

Radical CV Phonology - Features, segmental structure and syllable structure (A synopsis)

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[All references to my own work can be going to the #number next to the references which refer to items under ‘Publications: <https://harry-van-der-hulst.uconn.edu/>’. Other references cited here are provided in the text below. Many other relevant references, among others to related work by others, are fully referenced in my publications.]

The basic thesis of Radical CV Phonology (RCVP) is that the distinctive features in phonology should not be presented as a list, but rather as being the result of a principled structure that accounts for how phonetic spaces are parsed into features. RCVP continues a line of work in feature theory (especially in Dependency Phonology) which claims that phonological features are unary (monovalent, single-valued); see [van der Hulst \(1988 \[#40\], \(2016 \[#158\]\)](#).

If we assume that the segmental structure involves different ‘gestures’ or ‘class nodes’, the question must be raised whether the features or elements in these structural units are totally distinct or whether perhaps elements can occur in more than one gesture, albeit with different, but similar, phonetic correlates. This idea is, in fact, extremely common in theories that propose that we can use the same place features for consonants and vowels or for laryngeal states and tones.

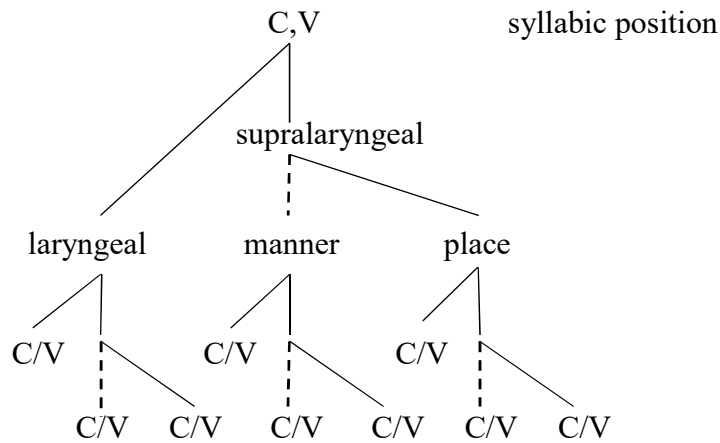
The idea of adopting unary elements that generalize over vowels and consonants was a central aspect of Dependency Phonology (DP) from the early 1970s, which from the start postulates that all phonological primitives are *unary*. For introductions to DP, see: [van der Hulst \(2006 \[#118\], 2011 \[#138\]; van der Hulst and van de Weijer \(2018 \[164\], to appear \[#184\]\)](#).

Going beyond the idea that place elements generalize over place properties of consonants and vowels, in their excursus on representations for tonal distinctions, Anderson and Ewen (1987 - *Principles of Dependency Phonology*. CUP, p. 273) made the intriguing suggestion that the place elements |i| and |u| can be employed for high and low tone, thus being part of both the place and the tone gesture. Pushing this strategy further, Anderson and Ewen suggest that the original place element |a| and the ‘manner’ element are in fact the same element |V| (1987: 215). In short, these authors propose to employ the same elements under different place nodes, while attributing the phonetic differences to the fact that the class node location of an element has a bearing on the phonetic interpretation of the elements. This reduction strategy is pushed to the extreme in Radical CV Phonology (RCVP), developed by [van der Hulst \(1995 \[#65\], 1996 \[#76\], 2000 \[#95\], 2021 \[#170\]\); van der Hulst and van de Weijer \(2018 \[#166\]\)](#). A full, book-length exposition of the theory with extensive empirical support is [van der Hulst \(2000 \[here link to book\]\)](#).

In these works, a variant of DP is developed that differs from standard DP by aiming at a precisely-defined, restricted set of segmental structures, needed for the expression of potential phonological contrast. The basic proposal is that there are only two elements, labelled |C| and |V|, that occur in all class nodes (limited to three such nodes: laryngeal, manner and place). It is to be expected that reducing the set of elements to just two comes with the need to invoke more ‘structure’, both in terms using ‘class nodes’ and appealing to a structure within class nodes.

Adopting the DP proposal that within a class, the elements can occur alone or in combinations, the structure in (1) expresses that the components C and V can occur multiple times in these three classes. We note the recurrence of an X-bar-like organization in which the head can be combined with a ‘first’ and a ‘second’ dependent (comparable to complements and specifiers in X-bar syntax):

(1) The ‘geometry’ of elements in RCVP



- Vertical broken lines dominate heads
- Slant lines dominate the dependents
- C/V = C or V

The combination of elements resulting from the head element and the first dependent is subject to ‘polarity’ (a kind of ‘unlike category’ principle) which excludes CC or VV. Because of this restriction, we could call the first dependent the ‘complement’ even though it is not obligatory. This allows 4 possibilities:

- (2) C C→V V→C V

Each of these four options can be provided with a second dependent (we could call this the specifier), which can freely be C or V

In [van der Hulst \(2020\)](#) I provide extensive typological evidence from phonemic inventories (especially as reported in Peter Ladefoged and Ian Maddieson (1996) - *Sounds of the world languages*. Wiley) in support of the need for the structures in (1) *for each class node*. Of course, the full array of structural possibilities in (1) is unlikely to be exploited in any given language.

Given the potential multiple structural occurrences of each element, a set of interpretation functions is needed that assigns a phonetic interpretation to each element in a specific structural position. These functions provide phonetic interpretations for each C and V, relative to three structural positions or roles:

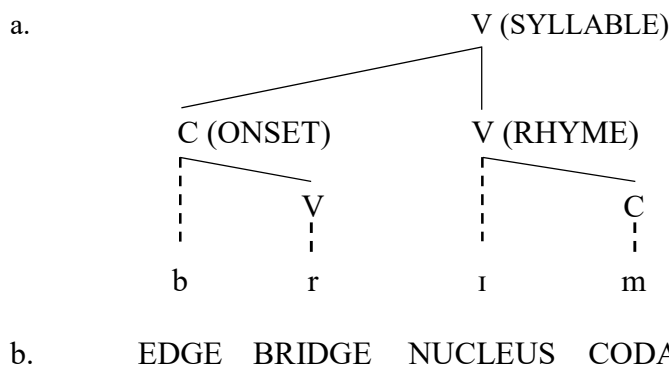
(3) Interpretation of C and V is sensitive to whether:

- a. It occurs in the laryngeal, manner or place node
- b. The element occurs in the head or in the first or second dependent position
- c. The element occurs in a syllabic head or a dependent position (see (4) below)

Invoking interpretation functions is required in any complete phonological theory. When phonologists propose that a feature such as [labial] applies to both consonants and vowels, such functions are required to account for the different phonetic implementations of this feature in the ‘consonant’ or ‘vowel’ domain. While one can subscribe to a so-called substance-free phonology (which means that the phonology does not make direct reference to phonetic implementations), it is nonetheless necessary to specify the phonetic correlations of phonological units and structures.

In RCVP, the syllable is ‘generated’ by the same structure that applies to class nodes, i.e. the structure in (4), here omitting the specifier position which can also occur because syllables at word edges can display greater complexity. This allows for four basic syllabic positions, two for the onset and two for the rhyme, the choice for C or V also being subject to polarity in this case:

(4) Syllable structure in RCVP



While the syntax of RCVP allows for four syllabic positions that are either C-headed (onset) or V-headed (rhyme), it does not deliver the grouping of both units into a syllabic unit. What then gives us the syllable grouping in (4) that prevents sequences of onsets and rhymes? We have to assume that building structure from bottom (starting with the elements) upwards (to the highest structural nodes) is subject to an instance of Merge that combines onsets and rhymes into a syllabic unit which is universally fixed in that the V unit is always the head. Subsequent Merge will then deliver (trochaic, i.e., left-headed) ‘feet-like’ structures which I analyze as recursive syllables (see [van der Hulst 2010 \[#129\]](#); [Den Dikken and van der Hulst \(2020 \[#67\]\)](#)).

The RCVP model is a theory that explains *why* we have the ‘features’ that are needed, rather than just listing them. It offers a very detailed theory which concretely delivers rather precisely the limited set of features that phonologists commonly use.

The structures in (1) and (4) are not part of some sort of innate language system. The basic claim of the RCVP model is that learners recursively parse ‘phonetic spaces’ (or diverse dimensions of the speech signal) into polar categories. As proposed in [van der Hulst \(2015 \[#153\]\)](#), a basic principle of categorization called *categorical perception* causes the emergence of a basic C/V opposition in each phonetic space. Following DP, RCVP then adds that within each space, the elements can occur alone or in combinations that involve a head/dependency relation.

This parsing strategy bears a resemblance to the *Successive Division Principle* in the theory of Elan Dresher (2009) - *The contrastive hierarchy in phonology*. CUP, albeit his algorithm is not a meta-theory of features. Rather, this algorithm assumes an innate set of features and applies them to a set of phonemes that has already been established. As such, Dresher’s model offers a theory of underspecification in a binary feature theory.

If we wanted to say that the opposing elements are two values of binary features, we could not say that these can be combined because combining [+F] and [-F] leads to a contradiction, while combining unary elements does not. One might ask how learners conclude that there are three gestures. My hypothesis is that the ability to parse the signal into three simultaneous layers must be anchored in distinct neuronal circuits in the auditory cortex that are specialized in detecting them.

The model encodes the two categories with ‘C’ and ‘V’, which is way of saying that each polar split delivers a more consonant-like and a more vowel-like category or feature, C/V referring to perceptual salience (‘sonority’) due to relative aperture from an articulatory point of view.

The C/V encoding across class nodes captures the relations between features in different spaces, that are often expressed in redundancy rules in binary models, like [+son] (=V) → [+voice] (V) or [+high] (=C) → [+ATR] (=C), etc.

I take polar categorization and head/dependency to be general cognitive principles, so there need not be language-specific innate systems for learning features. This idea is strengthened by the fact that the RCVP approach is not modality-specific. As I show in van der Hulst (2000, 2020: Chapter 10), the same principles that give us the structures in (1) and (4) predict ‘feature geometries’ for the phonological structure of sign languages which are supported by extensive work on the phonological analysis in Els van der Kooij - *Phonological categories in Sign Language of the Netherlands*. LOT Publications; see also [van der Hulst and van der Kooij \(2021 \[#169\]\)](#).

My work in phonology has been guided by the notion of *Structural Analogy* which refers to the possibility (or assumption) that different modules of the grammar are structured in an analogous fashion. Furthermore, I even pursued the structural analogy assumption within phonology by proposing that different class nodes, and even syllable structure, display the same C/V ‘syntax’. This assumption leads to the idea that ‘phonology and syntax are not that different’, with a point of controversy being whether phonology includes recursive structure. A program called ‘One Syntax for All’ has been explored in [van der Hulst \(2010 \[#129\]\)](#) and [Den Dikken and van der Hulst \(2020 \[#167\]\)](#).