Exploring the Utility of Algebraic Lattices in Modelling Syllable Structure

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Building up from the Logical Phonology (LP) conception of segments as sets of sets of features (Bale & Reiss, 2018; Reiss 2021) I model syllables as ordered tuples constructed from three components: Onset (O), Nucleus (N), and Coda (C) which are themselves sets of segments. Crucially, these tuples combine into an algebraic lattice with the tuple $\langle N \rangle$, the smallest possible syllable, as the Greatest Lower Bound (or meet) and the tuple $\langle O, N, C \rangle$, the largest possible syllable, as the Least Upper Bound (or join).

It is standard for models of autosegmental structure to encode open syllables by either (i) assuming exhaustive tree structure representation or (ii) explicitly referring to absence (of a coda). Both raise issues for a theory of rule computation in LP. (i) necessitates explicit reference to all syllabic components regardless of their participation in the process at hand. Referring to absence (or N′, where N is a natural class) is problematic for LP as the complement of a natural class is not necessarily a natural class itself. My model of syllables as lattices allows me to encode open syllables without assuming either (i) or (ii) by instead referring to the relevant sub-lattice.

A full lattice can be decomposed into its constituent sub-lattices (Davey & Priestly, 2002; Partee, ter Meulen & Wall, 1990). Since each sub-lattice is an algebraic structure in its own right it can be operated on independently of the full lattice. Thus by utilising the cover relation between the vertices $\langle O, N \rangle$ and $\langle N \rangle$ this model permits reference open syllables, that is syllables without codas, regardless of the status of the onset and without specifying *no coda*. Therefore, the environment can be defined such that a rule applies only to segments in open syllables by structurally excluding syllables containing codas without explicitly forbidding them and without implicating other parts of the structure (as is the case in with a simple exhaustivity analysis).

References

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