Rationalism and empiricism in syllabification

While there do appear to be recurring tendencies in how languages syllabify a given string of segments and in what sequences are allowed in a single syllable, there are also differences. For example, Ancient Greek dialects differed in how -VkrV- was syllabified (-V.krV- or -Vk.rV-)[1], and Icelandic has monosyllables like [vatn̥]. Previous work on syllabification in a procedural framework has assumed a universal core syllabification algorithm, based on a universal sonority hierarchy. In OT, work on acquisition of syllabification[2] assumes a universal set of syllable structure constraints.

Two related assumptions underlie work in both traditions: (i) that unsyllabified material is not pronounced—either because it is not in the output of the phonology (deleted by Stray Erasure[3]), or because, although present in the Surface Representation, it is not mapped to an articulatory output; and (ii) that children are human, and thus also subject to the restrictions in (i). In this paper we accept the assumption that children are human, but we reject the view that all phonological output that is mapped to phonetics must be fully syllabified—for both children and adults.[4]

By rejecting this assumption we predict that languages without syllable structure may exist and also that children's phonologies do not initially output syllabified representations. The claim that there could be an adult grammar G with no syllable structure follows from our argument, but is not actually falsifiable—G could have syllable structure but have no phonological processes sensitive to syllable structure that would tell us what the structure was. However, we do solve an acquisition problem by assuming strings may be unsyllabified at the output of the grammar. Given the existence of conflicting possibilities for syllabification of a string in different adult languages, it is guaranteed that some learners would initially make the wrong choice *vis-à-vis* their target language. In other words, like the reduction of allophony in morphological alternants to a single UR, the discovery of syllable structure (not just what sequences are allowed, but also how sequences are structured) requires batch learning over a body of stored data. Until this occurs, the child's phonology imposes no syllabification on strings, thus avoiding backtracking in learning—the learning path is monotonic, but only . if we allow batch learning.

It is widely accepted that there are no reliable acoustic correlates of syllable structure.[5] Contrast this with other phonological categories such as vowel height, which has a relatively reliable correlation with F_1. So, syllable structure is imposed on the signal by the mind on the basis of other information. The learner discovers the correct syllabification by using the same phonological cues that the analyst uses. For example, Italian does not have contrastive vowel length, but vowels are long in stressed open syllables. We find initial-stressed words such as [molto], [fatto], [fa:to], [so:pra], [pronto], [do:po], *etc.* The learner has all the evidence in the distribution of vowel length to conclude that [lt], [tt] and [nt] behave differently from [t], [p] and [pr]. The lack of phonetic correlates and the necessity of inferring syllable structure correspond to a rationalist perspective on language acquisition—syllables are like Determiners, Negative Polarity Items, Nominative Case, or any other abstract linguistic category. The role of experience in determining the particular syllabification in a target language, without reliance on markedness considerations or innate bias, corresponds to an empiricist perspective, which is necessary to reflect the plasticity of the language faculty.

The notion of UG is often misinterpreted as referring to traits shared by *all* languages. In fact, UG refers to an innate set of primitives that defines the categories that can be used to construct particular grammars. A given language may not make use of a particular element of UG. Thus, a child learning Italian has available an innate capacity to treat [pr] clusters as forming a unit with the following vowel, and [nt] clusters as not doing so. The empirical evidence in the data

(distribution of vowel length) ultimately tells the learner which clusters have which properties. But the child is not forced to assemble such units in the absence of a motivation to do so.
Conclusion: Syllabification, including sonority facts, differs significantly across languages, and it is only inferrable from phenomena like stress placement and vowel length. Therefore, it is misguided to posit a universal syllabification algorithm and a universal sonority hierarchy. Syllabification is only universal in the sense that *UG* provides abstract structures that a language may or may not exploit. A learner incorporates these structures into its grammar if motivated by positive evidence. Depending on the evidence presented to the learner, output strings may be fully, partially or no-at-all syllabified. Like Halle's recent work on stress feet, this allows us to reject the Strict Layering Hypothesis of Selkirk.[6]

References

[1]Discussed by D. Steriade 1982. *Greek prosodies and the nature of syllabification.* PhD dissertation, MIT.

[2]For example, Bruce Tesar and Paul Smolensky's work, including *Learnability in Optimality Theory*, MIT Press, 2000.

[3]Steriade 1982.

[4]See M. Halle 1999, 2000 (Talks at U. of Connecticut and Concordia U.) for a similar claim about stress feet and related suggestions by D. Steriade 1998 (Alternatives to syllable-based accounts of consonantal phontactics, ms. UCLA).

[5]For example, *Acoustic Phonetics* (K. Stevens 1998) does not even mention syllables in the index.

[6]Selkirk, E. 1984. *Phonology and Syntax: The Relation between Sound and Structure.* Cambridge, MA: MIT Press.