

## The sonority scale: categorical or gradient?

Clàudia Pons ([claudia.pons@uab.cat](mailto:claudia.pons@uab.cat))

Universitat Autònoma de Barcelona

**1. State of the affairs.** The sonority scale has proven to be a decisive parameter to account for syntagmatic relations between segments, such as their organization within the syllable and across syllables. But, whereas there is tacit agreement about the relative sonority of some classes of segments (cf. VOWELS > GLIDES > LIQUIDS > NASALS > OBSTRUENTS, after Clements 1990), there is a pervasive controversy about the relative sonority of the specific sounds which belong to these classes. This controversy mainly concerns the pairs laterals *vs.* rhotics, fricatives *vs.* stops, voiced obstruents *vs.* voiceless obstruents, and also stops *vs.* affricates *vs.* fricatives, and glottals. Indeed, the relative sonority of each of these sounds varies from one study to another, basically depending on language-specific patterns. This procedure often derives on circular argumentations, since particular versions of the sonority scale are invoked to account for specific language patterns, and these specific language patterns are adduced to justify the selection of these particular versions of the sonority scale (see Ohala 1990 for discussion on this direction). Another object of traditional debate is whether it is a licit resource or not to appeal to sonority confluences and reversals to justify differences across languages. Those who disagree with this view argue that the sonority scale is universal, categorical (composed by discrete units) and impermutable, and that discrepancies across languages must exclusively be derived from constraint reranking. There are different arguments, though, which advocate a more *flexible* and *gradient* approach to the sonority scale and which make evident that any attempt to obtain a universal and categorical sonority hierarchy indefectibly fails into arbitrariness: *a)* The specific phonetic features of each sound and each class of sounds can fluctuate from one language to another, although the given label coincides. *b)* The relative sonority of each sound can slightly vary depending on the structural position that they occupy: the study of Parker (2002), for instance, illustrates that the relative sonority of sounds varies depending on the syllabic position that they occupy. *c)* The relative sonority of sounds can diverge depending on the phonetic context: Larson (1993) proposes a model in which sonority is considered not absolute, but the result of a mutual (bidirectional) excitation between adjacent segments. *d)* The relative sonority of sounds can oscillate depending on the physiological properties of the speakers: in Parker (2002), slight sound sonority differences are detected in males and females. *e)* Languages do not share the same segment inventories, so that the relative sonority distances between sounds across languages may be different. *f)* Languages can make an equal or a different phonological use of the same physical properties of speech sounds (see Morén 2007).

Probably, the most comprehensive —and the least phonologically biased— study on sonority thus far is the one by Parker (2002), where a sonority scale grounded in physical properties of sounds such as intensity, peak intraoral air pressure, F1 frequency, peak air flow and duration is proposed. The application of these measurements on the sounds of Spanish and English leads the author to propose the universal sonority scale of (1); the author, on the other hand, draws a relevant claim: «Most languages in fact conflate the scale in the sense that they do not systematically exploit all the intervals. This is because they either lack the respective phoneme(s) entirely, or else they collapse together two or more adjacent ranks and thus do not distinguish them in terms of their phonological processes». This is an important point, which reaches a compromise between the aforesaid perspectives and which sets up the purpose of the present talk.

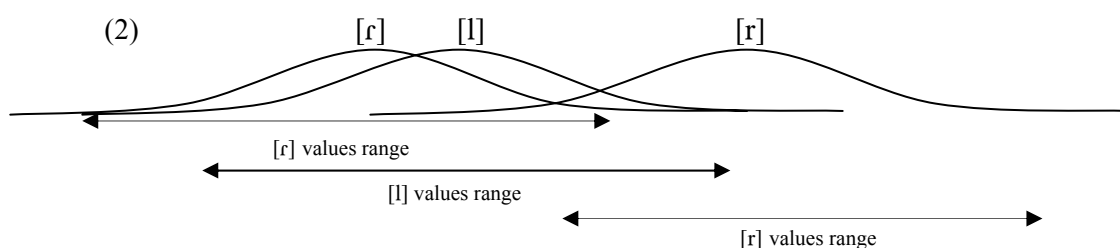
(1) *Phonetically grounded sonority scale* (Parker 2002: 236)

low vowels > mid vowels > high vowels > [ə] > glides > laterals & ɭ > flaps > trills > nasals > /h/ > voiced fricatives > voiced stops > voiceless fricatives > voiceless stops & affricates

**2. Goal & proposal.** The purpose of this talk is to discuss whether it is a licit resort or not to appeal to sonority confluences and reversals to justify differences across languages and, provided that it is, which sonority confluences and reversals should be possible and which should not. In other words, we will attempt to determine to which extent the organization of sounds in the sonority scale should be *categorical*, as assumed in most studies, *gradient*, or both, categorical for the organization of some sounds, and gradient, for that of others. On the one hand, we are going to investigate how these language-specific details could be formalized and be accessible to the mechanism of evaluation of candidates within Optimality Theory. The basic idea behind the proposal, inspired by the one in Boersma & Hayes (2001) to account for free variation, is that each specific sound covers a range of values in the sonority scale, and this range *can* be shared with that of another sound (see 2). In these cases, a different interpretation of the relative sonority of the sounds across languages (*i.e.* a different hierarchy) is allowed and expected (see 3). The consequence of this is that the hierarchy of some sounds is more fixed than that of others in the sonority scale. We will prove, on the

other hand, that this account allows to make typological predictions about the cross-linguistic frequency of each hierarchy. As illustration, we will focus on some familiar and some less well-known phonological patterns of liquids, a class of sounds which is especially ambiguous as far as sonority is concerned.

**3. Data & discussion.** Liquids are often presented as a whole class in the sonority scale, but frequently they are also broken down into two subclasses, laterals and rhotics, with the later being more sonorous (see, among others, Jespersen 1904, Alderete 1995, Boersma 1998, Gouskova 2005). The assimilatory patterns of Hungarian and Italian are consistent with this version of the hierarchy, provided that regressive manner assimilation can be interpreted as a strategy to avoid sonority rise across syllable boundaries. In Hungarian the lateral assimilates in manner of articulation to the following rhotic, but not viceversa (cf. *bal+ra* [barra] ‘to the left’ vs. *var+lak* [varlak] ‘to the left’) (see Vago 1980, Rice 2005). The same pattern is found in the evolution of heterosyllabic clusters in Italian (cf. *dol+ra* → *dorrà* ‘(he/she) will feel pain’ vs. *or(u)lu* → [orlo] ‘boundary’, Vennemann 1988). Different studies, however, prove that the direction *rhotics* > *laterals* is not always true, and that a distinction should be made between trills, on the one hand, and flaps and laterals, on the other. Bonet & Mascaró (1997), for instance, attribute the different distribution of rhotics in Romance languages such as Spanish, Catalan and Portuguese (cf. word-initial position → trill; onset position, after a C → trill; second position of an onset → flap; coda position → flap ~ trill) to sonority dispersion effects on onsets and codas, and depart from a radical scission of trills and flaps in the sonority scale (0 OBSTRUENTS <sub>TRILLS</sub> >> 1 NASALS >> 2 LATERALS >> 3 GLIDES <sub>FLAPS</sub> >> 4 VOWELS). The asymmetrical manner assimilation pattern of some varieties of Catalan (Majorcan & Minorcan Catalan) also leads to this conclusion, and, in this specific case, to the discrepancy between laterals and trills: whereas nasals assimilate in manner of articulation to the following lateral (*un llum* /un#lum/ [uɫ.lúm] ‘one light’), they do not do so to the following trill (*un riu* /un#riw/ [un.ríw] ‘one river’) (see Pons 2004, 2005). Similar assimilatory patterns are found in Selayarese (*ronḡaḡ* ‘loose’ → *ronḡaḡ-ronḡaḡ* ‘rather loose’ vs. *lamuḡ* ‘grow’ → [lamul lamuḡ] ‘plantation’) (see Rice 2005) and in Samosir Toba Batak (cf. /marlaḡe/ → [malláḡe] ‘to swim’ ; /tarsuḡgul #rohakku/ → [tarsuḡgulrohakku] ‘my spirit awoke’ (See Shin 1997). These facts and the subsequent intuitions about the sonority discrepancies between trills vs. flaps & laterals are totally consistent with the experimental results in Parker (2002) (see 1). As seen, however, in some languages (*i.e.* Hungarian, Italian) trills are interpreted as more sonorous than laterals. The sonority relation between flaps and laterals is even less obvious, and needs to be studied carefully. It is worth noting that, although Parker (2002) gives more sonority to laterals than to flaps, the phonetic results in his study are not that evident: «Specifically, /l/ patterns as more sonorous than the flap /r/ 10 times, as equivalent 7 times, and as less sonorous in 3 cases. The flap /r/ in turn outranks the trill 9 times and ties with it only once. There is not a single instance in which the mean value for /r/ is significantly more “sonorous” than that of /l/». There are several diachronic and synchronic processes, indeed, which make evident this ambiguity, and most of them take the direction *flaps* > *laterals*. We don’t have enough space to mention all of them, but we can refer, as illustration, to the following: *a*) word-initial flaps are proscribed in most Romance varieties whereas word-initial laterals are not; *b*) onset initial flaps preceded by a heterosyllabic consonant are generally not found, while laterals are; *c*) the evolution of Latin CL clusters to *Cr* in some Romance varieties (Italian, Sardinian, Alguerese Catalan, Portuguese), which has traditionally been seen as an onset sonority maximization strategy, *d*) the process of rhotacism of the intervocalic /l/ and /d/ in Alguerese Catalan (cf. *servidora* [salviróra] ‘servant fem.’; *vol* [vól] ‘(s)he wants’ ~ *volia* [vuríva] ‘(s)he wanted’), also reported in some Sardinian varieties and which can be regarded as a strategy to minimize the sonority slope between vowels, along the lines of Uffmann (2005); *e*) the velarized character of the lateral in Catalan is adduced in Wheeler (2005) as an argument to confer less sonority to these sounds than to flaps, etc. What these data suggest is that a fixed hierarchy between liquids suitable for all languages doesn’t exist, so that their organization in the sonority scale should be gradient rather than categorical (see § 2).



(3) Possible hierarchies across languages / Cross-linguistic frequency of each hierarchy

[r] > [l] > [r] (most likely)                      [l] > [r] > [r] (less likely)                      ...                      [r] > [l] > [r] (least likely)

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