Zukoff, Sam. forthcoming. Sonority Hierarchy (Ancient Greek). *Encyclopedia of Greek Language and Linguistics*. Brill. [prepublication draft, 8/24/2022]

Abstract

Sonority refers to the relative loudness or intensity of different manners of speech sounds. The commonly recognized sonority hierarchy, ranging from most sonorous to least sonorous, is as follows: *vowels > glides > liquids > nasals > fricatives > stops*. Sonority is of interest to Ancient Greek phonology primarily in two related domains: syllable structure and reduplication.

Sonority hierarchy in Ancient Greek

Sonority refers roughly to the relative loudness or intensity of different manners of speech sounds (Parker 2002). The commonly recognized sonority hierarchy, ranging from most sonorous to least sonorous, is as follows (e.g. Clements 1990): *vowels > glides > liquids > nasals > fricatives > stops*. While certain languages may require more or less precision among its sonority categories, sometimes including distinctions such as place of articulation, voicing among obstruents, or sibilancy among continuants, all language-specific sonority hierarchies agree on the broad class categories and their relative sonority, namely, *vowels > sonorant consonants > obstruents*. Sonority is of interest to Ancient Greek phonology primarily in two related domains (Steriade 1982): syllable structure and reduplication.

Syllable structure

Ancient Greek is notable, both within Indo-European and more generally, in that it allows a rich inventory of complex onset clusters. (In this section, I restrict the discussion of Ancient Greek to word-initial clusters, so as to remain agnostic regarding questions of medial syllabification; consult, e.g., Steriade 1982.) Many languages strictly limit which types of sounds may compose onset clusters. The most preferred clusters typologically are those which begin in a low sonority sound (such as a stop) followed by a high sonority sound (such as a liquid or glide). More broadly, languages prefer onset clusters which rise in sonority, and especially those with steep rises. Ancient Greek indeed has these types of onset clusters, but many more in addition, exhibiting all sorts of sonority profiles.

Ancient Greek has the typologically preferred stop-sonorant onset clusters: e.g. κρίνω *krī́nō* 'I decide' (stop-liquid), πνέω *pnéō* 'I breathe' (stop-nasal). (Note that, since most varieties of alphabetic Greek have lost glides **y* and **w* entirely, there is no possibility of stop-glide clusters.) Additionally, it has one other steeply rising sonority onset cluster, the fricative-sonorant cluster *sm*: e.g. σμύχω *smū́khō* 'I burn'. (This cluster is rare, and all other *s*-sonorant clusters are absent, because of historical loss of **s* in such positions.)

Ancient Greek also has many typologically more unusual onset clusters as well, including those with level and falling sonority. As in many other Indo-European languages, the sole onset cluster type that has falling sonority is *s*-stop: e.g. στέλλω *stéllō* 'I prepare'. Ancient Greek has two types of level sonority onset clusters. One is stop-stop: e.g. κτείνω *kteínō* 'I kill', φθείρω *phtheírō* 'I destroy'. The other is nasal-nasal. This is limited to *mn*, e.g. μνάομαι *mnáomai* 'I am mindful', and perhaps [ŋn] if we believe initial *gn* spells [ŋn], as in γνωρίζω *gnōrízō* 'I make known'. Lastly, Ancient Greek also permits stop-fricative onset clusters, namely *ps* and *ks*, which are of rising sonority, but minimally so: e.g. ψεύδω *pseúdō* 'I lie', ξέω *kséō* 'I shave'.

The only three-consonant onset clusters tolerated in Ancient Greek are of the shape *s*-stop-sonorant, thus combining the individually permissible *s*-stop and stop-sonorant onset sequences, the latter of which is the most preferred cluster in terms of sonority: e.g. σκληρός *sklērós* 'hard', σκνιπός *sknīpós* 'stingy', σπλάγχνα

splánkhna 'inward parts', σφραγίς *sphrāgís* 'seal', σταρτός *stratós* 'army', στλεγγίς *stlengís* 'scraper' (examples from Steriade 1982:214).

While Ancient Greek does permit *s*-stop onset clusters, which have a small sonority fall, it does not permit any steeply falling sonority clusters, such as liquid-fricative (e.g. *ls*) or nasal-stop (e.g. *nt*). It should also be noted here that, under certain analyses (e.g. Steriade 1982), it is only the steeply rising sonority clusters, namely stop-sonorant, which can form complex onsets in word-medial position. The special status of these clusters is made evident when we turn to reduplication.

Reduplication

Ancient Greek is well-known for its differential treatment of different onset clusters in reduplication (see recently Zukoff 2017a,b). In Ancient Greek, prefixal partial reduplication — i.e. segment copying — is employed as a morphological marker of certain verbal categories, most extensively in the perfect tense. For roots beginning in a single consonant, e.g. πέμπω *pémpō* 'I send', the reduplicated perfect form begins with a copy of that consonant followed by *e*, e.g. πέπομφα *pépompha* 'I have sent' (reduplicant bolded). The equivalent copying pattern is observed for certain types of cluster-initial roots, namely, stop-sonorant: e.g. κέκριμαι *kékrimai* 'I have decided' (stop-liquid), πέπνυμαι *pépnūmai* 'I have breathed' (stop-nasal). There is only a single instance of a voiced stop + nasal cluster which exhibits this type of reduplication: δέδμημαι *dédmēmai*, which is the perfect form of two different roots, δαμάζω *damázō* 'I tame' and δέμω *démō* 'I build'. Notably, neither of these roots begins in the *dm* cluster.

However, roots which begin in all other types of clusters exhibit a different pattern, namely, they fail to copy anything. This is (generally) the case for fricative-stop clusters, e.g. ἔσταλκα *éstalka* (ˣ*séstalka*) 'I have prepared', stop-stop clusters, e.g. ἔκτονα *éktona* (ˣ*kéktona*) 'I have killed', stop-fricative clusters, e.g. ἔψευσμαι *épseusmai* (ˣ*pépseusmai*) 'I have lied', nasal-nasal clusters, e.g. ἐγνώρικα *e*[ŋ]*nṓrika* (ˣ**[ŋ]e**[ŋ]*nṓrika,* ˣ**ge**[ŋ]*nṓrika*) 'I have made known', and *sm* clusters, e.g. ἔσμυγμαι *ésmugmai* (ˣ*sésmugmai*) 'I have burnt'. (There are patterned exceptions to this generalization; see Zukoff 2017b:488-492.)

Most scholars agree that the distinction between which clusters copy and which don't has something to do with sonority. Steriade (1982) analyzes the distinction primarily in terms of syllabification, which is dependent on sonority. Specifically, Steriade uses the concept of "Minimum Sonority Distance". Under this approach, languages can make reference to the number of steps along the sonority scale when formulating their phonological rules.

The sonority hierarchy which Steriade (1982:98,221) ascribes to Ancient Greek is as follows:

1. Voiceless stops: p,t,k,p^h,t^h,k^h ([-voice,-continuant,-sonorant])
2. Voiced stops: b,d,g ([+voice,-continuant,-sonorant])
3. Voiceless fricatives: s ([-voice,+continuant,-sonorant])
4. Voiced fricatives: z ([+voice,+continuant,-sonorant])
5. Nasals: $m,n,$([ŋ]) ([+sonorant,-continuant,+nasal])
6. Liquids: l,r ([+sonorant,+continuant,-nasal,+lateral])

If we put aside the lone example of δέδμημαι *dédmēmai*, all of the clusters which permit copying are those where the first consonant is at least 4 steps lower than the second consonant on the language-specific sonority scale. All the clusters which do not exhibit copying have a difference of less than 4 steps. For example, voiceless stop + fricative roots will have only a 2-step difference. Stop-stop and nasal-nasal roots will have a 0-step difference, since both members are of the same sonority category. And *s* + voiceless stop roots will have a 2-step difference in the wrong direction.

Steriade asserts that this 4-step condition is in fact what is responsible for this distribution, though somewhat indirectly. She argues that, word-medially, adjacent consonants can only be syllabified as a complex onset when they meet the 4-step condition. (She further argues that the mirror image of the 4-step condition accounts for which sequences can be syllabified as complex codas word-medially as well.) The reduplication rule then says that the only way a consonant can be copied is if it is the closest consonant to the reduplicant *and* it is part of an onset. For all of the clusters which do not meet the 4-step condition, the second consonant is syllabified as an onset, because it is adjacent to the following vowel, and the first consonant remains unsyllabified. This means that it is not eligible to be copied. Under this analysis, it is the 4-step minimum sonority distance requirement, interacting with syllabification, that explains which clusters can and cannot be copied in reduplication

Subsequent work has fleshed out Steriade's intuition about minimum sonority distance in new directions, largely relating to perception. Fleischhacker (2005) argues that perceptual factors deriving from something like sonority distance lead to preferences for copying segments in highly perceptible positions in a way that correctly derives the distribution. Zukoff (2017a) argues that there is a dispreference for repeated consonants in positions where perceptual contrast is degraded; these positions largely mirror those which are ascribed small or negative sonority transitions in the minimum sonority distance approach. There are at least two reasons why these approaches are to be preferred: first, they are grounded in perceptual factors; second, they do not require special treatment of clusters at word edges.

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