Onset weight with branchingness constraints: The case of Pirahã

Ben Hermans; ben.hermans@meertens.knaw.nl;Meertens Institute and VU Amsterdam
Francesc Torres-Tamarit; francescjosep.torres@gmail.com; CNRS Paris

One of the central claims of Hayes' classical theory of the syllable is that onsets cannot add to a syllable's weight because they are not moraic (Hayes 1989). After Hayes's publication, however, it has been shown repeatedly that this prediction is incorrect: in some languages onsets do add to weight. The standard approach is to say that, in those cases where onsets are weight adding, they are moraic (Topintzy 2006). This is illustrated in (1).

(1) Weight vs. non-weight adding onsets (Topintzy 2006)

(a) b)

Technically this approach works, but its fundamental problem is that it cannot reconcile a very important property of onsets with a very important property of moras; preferred onsets are those with low sonority (Smith 2003) and moras tend to dominate segments of high sonority (Zec 2007). Strictly speaking Topintzy's approach predicts that the first mora in (1a) tends to contain a segment of higher sonority. Faced with the fact that this is not true at all (Smith 2003), one could say that a mora tends to dominate a segment of higher sonority unless the segment is located in onset position. But this is entirely *ad hoc*.

Our goal is to give a more insightful analysis of weight adding onsets. It takes as its point of departure the well-established fact that consonants in onset position tend to have lower sonority. In that sense we claim to come closer to answering the question why onset consonants of lower sonority can be weight adding more readily than onset consonants of higher sonority. The language we will be dealing with is Pirahã (Everett and Everett 1984), the most complex system known so far in which onsets are weight adding.

In Pirahã the heaviest syllable in a tree-syllable window at the right edge of words is stressed. In words with syllables of equal weight, stress is final. Which syllable is the heaviest is determined by the weight scale in (2) (Hayes 1995). Some examples are given in (3).

(2) Weight scale for Pirahã (Hayes 1995:286)
PVV > BVV > VV > PV > BV > V
(where P = voiceless consonant; B = voiced obstruent; VV = long vowel)

(3)	PVV > BVV	'kao.ba.bai	'almost fell'
	BVV > VV	poo.'gai.hi.ai	'banana'
	VV > PV	pia.hao.gi.so.'ai.pi	'cooking bananas'
	PV > BV	a.ba.'pa	city name

Our analysis contains the following ingredients:

I. *The Hyman-onset and the Hayes-onset*. We propose that there are two types of onsets: in one type the prevocalic consonant is a dependent of the mora, which is the syllable's head (Hyman-onset). In the second type the prevocalic consonant is adjoined directly to the syllable node (Hayes-onset). These two structures are illustrated in (4).

(4) Hyman-onset vs. Hayes-onset

(a) b)

In principle the Hyman-onset is the default onset due to a constraint requiring that the head of a syllable (i.e. the mora) must branch. This branchingness constraint is an instance of a whole family of similar constraints requiring (among others) that the stressed syllable must be heavy (the head of a foot must branch) and that the main stressed foot must be bisyllabic.

II. *Exclusion of low sonority segments from the Hyman-onset*. Consonants of lower sonority, voiceless consonants in the case of Pirahã, are not allowed in the dependent of a head mora. Thus, in Pirahã the constraint $*[\text{-voice}]/\mu_{\text{Dependent}}$ is ranked above the constraint requiring that the head of a syllable (i.e. the mora) must branch.

III. *Branchingness constraints*. Weight sensitivity is expressed with branchingness constraints (as in Hayes 1980 and Hammond 1986). We propose two such constraints, the first penalizing branchingness at the syllable level, the mora level, and the melody level, and the second only at the syllable level. Their formulation is given in (5).

(5) Branchingness constraints

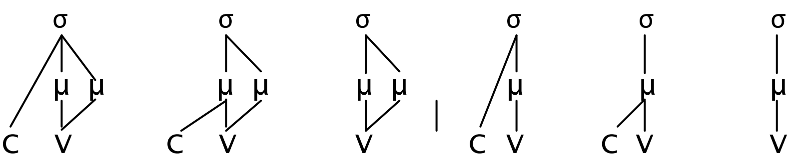
a. α *BRANCHING-FOOT'SDEPENDENT: A dependent of a foot must not branch.

b. β *BRANCHING-HIGHEST FOOT'SDEPENDENT: The highest dependent of a foot must not branch.

These two constraints are in a stringency relation: β is more specific than α. Therefore, if β is violated, then α is also violated. Consider now how the weight scale in (2) is mapped onto the violation profiles in (6) (marked with digits). The violation profiles express the fact that the heavier a syllable is, the more violations it receives when occupying a foot's dependent and the greater its inclination to avoid this position.

(6) Violation profiles of foot's dependent syllables

PVV > BVV > VV > PV > BV > V



3	3	2	1	1	0	Constraint α
2	1	1	1	0	0	Constraint β

Consider, for example, a BVV-syllable. This syllable type receives three violations from the general constraint α: one for the branching syllable, one for the branching first mora, and one for the branching vowel which also occupies a foot's dependent position. As for the constraint β, only one violation mark is assigned to the branching syllable, which is the highest foot's dependent.

So far nobody has paid much attention to the question where to parse prevocalic consonants. This was almost exclusively determined by the analyst's taste. We propose that both options can be correct, and which option is preferred is exclusively determined by linguistic arguments. If a language makes a distinction between the two types, we claim, it will always be the case that consonants of lower sonority prefer the Hayes-onset, not the Hyman-onset. In this way, we predict that if in a language onsets add to weight, then it will always be the case that the Hayes-onset adds more weight than the Hyman-onset. This follows from the fact that the two relevant constraints are in a stringency relation, which penalize twice a Hayes-onset: once by the general constraint α, and once by the more specific constraint β. The fact that onset consonants of lower sonority have a greater tendency to add to weight than onset consonants of higher sonority is not a problem for us at all, as it is for Topintzy (2006). Far from being a problem for our approach, this is in fact predicted by it. We can this not only describe how onset consonants contribute to weight, but we come also closer to answering the question why onset consonants of lower sonority contribute to weight more readily than onset consonants of higher sonority.