

Introduction

Alessandro Vietti & Lorenzo Spreafico

Preamble

Writing an introduction to a ‘new’ book on rhotics appears quite an awkward task, especially if one harbours hopes to present new data and to envisage perspectives on the topic, as the subtitle to the volume suggests. Is there really anything new about rhotics?

Even from a quick overview of the contributions collected, the answer is definitely positive. Although phoneticians, above all, have made great progress in understanding the articulatory, acoustic and perceptual characteristics of rhotics and their exceptional variation (Recasens & Espinosa 2007; Engstrand et al. 2007; Proctor 2009; Lawson et al. 2011), the /r/ family still remains an anomalous case as a class of sounds for many well-known reasons:

- a) The puzzling nature of their phonological representation (Wiese 2011);
- b) The unusually wide range of variants (not infrequently within the very same phonological system);
- c) The tendency to take on flexible social meanings.

The papers collected in this book thus clearly represent a step further towards a better understanding of rhotics in at least two ways: firstly, new data are collected on /r/ in many non-European languages, some of them coming from poorly (or not at all) described languages; secondly, different disciplinary standpoints are taken up in order to capture the kaleidoscopic /r/ phenomenology.

The primary goal of having descriptions of many languages is to document how /r/ is articulated and varies within distinct phonological systems. A twofold secondary aim is (a) to establish an empirical base for cross-linguistic and typological comparisons (b) which in turn could be used as a benchmark to take stock of theories or generalizations of human spoken communication (language sound systems). As a consequence, this book brings together articles that

Part of

Spreafico, L. & Vietti, A. (Eds.). (2013). *Rhotics. New Data and Perspectives*. bu.press. <https://doi.org/10.13124/9788860461025>



examine various aspects of rhotics in fifteen languages (or language varieties), namely:

- Saraiki (Indo-Aryan language spoken in South Punjabi; in Syed);
- Malayalam (Dravidian language spoken in southern India; in Scobbie et al.);
- Washili Shingazidja (Bantu language; in Patin);
- Modern Hebrew (Cohen);
- Greek (Baltazani & Nicolaidis);
- British English (Syed) and American English (Rieira & Romero);
- Dutch (Van de Velde et al.);
- German (Hoole et al.) and Tyrolean (South Bavarian German dialect, Spreafico & Vietti);
- Slovak (Hoole et al.);
- Romanian (Savu);
- Canadian French (van 't Veer; Sankoff & Blondeau) and French (Hoole et al.);
- Italian (Spreafico & Vietti; Romano).

On the other hand, /r/ and related phenomena are captured under different theoretical and methodological perspectives, following the tradition of previous *r-atics* workshops. Mechanisms and strategies of first (Syed) and second (van 't Veer) language acquisition, ultrasound-based comparison in bilinguals (Spreafico & Vietti), acoustic (Savu) and kinematic analysis of articulation of /r/ (Scobbie et al.; Hoole et al.), phonological interpretation of allophonic variation (Patin) or phonological processes (Cohen), socio-geographical representation of language variation under a diachronic angle (Van de Velde et al.; Sankoff & Blondeau; Romano), all taken together depict an enlightening and multifaceted image of r-sounds.

In the next section, the contributions are grouped according to the main perspective or scientific framework. The most insightful general questions emerging from the analysis are also reported and emphasized, in order to illustrate the range of transversal issues connecting papers to each other as well as connecting them all to less superficial issues related to the interaction between phonetics and phonology.

2. Language acquisition and bilingualism

The three contributions that fall within the broad framework of (first and second) language acquisition and bilingualism are from Van 't Veer; Syed and Spreafico & Vietti.

The first paper by van 't Veer explores the hypothesis of /r/ being featurally underspecified or not specified at all for place of articulation. The author refers to data from a study published by Rose (2000, 2003; data are available on the CHILDES phonetic database) and contrasts them with typological and diachronic evidence in the literature. He reports on two different patterns of L1 acquisition by 2 children. The first seems to categorize French /r/ more in terms of intrinsic phonetic properties (namely as uvular fricative) and partly discarding the phonotactic distribution of the phone. The second child picked up phonotactic information more as adult speakers do, thus classifying /r/ as a rhotic, and consequently not specifying it for PoA. The author adds to Rose's analysis an explorative acoustic examination on a very limited set of tokens, aiming to compare the two speakers' productions and to search for differences in the acoustic output. The results point towards a similar production of /r/ in both children, therefore opening again a number of questions on the nature of dorsal /r/ phonological representation. What information is more easily recoverable from the input in ambivalent phonemes, distributional or segmental? Could this case support, as the author suggests, a view of phonology as substance-free in which abstract representations are partly detached from acoustic information? Syed investigates the patterns of acquisition of English [ɹ] by Pakistani learners. The perceived phonetic distance is used to measure the similarity of English [ɹ] to the neighbouring sounds in the English inventory as well as in Saraiki consonant system. The Speech Learning Model's principle of equivalence classification (Flege 1995) is tested on a sample of 90 learners of English with varied competence and exposure to the L2. In accordance with the perceived distance between phones, a developmental pattern emerges from the analysis: English [ɹ] is acquired by learning to discriminate it from L2 [l] in the first place, then from L2 [w] and finally from Saraiki [r].

In their contribution, Spreafico & Vietti explore the articulatory properties of /r/ in simultaneous and sequential Tyrolean-Italian bilinguals. Using the ultrasound imaging technique, they examine whether adult bilinguals display different tongue shapes for rhotics in each language they speak and whether bilinguals' articulatory patterns in each language are similar to those used by almost monolingual speakers or not. The results show that very late sequential bilinguals (for the sake of simplicity read here 'almost monolinguals') do not present distinct lingual shapes for rhotics in the two languages, while the simultaneous bilinguals do. Moreover, inter-speaker comparison indicates that articulatory patterns for rhotics used by simultaneous bilinguals differ from those used by the very late sequential bilingual speakers who are used as control subjects. To sum up, late sequential speakers transfer their /r/ from L1 to L2, whereas simultaneous

bilinguals distinguish rhotics in the two languages, even if their rhotics are articulatorily different from those of the late sequential speakers. From the study, further directions of investigations need to be pursued: the articulatory means of phonological contrast within and between languages in bilinguals, the complex intertwining between articulation, acoustics and perception, and finally the role of sociophonetic factors in /r/ variation in simultaneous bilinguals.

3. Phonetics and phonology

Studies in the field of experimental phonetics play a major role in the structure of the book: three of them (Hoole et al.; Scobbie et al.; Baltazani & Nicolaidis) present innovative and insightful evidence on the articulation patterns of rhotics in German, French, Slovak, Malayalam and Greek using UTI, EMA and EPG data. The following two contributions (Savu; Rieira & Romero) provide an acoustic analysis of the effects of coarticulation on the structure of /r/ in Romanian and American English. The last two papers, belonging to this section, are more phonologically oriented: one proposes a CVCV phonology interpretation of /r/ allophonic variation in Washili Shingazidja, the other is an OT account for some idiosyncratic phonological processes in the loanword phonology of Hebrew.

Hoole et al.'s paper focuses on the kinematic properties of rhotics as a special case of gestural coordination of consonant with consonant and consonant with vowel. Two sets of EMA data are presented. In particular, the first study explores the characteristics of /kr/ clusters in German and French if compared to other obstruent-sonorant clusters, namely /kl/ and /kn/ clusters. The low overlap in plosive-rhotic clusters is discussed as a potential source of diachronic instability which could in turn be conducive to metathesis. Articulatory synthesis is also used to explain further the reason for the low overlapping.

The second study provides an analysis of syllabic liquids /l/ and /r/ in Slovak. To begin with, the kinematic properties of the liquids are examined, as a function of the position in the syllable, then an analysis of the articulatory coordination patterns is carried out. The remarkable results coming up from data examination are the following:

- a) There is no consistent difference between liquids in onset, coda or nucleus: kinematically speaking they are still consonants;
- b) Liquids present a lower overlap with the preceding C when they are in nucleus position than in onset;
- c) Nucleus /r/ shows less overlap than vowel or /l/ as syllable nuclei.

The authors discuss the phonological implications of the results by hypothesizing that syllabic consonants are typologically infrequent because they require a coordination pattern which is different from the default CV pattern. Consequently, in Slovak it is possible to have syllabic liquids because in absolute terms consonant-consonant coordination shows a low overlap, thus suspending “the basic principle of a continuous vocalic substrate with overlaid consonant constrictions”. The general aim of the research is to study the emergence and development of sound patterns as a function of the patterns of articulatory coordination.

The contribution of Scobbie et al. is a high-speed ultrasound imaging investigation of the phonemic system of liquids in Malayalam, a Dravidian language spoken in southern India. Malayalam represents an interesting case study for many reasons: on the one hand there is a complex system of contrasts in the liquids based both on primary and a secondary articulation (clear-dark resonances), on the other hand it works as a ‘natural laboratory’ to assess the potentialities and limits of the UTI technique to detect basic lingual properties of phonological distinctiveness. In accordance with previous acoustic studies on Malayalam and instrumental articulatory research on Tamil and Kannada, they carefully document the system of contrasts in general and the ambivalent properties of the fifth liquid in particular. Exploring the static and dynamic characteristics of the five liquid phonemes, the authors raise a valuable range of questions and conjectures for future research. Among these, the following issues deserve to be mentioned:

- The multifarious role of tongue root (a) in the resistance to coarticulation, (b) in the production of trills, (c) as an articulatory correlate of dark resonances;
- The unreported dynamic properties of the fifth liquid (post-alveolar approximant with frication), so called, by the authors, zig-zag movement;
- The need to take into account the phonological ambivalence of certain segments as part of the phonological competence (and not as an aberrant case).

Baltazani & Nicolaidis present an acoustic and articulatory (EPG) analysis of the Greek tap, which appears to be the dominant allophone of /r/ in many prosodic contexts (and precisely in /Cr/ and /rC/ clusters, between vowels, but also in singleton phrase and word initially). The presence of a vocalic element, together with the ballistic contact gesture, is interpreted here as an essential part of the sound structure of the rhotic (as in Savu’s contribution), rather than as an effect of the gestural overlap between two consonants in CrV contexts (as suggested in Hoole et al.). Following this last line of reasoning, the effect of the overlapping

might be the popping up of the vocalic nucleus between the two consonants, but the authors provide proof against this account, at least in Greek, observing the occurrence of a vocoid in absolute initial position ($\#rV$), where there is no other consonant to overlap with. The acoustic measurements show that the vocalic elements are longer than the constriction phase and their vocalic quality reflect the formant values of their corresponding nuclear vowels, only more centralized. Integrating the acoustic investigation, the EPG data provide evidence for a classification of taps into two categories with a complete or an incomplete closure. This distinction could suggest a view of taps as steps in a continuum from prototypical (fortis) taps to lenis taps to more vocalic realizations, as in a ladder towards a potential language change from (trills to) taps to approximants.

In a similar way, Savu explores the phonetic structure of taps in Romanian. The author puts forward the hypothesis that the phase of constriction is surrounded by two vocalic elements (not one as in Baltazani & Nicolaidis), which she considers components of a tap and not as intrusive or epenthetic vowels. Thus, the structure of a tap is made up by a sequence like vocoid+constriction+vocoid, more evident in $\#rV$, Cr and rC contexts. The primary aim of the study is to measure formant structure and duration of the vocalic elements in order to establish the range of variation. In addition, a secondary and original goal is to investigate a possible resemblance between the vocoids in Cr and rC contexts and those in VrV context. The preliminary results show that vocalic elements bordering the tap closure tend to approach the quality of the syllabic vowels, even if still positioning themselves in a mid-high central to front area. In order to further prove the structure of the tap, as the one proposed in the paper, more evidence should be added by (a) quantifying the coarticulation effects in VrV sequences, (b) observing the behaviour of taps in contexts when there are no vowels on either side (like $\#rC$, CrC and Cr $\#$) and they function as syllabic nucleus as in languages like Czech or Serbo-Croatian.

The role of a transitional vocalic element in Vr sequences is discussed within a different framework by Rieira & Romero. *Mutatis mutandis*, the hypothesis is again to prove that the vocoid should not be considered as a vocalic epenthesis, and consequently as the result of a phonological process, but rather as an unstable targetless transitional element affected by coarticulatory forces.

The study contains an acoustic analysis of Vr contexts in American English in slow and fast speech. In the first place, segmentation procedures, based on the identification of flexes in the formant curves, are used to divide the sequence into three components: the vowel, the transitional element, the rhotic consonant. Next, durational and formant structure information is measured for the three components, focusing on stressed monosyllables. As a final point, an

ANOVA analysis is carried out to test for the hypothesis of variation of the three components in relation to speech rate and vowel contexts. The effect of coarticulation is confirmed by (a) the variation of the schwa-like element as a function of the context and (b) by the influence exerted by the speech rate (even if data in the latter case are reported only for one exemplar speaker).

The following two contributions aim at giving a phonological explanation to the somehow anomalous behaviour of rhotics in Washili Shingazidja and Modern Hebrew.

The first study by Patin provides a detailed description of /r/ allophonic distribution in Washili Shingazidja, a Bantu language spoken on Grande Comore (one of the five Comorian islands). The data are collected from a single speaker. In the basic allophonic pattern a trill [r] alternates to a tap [ɾ]: the trill appears in initial position (and, apparently, mainly in Arabic loanwords) and the tap in intervocalic position (also across a word boundary). The distributional scheme becomes complicated by the presence of a preceding consonant, which triggers a trill, or a syllable with no high tones, which favors an approximant. The overall allophonic variation is accounted for within the CVCV phonology framework. Basically, the author suggests that a trill in absolute initial position corresponds to an underlying geminate and offers three arguments in support of his hypothesis:

- a) The geminate is the result of a process of assimilation of the determinant in Arabic loanwords (e.g. a[r]uħ < (a)l-ruħ ‘the soul’);
- b) The initial trill cannot be considered the consequence of fortition (which is normally associated to a voiceless retroflex);
- c) The geminate is likely to occur in casual speech as a result of a vowel deletion (e.g. [r]i[r]i ‘we played / we feared’ > [r]i mpi[ɾ]á ‘we played a game’).

However, the author admits that the CVCV phonology preliminary interpretation fails to account for the whole distribution pattern, such as the tap realization before [i], or the occurrence of the trill between a consonant and [i]. In addition, probably a wider sample of speakers is needed to gain a clearer idea of the relative weight of loanwords in the phonological process.

The second study by Cohen begins with the observation that phenomena not supported by the native Hebrew grammar seem to occur when /r/ is involved in loanwords from English into Hebrew. In particular, two phonological processes, reduplication (which is morphologically productive) and metathesis (not systematic) are likely to interact with the presence of /r/. In the process of adaptation of /r/ in loanwords, exceptional (read not part of Hebrew phonology)

prosodic phenomena appear: on the one hand /r/ is metathesised from coda to onset (e.g. *kornfleks* > *kronfleks*), on the other hand a pseudo-reduplication process move /r/ from onset to coda to create pseudo-reduplicative patterns, as in *proportsja* > *porportsja*.

The author proposes an account within Optimality Theory to give an explanation to what looks like the emergence of universal grammar constraints. He assumes the stratified lexicon hypothesis, according to which the lexicon is divided into a core and a periphery with partially different phonologies (Paradis & LaCharité 1997). Therefore, constraints which are relevant to explain loanword adaptation may not be applicable to native words phonology.

To explain metathesis, *CODA-r (a sub-specification of *CODA) is proposed. This constraint outranks MAX, LINEARITY_{N/LW} (native/loanwords) and *Cx (no complex syllable margins) and move /r/ from coda to onset. The optimalistic explanation formulated is not totally satisfactory when pseudo-reduplication comes into question. In that case, the same set of constraints plus REDUP does not produce the correct output, as in *proportsja* that should be **proprotsjia* instead of the actual winner, which is *porportsja* (with *CODA-r violated). Even if arguable, the contribution raises a significant question: is really *CODA-r a universal constraint? What kind of typological evidence do we have? It cannot be our ambition to answer these questions here, but a remarkable connection could be traced to the paper by Hoole et al., in which kinematic evidence for metathesis is reported as a consequence of low overlap in CrV sequences.

4. Language variation and change

The papers contained in the last section deal with the social and geographical variation of /r/ in three different areas: Romano presents data on the variability of rhotics in Italy; Van de Velde et al. analyse geographical variation in a diachronic perspective on the Dutch dialect in Flanders; likewise Sankoff & Blondeau report on a sound change in progress in Montreal French. It should be noted, however, that Romano's and Sankoff & Blondeau's papers are (up to now) unpublished studies from the *r-atics-2* conference, thus dating back to ten years ago. As they still represent valuable contributions and missing pieces of evidence in the debate on rhotics, the two articles find their natural place within the structure of the book. Romano's study is an accurate description of the allophonic distribution of /r/ in Standard Italian, as well as a detailed illustration of the socio-geographical variability of rhotics all over the Italian peninsula. The basic standard patterning is defined as an alternation of a trill and a tap, with the tap occurring only in

intervocalic unstressed syllables (e.g. raro [ra:ro] < /raro/ 'rare'), and the trill in the remaining contexts. Next, a wide range of coronal and dorsal variants are identified and classified as geographical (thus belonging to a geographical variety of Italian), social, idiolectal or pathological. As underlined by the author, further research on the articulation of /r/ in Italian as well as on the sociolinguistic meanings attached to rhotics is still needed (ten years ago, as today).

The last two papers examine the problematic sound change from apical to uvular /r/.

Van de Velde, Tops & van Hout discuss the socio-geographical spreading of uvular /r/ in Flemish Dutch over a span of almost ninety years (from 1922 to 2009). The authors analyse three sets of data, two coming from traditional dialectal surveys and one collected with a more sociolinguistic approach. The combination of geographical and social methods proves to be an excellent instrument to capture the dynamics of a sound change. In our opinion, to implement geographically-based rapid and anonymous surveys could represent a new perspective for a multidimensional documentation of language variation and change in Europe. This could be especially true if we aim to re-draw a map of the spreading of uvular /r/ across Western Europe. Coming back to the contribution, the results show an ongoing change from apical to uvular /r/ in the Flanders, in particular among the younger generations. Interestingly enough, it must be remarked that in a context of considerable social-geographical variability (e.g. twelve variants are registered in the RAS study), individual speakers are not likely to alternate front and back rhotics.

A similar finding is described in Sankoff & Blondeau's paper, reporting a sound change in progress in Montreal French from apical to uvular /r/. These strands of independent evidence (supported also by the study of Vietti & Spreafico 2008) seem to lead to the conclusion that some sound changes, at least at the individual grammar level, ought to be categorical, while others, like vowels shifts for instance (see recently Harrington 2006), have to be incremental in their nature. In their paper, Sankoff & Blondeau analyse in particular the sociolinguistic behaviour of two speakers that show a pattern of [r]-[R] variation (contained in the interval between 20 and 80 %), in order to understand phonological and stylistic factors of conditioning. The process of change from a variable to a categorical use of [R] passes through a phase of prosodic conditioning that favours the occurrence of uvular /r/ in syllable coda. On the other hand, it still remains unclear what stylistic reasons are affecting speakers' choice towards apical or uvular /r/.

5. On the vital importance of being variable

As this introduction illustrates, the book's aim was not to unravel the complex question of the phonological unity of /r/, but rather to purposefully pursue the empiricist idea of offering data-based descriptions of /r/ in many different languages and, possibly, from different theoretical angles. Therefore, the collection of papers taken as a whole reflects the understanding that in order to explain the variability of /r/ a broad cross-linguistic framework is needed (as proposed in Lindau 1985 as an example). In addition, most of the papers share another basic feature of the empirical view, namely the experimental context of data collection and the instrumental method of analysis.

Thus, if the aim appears to be very elementary in its nature, the combination of experimental method and cross-linguistic perspective may nevertheless lead to some important consequences for a phonology of rhotics. First, the evidence coming from articulatory data (notably EMA and UTI) shed a new light on the characteristics of the class of rhotics both in terms of static configuration and dynamic behavior (see for instance the coordination patterns of rhotics in consonant clusters). Moreover, and especially regarding UTI, the rich representation of lingual shapes and movements implies a change in the received categories of the sounds' articulation, and consequently it fosters the reformulation of the current terminology.

Second, the adoption of a cross-linguistic framework has several advantages, which in a very straightforward way allows us to:

- a) Test hypotheses and/or descriptions based on the most scientifically investigated languages (the varieties of English being the first);
- b) Compare /r/ segmental features and coordination patterns as well as allophonic distributional patterns;
- c) Verify whether the tendency of rhotics to take on sociolinguistic meanings is cross-linguistically consistent.

Taken all together, the three points address the general topic of the role of within system /r/ variability as a constant component in the sound systems of the world's languages, thus showing the importance of such a variable class of sounds as a functional and vital element in a fully fledged phonological system. As this introduction attests, the book raises many issues. We hope these issues will be as much a source of inspiration to everybody working on rhotics as they have been to us.

References

- Engstrand, Olle, Johan Frid & Björn Lindblom. 2007. A perceptual bridge between coronal and dorsal /r/. In Maria-Josep Solé, Patrice Beddor & Manjari Ohala (eds.), *Experimental approaches to phonology*, 175-191. Oxford: Oxford University Press.
- Flege, James. 1995. Second language speech learning: theory, findings and problems. In Winifred Strange (ed.), *Speech perception and linguistic experience: issues in cross-language research*, 233-277. Timonium: York Press.
- Harrington, Jonathan. 2006. An acoustic analysis of 'happy-tensing' in the Queen's Christmas broadcasts. *Journal of Phonetics* 34. 439-457.
- Lawson, Eleanor, James M. Scobbie & Jane Stuart-Smith. 2011. The social stratification of tongue shape for postvocalic /r/ in Scottish English. *Journal of Sociolinguistics* 15. 256-268.
- Lindau, Mona. 1985. The story of /r/. In Victoria Fromkin (ed.), *Phonetic Linguistics: Essays in honor of Peter Ladefoged*, 157-168. Orlando: Academic Press.
- Paradis, Carole & Darlene LaCharité. 1997. Preservation and minimality in loanword adaptation. *Journal of Linguistics* 33. 379-430.
- Proctor, Michael. 2009. *Gestural characterization of a phonological class: the liquids*. PhD thesis, Yale University.
- Recasens, Daniel & Aina Espinosa. 2007. Phonetic typology and positional allophones for alveolar rhotics in Catalan. *Phonetica* 64. 1-28.
- Rose, Yvan. 2000. *Headedness and prosodic licensing in the L1 acquisition of phonology*. PhD thesis, McGill University, Montréal.
- Rose, Yvan. 2003. Place specification and segmental distribution in the acquisition of word-final consonant syllabification. *Canadian Journal of Linguistics* 48(3/4). 409-435.
- Vietti, Alessandro & Lorenzo Spreafico. 2008. Phonetic variation of /r/ in a language contact context: the case of South Tyrol Italian. In Paul Warren (ed.), *Laboratory Phonology 11. Victoria University of Wellington, 30 June - 2 July 2008*, 145-146. Wellington: Victoria University.
- Wiese, Richard. 2011. The representation of rhotics. In van Marc Oostendorp, Colin J. Ewen, Elizabeth Hume & Keren Rice (eds.), *The Blackwell companion to phonology*. Oxford: Blackwell Publishing. Blackwell Reference Online. 10 December 2012.