de [s]es concitoyens.» (p. 89) [The speaker I filmed is neither marginal nor exceptional; his pronunciation does not strike one as more or less clear than that of other Montrealers]. The author did not describe the overall distribution of the variants used by his subject in different contexts, which can however be partly inferred from the presentation itself. As the fluctuation is only illustrated in preconsonantal and utterance-final positions, one may safely assumed that this speaker only or overwhelmingly articulated apical rhotics in word-initial position, and likely so in intervocalic position, which the experimenter did not feel necessary to document at all.

Four types of rhotics with apico-dorsal articulation are illustrated in this study, all observed in utterance-final position, in the words *nerfs, taire, Pierre* and *tort.* In a later revision, Santerre (1989: 755) concluded that the same configuration also obtained for the word-final rhotic of *gare* in *gare Windsor* [Windsor station]. The published tracings show that the apico-dorsal rhotic begins with a dorsal stricture with the back of tongue articulated in the uvular region, followed by an apical flap during which the back of the tongue moves away from the nasopharyngeal wall, thereby lessening the dorsal stricture. The apical flap is described as

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[20] A proportion of 68% of Vinay's Montreal informants used the apical rhotic. Of the remaining ones, who used the uvular rhotic, two-third had at least one parent – usually the mother – born and raised in areas where the uvular rhotic was dominant. The sample used for this study consisted mainly of educated speakers, with an average age of 32 years. Clermont & Cedergren (1979: 18) did not observe any significant relationship between the region of origin of recent immigrants and the use of uvular rhotics by their children in their analysis of the 1971 Montreal sociolinguistic corpus. The speakers examined for this latter corpus consisted of a random sample of 120 speakers, stratified by age, sex, and social class (Sankoff & Sankoff 1973), which means that the speakers from higher classes are also overrepresented, but certainly less than in Vinay's.

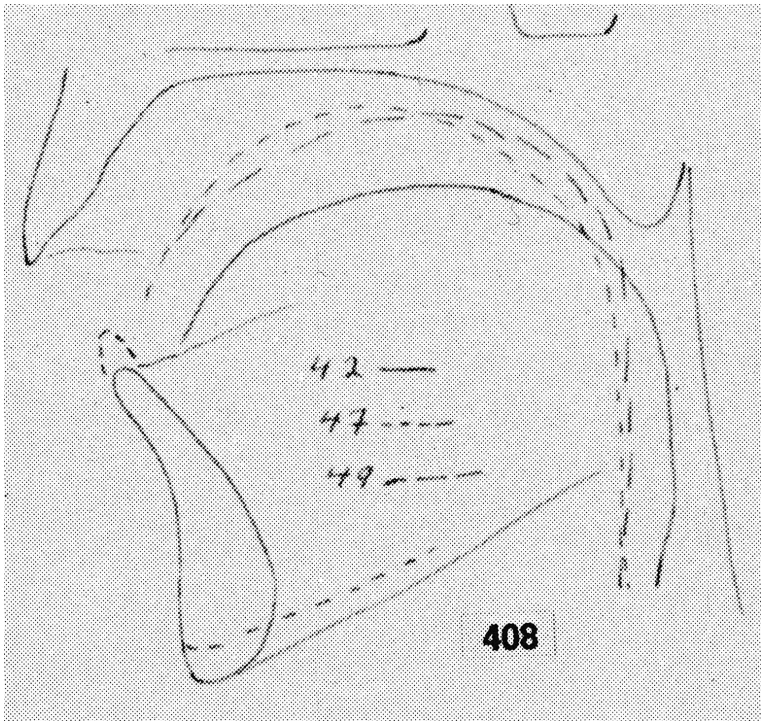
[21] Clermont & Cedergren (1979: 14-15) based their observations on a subset of 113 of these speakers. The figures reported by Sankoff & Blondeau (2007: 565) appear to be significantly different, in particular for the age-groups 15-20 and 21-30.

[22] Elsewhere described as «travailleur manuel» [manual worker] (Santerre 1989: 744).

hardly, or sometimes not at all, noticeable by the ear. As a rule, the two articulations appear to be consecutive, rather than simultaneous, and the rhotic may be thought of as a composite segment beginning with a uvular approximant followed by a single apical tap [ʁ̞ɾ] (in *gare, taire, tort*).[23] In one case (*Pierre*), an additional fricative gesture was observed at the very end: [ʁ̞ɾθ].[24] In yet another case (*nerfs*), the back of the tongue resumed its uvular articulation, as can be easily seen on the film, although by then, the damping of the laryngeal source made it difficult to be perceived by the ear.

This is how Santerre described the different steps observed in the last case:

> **Sentence 408:** "La guerre des nerfs" [nɑɛʁ̞ɾ][25] (or probably better [nɑɛʁ̞ɾʁ̞])
> [The frames 42, 47 & 49 of the image immediately below and the frames 50 & 51 of the next image occur successively in time and belong to the same sequence.]



> **Image 42:** position articulatoire du [ɑ] au début de la diphtongaison.
> **Image 47:** la langue a atteint la hauteur d'un [ɛ̞] assez fermé, soit le point le plus haut de cette syllabe dans la partie antérieure du canal buccal; on peut aussi voir que les formants 1 et 2 sont à ce moment très écartés l'un de l'autre.
> **Image 49:** il y a eu recul du dos de la langue sous le voile du palais et l'uvule, ce qui a pour effet d'infléchir F_2 vers le bas; mais la constriction doit être très lâche, si seulement elle a vraiment lieu, puisque la voyelle reste très intense et son spectre non affecté par une composante apériodique visible ou audible. Pourtant on perçoit nettement un [ʁ̞] postérieur, qui est vocalique et fait par coloration formantique du mouvement de recul de la langue.

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[23] The articulation observed for *tort* was chosen to illustrate the masking of the approximant [ʁ̞] under certain conditions, and in particular after the diphthongized reflex [a͡o] of [ɔ], which is commonly used in Montréal colloquial French before a word-final rhotic.

[24] In his revised work, the fricative ending of *Pierre* has been removed from the phonetic transcription, cut off from the spectrogram and omitted from the x-ray tracings, perhaps for lack of the necessary space to discuss this additional property.

[25] I have adjusted the phonetic transcriptions here and below to the actual description given by the author.

[Frame 42: articulatory position of [ɑ] at the beginning of the diphthong.
Frame 47: highest point of articulation for that syllable, as the tongue reaches the height of a relatively close [ɐ̟] in the anterior part of the vocal tract; at that moment, the formants F_1 and F_2 are quite far apart.
Frame 49: withdrawal of the tongue dorsum below the velum and the uvula, with lowering of F_2; at that moment, the degree of stricture must be quite low, perhaps not exceeding that of the preceding vowel, as the latter is still intense and without visible or audible aperiodicity in its spectrum. Nonetheless, one clearly perceives the approximant produced by the withdrawal of the tongue as a dorsal rhotic [ʁ].]

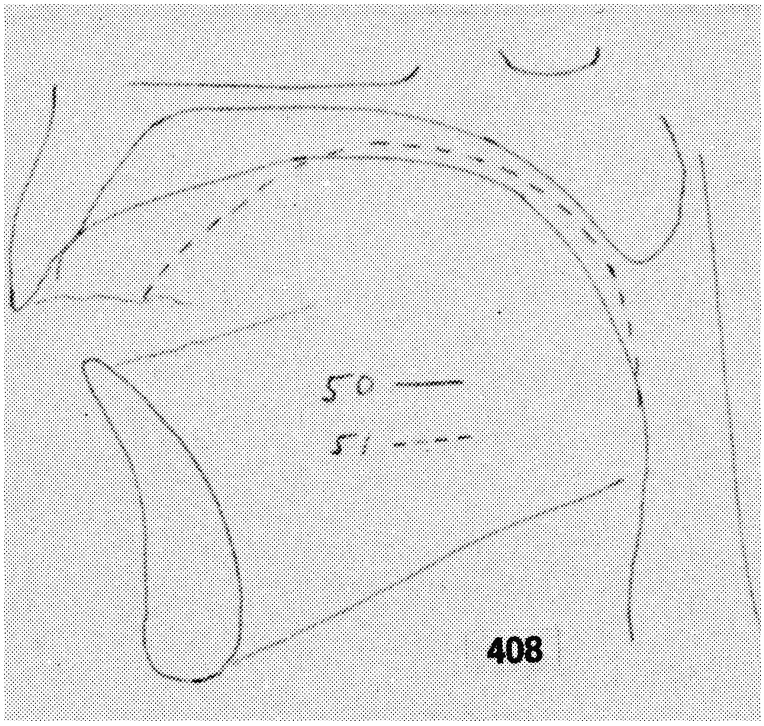

Image 50: on pourrait déjà voir à 49 que l'apex amorçait un mouvement vers les alvéoles; l'articulation est complète à 50 et ne comporte qu'un seul battement; le spectre est coupé par une obstruction apicale qui éteint la résonnance formantique jusqu'au minimum;
Image 51: il faut remarquer à 51 que la langue a retrouvé sa position de [ʁ] postérieur, mais la fourniture laryngée est maintenant très faible et la perception devient difficile.

[Frame 50: a movement of the apex toward the alveolar ridge was already perceptible in frame 49; the movement is now complete in frame 50 and consists of a single contact; the apical closure interrupts the spectrum and reduces the resonance of the formants to its minimum;
Frame 51: the tongue has now resumed its earlier position as a dorsal rhotic [ʁ], although the damping of the laryngeal source makes it now difficult to be perceived.]

The author remarked that the apical articulation of such double-articulated rhotics was difficult to perceive: «Cette occlusion apicale passe inaperçue, à moins qu'on s'applique bien à l'entendre. […] les Montréalais […] entendent un [ʁ̟] postérieur faible et le [r] apical est compté comme disparu» (p. 84) [This apical articulation goes unnoticed, unless one really strives to hear it. Montrealers […] hear it as a dorsal approximant [ʁ̟] without trace of the apical articulation].

Santerre saw this as the 'missing link' in the series of progressive phonetic changes that would have allowed apical rhotics to turn into a uvular ones, not only in Montreal, but more generally in all dialects of French – without specifying what series of changes he had in mind. This implies that the shift from apical to uvular articulation in Montreal was not simply the

adoption of a socially more prestigious norm (or 'change from above' in Labovian terms) as it is often depicted (cf. Sankoff & Blondeau 2007: 578), but could also have resulted from plain evolutive phonetic processes, be they amplified or accelerated by social factors.

A reasonable hypothesis, consonant with Santerre's thesis, would be that apical rhotics in coda position usually have some weak secondary uvular weak articulation: [r̝ʁ] or [r̝ʁ]. The first step in the direction of the change would be a typical case of reduction in word-final position, involving the weakening of the final apical articulation to a point where it no longer is audible and eventually becomes completely lost. Two speakers interviewed for the 1971 Montreal sociolinguistic study may exemplify that stage: speakers #17 (age 41) and #58 (age 26) as described in Clermont & Cedergren (1979: 26).[26] These two speakers depart only minimally from conservative speakers not influenced by normative pressure. They used apical rhotics in all contexts, and diverge from conservative speakers only in word-final position, where a relatively small number of uvular rhotics were produced (in 11% of the cases for speaker #58 and 33% for speaker #17),[27] some of which may well have been of the doubly articulated kind [r̝ʁ] with inaudible [r] observed by Santerre.

This hypothesis is similar to that proposed earlier by Jespersen, but makes the economy of the intermediate untrilled step [ɹ] postulated by the Danish scholar. As I have formulated it here, it also supposes that the dorsalization of rhotics begins in word-final position, possibly also before a consonant, and does not make any commitment on how it extends to other positions.

I have adopted Santerre's interpretation that doubly articulated rhotics with vanishing apical articulation in word-final position reflect earlier equally doubly articulated rhotics. The observations made in Montreal in the seventies, however, cannot totally exclude the possibility that the uvular articulation owes its existence to normative pressure. Under that latter interpretation, Santerre's subject would have acquired a 'regular' singly-articulated apical rhotic in childhood and later switched to the socially-favored uvular variant – in word-final position only however – without being able to totally repress the early articulatory habits that set the tongue apex in motion.[28]

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[26] These two speakers would only qualify as models for this early change if their word-final rhotics were uvular approximants or fricatives. Neither Clermont & Cedergren's nor Sankoff & Blondeau's studies distinguish rhotics along the trilled/fricative/approximant dimensions. Tousignant (1987) examined the complete taped interviews of a subset of 20 speakers from the same corpus, including those of speaker #58. According to his analysis (Tousignant 1987: 160-162), the statistics for the total production of apical and uvular rhotics by speaker #58 would be so: apical [r] (61%), trilled [ʀ] (39%) and fricative [ʁ] (0%). These data are impossible to reconcile with the statistics given by Clermont & Cedergren. If one admits that their statistics were sufficient to make valid predictions about the complete taped interview, there could be at most 11% trilled [ʀ] in the whole interview, and that, in the unlikely event that speaker #58 did not produce a single rhotic that was not word-final.

[27] Speaker #30 (age 30) – who also preserved the primitive apical articulation in syllable-initial position – produced uvular rhotics more frequently before a consonant (58%) than in word-final position (6%). If these figures are statistically representative, this could indicate that lenition may progress differently for different speakers.

[28] I have ignored here the vexing problem concerning the specific problem of the acquisition of apical rhotics during childhood, which could also explain why apical rhotics have a secondary dorsal articulation. As mentioned earlier, there is ample evidence that in linguistic communities where the apical trill is the norm for the adults, a significant proportion of children use instead a dorsal rhotic during the early stages of acquisition

7 Apical rhotics in Montréal ca 1960

The existence of similar apico-dorsal rhotics in linguistic communities where social pressure could be ruled out would certainly constitute stronger evidence for Jespersen's thesis. Although the observations made by Charbonneau (1971) on the articulation of word-final rhotics in 1960 do not exactly meet our desiderata, they offer some useful perspective. Charbonneau's subject is a working-class male born in Montreal in 1939, and recorded in 1963.[29] His sociological profile is thus quite similar to that of Santerre's subject, but the data were recorded some ten years earlier, when the use of uvular rhotics in Montreal was certainly less.

Charbonneau's study was devised to observe the articulation of nasal and nasalized vowels and was not directly concerned with that of rhotics. Nonetheless, it contrasts the articulation of nasal vowels to that of similar oral and nasalized vowels, including twelve vowels followed by a rhotic in utterance-final position in the words *tonnerre, mer, père, canard, bagnard, fanfare, bord, mort, nord, lenteur, chômeur* and *baigneurs.* The articulation of each vowel is illustrated by a sequence of x-ray tracings from the moment when the preceding consonant reached its maximum stricture until that of the following rhotic is detected; additional details on further articulatory gestures of the rhotic, as observed by the experimenter on the rest of the x-ray motion film, but not documented in the published sketches, may be discussed in his overall analysis for each of the vowels.

The experimental design does not offer the best conditions for the analysis of velar or uvular articulations. In many cases, there are interferences produced by a lowered velum, as the experimenter chose a large number of nasal-initial stressed syllables ([ton]***n****erre,* ***m****er,* [ca]***n****ard…*) to observe the effect of the lowered velum on the following vowel. This problem is compounded by the fact that Charbonneau's subject equally articulated word-final vowels and rhotics (with exception of the final rhotic of *bord* [bɔɹ]) with a lowered velum, even when the preceding vowel was not preceded by a nasal consonant, as in *lait* [lɛ] or *père* [pɛːɹ]. Furthermore, many of the vowels found in the last syllables of the words chosen by the experimenter are mid-back [ɔ] or low-back [ɑ], articulated with a relative strong stricture in the velar or uvular regions, making it also difficult to observe the inherent secondary articulation associated to a following rhotic, if any.

Charbonneau regularly noted that the rhotics of his corpus (always found in word-final position by design) were weakly articulated (except perhaps for *bagnard, fanfare,* and *nord* for which he did not explicitly comment this aspect) and most often described them as «[r] sans battement et vocalisé» [apical approximant rhotic]. However, in most cases – the only exceptions are *mer* and *canard* – the apex clearly moved in the direction of the alveolar ridge without touching it. This gesture was sometimes signaled by a simple inflexion of the tongue (*mort, nord*), sometimes by an ample movement, as in [fɑːɹ], where the articulation shown by the dotted line on Figure 1 was retained for an extensive period (84 ms), yet without contact.

(Passy 1891a, 1891b, Millet 1926, Wollock 1982) and usually abandon this language 'impediment' later under social pressure (possibly from peers that acquired early the adult norm), a pressure which affects boys sooner than girls. In particular, one is not warranted in assuming, as do Sankoff & Blondeau (2007: 580), that «apical [r] must have been the target and the first-acquired form in L1 acquisition for the vast majority of teenagers and young adults in Montreal in 1971 who were early adopters of dorsal [R], given the input they would have had from their parents».

[29] An older subject (A.L.) born in l'Assomption (35 km north of Montreal) in 1913 was also filmed. His x-ray films, for which no tracings were undertaken, were compared directly on a screen to that of the younger informant for control. The analysis published in print only describes the articulations of the younger subject.

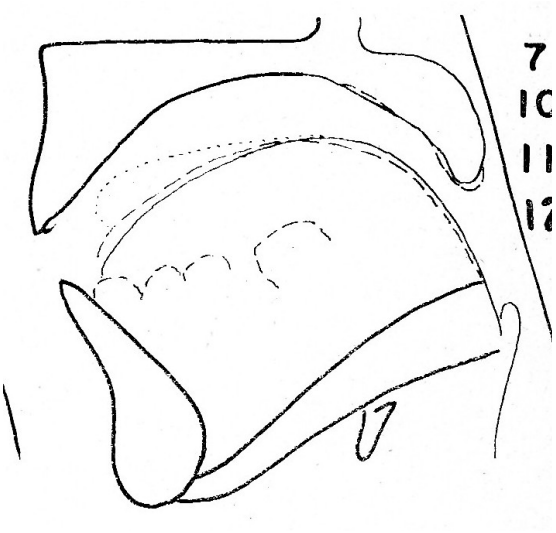

Figure 1. fanfare [fa̤ːɹ]

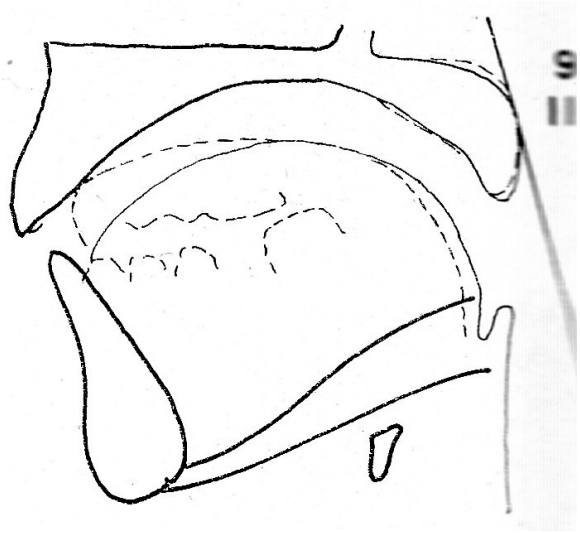

Figure 2. pâte [pɑːt]

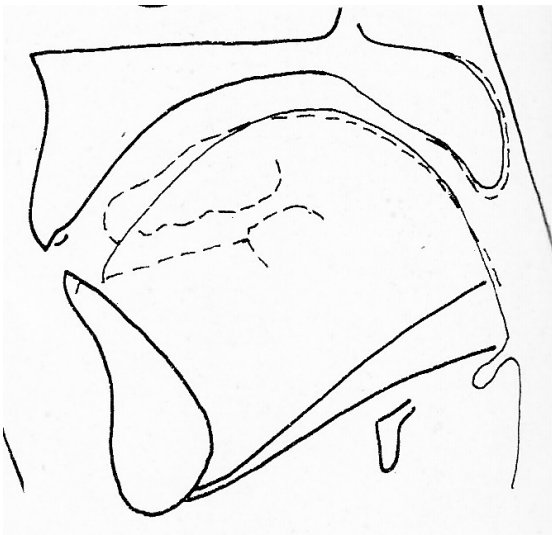

Figure 3. tonnerre [nɛːɹ]

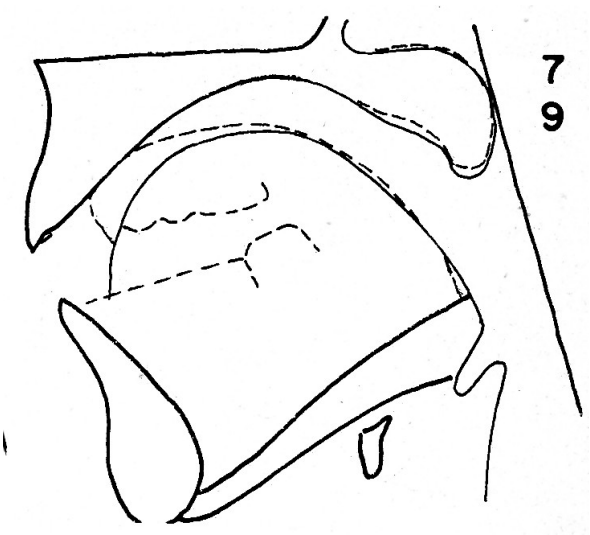

Figure 4. tonnelle [nɛl]

When the vowel preceding the rhotic is not, or is only slightly diphthongized, as in *fanfare* and *tonnerre* illustrated above, the velar-uvular stricture appears relatively early during the articulation of the vowel. Thus the back stricture for [fa̤ːɹ][30] appeared almost immediately after the release of [f] and was retained until the apex moved in direction of the alveolar ridge (illustrated by the last two frames of Figure 1). This contrasts with the movements of the tongue for a similar vowel followed by dental [t] in [pɑːt]; the sequence of articulations for [pɑːt] was similar to that of [fa̤ːɹ] at the beginning, when the root of the tongue moved rapidly toward the pharynx to achieve the articulation of [ɑ], with a markedly larger lowering of the mandible however. During the last stages (illustrated in Figure 2), however, the back stricture disappeared when the back of the tongue lowered and the apex moved up to touch the alveolar ridge.

[30] The subject produced a «[a] antérieur moyen», noted here as retracted [a̤] instead of the back vowel [ɑ] hoped for by the experimenter (cf. Charbonneau 1971: 179)

A similar pattern is found with the vowel [ɛ], showing that the back stricture associated to the apical rhotic is not simply the retention of the basic articulation of the preceding vowel as may be interpreted for [a̠]/[ɑ]. Thus, shortly after the release of [n] in [nɛːɹ], the back of the tongue was raised toward the velar-uvular region and remained in that position until the end. The back stricture that can be seen in Figure 3 for the final frames of [nɛːɹ] when the tongue apex moved up to produce the rhotic was achieved right from the beginning. No back stricture, on the other hand, appeared at all for [ɛ] in [nɛl], and in particular during the last stages shown in Figure 4, when the tongue apex moved to touch the alveolar ridge for the articulation of [l].

A similar back stricture is observed for diphthongized vowels, as in *père* [pae̯ɹ] or *bord* [bɒo̯ɹ], but only appears during the second half of the articulation of such diphthongs.

There are definite similarities between the articulations observed by Santerre and by Charbonneau. In both cases the rhotic was produced with a non-trilled apical articulation not perceived by the ear. In both cases also, the apical articulation was preceded by a velar-uvular stricture. However, there were also some differences: the apical articulations were respectively a flap [ɾ] and an apico-alveolar approximant [ɹ]. The velar-uvular stricture was more intense for Santerre's subject, which appears to have masked the flap [ɾ] and given the overall impression that the rhotic was uvular. Charbonneau, on the other hand, did not once allude to any uvular tinge in the perception of the rhotic, nor did he identify any special acoustic impression for the apico-alveolar stricture [ɹ], which is unequivocally attested on a relatively large number of Charbonneau's x-ray tracings. He was perhaps ill-prepared to identify such approximants. One can feel uneasiness in the ways he tried to express his auditory impression of how the rhotics sound. Describing what appears on the x-ray tracings as an unambiguous apico-alveolar rhotic whose articulation may have lasted some 110 ms, he wrote: «Toutefois, il ne semble pas que [le *r*] ait été réellement articulé. Il apparaît plutôt que la pointe de la langue se soit seulement dirigée vers les alvéoles et que le son vocalique ait persisté. Il s'agirait donc d'un [r] sans battement et vocalisé, qui prolonge l'impression auditive de la voyelle» (p. 105) [However, it does not appear that the rhotic has really been articulated (sic). It appears instead that the apex moved toward the alveolar ridge and that the vocalic sound persisted. This is probably an untrilled vocalized rhotic, which extends the auditory impression of the vowel].

Although the data available can hardly be considered sufficient to allow for definitive conclusions, it is quite legitimate to think that, in word-final position at least, apical rhotics – either trilled [r], or flap [ɾ], or approximant [ɹ] – may have a secondary uvular articulation, albeit with a relatively small degree of stricture, as produced by Charbonneau's subject. Santerre's subject would exemplify one further step of the evolution of apical to uvular rhotics, with an increase of uvular stricture to the detriment of the apical stricture, which becomes a secondary articulation, less audible, and eventually disappears completely.

8 Conclusion

There can be no doubt that the conception of the change from apical [r] to uvular [ʀ] popularized by Bloomfield as being necessarily abrupt cannot be sustained. Articulatory speaking, it is possible for an apical rhotic to progressively turn into a uvular one.

Several models of progressive change have been proposed. One may perhaps dismiss the model in which the tongue retains a trilled articulation in a series of incremental displacements of a single point of articulation, apico-velar at the beginning and dorso-uvular at the end, akin to that suggested by Rousselot and described by Millet. It is quite conceivable on the other hand that the change reflects the progressive takeover of an erstwhile secondary articulation. Two issues remain problematic. Is the double articulation an *intrinsic* property of

apical trills, or the result of some historical change? Are trills retained or lost during the takeover? Jespersen's and Dauzat's views are opposite on both issues.

Dauzat saw the evolution as taking place in two steps, first [r] > [r^{R}], i.e. the rhotic acquires an additional uvular trilled articulation, then [r^{R}] > [ʀ], i.e. the apical articulation is lost. Jespersen on the other hand assumed that apical [r] is *intrinsically* doubly articulated [rᵏ], i.e., composed both of an apical trill and a secondary uvular (or velar) stricture. The demise of the apical articulation – first reduced to a fricative/approximant – promotes the secondary articulation, thereby yielding a uvular fricative/approximant [ʁ]. The trilled [ʀ] variant observed in European languages, he argued, would not obtain as the result of a regular phonetic change, but developed as a formal stylistic variant mimicking the primitive trilled [r], which had been preserved in the language precisely with that function.

Charbonneau and Santerre studies support Jespersen's general conception, while adding some options. Charbonneau study suggests that apical [r], at least in some contexts, may have been doubly articulated [rᵏ] and later developed into an equally doubly articulated fricative/approximant [ɹᵏ] as an intermediate step, as in Jespersen model. Santerre's observations, on the other hand, show that another route is possible, with reduction of the trill to a tap [ɾᵏ] on its way to [ʁ], without the intermediate fricative/approximant stage. Concerning the trilled status of the uvular rhotic, Santerre's observations also show that the trilled variant [ʀ] is neither a necessary precursor of [ʁ] nor a likely result in the phonetic evolution from apical to uvular varieties.

Santerre's observations further suggest that dorsalization in Montreal French would set first in word-final position. This is also consonant with statistics compiled earlier by Charbonneau, also indicating that dorsalization begins in word-final position. In a survey he conducted sometimes before 1952 among 40 residents at the Collège de l'Assomption (north of Montreal), aged between 12 and 20, Charbonneau (1955: 96-97) found that 72.5% of the residents interviewed used apical trills (perhaps only in syllable onsets, as in *rose* or *brique*); on the other hand, 42.5% of them would use a uvular fricative/approximant in *devoir*. Given the general characteristics of this survey, this implies, in all likelihood, that some 38% of the speakers that used apical rhotics in syllable onsets, would instead a uvular fricative [ʁ] in word-final position, as they did in *devoir*.[31] This evidence may be construed as a strong indication that the uvular fricative [ʁ] in word-final position observed in Montreal French during the seventies, need not always reflect the adoption of a social normal, at it has been assumed in recent sociolinguistic analyses, but may be, as hypothesized by Santerre, a regular development from the apical rhotic.

Sankoff & Blondeau (2007) – who use the symbol «[R]» to refer to the class of uvular rhotics, without distinguishing trilled [ʀ] from fricative/approximant [ʁ] – observe:

> «A further mystery concerns the nature of the allophonic variation both between the […] variants of /r/ (C&C, Tousignant 1987a, SBC, Sankoff & Blondeau 2008). For variable speakers [i.e., speakers that do not use apical rhotics only or uvular rhotics only], there is a strong tendency to retain [r] in onsets, the most salient position, whereas the innovative [R] seems to appear first in codas in which /r/ is in any case subject to lenition and deletion. It would seem that a high-prestige pronunciation ought to occur first in the most salient position, but in listening to the speech of our variable speakers, it is almost as if [R] creeps in through the back door, where the least attention is being paid. Speakers who tend toward categoriality of either the conservative or the innovative variant tend to have a higher proportion of [r]

[31] Vinay did not report, and probably did not look for, specific differences in the articulation of rhotics in word-final position; he stated as a general rule that in word-final position, among apical rhotics, «le type fricatif /ɹ/ l'emporte» [the fricative type /ɹ/ is the most frequent] (Vinay 1950: 494)

> and [R] tokens overall. That is, these speakers have many fewer cases of vocalized or deleted forms than do the intermediate speakers. It is almost as if the intermediate speakers no longer have a clear consonantal target for /r/» (Sankoff & Blondeau 2007: 579).

It would probably cease to be a mystery if the «innovative [R]» discussed by these authors turned out to be a fricative/approximant [ʁ],[32] which could thus be interpreted for some of the speakers as a phonetic reflex of [r] rather than a borrowing from a socially prestigious usage.

On the other hand, if one admits that the dorsalization of apical rhotics is a normal development in word-final or preconsonantal position, its extension to other positions in the word does remain mysterious. One may hypothesize that dorsalization normally begins in word-final or preconsonantal position and is later generalized elsewhere, a process that might be sensitive to social factors.

Imperfect learning by children during the early stages of acquisition may have been another factor responsible for the rapid spread of dorsalization in Montreal, as hypothesized by Passy for similar changes in Europe, who argues that the child's immature uvular rhotic, normally abandoned in the later stages of acquisition, may be retained when it becomes socially valued in the community.

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[32] A recent study on the evolution of rhotics in Trois-Rivières (Côté & Saint-Amant Lamy 2012:1449) shows that it was relatively similar to that observed in Montreal. It also points out that «un bon nombre de R postvocaliques en finale de mot, suivis immédiatement d'une consonne ou d'une pause, sont vocalisés» [a large number of word-final postvocalic rhotic at the pause or followed by a consonant are approximants], which somehow allows one to conjecture this to be also true in Montreal.

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