Enhanced Metrical Theory and Sonority-Driven Stress

1. Introduction

The goals of this talk are (i) to present a theory of foot form enhanced to take account of non-moraic syllables (minor syllables), and (ii) to explore a striking consequence of this theory: that there are no 'pure' sonority-driven stress systems. The evidence for these claims comes from the author's typological surveys, fieldwork, and experiments.

The theory builds on previous research on minor syllables (Matteson 1965, Lin 1993, 1997, 1998, Shaw 1994, Gafos 1998, and many others): i.e. syllables may lack moras entirely, and schwa in particular are prone to lacking a mora. Constraints regulate how feet relate to non-moraic syllables; for example, constraints requiring syllable and moraic binarity will be satisfied by feet of the type (CV:$^{\mu\mu}$.Cᵊ), where ᵊ is a non-moraic vowel, but be violated by feet like (Cᵊ.Cᵊ) (no moras), (CV.Cᵊ) (one mora), and (CVCVCᵊ) (three syllables).

A consequence of this theory is that stress-sensitivity to central vowels is due to avoidance of non-moraic syllables. In fact, I argue that *all* central vowel stress avoidance is due to lack of moras. This claim will be addressed by both reviewing extant cases and presenting an in-depth analysis of one case in particular – Piuma Paiwan.

I also argue that apparent sonority-sensitivity in stress is *only ever* due to lack of moras: cases where stress is claimed to be sensitive to peripheral vowel distinctions are examined by both reviewing putative cases and discussing Gujarati in particular (as it has been the subject of experiments by the author). Finally, methodological issues and theoretical implications from the current findings will also be discussed.

2. Central sensitivity

The majority of sonority-driven stress cases involve stress avoiding schwa, or other central vowels. There are 40 languages known to the author. However, it is argued here that this type of sonority-driven stress is actually a side-effect of moraicity: stress avoids non-moraic schwas. Evidence for both non-moraic schwas and their effect on stress is found in my fieldwork and experiments on Piuma Paiwan.

Piuma Paiwan stress has been described as falling on the penult by default (e.g. [káka] 'sibling', '[vúvu] 'grandparents') (Chen 2009a, b, Yeh 2011). However, when the penult contains a schwa, stress falls on the ultima (e.g. [kərí] 'small', [cəvús] 'sugarcane', [kəmán] 'to eat').

Results from an experiment by the author show that there is objective evidence that stress avoids landing on a schwa: F0 peaks over the penult in CVCV words, but over the ultima in CəCV words:

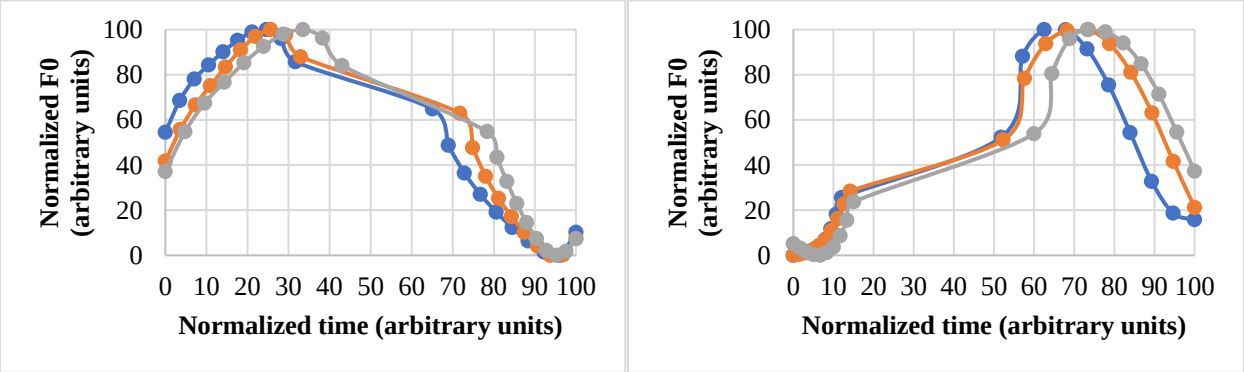

Fig.1. Words without schwa (Left) show F0 peak over the first syllable; Words with penultimate schwa (Right) shows an F0 peak over the second syllable.

However, the schwa avoidance seen above is shown to be a side-effect of schwa's prosodic status ([redacted]). Schwa in the penult is diagnosed as non-moraic: e.g. [kᵊ.rí]. Its duration is extremely short, averaging around 40ms, and its vowel quality is highly influenced by its surrounding segments. This schwa *cannot* be monomoraic because Paiwan has two other schwas: a monomoraic and a bimoraic one (i.e. Paiwan has a three-way surface distinction of schwa length). The monomoraic schwa is found in words with the form CVCə, e.g. [tí.dəq] – here, the schwa is significantly longer than the non-moraic schwa and has more F1/F2 stability. The bimoraic schwa is found in words with the underlying form /CəCəC/; these surface as [CᵊCəːC]: e.g. [ɬᵊ.ʎáːt]. The bimoraic schwa's duration is twice the length of the non-moraic schwa, and its vowel quality is relatively stable. In short, Piuma Paiwan has *three* types of schwa in terms of duration and formant stability: bimoraic [əː], monomoraic [ə], and nonmoraic [ᵊ].

A theory of foot-mora interaction is presented to account for both these findings, and the typology of stress sensitivity to central vowels. A key part of the argument is provided in the tableau below: the constraint FTBIN-μ bans candidates with mono-moraic feet (c), but avoidance of a mora on schwa forces the foot to encompass the final syllable and lengthen it (b vs. a).

(1) *Avoidance of penultimate schwa; lengthening of final syllable*

/kəri/	FTBIN-μ	*μ/ə	HDσ
☞ a. kᵊ(rí:ᵘᵘ)			*
b. (kə́ᵘ.riᵘ)		*!	
c. (kᵊ.ríᵘ)	*!		

3. Peripheral sensitivity

There are 14 languages that are reported to have a stress which is attracted to certain peripheral vowels over others. Gujarati is probably the most well described case with distinctions among peripheral vowels (e.g. [redacted] and references cited therein). De Lacy (2002b) claims that stress falls on the penult by default (e.g. [dʒája] 'let's go), but will move onto a final syllable with [a] if the penult contains a less sonorous vowel (e.g. [ʃìkáɾ] 'a hunt'). However, a production experiment by the author shows that of the five types of phonetic evidence examined, only F1 provides clear evidence for stress, and it reveals stress to be consistently penultimate, and not sonority-driven.

The descriptions of all other cases are shown to suffer from unreliability, inconsistency, and a variety of other methodological problems.

4. Implications

Two further theoretical implications arise from the present findings. One is that prosody is 'myopic': stress does not have access to vowel sonority (consistent with Itô & Mester 2003's hierarchical locality proposal). Another is the nature of vowel reduction: it cannot be due to the same constraints that motivate sonority-driven stress (e.g. de Lacy 2006:ch.7). Crosswhite (1999) suggests that at least some vowel reduction may be loss of moraicity, producing a non-moraic schwa. The present work therefore potentially eliminates a type of analysis for vowel reduction, and leaves the non-moraic option.