# Markedness in Language and Music

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- Language and Music are comparable cognitive systems. Both admit 'duality of structure', 'structure dependence' and 'creativity'. The central tenet of Vijayakrishnan (2007) is that the architecture of the grammar of language and music must be comparable.

- One of the best candidates for capturing the **universal properties** of language is the notion of Markedness
  " In structural linguistics (Hjelmslev 1935, Trubetzkoy 1939, Jakobson 1941: cf. Anderson 1985), but also in Generative Phonology (Chomsky and Halle 1968, Kean 1975, Kiparsky 1985) and Natural Phonology (Stampe 1972, Hooper 1976), a notion of MARKEDNESS plays a key role, which embodies universality in a 'soft' sense. The idea is that all types of linguistic structure have two values, one of which is 'marked', the other is 'unmarked'. Unmarked values are cross-linguistically preferred and basic in all grammars, while marked values are cross-linguistically avoided and used by grammars only to create contrast." (Kager 1999 p2)

Markedness is rooted in difficulty in production/perception and is supported cross-linguistically. Unmarked elements occur widely and their marked counterparts have limited occurrence.

i. /p, t, k/ << /b, d, g/ and /p, t, k/ << /$p^h$, $t^h$, $k^h$/

ii. /i, u, a/ << /e, o/

Implicational statements are valid for unmarked~marked pairs of elements. The presence of the marked element in a language implies the presence of the unmarked element. However, there may be stray exceptions to such markedness statements e.g., Arabic does not have /p/ but has only /b/ and Paumari, a language of the Arawan family of Brazil has the three vowels /i, a and o/ (Everett 2003). But one does not abandon the theory of Markedness on the basis of a few counter-examples.





- However, languages do chose to allow marked elements and linguistics accommodates for this fact by allowing markedness statements to be prioritized in the grammars of languages. For instance, whereas Sanskrit allows aspirates Tamil does not. We can account for this difference by postulating a requirement that aspirates have to be faithfully parsed. Thus the generalization Faithfully parse Aspirates (or Faith Asp for short) has higher priority than *Aspirates which bans aspirates but the prioritization is reversed in Tamil.

| Sanksrit | Tamil |
|---|---|
| Faith Asp >> *Asp | *Asp >> Faith Asp |

- **Tentative Hypothesis for Music**

The markedness statement for the twelve notes of the octave
/C, D, E flat, E, F, G, A, B flat, B/ << /D flat, F sharp, A flat/

Of course in a trained musician this markedness statement will never show up as all the twelve contrasts would have been acquired to perfection. However, when one examines many systems of music, one may come across some evidence supporting this claim.

**Primary Evidence**: Dorna (work in progress) in her examination of a large number of scales in tribal/folk music systems across India did not report even a single occurrence of a scale where these three notes were selected in her illustrated presentation.

**Mathematical Proof**: Examining the pitch ratios of the twelve notes one can arrive at a more or less increasing order of markedness depending on the complexity of the ratio. The simpler the ratio, the less marked the relation. Thus we have the following series in the increasing order of markedness:
C >> G >> F >> A >> E >> E flat
[But we do not have a satisfactory statement for the remaining notes i.e., B, B flat and D and the three notes we have hypothesized to be the most marked, namely D flat, A flat and F sharp. (Kiparsky (p.c) cf. Vijayakrishnan pp. 299-300).]

**Anecdotal evidence**: Beginners find D flat and A flat difficult in the scale of the raagam Maayaamaa|avagau|a [C, D flat, E, F, G, A flat, B]

Scales which select F sharp rather than F in the absence of G are more difficult to master for beginners e.g., Vasanta: [C, F, E, F, A, B / C, B, A, F, E, D flat, C] << Hamsaanandi [C, D flat, E, F sharp, A, B] << Kumudakriyaa [C, D flat, E, F sharp, A flat, B]

- In addition to the twelve notes to an octave, Indian music theory hypothesizes that there are ten more 'notes' to a scale. Apart from the stable C and G, every note is hypothesized to have a reduced or augmented variant, on an average 20 cents lower/higher than the regular notes. However, in reality, Carnatic music has only twelve **stable** pitches in an octave and not twenty two (Krishnaswami 2003).

- A raagam makes a selection from the set of twelve notes for defining its scale and, in addition, may idiosyncratically select the reduced/augmented variant e.g., while Saaveeri selects a reduced E, Jaganmoohini does not (though both select E); similarly, while Madhyamaavati selects reduced B flat, Aabeeri does not (though both select B flat). The selection of a reduced/augmented note is always paired with the selection of the standard variety of that note.

- Let us now examine the ways in which a 'note' can be rendered in Carnatic music. While the standard notes can be rendered as steady pitch plateaus at the scalar values which we term RenScale, the reduced /augmented cannot be rendered as RenScale variants. This explains why there are only twelve steady pitch renderings in an octave even in Carnatic music (Krishnaswami op cit). Importantly, all notes in Carnatic music (including the reduced/augmented ones) can be rendered as a pitch movement which we term RenPM. The pitch movements may be realized as pitch waves, pitch curves or pitch spikes (depending on duration/style/tempo etc). Thus there is an absolute prohibition on realizing the reduced/augmented notes as steady pitches attributed to the Markedness statement *Red.AugRenScaleN.

- For our purposes, D flat and A flat have reduced variants and F sharp an augmented variant. While the reduced variant is rendered from the lower note as an anchor and the regular note or even a higher note as the target (depending on the duration, style, tempo etc), the augmented note is





rendered from the higher note as the anchor and an inverted pitch wave/curve/spike with the lower note as the target. A model diagram for reduced D flat for the sequence notated as reduced D flat: (long note) is given below:

D

D flat

C

Figure 1

Since the reduced/augmented notes are never, ever rendered as RenScale, the markedness statement prohibiting these renderings is ranked very high in the grammar of Carnatic music. Of the two renderings of the standard notes, RenScale renderings are, obviously, less marked than the PM renderings. Thus we can rank these possibilities as shown below:

*RenScaleRed.AugN
>>
*PMN
>>
*RenScaleN

What about the rendering of the reduced/augmented notes when selected by specific raagas? Obviously, they have to be rendered and the only way they can be rendered will be as PM. We refer to the fact that a raagam selects the reduced/augmented variants as FaithN (be faithful to the raagam's selection of note (in the musical phrase in question)). Therefore we have the ranking below:

FaithRed.AugN, *RenScaleRed.AugN
>>
*Red.AugNPM
>>
*RenScaleN

The ranking above makes sure that while the standard notes will be allowed a RenScale rendering[1], reduced/augmented notes will not be allowed RenScale values and so they will have to be rendered as pitch movement.

- Markedness statements are of two types, namely context-free (like the ones given above) and context-sensitive. The latter generally pertain to the less marked member of the pair of elements which is, however, more marked in specific environments e.g., while /p, t, k/- the voiceless stops are less marked than /b, d, g/- the voiced stops, generally, the former set is more marked in specific environments like the following:

  V__V and N___ i.e., in the intervocalic and the post nasal environments.

- The central point made in this paper is the following: The least marked of values i.e., the RenScale values for the three most marked notes, namely D flat, A flat and F sharp are forbidden in the special context when they are long and phrase final **in certain styles of Carnatic music (including my style)**. This can be captured as below:

  *[…RenScaleN:] where N is D flat, A flat or F sharp and is long in phrase final position.

- The markedness constraint above is part of a large set of statements pertaining to boundary notes specific to raagas (cf. Vijayakrishnan 2007 pp. 161-65). Both prominent notes and boundary notes in musical phrases are controlled by raagam-specific constraints in Carnatic music. However, the prohibition on phrase final long D flat, A flat, F sharp, unlike other constraints, is a raagam-free statement. For example, the prohibition on phrase final long B in the raagam Sahaanaa

  *[F A B,] but [F A,]

  is specific to the raagam as other raagas allow this note in the same position e.g., Sriraagam

  [F A B,] as well as [F A,]

[1] This requires further refinement which we ignore for presentation purposes.





Two points that are worth making are:

1) The prohibition on *[…RenScaleN:] with N spelt out as D flat, A flat or F sharp is absolute, irrespective of the raagam specification.
2) No other note among the twelve that make up the octave (to the best of my knowledge) has such a restriction.

- Thus it is beyond reasonable doubt that the phenomenon we have on hand is related to the inherent markedness of these three notes when compared with the remaining notes in the twelve note scale.

- In styles (including mine) where this constraint is active, phrases which have a final, long D flat, A flat or F sharp are avoided as being too dramatic. In raagas which select these notes and also the reduced/augmented related note there is no problem as the latter will, any way be rendered as PM e.g.,

| | |
|---|---|
| Gauḻa | [E F red.D flat,] |
| Kiiravaaṇi | [C B red.A flat ,] |
| Lataaŋgi | [A flat G aug.F sharp,] |

But in raagas where the reduced/augmented note is not selected, the strategy adopted is either to avoid such phrases or rephrase them suitably e.g.,

| | |
|---|---|
| Bauḻi | *[E G D flat,] but [E G D flat, G] |
| | *[A flat C D flat,] but [A C D flat, C] |

However, it must be pointed out that there are several styles where this constraint is not in operation being re-prioritized (rendered invisible). The fact that only these three notes of the set of twelve are singled out for the context-sensitive but raagam independent prohibition is not amenable to any explanation other than markedness and hence supports my claim regarding the intrinsic markedness of these three notes.

- Accepting an explanation based on Markedness in music commits us to a position comparable to **Universal Grammar** for language which I term **Universal Musicology**. A programme in Universal Musicology will address at least the following concerns pertaining to pitch manipulation of notes of music:

- How do music systems evolve from three note scales to a full fledged octave?
- How are music systems acquired?
- Are the stable pitch landmarks in an octave maximally twelve universally? Why?
- Since humans can perceive even small changes in pitch in context (in languages, tones may be exploited lexically and minor pitch variation is universally exploited intonationally) and the 'minor pitch variation' for language can be as low a range as 5 to 8 Hz, what is the outer limit to the exploitation of inter-tonal pitch in music systems across the world? The average pitch interval between the twelve notes on my veena is 91.16 Hz (worked out from Vijayakrishnan (2007 p. 82)) and the average quarter tone interval **hypothesized** by Carnatic music theory is 22 (op cit p. 85 from Sambamurthy 1999).
- Of course, we have the entire range of rhythmic systems to explore as well, subjecting them to similar markedness criteria.

- **Conclusion**

The programme of Universal Musicology (along with the ongoing research on Universal Grammar for language) outlined here will enable us to arrive at the possible substantives of pitch and rhythm that govern human perception/production of language and music, throwing light on the cognitive aspects of both these systems. For instance, it would be fascinating to map the similarities in the production/perception of the systems of pitch and rhythm in language and music (Nicholson et. al. 2003), how they are similar in many aspects and yet distinct due to different, defining criteria, etc. For example, while rhythm/prominence in language is known to perform a demarcative function defining words from any one of the two edges (left or right) or even both edges (in some languages), the simple question to ask is "Are there musical systems which define rhythm/rhythmic prominence from the right edge of musical phrases?" If the tentative answer is "no", then we need to find out why this is a parameter along which language and music seem to differ. Many such fascinating questions await the programme of Universal Musicology if it takes off.





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