

Gen is SR minus UR: Variables in Optimality Theory

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GEN is what the grammar adds to stored representations (UR) to make phonetically detailed programs for speech productions (SR). In a realistic mental model this means that GEN is what is stripped from SR to make it storable or what is added to UR to make it sayable. Either way, GEN is roughly SR minus UR. To understand GEN, we need a good understanding of both UR and SR. The more alike they are, the less GEN has to do. The less alike they are, the more GEN has to do.

This paper makes three general proposals, the first and third of which are novel as far as I know:

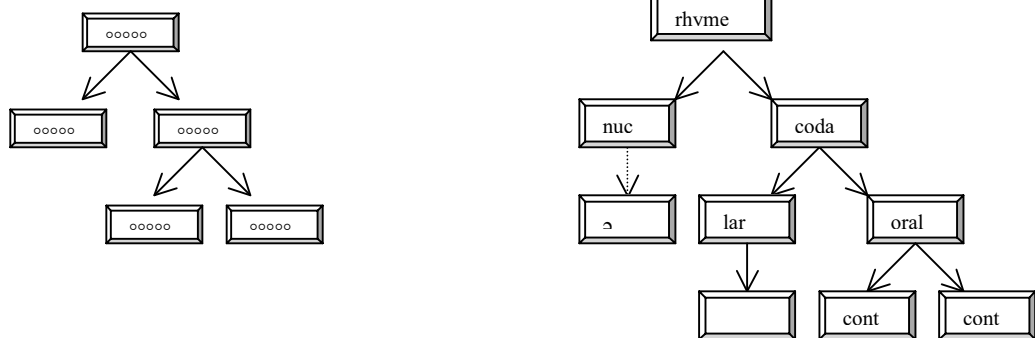
URs are trees with variables.

SRs are trees without variables.

Gen unifies trees and fills in variables.

Gen: A grammar with an infinite number of candidates to check *cannot* function as a model of speech production in real time. To remedy this I propose a number of restrictions on Gen that result in it generating at most *the product of the number of allomorphs in the intended message*. For *bananas* there is a single allomorph [bə'nænə] and three allomorphs for plural [z, s, əz], so that GEN has only to consider 3 (1•3) candidates. The number increases in languages with assimilation, vowel harmony, etc. but never requires anything approaching an infinite set of candidates.

UR: An underlying representation with a string of segments *cannot* function as a model of forms stored in long term memory. Short term memory holds very few units of information (Miller 1956), probably no more than 4 ± 1 (Cowan 2001). Since morphemes must get through STM to make it into LTM, we can safely assume they are organized into a small number (4 ± 1) of units that have themselves already been stored. Thus the UR for *Massachusetts* cannot be a linear string of ten segments /mæsətʃʊsɪts/, since nobody could ever get that string into STM and from there into LTM. UR must therefore be a richly organized structure, the units of which are presumably prosodic. URs are thus essentially what SRs have been for decades: trees full of information. I adopt from Marcus 2001 a neural model of 'treelets' that he and Jackendoff (2002) use to model stored semantic, syntactic, and morphological representations:



A human mind is full of these, and learning (facts, idioms, affixes, URs) consists of filling in the register sets (boxes) and determining the strengths of connections (arrows). Nonalternating *banana* has a simple tree; alternating *-s* has a tree with ə in a tenuously linked (dotted line) nucleus and a coronal fricative in the coda with an unspecified (blank box) laryngeal setting. Such autosegmental URs are essentially collections of allomorphs; GEN just fills in the variables (dotted lines, empty boxes) to give fully specified SRs. URs are just SRs with a few pieces missing.

SR: A surface representation is just what we usually take it to be, a tree with all the boxes and lines filled in. Given such URs and SRs, GEN is just *unification* plus *filling in the variables* of a set of partially specified trees. Ranked and variable constraints only have to decide among a *small set* of fairly similar candidates generated by GEN.