Bangla Monosyllables: A Sonority based Study

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Abstract : The P Monosyllables offer the test-field for identifying legal combinations of segments in a language and, at the same time, for framing a set of laws for rejecting illegal partners in that same linguistic customs. The former is accomplished by devising a template that functions as a syllable-detector while the latter by discovering pertinent constraints or template conditions that reflect the phonotactics of the language.

Tools like template and template conditions have their foundation chiefly on the four aspects of sonority, viz. sonority value, sonority scale, sonority hierarchy and sonority sequencing generalization, as is depicted in the phonological tradition.

The present paper treats the monosyllables in Bangla, an Eastern Indic language, in terms of the (i) canonical patterns (ii) internal structures (iii) correlation between the phonetic peak and phonological nucleus (iv) template (v) template conditions and (vi) phonotactic implications of them. In the course of analysis the paper exploits the sonority factor to its fullest extent and also points out the limitations of the sonority scale as proposed in the literature as a universal yardstick.

Key words: Monosyllables, Syllables, Sonority value, Sonority Sequencing Principle, Metrical Phonology, Template

Introduction

As regards the plenteous contributions of Prof. Suniti Kumar Chatterji to the fields of knowledge Professor Bh. Krishnamurti (1997:7) puts up a concise account of his publications in print as follows – "SKC, during his over 60 years of active academic life, produced nearly 930 publications, written in four languages – English, Bengali, Hindi and Sanskrit. These include 41 books, 413 articles, 10 reviews and 321 miscellaneous items and short communications. He had five publications (excluding reviews and brief communication) on Indo-European, 32 on historical linguistics, (Indo-European/ Indo-Aryan), 93 on anthropological and ethnological themes, 10 on general linguistics, 51 on language problems and planning with special reference to India, 16 on philological studies, 19 on phonetics and phonology, 16 on morphology and grammatical topics, 15 on Hindi and Urdu, 55 on topics of literature with special reference to India, 10 on travel, 22 on art, and 102 on miscellaneous topics."

Among these we like to point to his works on phonetics and phonology, especially to the book A Bengali Phonetic Reader (1928), the pioneering study of the sounds and phonemes of Standard Bangla following the then influential methodology of phonetics. It is a known fact to all of us that until the present the researchers working on Bangla linguistics, especially on phonetics-phonology, mandatorily need to consult this book. The book chiefly describes phonetically the phonemes and some variations of them in Bangla and teaches how to transcribe them.

The phonemes along with their variants, i.e. allophones, are considered the micro units of phonology, while the phonological representation of larger units of language structure, for example, morpheme, word, phrase, clause, sentence, or from the viewpoint of poetry, verse/ poNti, clause/ pOd, foot/ pOrbo, sub-foot/ upo-pOrbo and syllable/dOl are considered the macro units of different length in phonology. Among the structural units of language the phonemes are meaningless units, while starting from morphemes to sentences - all are meaningful units. However, as macro units of phonology the meaning aspect of these units is not taken into account. Using the classical dichotomy of expression-content it may be clarified as only the expression aspect of these larger units come under the scope of phonology. A comparison with the units of verse structure makes it simpler to understand because in scansion only the phonological face of a verse is counted, not the semantic one. Amongst the macro units of phonology syllables are the smallest or lowest, thus syllables are the meaningless but not the minimum. Chatterji (1928) singles out the various phonetic aspects of Bangla phonemes, the building blocks of the macro units of phonology and opens up the way to the next generation of linguists whose responsibility is to study the nature and features of the macro units.

To start with Bangla syllables, the various aspects of them have been analysed in a handful of studies, e.g. Mallik (1960), Hai (1964), Sarkar (1979, 1986), Mallik et al. (1998), Dan (1993, 2004), Kar (2009, 2010) etc. It is to be noted that besides the field of Bangla linguistics syllables received due attention since 1922 in the works of the distinguished metricist Prabodh Chandra Sen. We shall touch upon this fact in a while.

The current deliberation, as the title indicates, concentrates on Bangla Monosyllables.

Monosyllables, as opposed to syllables, display a multidimensional identity composed of both universal and language specific traits, hence are potentially responsive to an infinite range of investigation. The present deliberation captures a phonological profile of the monosyllables in Bangla employing the metrical framework.

Bangla or Bengali, a member of the Eastern branch of the Indic subfamily of Indo-European, is typologically an inflectional language mainly spoken in the Indian sub-continent. It is the national language of Bangladesh and the regional official language of the states of West Bengal, Tripura and Assam of the Republic of India.

The metrical framework, a non-linear model of phonology, at its inception main-

ly questioned the segmental treatment of English stress as proposed in *The Sound Pattern of English* (Chomsky & Halle 1968) and offered a^+ macro unit based treatment of that in accordance with the relative prominence of syntactic and morphological constituents in terms of a hierarchical organization of phonological strings based on syllables (Liberman & Prince 1977). Then onwards the present day metrical approach gradually took shape on the basis of a good number of constructive criticisms of the various aspects of the initial proposals and attained the level of a well-developed theory (Hogg & Mccully 1987).

However, the current model of metrical phonology, both in its units and tools, is remarkably similar with one of the indigenous metrical theories of Bangla verse language sprouted as early as in 1922. The sole architect of the indigenous theory was the renowned metricist Prabodh Chandra Sen whose extensive research work extended from 1922 to 1986 independently of both the Sanskrit and the Western traditions. This fact added positively to our motivation behind choosing the metrical framework for studying the syllable structures in Bangla.

The present article deals with the hierarchical structure of Bangla monosyllables and the conditions thereof in terms of the concepts of sonority hierarchy and syllable template, the chief tools of the metrical framework. Section 1 differentiates between syllables and monosyllables, section 2 provides an overview of a few structural properties of Bangla monosyllables, section 3 sketches the phonological profile of Bangla monosyllables exploiting metrical tools, and section 4 summarizes the relevant typological statements scattered in the text.

1. Syllable vs. Monosyllable

A syllable, as is commonly understood, is a unit of pronunciation typically larger than a single sound and smaller than a word. Since at least the time of Chaucer the term ***syllable*** has been there in the English language and it is frequent in linguistic descriptions at different planes; yet a precise definition of the term is still lacking.

In effect, in linguistic descriptions the term ***syllable*** is often used in an imprecise intuitive way reflecting an intuitive reality existing in the phonological system and, in case of a language with script, also in the writing convention of a language. For example, in English a word may be pronounced *one syllable at a time*, as in /ne-va-ðɤ-les/ 'nevertheless', /ɑ:-tə-mæ-tɪk/ 'automatic', /kæl-kjʊ-leɪt/ 'calculate etc. and in writing words are hyphenated as per their *syllabic divisions*. Comparable examples from other languages are, Bangla /*kim-bhut-ki-ma-kar* <কিম্ভূতকিমাকার> 'of strange form', /*lan-ɖo-bhɔn-ɖo*/ <লন্ডভন্ড> 'disordered', /*a-kaS-pa-tal*/ <আকাশপাতাল> 'heaven and hell', and Hindi /*du:s-ra*/ <दूसरा> 'second', /*kə-bu:-tər*/ <कबूतर> 'pigeon' etc. At this level, the notion of syllable is intuitively real to native speakers.

Although this pretheoretical notion of syllables is to some extent obscure and intuition-bound, this notion seems to have become one of the indispensable and irreducible units on at least two levels of representation, the phonetic level and the phonological level. As a result attempts have been made to define the concept of syllables at both these levels. Some such attempts are examined below.

As a phonetic unit, the syllable was first defined by the psychologist R. H. Stetson in 1928. In his motor or pulse theory of syllable production he argued that each syllable corresponds to an increase in air-pressure, air being released from the lungs as a series of chest pulses. This can often be readily felt and measured, particularly in emphatic speech. But subsequent experimental work has shown that there is no simple correlation between pulses and intuitive syllables. The problem is especially obvious in cases like *going*, which is two syllables, but is usually uttered in a single muscular effort.

The prominence theory, an alternative phonetic approach, instantiated in the work of Pike (1943), argues that in a string of sounds, some are intrinsically more 'sonorous' than others, and that each peak of sonority corresponds to the centre of a syllable. Peaks are best illustrated by more sonorous sounds like vowels, whereas less sonorous sounds such as stops mark the valleys of prominence. In a more recent formulation of the theory Ladefoged (1982) defines sonority as the loudness of a sound relative to that of other sounds with the same length, stress and pitch.

This approach, in terms of peaks and valleys of sonority, gives a useful general guideline, but it does not always indicate clearly where the boundary between adjacent syllables falls.

Some other useful proposals regarding the phonetics of syllables and related units were made by J. C. Catford (1977a). Catford suggests that speech is produced in measured bursts of initiator power, or feet, which are the basic rhythmic units of a language. In English, for example, each initiator-burst corresponds to a stressed syllable, and the intervals between stressed syllables are roughly equal. So English is said to be 'stress-timed', as opposed, for instance, to French, where there seems to be one burst per syllable regardless of accent. Thus French and Spanish (and possibly Bangla - a matter to be investigated) are 'syllable-timed'.

Accepting these proposals as workable ones, it may be said that, since in syllable-timed languages each initiator-burst generally coincides with a syllable, the concept of 'phonetic syllable' seems reasonably straightforward in such languages.

Phonetic approaches of this kind attempt to provide a definition of the syllable valid for all languages. In contrast, theories concerned with the phonological aspect of the syllable focus on the ways sounds combine in individual languages to produce typical sentences. In fact, the phonological syllable requires a more precise definition, especially with respect to boundaries and internal structures.

According to Lass (1984: 250) "the phonological syllable might be a kind of minimal

phonotactic unit, say with a vowel as a nucleus, flanked by consonantal segments, or legal clusterings, or the domain for stating rules for accent, tone, quantity and the like."

Thus the phonetic syllable is a 'performance' unit, whose entire reality is phonetic; the phonological syllable is a structural unit, perhaps with non-phonetic properties as well.

Keeping in mind the phonetic and phonological aspects of syllables let us now consider the monosyllables. Based on the syllabic component words are classified as monosyllabic and polysyllabic. The self explanatory attribute 'monosyllabic' picks up the words that are composed of only one syllable. For example, English /kɪŋ/ 'king', /pleɪ/ 'play', /streɪnʤ/ 'strange' etc., Hindi /*ek*/ <एक> 'one' /do/ <दो> 'two' /dost/ <दोस्त> 'friend', /jəb/ <जब> 'when' etc., Bangla /*ma*/ <মা> 'mother', /*bon*/<বোন> 'sister', /*bhay*/ <ভাই> 'brother', /*pran*/ <প্রাণ> 'life' etc.

Monosyllables, on the one hand, like syllables, are recognized as the lowest level macro units of phonology, the micro units being the sounds/phonemes. Thus they have a phonetic representation as well as a phonological representation. Both the representations together put forward a test-field for, firstly, checking legal combinations of segments in a language, and secondly, framing a set of laws for pointing at illegal partners in that same linguistic system. For example, in Bangla, as regards legal combinations, a syllable can begin with at the most three consecutive consonants, as in the word [stri] <ষ্ট্রী#> 'wife', but never with more than that. The 'law' expressing this is *#CCCC.

In phonology the former is achieved by devising a template that operates as a syllable-detector while the latter by detecting relevant constraints or template conditions which reveal the phonotactics[1]. of the language. In the phonological literature the framing of tools like syllable template and template conditions banks heavily on the various aspects of the concept of sonority.

Monosyllables, on the other hand, are also identified as a type of word as they display at least four distinct features that are unlike syllable-features and like word-features. We would like to interpret the attribute *mono (to syllable)* in the term *monosyllable* as an acronym MONO that represents the four features as follows. M stands for meaning, O for overt structure, N for naming potentiality and O for orthography. Thus monosyllables are syllables which have meaning, overt structure, naming potentiality and orthographic implication.

Firstly, unlike syllables and like morphemes and words monosyllables have meaning – a feature that makes them morphologically relevant. For example, /rod/ <রোদ> 'sunlight', /*mach*/ <মাছ> 'fish', /*Se*/ <সে> 's/he', /*tin*/ <তিন> 'three' etc. and /*dhu:p*/ <धूप> 'sunlight', /*ris*/ <रिस> 'anger', /*saf*/ <साफ> 'clean', /*ərth*/ <अर्थ > 'meaning' etc. are morphemes as well as monosyllables with distinct meaning in Bangla and Hindi respectively.

Secondly, unlike syllables monosyllables display overt internal structures at different levels – the levels of phonology and morphology. For example, the word /kʌt/ 'cut' in the English sentence *She cut her finger with knife* is a morphologically complex monosyllable as it is composed of two morphemes, the verb cut and past tense.

Thirdly, unlike syllables and like words monosyllables can name something or some person, i.e. they are words with all privileges of a dictionary entry. One does indeed find all the monosyllables of her language in a dictionary of that language.

Fourthly, unlike syllables each monosyllable is directly linked to a particular reference point in the orthographic convention of a language that has a script and lacks spelling pronunciation. For example, in English, the syllable [si:] has no fixed orthographic reference, it may refer to <sea> as in the word 'season', to <cea> as in 'ceasing', to <see> as in 'seeded', to <sei> as in 'seize', to <ce> as in 'cedar', or to <cei> as in 'ceiling'. But the monosyllable [si:] is linked either to <sea> when it is a noun, or to <see> when it is a verb.

Based on these four features monosyllables may be treated as interface units.

In sum, these syllable-like and the word-like features, mentioned above, are the general features of monosyllables in many languages. Monosyllables also present language-specific features. Now we shall attempt to capture the language-specific features of Bangla monosyllables.

2. An overview of Bangla monosyllables

The phonemic inventory of Bangla consists of 7 oral vowels, 7 nasal vowels, 30 consonants and 4 semivowels. Following the transcription conventions of Ray et al[2] (1966) they are as follows:

Vowels

High vowels:	i	iM					u	uM		
Mid vowels: e	eM						o	oM		
Low vowels: E	EM	a	aM				O	OM		

Semivowels

High	y		w							
Mid	Y		W							

Consonants

Stops	p	ph	t	th	T	Th	c	ch	k	kh
	b	bh	d	dh	D	Dh	j	jh	g	gh
Fricatives			s				S		h	
Nasals		m	n							N
Lateral				l						
Trills/flaps				r	R	Rh				

I'll attempt to give an overview of Bangla monosyllables from five angles, viz. phonetic, phonological, morphological, syntactic and lexical.

2.1. *Phonetic*

2.1.1. *Stress*

Bangla, impressionistically identified as a syllable-timed language, like French and Spanish and unlike English and German, the stress-timed ones, has no phonemic stress. Studies (Chatterji 1928, Bykova 1981) claim that stress is not significant in Bangla so far as the individual words are concerned. It is predictable and dominantly initial in isolated words and is always subsidiary to sentence-stress (Hayes & Lahiri 1991).

2.1.2. *Length*

Bangla vowels have no phonemic length, rather they have purely predictable phonetic length (Dasgupta 2003, Dan 2011a). Vowels tend to be long in monosyllables and non-long elsewhere, e.g. [di:n] 'day', [ra:t] 'night', but [dinrat] 'day and night'; [du:d] 'milk', [bha:t] 'rice', but [dudbhat] 'milk and rice', [E:k] 'one', but [EkTa] 'one-CL' etc. So length for monosyllables in Bangla stands for the phonetic duration of monosyllables, the arithmetical aggregate of the duration of the constituent segments.

Consonantal length is a potential area for investigation as consonantal gemination has phonological relevance in the language. However, gemination is a boundary phenomenon within polysyllabic words and thus outside the scope of this paper.

2.1.3. *Aspiration*

Aspiration is phonemic in Bangla. All stop consonants have their aspirated counterparts, though word finally aspirated segments tend to lose aspiration to such an extent that they often become almost unaspirated (Dan 2011b), e.g. [ba:g] 'tiger' but [bagher] 'tiger-GEN'; [du:d] 'milk' but [dudhe] 'milk-LOC'. Thus unlike Hindi, a language in which monosyllables show perceptually quite strong aspiration word finally, e.g. [Sudh] 'pure', [dugdh] 'milk' etc., Bangla monosyllables show very mild, almost negligible amount of aspiration in their coda positions.

2.2. *Phonological*

2.2.1. *Less marked vs. more marked properties*

A structure that is avoided in unrelated languages is said to be marked relative to those structures that are not avoided. The less marked properties of the structures of Bangla monosyllables are:

i) Simple onsets are allowed, e.g. pa 'foot'.

ii) Monosyllables may be open, e.g. *ca* 'tea'. Bangle employs the principle of maximal onsets for syllabification (that syllabifies a VCV sequence as V.CV) attesting CV as the most preferred syllable pattern.

iii) Monophthongs serve as peaks, e.g. *mon* 'mind'.

iv) Complex codas are not allowed in native monosyllables.

v) Basically conforms to the Sonority Sequencing Principle.

More marked properties are:

i) Onsetless syllables are allowed, e.g. *am* 'mango'.

ii) Complex onsets are allowed, e.g. *pran* 'life'.

iii) Diphthongs serve as peaks, e.g. *teys* '23'.

iii) Closed syllables are allowed, e.g. *ghum* 'sleep'.

iv) Simple codas are allowed, e.g. *bon* 'sister'.

v) Complex codas are allowed in borrowed monosyllables, e.g. *bENk* 'bank'.

vi) s+stop, the cross-linguistically attested cluster that violates the Sonority Sequencing Principle, is found, e.g. *sthan* 'place'.

2.2.2. *More marked peaks are more controversial*

Any of the seven oral and seven nasal vowels and diphthongs can serve as the peak of a monosyllable, among which diphthongs are the more marked ones.

Often a word with the composition of a diphthong as the peak followed by a simple consonant is ambiguous between two readings, monosyllabic and disyllabic, as in it the vocalic slot reflects the phonetic length, the usual phenomenon within a monosyllable, e.g. *dewl* and *de-ul* 'temple', *gowr* and *go-ur* 'a name'.

Contrary to this, a diphthong followed by a single consonant followed by another vowel (in a disyllabic word, of course) is shorter and maintains its diphthongal character, e.g. *dew-le* 'insolvent'.

The script convention too contributes to this controversy. Bangla script has unitary graphemes for only two diphthongs, viz. [*oy*] <ঐ> and [*ow*] <ঔ>. Hence while these two are visibly single units others are not, e.g. *dowr* '*run*' <xx> (<দৌড়>) but *khewR* 'vulgar song' <xxx> (<খেউড়>).

In fact, *khewR* is more prone to a disyllabic reading.

Another interesting gap in the system is that Bangla does not have any monosyllable with [oy] as its peak followed by a single consonant, i.e. *(C)oyC. So the scope of verifying the influence of script too is restricted.

However, double reading does not assign a questionable status to Bangla diphthongs altogether, because the monosyllables with word-final diphthongal peaks categorically yield single reading irrespective of the difference in their visual representations, e.g.

bow 'wife' <x> (বৌ/বউ>), *koy* 'where' <x> (কে/কই>), *jOY* 'victory' <xx> (<জয়>), *bhOY* 'fear' <xx> (<ভয়>), *mEW* 'baby-talk item for cat' <xx> (<ম্যাও>) etc.

The point here is that we don't really know whether dowR and khewR, with reference to syllabification, behave the same way or not. That is why if we collect speakers' opinions with the following options only option 4 would have absolute rejection, while the rest would receive mixed responses.

Between *dowR* and *khewR*
1. both are monosyllabic
2. both are disyllabic
3. *dowR* is monosyllabic, while *khewR* is disyllabic
*4. *khewR* is monosyllabic, while *dowR* is disyllabic

The above issue entails a valid question: do we really know the actual range of monosyllables in Bangla? Various language games may help to find some cues in this respect. In recent times Ghosh Dastidar (2017) attempted to capture the point of deviation where the syllable based metrical rules collapse and result in irregularity in the field of Bangla verse language, especially in the syllabic metrical pattern. However, studies in this direction are too scant to give way to a theoretic position.

2.2.3. *Indigenous metrical literature*

In the indigenous metrical literature with reference to mora counting, monosyllables receive the same treatment as any other syllable. Bangla has three basic metrical patterns, viz. syllabic, moric and composite. A syllable with a final simple vowel, i.e. conventionally an open syllable, and in terms of the light-heavy dichotomy a light one, is considered monomoric in all these three patterns. But a syllable with either a diphthongal peak or a coda, i.e. a closed or a heavy syllable, is monomoric in the syllabic pattern, bimoric in the moric pattern and positionally bimoric (word-finally) or monomoric (elsewhere) in the composite pattern. So in this domain heavy syllables are of greater interest than light syllables.

In fact, monosyllables do receive some special attention in terms of foot formation, specifically in exceptional cases of elision and insertion of pauses. But this is more morphological than phonological.

2.2.4. *Interface properties*

These properties operate in the interface area between phonology and morphology.

Phonological processes, viz. vowel harmony, deletion and semivowel formation, operate even within the domain of monosyllables.

2.2.4.1. *Vowel harmony*

In this process a high vowel trigger raises the vowel height of the syllable

immediately preceding it by one degree, e.g. *So* 'sleep'+ *i* '1st PER-PRES.'= *Suy* 'I sleep'.

The pervasiveness of the process of vowel harmony in Bangla even rejects /*Ey, *Ew, *Oy, *Ow/ diphthongs as peaks of monosyllables.

2.2.4.2. *Deletion*

A suffixal vowel is deleted, e.g. *kha* 'eat'+ *en* '3rd PER-PRES-FOR' = *khan* 's/he eats'.

The process of deletion has other morphological implication too. Deletion applies to the verbal sector and always converts CV-VC into monosyllabic CVC (kha-en = khan). As a consequence of this the canonical shapes CVVC (teyS '23') and VVC (ayn 'law') of monosyllables are rightly predicted as belonging to the nominal sector of the language.

2.2.4.3. *Semivowel formation*

A simple peak becomes complex, i.e. diphthongal, e.g. *hO* 'be'+ *o* '2nd PER-PRES-ORD-IMP'= *hOW* 'you become'.

2.3. *Morphological*

Morphologically monosyllables may be simple or complex. Examples of simple forms are, *din* 'day', *powS* 'name of a Bengali month', *boy* 'book', *hat* ' hand', *stri* 'wife', *gram* 'village' etc.

Morphologically complex monosyllables are almost always of portmanteau type, where the number of morphemes exceed the number of morphs, e.g. *kha* 'eat'+ *o* '2nd PER-PRES-ORD-IMP' = *khaW* 'you eat', the monosyllable is composed of two morphs but five morphemes.

Bangla monosyllables may belong to any parts-of-speech, e.g. noun (*ma* 'mother', *kan* 'ear' etc.), pronoun (*tuy* 'you-INF', *kar* 'whose' etc.), verb (*cOl* 'let's go', *daW* 'give' etc), adjective (*lal* 'red', numerals for 1 to 10 etc.), adverb (*khub* 'very' etc.), postposition (*pOr* 'after' etc.), and others (*ar* 'and', *na* 'no', *hEM* 'yes', *chi* 'fie!', to 'so' etc.).

2.4. *Syntactic*

Morphologically monosyllables, both simple and complex, often have syntactic implication, e.g. the postposition *pOr* 'after' assigns a genitive suffix to its preceding noun.

gan-er *pOr*

song-GEN after

'after the song'

The 2nd person informal pronoun *tuy* as a subject of the sentence reflects on the verbal agreement.

tuy *ja-bi*
you-INF go-will
'you will go'

2.5. *Lexical*

Bangla has a segmented lexis. With reference to the source the words, so also the monosyllables, are commonly classified into three strata:

i) Direct adoptions from Sanskrit, traditionally termed tatsama 'equal to that' (*tat* 'that', *sama* 'equal'). Example of monosyllable, *rup* 'beauty'.

ii) Native Bangla words rooted in Sanskrit and Prakrit, termed tad-bhava 'derived from that' (bhava 'derived'), e.g. *duy* 'two', *tin* 'three', *car* 'four', *paMc* 'five' etc.

iii) Other borrowed stocks that include Turko-Perso-Arabic items and items from English, Dutch, Portuguese, French, Chinese, Gujarati, Tamil and other, even forgotten, origins, e.g. *layn* 'line', *dost* 'friend' etc.

Bangla has a very receptive nature as far as the fortification of lexis is concerned. These three strata build up the active vocabulary of the native speakers. In the borrowed stock degrees of naturalization are identified, e.g. *layn* 'line', *bENk* 'bank' do not stand out as loans, while *jerOks* 'xerox' shows semi-naturalization, and *sOfToWar* 'software' almost zero-naturalization (DASGUPTA 2003). While commenting on the lexical diversity of Bangla Dasgupta (2003) uses the numerals, a representative sector, and shows that in Bangla

i) cardinals are tatsama at 0 and 1

ii) tadbhava from 2 to 100

iii) Persian at 1000

iv) tatsama for ordinals from 1 to 10

v) tadbhava for date (1la, 2ra) and playing cards cardinals (duri, tiri), and

vi) English for ordinals in academic and other competitive contexts (1st, 2nd, 3rd).

Bangla phonology comprises reflections of all these stocks, e.g. complex onsets identify loans from Sanskrit, English etc. while complex codas loans from English and Persian. Thus the canonical shape of a monosyllable gives clue for the strata which it belongs to.

3. *Phonology of Bangla monosyllables*

The present section, after examining all the 15 canonical patterns of Bangla monosyllables, captures the phonological profile of Bangla monosyllables in terms of the

sonority value, the sonority scale, the sonority hierarchy and the sonority sequencing generalization, the basic tools of metrical phonology.

3.1. *Canonical shapes*

A number of studies have already provided various findings on Bangla syllables such as – on the segmental make up of Bangla syllables, on the clusters used therein, on the frequency of occurrence of syllables at various positions in words based on corpus (Mallik 1960, Mallik et al. 1998), on the sequences formed at boundaries and the phonetic length of syllables (Hai 1964), on the canonical shapes and the metrical relevance of syllables (Sarkar 1979, 1986). There have also been two analyses of Bangla syllables, one in the metrical framework (Dan 1992, 1997, 2004) and the other in the optimality framework (Kar 2009). Among these we shall refer to Mallik (1960), Sarkar (1986) and Mallik et al. (1998) for data and Dan (2004) and Kar (2009) for analysis, the studies relevant for the purpose of monosyllables.

Above studies attest 16 canonical syllable patterns in Bangla as shown in Table 1.

consonant final	vowel final	diphthong final
CVC	V	VV
VC	CV	CVV
CCVC	CCV	CCVV
CVVC	CCCV	CCCVV
VVC		
CCCVC		
CCVVC		
CVCC		

Table 1. 16 *Canonical patterns of Bangla syllable*

Among these CCCVV is not attested in monosyllables and thus is excluded from the present discussion and CCVVC and CVCC are attested in common loans.

The VV sequences of the shapes of the 1st and 3rd columns are the diphthongal peaks of syllables, where

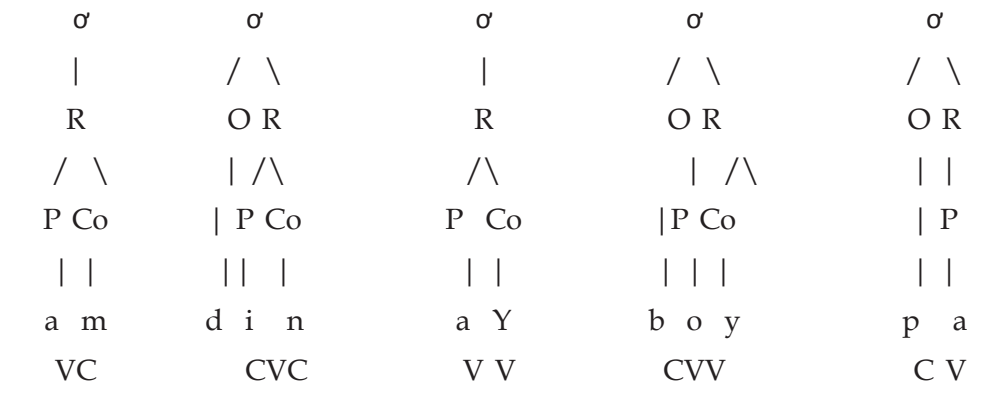
i. the 1st V is always [+syll]

ii. the 1st V is always higher than the 2nd one

iii. the 2nd V is a semivowel with the feature [-syll] (Sarkar 1985-86, Dan 2004), and

iv) the 2nd V is more like a consonant both metrically and morphologically (Sen 1986, Dan 2004).

Following the principle of metrical phonology, viz. syllables with branching rimes are heavy and those with non-branching rimes are light, syllables in Bangla may be classified into two groups, light and heavy, on the basis of their internal hierarchical structures as follows:



In the examples only *pa* 'foot' (CV) has a non-branching rime and it is a light syllable, while the others, irrespective of whether they are consonant-ending (i.e. CVC/VC) or semivowel-ending (i.e. CVV/VV), have branching rimes, branching into peak and coda, and they are heavy syllables.

The same dichotomy holds good for monosyllables and the 15 canonical shapes fit into two broad classes, light and heavy, as shown in Table 2.

Light	Heavy
V	CVC
CV	VC
CCV	CCVC
CCCV	CVVC
	CCVVC
	CVCC
	CCCVC
	VVC
	VV
	CVV
	CCVV

Table 2. Light and heavy canonical patters of Bangla monosyllables

Among these 15 canonical shapes the most preferred shape is CV, a fact that conforms to the syllable universals proposed by Jakobson (1941). Indigenous monosyllables in Bangla reject both complex onset and complex coda. Complex onsets, viz. CC and CCC, are available in words borrowed from Sanskrit (*stri* 'wife') and English (*prayj* 'prize'), while complex codas are available in words borrowed from Perso-Arabic (*dost* 'friend') and English (*lisT* 'list', *pEnT* 'pants'). Borrowed items not only add up to every speaker's lexicon but also make up the phonology of the language. For example, complex onsets and codas of monosyllables remain intact in the standard Bangla pronunciation, while in non-standard varieties they are sometimes divided between syllables using epenthesis (*geram* < *gram* 'village', *Teram* < *Tram* 'tram'), or simplified using deletion (*pEn* < *pEnT* 'pants'). But the interaction between standard and non-standard varieties is absolutely unimpeded, though, unlike Japanese where onset clusters are always simplified, e.g. Eng free > Jap. furii, the simplification processes seem to apply quite irregularly in Bangla. Maybe a strata-based study of the processes would reveal some regularity in the system.

On the basis of these canonical shapes the general structure of Bangla syllables is established as $C_0^3V_1^2C_0^2$, the optimal pattern of which is CCCVVCC, which has no exponent in the language.

3.2. *Sonority*

Pike (1943) in his prominence theory talks about sonority when he argues that in a string of sounds some are intrinsically more sonorous than others and that each peak of sonority corresponds to the centre of a syllable.

Ladefoged (1982) defines sonority as the loudness of a sound relative to that of other sounds with the same length, stress and pitch.

Bangla being a non-tone language does not possess phonemic pitch. Both stress and length, as have already been stated (in 2.1.1. & 2.1.2.), are non-phonemic in Bangla.

3.2.1. *Sonority scale*

Traditionally it is assumed that the organization of segments within and across the syllable is governed by the principles of sonority, a property that ranks segments along a hierarchy from most sonorous to least sonorous. A number of cross-linguistic tendencies on the distribution and sequencing of segments is explained with reference to the sonority hierarchy.

The relative sonority of different phones has been measured using different scales in the literature. I'll mention four such sonority scales and comment on their applicability to Bangla monosyllables.

3.2.1.1. *Sonority scale 1 (Hogg & Mccully 1987)*

On the basis of three studies on sonority, viz. Saussure (1966), Vennemann (1972) and Hooper (1976), Hogg & McCully (1987:33) propose a ten point sonority scale in terms

of which they formalize the sonority hierarchy of English monosyllables. On this scale, henceforth SS1, the most sonorous sounds are given the highest value and the least sonorous the lowest value. Dan (1992 & 2004) used this scale and assigned sonority values to Bangla sounds as follows:

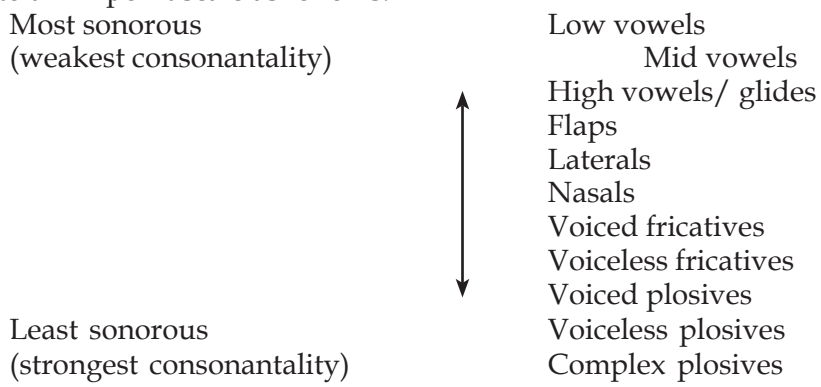
natural class	sonority value	Bangla sounds
low vowels	10	E a O EM aM OM
mid vowels	9	e o eM oM Y W
high vowels	8	i u iM uM y w
flaps & trills	7	r R Rh
laterals	6	L
nasals	5	m n N
vd. fricatives	4	H
VI. fricatives	3	s S
vd. stops	2	g gh j jh D Dh d dh b bh
vl. stops	1	k kh c ch T Th t th p ph

Table 3. Sonority values of Bangla sounds on SS1

Hogg & McCully (1987:47) assigned the same sonority values of the high vowels to their consonantal versions, the semivowels. Dan (1992 & 2004) too not only followed that for both high and mid semivowels, rather extended the principle and assigned the same sonority values of the oral vowels even to their nasalised versions as shown in Table 3. The demerits of this scale in terms of the principle of Sonority Sequencing Principle would be discussed in a while.

3.2.1.2. *Sonority scale 2 (Burquest & Payne 1993)*

The sonority scale 2, henceforth SS2, proposed by Burquest & Payne (1993), is a hierarchical statement of relative sonority of different phones, which could easily be converted into an 11 point scale as follows:



As complex plosives are boundary phenomena in Bangla, deleting the lowest point from the scale is justified for the purpose of monosyllables. This process results in a 10 point scale, identical to the SS1. Hence we won't elaborate on this one for obvious reasons.

3.2.1.3. *Sonority scale 3 (Harris 1983)*

It is a five point scale used by Harris (1983) for the sonority analysis in Spanish. The same scale is used for Bangla by Kar (2009). The relative sonority values are as follows:

Vowels (5) > Glides (4) > Liquids (3) > Nasals (2) > Obstruents (1)

Along with this scale Harris (1983) and Kar (2009) employ the related concept of Minimal Sonority Distance, henceforth MSD, between segments of a syllable. Harris has established a strict MSD value of 2 in Spanish while Kar (2009:45) rightly shows that the MSD value varies between 2 and 4 between the onset-nucleus segments, and between 2 (obstruent-liquid clusters) and 1 (nasal-liquid clusters) between the segments of complex onsets in Bangla syllables. Accordingly Kar (2009) sets the MSD value as 1, stated as MSD-1, and proposes this to be a markedness constraint, a tool of his OT analysis.

The SS1 and the sonority scale of Harris (1983), henceforth SS3, will be compared shortly.

3.2.1.4. *Sonority scale 4 (Parker 2002)*

It is a comprehensive scale grounded in physical properties of sounds such as intensity, peak intraoral air pressure, F1 frequency, peak air flow and duration and thus phonologically least biased. The hierarchical levels are as follows:

low vowels > mid vowels > high vowels > [ə] > glides > laterals & [ɻ] > flaps > trills > nasals > [h] > vd. fricatives > vd. stops > vl. fricatives > vl. stops & affricates.

Parker (2000), as stated in Pons (2008)[3] , proposes the above sonority scale, henceforth SS4, after applying these measurements of sonority on the sounds of Spanish and English along with a relevant claim: most languages in fact conflate the scale in the sense that they do not systematically exploit all intervals. This is because they either lack the respective phoneme(s) entirely, or else they collapse together two or more adjacent ranks and thus do not distinguish them in terms of their phonological processes.

The claim directly advocates a more flexible and gradient approach to the sonority scale as opposed to a universal, categorical and impermutable approach in the traditional debate of whether it is a licit resource or not to appeal to sonority conflations and reversals to justify differences across languages.

Moreover, the advocates for a universal categorical scale propose to account for the discrepancies across languages in terms of constraint rankings, i.e. in terms of the tools of the Optimality Theory, a framework I am not using in this paper.

Rather I follow the gradient approach and accordingly modify my scale of sonority citing linguistic justifications. An observation worth mentioning at this juncture is that the scale lacks any grade for voiced affricates, an apparent weakness of it. Nevertheless, the scale being a more flexible and gradient one, as opposed to a universal one, in its approach and the grades on it being notional this weakness does not have any negative effect.

3.2.2. *Sonority Sequencing Principle*

Even though there is lack of agreement on the nature of sonority itself, its phonetic correlates and the way sonority scales are constructed in the literature, its role in deriving some of the most common restrictions on segment sequencing is uncontroversial. One such restriction is the generalization that in any syllable the segment ranking highest on the sonority scale constitutes the peak of the syllable. All the segments are organized around the nucleus in such a way that the most sonorous segments are closer to the peak and the less sonorous ones are further away from it. In other words, where we find a sequence of segments preceding or following a sonority peak, the sonority values increase as one nears that peak, and decrease as one moves away from that peak. This generalization is known in the literature as the Sonority Sequencing Principle, henceforth SSP. This was pointed out by Jesperson (1904), Grammont (1933), Hooper (1976), Kiparsky (1979), Steriade (1982), Selkirk (1982), Clements (1990) and others.

With reference to the SSP the sonority values of the 15 canonical shapes of Bangla monosyllables are measured using the three sonority scales, viz. the SS1, the SS3 and the conflated SS4, in Table 4. The conflated SS4 is a reorganized SS4 that applies to Bangla. The codification of and the justifications behind the conflated SS4 will be discussed in 3.2.4. and 3.2.5. The sonority values on the SS1 and the SS3 will be examined in 3.2.3. and those on the conflated SS4 in 3.2.6.

pierns	Monosyllables	Gloss	SS1	SS3	conflated SS4
V	O	that person	9	5	9
CV	ghi	Ghee	2-8	1-5	2-8
	Na	Not	5–10	2–5	3–10
	Ke	Who	1–9	1–5	1–9
CVC	kath	wood	1–10–1	1–5–1	1–10–1

pierns	Monosyllables	Gloss	SS1	SS3	conflated SS4
	Nil	Blue	5–8–6	2–5–3	3–8–5
	Lal	Red	6–10–6	3–5–3	5–10–5
	Sukh	happiness	3–8–1	1–5–1	1–8–1
	SeS	End	3–9–3	1–5–1	1–9–1
VC	Ek	one	10–1	5–1	10–1
	aT	Eight	10–1	5–1	10–1
	uT	camel	8–1	5–1	8–1
VV	aY	income	10–9	5–4	10–7
	Uy	white ant	*8–8	5–4	8–6
	Ey	This	9–8	5–4	9–6
	Oy	That	9–8	5–4	9–6
CVV	Boy	Book	2–9–8	1–5–4	2–9–6
	Ney	Not	5–9–8	2–5–4	3–9–6
	Bow	Wife	2–9–8	1–5–4	2–9–6
	bhoY	Fear	2–10–9	1–5–4	2–10–7
CCV	Bhru	eyebrow	2–7–8	1–3–5	2–4–8
	Sri	Mr.	3–7–8	1–3–5	1–4–8
CCVC	Sthan	Place	*3–1–10–5	*1–1–5–2	*1–1–10–3
	Kles	trouble	1–6–9–3	1–3–5–1	1–5–9–1
	Gram	village	2–7–10–5	1–3–5–2	2–4–10–2
	hrOd	Lake	4–7–10–2	1–3–5–1	2–4–10–2
	Srot	Current	3–7–9–1	1–3–5–1	1–4–9–1
CVVC	powS	a Bengali month	1–9–8–3	1–5–1–1	1–9–6–1
	Mayl	Mile	5–10–8–6	2–5–4–3	3–10–6–5
	gaYn	singer	2–10–9–5	1–5–4–2	2–10–7–3
CCVV	krOY	buying	1–7–10–9	1–3–5–4	1–4–10–7
	pray	almost	1–7–10–9	1–3–5–4	1–4–10–7
CCVVC	prayj	Prize	1–7–10–8–2	1–3–5–4–1	1–4–10–6–2
CCCV	stri	Wife	*3–1–7–8	*1–1–3–5	*1–1–4–8
CCCVC`	strir	wife's	*3–1–7–8–7	*1–1–3–5–3	*1–1–4–8–4

pierns	Monosyllables	Gloss	SS1	SS3	conflated SS4
VVC	ayn	Law	10–8–5	5–4–2	10–6–3
	awS	a kind of paddy	10–8–3	5–4–1	10–6–1
CVCC	last	Last	*6–10–3–1	*3–5–1–1	*5–10–1–1
	cost	elegant	*1–9–3–1	*1–5–1–1	*1–9–1–1
	bENK	Bank	2–10–5–1	1–5–2–1	2–10–3–1

Table 4. Sonority values of 15 canonical shapes of Bangla monosyllables on SS1, SS3 and conflated SS4

3.2.3. *Sonority values of 15 canonical shapes of monosyllables on SS1 & SS3*

As regards to the SSP the values on the SS1 show disagreement in five canonical shapes, viz. VV, CCVC, CCCV, CCCVC and CVCC, while those on the SS3 show disagreement in four, viz. CCVC, CCCV, CCCVC and CVCC.

The disagreements shown in CCVC, CCCV, CCCVC and CVCC involve a particular onset cluster, viz. s+vl. obstruents, and are shared by both the SS1 and SS3 treatments.

Kar (2009) uses the SS3 and takes recourse to the provision of extra syllabicity to resolve the problem. Kar (2009: 61) treats the sibilant partner of both the s+obstruent and s+sonorant clusters as extra syllabic, occurring under a node directly connected to the prosodic word level. In the literature s+obstruent, or more specifically s+stop, clusters of complex onsets have been identified as problem cases, violating SSP, and thus are designated more marked, with cross-linguistic evidences, while the s+sonorant clusters of complex onsets are regarded less marked as they do not violate SSP. Hence treating both the types, viz. s+obstruents and s+sonorants, at par is quite questionable.

Dan (2004) uses the SS1 and following Hogg & McCully (1987: 49) handles the problem by treating /sT, st, sth/ (and also /sp/ and /sph/ in polysyllabic words) as single constituents in syllable onsets and thus adding up the sonority values of both the members. The evidences for treating /sT, st, sth/ as single constituents are, firstly, the voiceless fricative /s/ appears to have extremely close links with the following stop consonant which too is invariably voiceless, as /*sd, *sg, *sb, *sbh/ are nonexistent in Bangla, and, secondly, in Bangla /s/ is the only sibilant allowed as the first member of clusters, e.g. *snan* 'bath' but *proS-no* 'question', *smi-ta* 'a name' but *SuS-mita* ' a name', *lasT* 'last' but *bak-So* 'box'. The examples show that /s/ is the first member of clusters; whereas /S/ is the member of a mere sequence. So in Bangla /s/ as the first member of the complex onset of a monosyllable ensures close links between /s/

and its following segment. When the following segment belongs to the same natural class of voiceless obstruents the two together form a unitary segment.

The disagreement in VV appears only in the SS1 column and it concerns diphthongs. Dan (2004) suggests that the semivowels, involving a higher degree of obstruction than their vowel counterparts, need to be assigned separate sonority values of their own and a finer scale fulfilling that will be able to do justice to the problem of diphthongs.

Although the SS3 (Kar 2009) does not face this problem as it assigns a separate value, 4, to glides, the structures of monosyllables as illustrated by this scale are extremely opaque and thus remarkably insufficient for drawing any conclusion on the syllable phonotactics of the language. For example, each and every diphthong in terms of the sonority values of the SS3 carries the value 5-4.

In fact, a sonority scale with fixed universal values mostly refers to the major natural classes of sounds. A scale with fewer points, like the SS3, though useful for checking the validity of SSP, fails to capture the essential distinctions within those classes as it collapses more than one subclasses together to fit into the universal scale. However, a scale with more points, like the SS1, that depicts the natural classes in a better way, too is not without problem.

At this juncture we like to exploit the principle of a more flexible and gradient approach to the sonority scales in the place of a universal, categorical one and show the consequences. We shall fall back on the SS4 (Parker 2002), modify it in allowable directions with phonological justifications and apply it to the data.

3.2.4. *Justifications for SS4*

I repeat the hierarchical levels of the SS4.

low vowels > mid vowels > high vowels > [ə] > glides > laterals & [ɻ] > flaps > trills > nasals > [h] > vd. fricatives > vd. stops > vl. fricatives > vl. stops & affricates.

i) Bangla has three levels of vowel height, viz. low, mid and high. All these three levels are equally pertinent for the persistent phonological process called vowel harmony or more specifically vertical vowel harmony. In this process a high vowel trigger raises the vowel height of the syllable immediately preceding it by one degree. For example, *lekh* 'write'+ i '1st PER-PRES' = *likhi* 'I write' (c.f. *lekhe* 's/he writes), *dEkh* 'see'+ *un* '2nd PER-PRES-IMP-FOR' = *dekhun* 'you (FOR) see' (c.f. *dEkhe* 's/he sees'), *kOr* 'do'+ *uk* '3rd PER-PRES-IMP-ORD' = *koruk* 'let him/her do' (c.f. *kOre* 's/he does'), *So* 'sleep'+ i '1st PER-PRES'= *Suy* 'I sleep' (c.f. *SoY* 's/he sleeps'), *khuki* 'baby girl' (c.f. *khoka* 'baby boy'), *nodi* 'river' (c.f. *nOd* 'big river'), *diSi* 'country made' (c.f. *deS* 'country'), *tuy* 'you-INF-SG' (c.f. *tora* 'you-INF-PL') etc. The process is persistent as it applies to different grammatical categories like verb, noun, pronoun, adjective, adverb and so on. One degree raising in the vowel height justifies for the first three levels of the SS4 for Bangla.

ii) Bangla lacks [ə]. Hence this level is dropped for obvious reasons.

iii) Bangla uniquely possesses two pairs of semivowels, mid and high. Other languages, including English, Hindi, possess generally one pair of semivowels. We checked with twenty-seven Indian languages belonging to four major language families, viz. Indo-Aryan, Dravidian, Tibeto-Burman and Austro-Asiatic, and except for Kurux, a Dravidian offspring, in no language we found more than a pair of, i.e. two, semivowels. Kurux shows a pair of lower-high and a pair of mean-mid semivowels, while the vowel inventory of Kurux presents six vowel heights (Ekka 1985:31).

The four semivowels of Bangla are the consonantal versions of their vowel counterparts and take part in the phonological processes of diphthong formation. For example, *hO* 'be'+ i '1st PER-PRES'= *hoy* 'I become', *hO* 'be'+ e '3rd PER-PRES-ORD'= *hOY* 's/he becomes'.

The point that I want to make here is that the height of the semivowels is relevant for a right kind of substitution for vowels in semivowel formation.

Hence I reserve the next two levels on the SS4 for the semivowels, mid and high respectively, of Bangla.

iv) The next level is reserved for the lateral /l/ of Bangla.

v) Bangla /r/ has two variants. It is trilled syllable initially, and flapped elsewhere (Bhattacharya 1993:14). The retroflex flaps [R, Rh], according to Bhattacharya (1993:10), are in complementation with stops [D, Dh] respectively. [R & Rh] are also treated as phonemes with skewed distribution in the literature (Shaw 1992, Dasgupta 2003). Because of the partial flap-property of /r/, [r, R, Rh] these three could be collapsed together into the next level.

vi) The next level is reserved for the nasals, viz, /m, n, N/.

vii) Now about the last five levels, i.e. from [h] to voiceless stop & affricate. Bangla has only three fricatives, viz. voiced /h/ and voiceless /s, S/. [s] is also one of the allophones of /S/. /S/-/s/ and /h/ are not the –voiceless-voiced counterparts of each other phonologically.

There are classes of voiceless and corresponding voiced stops with ten members in each.

From the phonological point of view in the standard colloquial Bangla the consonants, compared to the vowels, offer a lot less interesting features since, at the native level at least, they are only subjected to low-level rules that are usually triggered by coarticulation (Sarkar 2004:158).

In reality, since rigorous phonological studies in this domain are still in their infancy, it becomes necessary to make tentative proposals in the areas of fricatives and stops, the classes that don't present sufficient evidence to be ranked separately from each other on the SS4. I collapse these two classes under the broader natural class ob-

struents, but distinguish between voiced and voiceless obstruents, as within this class voiced-voiceless or voiceless-voiced combinations are prohibited. Hence I reserve the next two levels, the higher for the voiced obstruents and the lower for the voiceless obstruents, on the SS4.

3.2.5. *Conflation of SS4*

The conflation of the SS4 for Bangla segments along with relative numerical values is as follows:

low vowels (10) > mid vowels (9)> high vowels (8) > mid glides (7) > high glides (6) > laterals (5)> flaps/trills (4) > nasals (3) > vd. obstruents (2) > vl. obstruents (1)

Let us call this the conflated SS4. A syllable template and the conditions thereof will be stated in terms of these relative numerical values of the conflated SS4 after examining the values of the 15 canonical shapes on this scale.

3.2.6. 15 *canonical shapes of monosyllables and conflated SS4*

The last column of Table 4 presents the sonority values of the 15 canonical shapes of Bangla monosyllables on the conflated SS4. In terms of this scale apparently the number of problem shapes has not reduced drastically, from five it has become four, which, of course, is not so convincing. Let us have an in-depth look at the specific problems rather than at the number of canonical shapes since not all forms under a particular problem shape are problematic.

To be very specific, with reference to the SSP earlier we had two types of problem cases, viz. diphthongs and s+stop clusters. The conflated SS4 takes care of the disagreement arising in diphthongs quite efficiently, which means 50% of the problem cases are accounted for. The rest comprises the s+stop clusters.

The s+stop clusters, in terms of the SS1, show a high degree of disagreement as they show a fall-rise pattern of the sonority value towards the peak, e.g. sthan 3-1-10-5, stri 3-1-7-8 etc., while in terms of the conflated SS4 these forms show a level sonority value, e.g. sthan 1-1-10-3, stri 1-1-4-8 etc., which stands for a low degree of disagreement with the SSP.

Level sonority values in complex onsets or codas are evident in languages that allow geminate onsets (Leti, Trukese, Pattani Malay) and geminate codas (Hungarian). Moreover, the s+stop clusters are cross-linguistically identified as more marked clusters as they violate the SSP.

I account for these clusters by treating them as unitary segments and thus adding up their sonority values, e.g. *sthan* 1+1-10-3, i.e. 2-10-3, so that the SSP is not violated. Maybe a condition, stating, add up level values, will take care of the matter. Thus sthan and stri will have the following structures:



The proposal has already been justified in 3.2.3.

Moreover, with such a treatment it could be claimed that phonotactically Bangla may have at the most two members in the onset of a syllable.

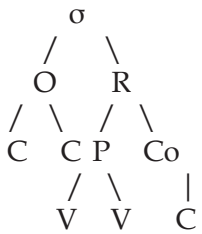
The claim, on the one hand, is supported by the observation that /str/ is the only CCC complex onset in Bangla monosyllables coming from Sanskrit and English, and on the other hand, it can explain why other CCC cluster types (*tmr, *prl, *smr etc.) are not tolerated in Bangla.

The other advantage of using the conflated SS4, rather the SS4, is that since the very inception of the SS4 is based on the principle of conflation and reversal it could be further modified on the basis of rigorous researches in phonetics and phonology and be used more efficiently.

3.2.7. *Template for Bangla monosyllables*

A template may be defined as an abstract structure which all syllables have to fit in in order to be recognized as acceptable syllables in a particular language. We shall formulate the template for Bangla monosyllables.

With the unitary treatment of the s+stop consonant the number of members of the complex onset is restricted to two. In non-borrowed Bangla monosyllables the coda consists of a single member and the peak at the most two members, i.e. a diphthong. Thus the normal maximal structure for Bangla monosyllables is CCVVC, arranged as:

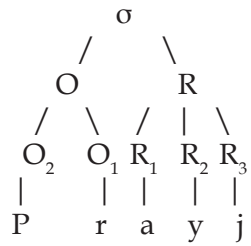


The tree structure suggests that the syllable is organized hierarchically into Onset+Peak+Coda, where the latter two form a Rime constituent. Such an organization is supported by the fact that in Bangla the weight of a syllable and the mora-count of a syllable, although crucial to the constitution of the rime components, appear to play no part in the construction or the number of segments of the onset.

The division of rime into peak and coda is rejected as a false division in the literature because the subdivisions under the rime node apparently play no crucial role, rather the rime node itself plays the crucial role, in phonology (Hogg & Mccully 1987:45).

In Bangla at least two phonological phenomena, viz. syllable weight and mora-counting, directly depend on the branching or non-branching of the rime node, rather than that of the peak or coda separately, as has been discussed in 3.1. If the subdivisions of rime are done away with then a simple and generalized statement, viz. a syllable is heavy if and only if the rime branches, can take care of the heavy-light aspect of the syllable.

So for reasons of generalization and simplicity, as stated above, we reject the subdivisions under rime and accept the direct branching of rime. Thus the above structure, along with convenient indexing, may be flattened as:



'prize'

Such flattening naturally accommodates the CVCC shape available only in borrowed monosyllables, e.g. bEnk 'bank'.

It is interesting that no native monosyllable appears to have branching of this type, using all options, though the branching under this template is not at all counterintuitive. This could be handled in terms of a global restriction on the template stating that locally the onset and the peak may branch but globally not more than four branches are allowed under a syllable template in Bangla.

3.2.8. *Template conditions*

In terms of the conflated SS4 and SSP two sets of template conditions, viz. general and specific, for Bangla monosyllables may be formalized as follows.

3.2.8.1. *General template conditions*

These conditions apply to the maximal tree structure as a whole and comment on the presence-absence status of the terminal nodes.

i) R_1 is obligatorily filled.

ii) O_1 is optionally filled.

iii) O_2 is filled only if O_1 is filled.

iv) R_2 is optionally filled.

v) R_3 is filled only if R_2 is filled.

3.2.8.2. *Specific template conditions*

These conditions apply to the specific branch of the tree and determine the sonority values, henceforth SV, of the terminal nodes.

i) SV of $R_1 \geq 8$, i.e. the SV of R_1 cannot be less than 8.

ii) SV of $O_1 \leq 5$, i.e. the SV of O_1 cannot be more than 5.

iii) SV of $O_1 \geq 3$ if O_1 is filled, i.e. the SV of O_1 cannot be less than 4 if O_1 is filled, e.g. /ml, gr, br/; but /*nd, *bb, *bm/ etc.

iv) SV of $O_1 \leq 5$ if O_2 is filled, i.e. the SV of O_1 cannot be more than 5 if O_2 is filled, e.g. /gr, pl, sl/ etc.

v) SV of $O_2 \leq 3$, i.e. the SV of O_2 cannot be more than 3, e.g. /ml, hr, sr, gr, tr/; but /*lr, *lm/ etc.

vi) SV of $R_2 \leq 7$, i.e. the SV of R_2 cannot be more than 7, e.g. R_2 can have at the most the mid semivowels, viz. Y and W.

vii) SV of $R_2 \geq 3$ if R_3 is filled, i.e. the SV of R_2 cannot be less than 3 if R_3 is filled, e.g. the nasal segment of a CC coda of a borrowed monosyllable.

viii) SV of $R_2 \leq 7$ if R_3 is filled, i.e. the SV of R_2 cannot be more than 7 if R_3 is filled, e.g. the semivowel of a diphthong followed by a consonant.

ix) SV of $R_3 \leq 5$, i.e. the SV of R_3 is not more than 5, e.g. *mayl* 'mile'.

Thus the terminal nodes of a syllable have to fulfil the above template conditions in order to be acceptable as a potential syllable in Bangla.

4. *Conclusion*

To conclude we jot down the following typological statements that have already been mentioned in the discussion in a scattered manner.

i) Bangla has four semivowels UNLIKE languages with two semivowels (English, Hindi, Gujarati, Tamil, Khasi, Manipuri, Angami).

ii) Bangla allows both open and closed monosyllables UNLIKE languages that allow only open ones (Shona).

iii) Bangla monosyllables allow restricted voicing in obstruent clusters, both the

members being either voiced or voiceless UNLIKE languages rejecting any voicing (Maori, Ainu) as well as languages allowing unrestricted voicing (Kannada, Tulu, Khasi, Georgian ([td] type clusters are allowed)).

iv) In Bangla monosyllables onsets are tolerated optionally UNLIKE languages with monosyllables with obligatory onsets (Yawelmani).

v) Bangla monosyllables allow complex onsets UNLIKE languages that disallow complex onsets (Yawelmani).

vi) Bangla monosyllables allow complex onsets and in borrowed items even complex codas UNLIKE languages that invariably reject complex onsets and codas (Japanese).

vii) Bangla monosyllables invariably reject geminate onsets and codas UNLIKE languages that allow geminate onsets (Leti, Trukese, Pattani Malay) or geminate codas (Hungarian).

viii) Bangla monosyllables (like Sanskrit and Gujarati) register a word-final deaspiration UNLIKE languages that retain word-final aspiration (Hindi).

Abbreviations :

CL	classifier
FOR	formal
GEN	genitive
IMP	imperative
INF	informal
LOC	locative
ORD	ordinary
PER	person
PL	plural
PRES	present
SG	singular

End Note :

[1] Phonotactics determines the set of permissible arrangements of sequences of speech sounds in a given language. It rejects the unacceptable sound sequences by means of phonotactic constraints which are highly language specific. For example, [st] is not a permissible cluster in Japanese, though it is a permissible one in Bangla.

[2] E is a low front vowel, O is a low back vowel (unrounded and rounded respectively). T D R Rh are retroflex, N is velar, S is a palato-alveolar. Y W are mid counterparts of y w. M indicates nasalization of the vowel immediately preceding it.

[3.] Unfortunately I did not have direct access to Parker (2000). I gather the theoretical view point of Parker (2000) from Claudia Pons' (2008) poster titled THE SONORITY SCALE: CATEGORICAL OR GRADIENT? It provides a critique of the position of Parker (2000) in the debate of sonority conflations and reversals in order to justify its own position in favour of Parker (2000)

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