

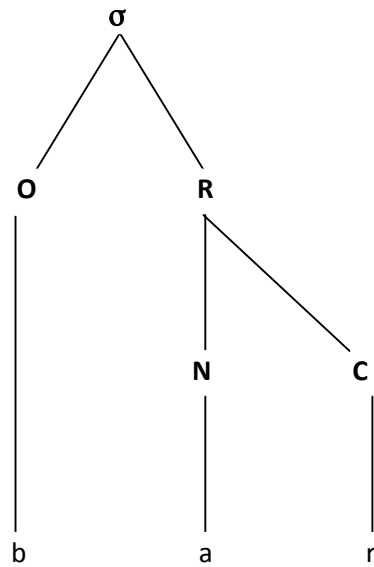
Optimality Theory and the Kashmiri Syllable

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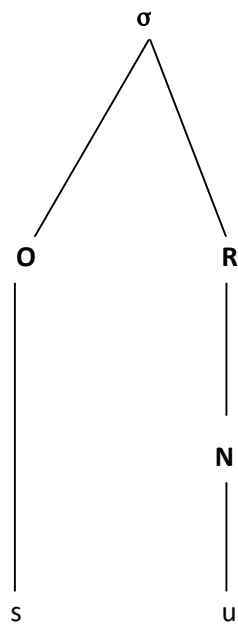
Introduction: The syllable is a major ingredient of phonological generalizations. It is crucial in defining phonotactic patterns of well-formed sequences of segments, in particular segments of consonants and vowels. It supplies a level of prosodic organization between segments and higher level prosodic units. It is defined as a prosodic category organizing segments in sequences according to their sonority values.

Constituency in Syllable Structure: The two main constituents within a syllable are the **onset** and the **rhyme**. In the word /bar/ 'door', for instance, the first segment /b/ constitutes the *onset* of the syllable and the last two segments /a/ and /r/ taken together constitute the *rhyme*. The *rhyme* may be further subdivided into the constituents **nucleus** and **coda**. Thus, in the word /bar/, the vowel /a/ constitutes the nucleus and the consonant /r/ constitutes the coda. The constituency of the single-syllable morpheme /bar/ can be represented as follows, greek 'σ' (sigma) stands for 'syllable', 'O' stands for 'onset', 'R' stands for 'rhyme', 'N' stands for 'nucleus', and 'C' stands for 'coda': e.g.,

/bar/ 'door'



A syllable such as this, which contains one or more consonants in coda position, is called a **closed syllable**, whereas a syllable which does not contain any consonants in coda position is referred to as an **open syllable** e.g., the word /su/ 'he'



Syllabic Pattern of Kashmiri: Following is the syllabic pattern found in Kashmiri.

Syllable structure	Example	Gloss
V	/a:/	'yes'
CV	/su/	'he'
CCV	/tre/	'three'
VC	/al/	'pumpkin'
CVC	/gər/	'watch'
CCVC	/srog/	'cheap'
VCC	/amb/	'mango'
CVCC	/mast/	'care free'
CVCC	/khanD/	'sugar'

Table 1: Syllable Structure of Kashmiri

The vowels /i:/, /ə:/, and /u:/ are not contained in final open syllables.

The syllabic structures given above may function as syllabic constituents for forming polysyllabic words e.g.

CVC+CV=CVCCV /galti:/ 'mistake'
 CVC+CVC=CVCCVC /gəzrun/ 'to count'

The present paper attempts to focus on the syllabic structure of Kashmiri from an optimality perspective, taking syllable structure constraints, syllable form and complications into consideration.

Optimality refers to the observed surface forms of a language which arise from the resolution of conflicts between competing constraints. A surface form is optimal if it incurs the least serious violations of a set of constraints taking into account their hierarchical ranking.

In Optimality Theory, two functions are involved in the generation of utterances. These are **Gen** (Generator) and **Eval** (Evaluation). **Gen** takes an input and returns a (possibly infinite) set of output candidates. Some candidates might be identical to the input, others modified somewhat and many others unrecognizable. **Eval** chooses the candidate that best satisfies a set of ranked constraints; this optimal candidate then becomes the output.

The essential property of the **Gen** is that it is free to generate any conceivable output candidate for some input. This property is called **Freedom of Analysis i.e.** any amount

of structure may be posited. The **Eval** is undoubtedly the central component of the grammar since it is burdened with the responsibility of accounting for all observable regularities of surface forms. Although any candidate output can be posited by **Gen**, the crucial role of **Eval** is to assess the 'harmony' of outputs with respect to a given ranking of constraints. The constraint hierarchy contains all universal constraints (a set called **Con**), which are ranked in a language-specific way.

The constraints of **Eval** are of two types: **Markedness constraints** which enforce well formedness of the output itself, prohibiting structures that are difficult to produce or comprehend. **Faithfulness constraints** enforce similarity between input and output, for example requiring all input consonants to appear in the output or all morphosyntactic features in the input to be overtly realized in the output. Markedness and Faithfulness constraints can conflict, so the constraint ranking which differs from language to language determines the outcome.

In standard OT, constraints are *strictly ranked* and *violable*. Strict ranking means that a candidate violating a high-ranked constraint cannot redeem itself by satisfying lower-ranked constraints (constraints are not numerically weighted, and lower ranked constraints cannot gang up on a higher-ranked constraint). Violability means that the Optimal candidate need not satisfy all constraints. **Eval** can be viewed as choosing the subset of candidates that best satisfy the top ranked constraint, then, of this subset, selecting candidate that best satisfies the second-ranked constraint, and so on. Another way of describing **Eval** is that **A** is optimal if and only if, for any constraint that prefers another candidate **B** to **A**, there is a higher-ranked constraint that prefers **A** to **B**.

The constraints are minimally violated in the sense that the form that surfaces is the one which incurs the least serious violations as compared to a set of possible candidates. The seriousness of a violation is defined in terms of hierarchies of constraints which are arranged by importance. The violations of higher ranked constraints take absolute *priority* over lower ranked constraints. The winning candidate need not, satisfy all constraints, as long as for any rival candidate that does better than the rival. OT attributes major importance to the surface level in the interaction of constraints, disallowing access to intermediary levels between the input and output.

Interaction of Constraints: Optimality Theory defines two types of constraints viz Markedness and Faithfulness. These constraints interact with each other and are ranked in a language specific hierarchy. The ranking schema of these constraints is responsible for the various attested situations such as contrast, neutralization and allophonic variation. Whether some surface phonetic contrast (such as that between

oral and nasal vowels) is allophonic or lexically distinctive in a language, depends on the interaction of these constraints. When markedness dominates faithfulness, the language achieves outputs that are minimally marked at the expense of a neutralization of lexical contrasts. But when faithfulness dominates markedness, the language makes the reverse choice, realizing its input contrasts at the expense of output markedness:

- a. Markedness >> Faithfulness (lexical contrasts are neutralized)
- b. Faithfulness >> Markedness (lexical contrasts are expressed)

Basic Syllable Structure Constraints (Hammond 1997):

- (a) **ONS** ----- A syllable must have an Onset.
- (b) **COD** ----- A syllable must not have a coda.
- (c) **PARSE** ----- Underlying segments must be parsed into syllable structure.
- (d) **FILL** ___ Syllable positions must be filled with underlying segments.

PARSE and FILL are faithfulness constraints: They declare that perfectly well-formed syllable structures are those in which input segments are in one-to-one correspondence with syllable positions. Both FILL and PARSE are representative of families of constraints that govern the proper treatment of child nodes and assumptions made here. As the basic syllable theory develops, FILL will be articulated into a pair of constraints:

- a. **FILL^{Nuc}**: Nucleus positions must be filled with underlying segments.
- b. **FILL^{Mar}**: Margin positions (Onset and Coda) must be filled with underlying segments.

Syllable form:

- (a) **NUC** ___ Syllable must have nucleus.
- (b) ***COMPLEX** ----- No more than one C or V may associate to any syllable position node.
- (c) ***M/V** ___ Vowel may not associate to Margin nodes (Onset and Coda).
- (d) ***P/C** ___ Consonant may not associate to Peak (Nucleus) node.

The theory which is examined here is **Basic CV syllable theory**.

Syllable structure is governed by the basic syllable structure constraints, viz, ONS, -COD, NUC, *COMPLEX, *M/V, *P/C, PARSE and FILL. Of these, ONS, -COD, PARSE and FILL are relatively ranked in any domination order in a particular language while others are fixed in super ordinate position.

The basic syllable structure constraints, ranked in a language-particular hierarchy, assign to each input its optimal structure, which is the output of phonology.

According to the typology of syllabic systems, three constraints have been predicted. First, there is the ONSET constraint, which requires all syllables begin with at least one consonant i.e.

(i) **ONSET**: Syllables begin with a consonant.

Second, there is the preference for syllables not to end with a consonant, i.e.

(ii) **NO CODA**: Syllables end with a vowel.

Third, there is faithfulness, which militates for no changes in the mapping from input to output, i.e.

(iii) **FAITHFULNESS**: Pronounce everything as is.

These constraints provide for a simple characterization of the basic syllabification systems of the world. It is important to notice that ONSET and NOCODA do not directly interact. That is, if they are ranked right next to each other, either ranking of one with respect to the other has the same effect. Hence, there are four possible empirically distinct rankings which are given below:

All rankings of [FAITHFULNESS, ONSET, NO CODA]

Rankings	Types
a. FAITHFULNESS >> ONSET, NOCODA	(O)V(C)
b. ONSET, NOCODA >> FAITHFULNESS	OV
c. ONSET >> FAITHFULNESS >> NOCODA	OV(C)
d. NOCODA >> FAITHFULNESS >> ONSET	(O) V

These are the kinds of syllables that these rankings predict. The notation is interpreted as follows. If a symbol is present, that means that structural position is required in a syllable, e.g. all syllables require vowels. If a symbol is absent, that means that structural position cannot occur in that language, e.g. OV means codas are not allowed. A symbol in parenthesis means that structural position is optional, e.g. (C) means codas are possible but not required (that is, OV(C) is short hand for OV and OVC in the same language).

These rankings produce their respective syllable types. From these rankings, the first one is the **basic Kashmiri pattern** i.e. Faithfulness dominates Markedness constraints. FAITHFULNESS is ranked above ONSET and NOCODA, which means that onsets may be missing (/an/ 'bring' vs. /pan/ 'thread') and codas may be present but only in order to satisfy FAITHFULNESS (/na/ 'no' vs. /nas/ 'nose').

Complications: Kashmiri is actually more complex than it is presented above. It is characterized as a (O)V(C) language, but this oversimplifies the situation in two respects. First, as noted above, there are at least two additional constraints which seem to be unviolated in Kashmiri: PEAK and LICENSING. One can add these at the top of the constraint hierarchy as given below:

PEAK, LICENSING >> FAITHFULNESS >> ONSET, NOCODA

A second problem is that Kashmiri allows more than a single consonant in onset or coda position. This can be seen in three contexts. First, the existence of word—initial consonant clusters, e.g. in /krãz/ ‘skeleton’, /drog/ ‘expensive’, etc. shows that onsets can have more than one consonant. Second, the existence of word—final consonant clusters shows that codas can be complex, e.g. in /amb/ ‘mango’, /khanD/ ‘sugar’, etc. Third, there are word—medial consonant clusters that are at least two consonants long, e.g. in /kapTun/ ‘cutting of clothes’, /yakhdam/ ‘at once’, /badtar/ ‘very bad’, etc.

To accommodate these facts, one must make two assumptions. First, one must assume that the *COMPLEX constraint is dominated by FAITHFULNESS.

(i) *COMPLEX: Syllables have at most one consonant at an edge.

Second, one must provide some account for why not all sequences of consonants are well-formed. For example, while /amb/ is a well formed Kashmiri word, /*abm/ is not. The most obvious generalization governing possible sequences of consonants at the edges of syllables is that they must exhibit an appropriate sonority profile. Onset consonant sequences must increase in sonority and coda consonant sequences must decrease in sonority. This can be formulized as the SONORITY constraint, which also appears to be unviolated in Kashmiri.

(ii) SONORITY: Onsets must increase and codas must decrease in sonority.

It is important to note here that character of word-initial and word-final clusters only follows on the assumption that all segments satisfy LICENSING in Kashmiri. Therefore, the absence of /*abm/ as a possible word of Kashmiri follows from two assumptions. First, all segments must satisfy LICENSING. Second, all syllables must satisfy SONORITY.

Conclusion: To summarize so far, Kashmiri is an example of an (O)V(C) language with FAITHFULNESS ranked above ONSET and NOCODA. Kashmiri exhibits complex onsets and codas as well, entailing that *COMPLEX is low ranked. These clusters satisfy sonority sequencing which entails that LICENSING and SONORITY are high ranked. Finally, every syllable must have a vowel, which can be captured by ranking PEAK highly. A complete hierarchy consistent with these conclusions is given below:

PEAK, LICENSING, SONORITY >> FAITHFULNESS >> ONSET, NOCODA, *COMPLEX

This represents the picture of syllable structure of Kashmiri in an optimality theory.

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