Opacity, resyllabification and Portuguese rhotic allophony

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Overview. In this paper, I present an analysis of Portuguese rhotic allophony that is couched in Stratal Optimality Theory (Bermúdez-Otero 2011, 2018; Kiparsky 2000). I argue that opacity arises in rhotic patterns owing to the stratum-specific operation of /ɾ/-frication and /ɾ/-deletion, both of which in turn are dependent on resyllabification and sonority-sequencing constraints.

Data. The data in (1) illustrate the main patterns of interest assuming typical realisations for urban central-costal varieties of European Portuguese (henceforth, EP). The rhotic tap, [ɾ], occurs in word-final (pre-pausal) environments, as in (1a) and (1e). It can also appear word-internally in pre-consonantal (1b, g) and pre-vocalic (1d) positions, and across word boundaries, both pre-consonantally (1h) and pre-vocalically (1c). Interestingly, [ɾ] may not occur in enclitic contexts like (1f) where the final /ɾ/ in /amaɾ/ deletes and [l] intervenes between the clitic and its verbal host on the surface.

The rhotic fricative, represented here with [ʁ], occurs word-initially in examples like (1i), and after proclitics, as in (1j). Whilst only taps are observed pre-consonantally, [ʁ] appears post-consonantally in cases like (1k). The fricative may also occur in word-medial intervocalic contexts, as in (1l).

(1) EP rhotic consonants

a.	[maɾ]	'sea'	e.	[ɐmaɾ]	'to love'	i.	[ʁiu]	'river'
b.	[mɐɾtɛlu]	'hammer'	f.	[ɐmalu]	'to love it/him'	j.	[uʁiu]	'the river'
c.	[maɾałtu]	'high sea'	g.	[ɔɾlɐ]	'shore'	k.	[pałʁɐ]	's/he chatters'
d.	[ɛɾɐ]	'era'	h.	[maɾlĩpu]	'clean sea'	l.	[eʁu]	'error'

Previous work. Existing scholarship has highlighted that these data present analytical challenges, particularly with regard to representation. Mateus & d'Andrade (2000) assume that EP possesses a single rhotic phoneme, /ɾ/, from which forms like those listed in (1) all derive. Thus, a phonological rule enforces the frication of /ɾ/ in contexts like (1i–k) and [ʁ] in examples like (1l) is argued to be a surface reflex of an underlying geminate, i.e. /eɾɾo/, here. By contrast, Bonet & Mascaró (1997) take a pan-Iberian approach and query whether contrast between forms like (1d) and (1l) might reflect an underlying distinction: i.e. an underlying trill in (1l). Cristófaro Silva (1998) takes this one step further and assumes that all forms in (1i–l) contain a rhotic consonant that is phonemically distinct from /ɾ/.

Current approach. Rather than issues of phonological representation, the focus of this paper is instead given to derivational questions. The main question I aim to address is how morpho-syntactically conditioned opacity in rhotic forms can best be accounted for. As Mateus & d'Andrade propose, an allophonic process mapping initial /ɾ/ to [ʁ] applies transparently in examples like (2a). However, this process appears to overapply in cases like (2b) where a proclitic (or prefix) displaces the /ɾ/ from initial position (here, within the P-word). Furthermore, whereas /ɾ/ deletes under enclisis in (2c), deletion is not observed elsewhere, cf. (2d). Examples like (2e) constitute a case of underapplication of /ɾ/-frication if it is assumed that final consonants resyllabify across a word boundary pre-vocalically. Assuming, alternatively, that word-final /ɾ/ remains in coda position in /Vɾ#V/ sequences avoids this issue. However, this approach entails the inevitable condition that word-medial /Vɾ-V/ must somehow be treated differently by the grammar: cf. /amaɾ-eN/ → [ɐ.ma.ɾɐ̃ʃ], *[ɐ.maɾ.ɐ̃ʃ] 'to love' (3PL).

(2) Opacity in rhotic forms

a.	/ɾio/	→	[ωʁi.u]
b.	/o=ɾio/	→	[ωu.ʁi.u]
c.	/amaɾ=lo/	→	[ωɐ.ma.lu], *[ɐ.ma.ɾu], *[ɐ.maɾ.u]
d.	/maɾ#liNpo/	→	[ωmaɾ][ωlĩ.pu], *[ωma][ωlĩ.pu]
e.	/maɾ#alto/	→	?[ωma][ωɾał.tu], ?[ωmaɾ][ωał.tu], *[ωma][ωʁał.tu]

Analysis. In aiming to resolve these issues, I propose an analysis of the EP rhotic patterns that is couched in a stratal model of phonology. A key component is the domain-specific application of /ɾ/-frication. As shown in (3a–b), I propose that this applies at the stem level (SL). Mappings like (3a) are

driven by a constraint militating against domain-initial [ɾ]. Instances of /ɾ/ that do not occupy domain-initial position in the stem stratum are therefore not targets for frication: e.g. /maɾ/→[maɾ] in (3e). This is with the exception of cases like (3b) which I assume reflect a separate, sonority-driven optimisation pattern. Here, a syllable-contact constraint enforces the frication of /ɾ/ post-consonantally to minimise, where possible, the generation of heterosyllabic sequences of equal or near-equal sonority, i.e. *[-ɬ.ɾ-].

(3) Stratal derivation of EP rhotic patterns

	a. /o=ɾi-o/	b. /palɾ-a/	c. /am-a-ɾ={o, lo}/	d. /am-a-ɾ-eN/	e. /maɾ#alt-o/	
SL	↓	↓	↓	↓	↙	↘
	[ʁi.u]	[paɬ.ʁɐ]	[a.mɐ]	[a.mɐ]	[maɾ]	[aɬ.tu]
	↓	↓	↓	↓	↓	↓
	/ʁi.u/	/paɬ.ʁɐ/	/a.mɐ-ɾ/	/a.mɐ-ɾ-eN/	/maɾ/	/aɬ.tu/
WL	↓	↓	↓	↓	↓	↓
	[ʁi.u]	[paɬ.ʁɐ]	[ɐ.maɾ]	[ɐ.ma.ɾɐ̃j̃]	[maɾ]	[aɬ.tu]
	↓	↓	↓	↓	↘	↙
	/o=ʁi.u/	/paɬ.ʁɐ/	/ɐ.maɾ=lo/	/ɐ.ma.ɾɐ̃j̃/	/maɾ#aɬ.tu/	
PL	↓	↓	↓	↓	↓	
	[u.ʁi.u]	[paɬ.ʁɐ]	[ɐ.ma.lu]	[ɐ.ma.ɾɐ̃j̃]	[ma.ɾaɬ.tu]	

Following from the assumption that /ɾ/-frication is a strictly stem-level process, any /ɾ/ that is supplied by morphological operations at the word level (WL)—e.g. concatenation of the verbal infinitive suffix in (3c–d)—evades frication. In the presence of additional morphological material, I assume that /ɾ/ syllabifies as an onset at the word level wherever possible, as in (3d): cf. Mateus & d'Andrade (2000: 61). Stratum-specific faithfulness operations ensure that instances of [ʁ] generated at the stem level also map faithfully to [ʁ] in the word-level grammar, as in (3a–b).

The phrase level (PL) is the locus of other operations of interest. For example, clitics become available for phonological computation within the phrasal stratum in this model. This leads, firstly, to the appearance of [ʁ] outside of domain-initial position in (3a). Secondly, encliticisation triggers /ɾ/-deletion in (3c) where the /lo/ clitic allomorph is selected. Similar to post-consonantal /ɾ/-frication in examples like (3b), I propose that this is sonority-driven: in agreement with the universal hierarchy for onset sonority (Gouskova 2004), a form with syllable-initial [l] is optimal relative to other candidates with [ɾ]: i.e. *[ɐ.ma.ɾu], *[ɐ.maɾ.lu]. This contrasts with examples like (3d) and (3e). Here, the non-availability of a lexical allomorph with initial /l/ means that outputs in which /ɾ/ maps faithfully to onset [ɾ] win out. Thus, although resyllabification relocates /ɾ/ to a ω-initial position, restriction of /ɾ/-frication to the stem level correctly predicts that [ʁ] can never occur in examples like [ωma][ωɾaɬ.tu].

Discussion. The analysis sketched above supports Mateus & d'Andrade's approach of deriving the allophonic patterns from a single rhotic consonant, i.e. /ɾ/. Additionally, the analysis I propose builds on Mateus & d'Andrade's fundamental observation that syllabification regulates the allophony. Taking this further, incorporating stratum-specific application of /ɾ/-frication and /ɾ/-deletion into the analysis leads to a unified account of the principal phonological facts.

References

Bermúdez-Otero, Ricardo. 2011. Cyclicity. In M. van Oostendorp, C. Ewen, E. Hume & K. Rice (eds.), *The Blackwell companion to phonology*, 2019–2048. Malden, M.A.: Wiley-Blackwell.

Bermúdez-Otero, Ricardo. 2018. Stratal Phonology. In S. J. Hannahs & A. R. K. Bosch (eds.), *The Routledge handbook of phonological theory*, 100–134. Abingdon: Routledge.

Bonet, Eulàlia & Joan Mascaró. 1997. On the representation of contrasting rhotics. In F. Martínez Gil & A. Morales-Front (eds.), *Issues is the phonology and morphology of the major Iberian languages*, 103–126. Washington D.C.: Georgetown University Press.

Cristófaro Silva, Thaïs. 1998. *Fonética e fonologia do Português*. São Paulo: Editora Contexto.

Gouskova, Maria. 2004. Relational hierarchies in Optimality Theory: the case of syllable contact. *Phonology* 21. 201–250.

Kiparsky, Paul. 2000. Opacity and cyclicity. *Linguistic Review* 17. 351–365.

Mateus, Maria Helena & Ernesto d'Andrade. 2000. *The phonology of Portuguese*. Oxford: Oxford University Press.