Are there any *truly quantity-insensitive* systems?

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0. Introduction

This paper* explores the issue, relevant to the theory of metrical phonology, as to whether trochaic stress rules ever completely ignore distinctions of syllable quantity. Firstly, we will present results of a typological survey, which strongly suggests that quantitative distinctions may be partly ignored, but never be completely ignored. Secondly, we will present two case studies of Gooniyandi and Finnish, which show various ways in which weight distinctions may become manifest in trochaic systems whose feet are otherwise quantity-insensitive. The theoretical consequences of our findings are addressed in Kager (1992b).

The theories of quantity and stress allow languages to vary along two dimensions, assumed to be independent. Firstly, whether or not a language has a distinction of syllable quantity (e.g. a distinction of vowel length). Secondly, whether or not a language has quantity-sensitive stress. Quantity-insensitive feet do not take into account the weight of the syllables they parse, while quantity-sensitive feet do so, and restrict heavy syllables to head positions. For trochaic feet, Hayes (1991) expresses this distinction as one between quantity-insensitive *syllabic trochees*, and quantity-sensitive *moraic trochees*:

(1) a. *Syllabic Trochee*: Construct (* .)
$\sigma\ \sigma$

b. *Moraic Trochee*: Construct (* .)
$\sigma_\mu\ \sigma_\mu$ or (*)
$\sigma_{\mu\mu}$

Freely combining these two dimensions, theory predicts the following types of system. Firstly, systems without quantitative distinctions, based on syllabic trochees. Empirically, these are indistinguishable from moraic trochee systems that happen to lack quantitative distinctions. Let us call such systems *trivially* quantity-insensitive. In the absence of weight distinctions, stress alternates in a strictly binary fashion. This type is exemplified by *Anyula* (Kirton 1967), which has the characteristic bisyllabic word minimum, as well as alternating stress:

```
(2)  a.  (*   .)      b.  (*   .)  .  (*   .)
         há.wu            má.ru.wa.rá.la
         "cloud"          "with the cousin"
```

Secondly, theory predicts quantity-sensitive systems, with weight distinctions and moraic trochees. Here, each heavy syllable forms a foot on its own, and feet are formed of pairs of light syllables. A good example is *Nunggubuyu* (Hore 1981), where the word minimum is bimoraic, i.e. a minimal foot. Stress is on all heavy syllables and on every other syllable in a string of light syllables. (Below "-" indicates a heavy syllable, "˘" a light syllable):

```
(3)  a.  (*)          b.  .  (*)  (*   .) (*)  (*   .)
          -               ˘   -    ˘   ˘   -    ˘   ˘
         yúul             dhu.màa.mù.gu.nàa.mú.rra
         "bushland"       "snake species"
```

Thirdly, systems with weight distinctions, and syllabic trochees that ignore these, provide the motivation for metrical theory to consider the presence of a quantity contrast formally independent from quantity-insensitive stress. Before turning to actual languages, let us determine what such a *truly* quantity-insensitive system would look like. In its purest form, it would have a bisyllabic word minimum, and strictly binary stress alternation, ignoring syllable weight:

(4) a.
```
(*  .)
 ˘  ¯
tá.taa
```
b.
```
(*   .) (*  .)  .
 ¯   ˘   ˘  ¯   ¯
táa.ta.tá.taa.taa
```

The goal of this paper is to show that such systems are only marginally attested, and apparently always combine the syllabic trochee with the moraic trochee into the so-called *generalized trochee* (cf. Hayes 1991).

1. The generalized trochee hypothesis

Hayes (1991) observes stress systems in which both the syllabic and the trochaic trochee seem to be relevant, i.e. systems in which both [σ σ] and [$\sigma_{\mu\mu}$] are proper feet. Firstly, many syllabic trochee systems with a syllable weight contrast have *bimoraic* word minima, as in *Pintupi* (Hansen and Hansen 1969). Another case is the *Mpakwithi* dialect of *Anguthirmi* (Crowley 1981:154): "In monosyllables, the length contrast is lost, and all vowels in monosyllabic words are phonetically long. However, if a monosyllabic word is made polysyllabic by the addition of a suffix, the vowel is short." That is, the bimoraic word minimum is enforced by monosyllabic lengthening, producing alternations as in (5):

(5)	a.	/ra/	[ra:]	"stomach"
	b.	/ra+ɳa/	[raɳa]	"stomach (locative)"

In both Pintupi and Mpakwithi, vowel length distinctions are restricted to the first syllable. Still, relevance of the syllabic trochee (instead of the moraic trochee) can be inferred from the location of (secondary) stresses in words whose first syllable is heavy. This pattern follows the scansion (6a), rather than (6b).

(6) a. $[\sigma_{\mu\mu}\ \sigma_{\mu}][\sigma_{\mu}\ \sigma_{\mu}][\sigma_{\mu}\ \sigma_{\mu}]$ ... Syllabic trochee parsing
b. $[\sigma_{\mu\mu}][\sigma_{\mu}\ \sigma_{\mu}][\sigma_{\mu}\ \sigma_{\mu}][\sigma_{\mu}$ ... Moraic trochee parsing

Crowley (1981:156) describes Mpakwithi stress as follows: "The first syllable and every alternate syllable receives stress. [...] Note however that if an otherwise stressable syllable is the last of the word, it is not stressed." From this description it can be inferred that when the first syllable is heavy, stress alternation resumes on the *third* syllable, as predicted by the syllabic trochee, not on the second, as predicted by the moraic trochee. Rightward syllabic trochees produce the pattern:

(7) a.
```
(* .) .
 ˘ ˘  ˘
á.ra.na "toenail"
```
b.
```
 (* .) (* .)
  ˘ ˘   ˘ ˘
?ú.nu.wá.na "blister"
```
c.
```
 (*    .)  .
  ¯    ˘   ˘
dʳée.gwa.ti "trevally"
```
d.
```
(*   .) (*  .)
 ¯   ˘   ˘  ˘
d̲áa.t̲a.má.na "sap"
```

We thus find that Mpakwithi employs both the syllabic and the moraic trochee. Secondly, Hayes observes that the heavy monosyllabic foot [$\sigma_{\mu\mu}$] shows up in syllabic trochee systems in another context. Estonian (Hint 1973, Prince 1980) has a rightward quantity-insensitive style of alternation (we ignore optional ternarity). Final syllables that cannot be parsed into disyllabic feet are stressed iff they are heavy:

(8) a. (* .) (* .) (* .) . b. (* .) (* .) (* .) (*)
$\sigma\ \sigma\ \ \sigma\ \sigma\ \ \sigma\ \sigma\ \ \sigma_{\mu}$ $\sigma\ \sigma\ \ \sigma\ \sigma\ \ \sigma\ \sigma\ \ \sigma_{\mu\mu}$

A near-minimal pair of examples illustrating this property is given below:

(9) a. pí.mes.tà.va.le "blinding (ill.sg.)"
b. pí.mes.tà.va.màit "blinding (part.pl.)"

In order to account for the mixed nature of the systems discussed above, Hayes proposes the *generalized trochee* as a combination of the syllabic and moraic trochees.

(10) **Generalized trochee**: Construct (* .) $\sigma\ \sigma$ else (*) $\sigma_{\mu\mu}$

By *maximality* of foot construction, generalized trochees are disyllabic wherever possible. All expansions of [$\sigma\ \sigma$] are allowed, including those in which a heavy syllable occupies the weak (right-hand) position. The heavy monosyllabic trochee [$\sigma_{\mu\mu}$] shows up in contexts where no bisyllabic feet can be constructed: in monosyllabic words and at edges of domains.
Observations about systems such as Pintupi and Estonian lead Hayes (1991:101) to hypothesize that "the theory might eliminate entirely the category of syllabic trochee systems. It appears that all languages with syllabic trochees either require a generalized trochee analysis [...], or else have no distinction of syllable quantity." Let us refer to this as the *Generalized Trochee Hypothesis* (GTH). The GTH asserts that no stress rule completely ignores quantity distinctions. In this paper, we will provide evidence for the GTH from various sources, adding typological observations and case-studies to those of Hayes.

2. Testing the Generalized Trochee Hypothesis

Let us first consider the set of syllabic trochee systems with weight contrasts that are cited by Hayes (1991), one of the most extensive sources on stress typology. This includes *Czech, Dehu, Estonian, Finnish, Hungarian, Nengone, Piro, Vogul,* and *Votic*. However, for none of these systems can a completely quantity-insensitive stress pattern be established. Firstly, the source references for the majority of these systems (Dehu: Tryon 1967a, Nengone: Tryon 1967b, Piro: Matteson 1965, Vogul: Kálmán 1965, Votic: Ariste 1968) are fairly sketchy, and quantity-insensitivity is implicit at best. Particularly, irrelevance of quantitative contrasts to stress is left unmentioned, while no stress-marked examples are presented to demonstrate quantity-insensitivity. Secondly, all of the better-documented systems (the remaining Finno-Ugric languages and Czech) display some quantity-sensitivity. Secondary stresses in these systems are fairly weak and variable, but variability is always conditioned by syllable weight, as in Estonian (Prince 1980), Finnish (Carlson 1978), Hungarian (Kerek 1971:39-40) and Czech

(Jakobson 1962:615). English secondary stress has been claimed to be quantity-insensitive, but Kager (1989) shows that it is at least partially quantity-sensitive, analyzing it by a foot parsing mode much like the generalized trochee.
Let us now test the Generalized Trochee Hypothesis for a set of systems that were not considered by Hayes. Two core predictions from the GTH are the following:

(11) a. If a language has a distinction of syllable quantity, as well as a word minimum, then the minimal word must be bimoraic, not bisyllabic.
b. If a language has a distinction of syllable quantity, then it must allow monosyllabic heavy feet, even when it does not allow monomoraic light feet.

Both predictions receive overwhelming confirmation from a survey we conducted on Australian stress systems. The testing domain consists of languages that match all of the following three criteria: (i) distinctive vowel length *AND* (ii) some word minimum *AND* (iii) rhythmic stress based on *syllabic* trochee: $[\sigma_{\mu\mu}\ \sigma_{\mu}][\sigma_{\mu}\ \sigma_{\mu}]$ instead of $[\sigma_{\mu\mu}][\sigma_{\mu}\ \sigma_{\mu}]$, cf. (6). Out of 58 languages initially considered, only eight matched all three criteria. Results are summarized in (12):

(12)

Language	*Word min.*	$[\sigma_{\mu\mu}]$ occurs non-initially
A. Systems with V-length contrasts outside first σ		
Gooniyandi (McGregor 1990)	$[\mu\mu]$	yes
Ngiyambaa (Donaldson 1980)	$[\mu\mu]$	yes
Yindjibarndi (Wordick 1982)	$[\mu\mu]$	yes
Guugu Yimidhirr (Haviland 1979)	$[\mu\mu]$	yes
B. Systems with V-length restricted to first σ		
Anguthirmi (Crowley 1981)	$[\mu\mu]$	---
Mantjiltjara (Marsh 1969)	$[\mu\mu]$	---
Pintupi (Hansen and Hansen 1969)	$[\mu\mu]$	---
Baagandji (Hercus 1984)	$[\sigma\sigma]$	---

A bimoraic word minimum is found in all systems, except Baagandji (see below). The second prediction, which can only be tested in systems with length contrasts outside the first syllable, is confirmed for all such systems in the sample. We conclude that both predictions of the GTH are largely corroborated for Australian languages.
Let us now consider the case of *Baagandji*. Firstly, although Baagandji has a bisyllabic word minimum, the only monosyllable *ŋii*, *ŋim* "yes" conforms to bimoraicity. Secondly, the presence of the syllabic trochee $[\sigma_{\mu\mu}\sigma_{\mu}]$, along the lines of Mpakwithi (cf. 6a), is only inferred from Hercus' description (1984:45): "In all words of three syllables the accent is still on the first syllable, and the final syllable [...] has a very minor secondary accent [...] In all types of words of four syllables the pattern is again trochaic with the secondary accent being more prominent." Examples marked with secondary stress are *gúnigà* "fire" and *bíradùda* "hawk". However, secondary stress is not transcribed in the only stress-example presented with an initial heavy syllable, *báagandji* "Baagandji".

3. The generalized trochee in Gooniyandi

Gooniyandi (McGregor 1990) is an Australian language with a bimoraic root minimum (where closed syllables count as heavy): "[...] all monosyllabic roots have the syllable structures C(C)aa or CVC(C), where V is a short vowel. That is, all monosyllabic roots consist of two morae." (McGregor 1990:90) Examples[1]:

(13)		*CVV roots*			*CVC(C) roots*	
	a.	baa-	"call out"	e.	gaj-	"cut"
	b.	daa-	"give"	f.	ward-	"go"
	c.	maa	"meat"	g.	barn-	"return"
	d.	nyaany	"uncle"	h.	laj	"footprint"

Monosyllabic roots comprise about eight percent of all roots, i.e. those listed in a thousand-item dictionary. Percentages below are from McGregor (1990:90):

(14)	*σ Length*	*Verbal roots*	*Non-verbal roots*	*Total*
	1	30	1	8
	2	58	29	35
	3	9	47	39
	4	3	20	16
	5	---	3	2
	6	---	(0.1)	(0.1)

Stress in simple roots is initial (except in some trisyllabic roots whose second syllable is heavy, cf. i, j, m). In roots that are long enough (except in p. and w.), a second stress falls on the penult, under clash avoidance. Finally, a stress falls on final heavy syllables in words with stressless penults, i.e. under clash avoidance:

(15)				
	a.	-	máa	"meat"
	b.	˘ ˘	bá.ga	"burr"
	c.	˘ -	ngá.boo	"father"
	d.	- ˘	bóol.ga	"old man"
	e.	- -	dóo.mboo	"owl"
	f.	˘ ˘ ˘	ngá.dda.gi	"my"
	g.	˘ ˘ -	ngá.dda.nyóo	"mother"
	h.	˘ - ˘	dá.goor.la	"hole, depression"
	i.	˘ - ˘	ma.ndáa.dda	"Leichhardt tree"
	j.	˘ - ˘	ga.ráj.bi	"boy"
	k.	- ˘ ˘	bál.nga.rna	"outside"
	l.	- ˘ -	góo.dda.ngóol	"magpie"
	m.	- - ˘	bil.gáa.li	"midnight"
	n.	- - -	góo.roo.ngál	"Christmas Creek"
	o.	˘ ˘ ˘ ˘	yí.ma.ddá.dda	"leaf"
	p.	˘ ˘ ˘ -	ngá.tha.dda.mány	(place name)
	q.	˘ ˘ - ˘	ngí.ddi.wárn.di	"across"
	r.	˘ ˘ - -	wí.li.móo.roo	"chicken hawk"
	s.	˘ - ˘ -	já.mbin.bá.roo	(a type of fish)
	t.	˘ - - -	bá.boo.ddóo.nggoo	"to the bottom"
	u.	- ˘ ˘ ˘	thárl.mi.nggí.di	"tree stump"
	v.	˘ ˘ ˘ ˘ ˘	lá.wa.gi.má.na	"white"
	w.	˘ ˘ ˘ ˘ ˘ ˘	ngá.wa.li.mí.li.ja	(place name)

McGregor (1990:122-123) proposes a mora-based analysis along the following lines. CVV and CVC are bimoraic, and a prominence pattern is mapped onto morae: SU, SUU, SUSU, SUUSU, SUUSUU, SUUSUSU, SUUSUUSU. Essentially, the pattern is ternary, avoiding lapse, while the final mora is always stressless. Mora prominence translates into syllable prominence by two rules. Firstly, a syllable is stressable if one of its morae is stressed. Secondly, if two successive syllables are stressable, only one of them may receive stress, and it is usually the one with the most morae. This analysis works as shown below:

```
(16) a.  SU   SU     b.  S   U   U       c.  S   US   U
         dóo.mboo        ngá.dda.gi          dá.goor.la

     d.  S  U  U  S  U    e.  S   U   US   U
         lá.wa.gi.má.na       ngí.ddi.wárn.di

     f.  S  UU   SU    SU  g.  S  US    U
         bá.boo.ddóo.nggoo     ma.ndáa.dda

     h.  S   UU  S  UU     i.  S   U   U   SU
         já.mbin.bá.roo        ngá.tha.dda.mány
```

However, this analysis runs into two problems. The theoretical problem is that *syllabic integrity* (cf. Prince 1980) is violated. That is, in cases such as (16e,g), heavy syllables are split between moraic feet, under the natural assumption that all mora counting is done by moraic feet (trochees or dactyls). Secondly, the analysis encounters an empirical problem in words starting with double-heavy, such as *góo.roo.ngál* "Christmas Creek". This is incorrectly predicted to be **góo.roo.ngal*, since no stressed mora falls in the final syllable:

```
(17)  SU  US   UU
      góo.roo.ngál    (predicted to be *góo.roo.ngal)
```

Interestingly, Gooniyandi has bisyllabic reduplication, a process insensitive to the weight of the syllables involved. This diagnoses the maximal generalized trochee [σ σ]. Reduplicants constitute single phonological words, each with initial stress:

(18) A. *Initial two syllables prefixed to base*

a.	gárn.da-gárn.da.di	"windpipe"
b.	gá.mba-gá.mba.yi	"many young boys"

B. *Final two syllables suffixed to base*:

c.	wí.li.móo.roo-móo.roo	"chicken hawk"
d.	bál.nga.rna-ngá.rna	"wide"

Example (18d) shows that base segments must be mapped onto a bisyllabic *template* (cf. McCarthy and Prince 1986), since the reduplicant */ngarna/* does not coincide with a stress foot in the base.

We thus find that the prosodic morphology of Gooniyandi points to the syllabic trochee (i.e. bisyllabic reduplication), as well as the moraic trochee (i.e. the bimoraic word minimum). This only makes sense from the viewpoint of the generalized trochee. Under the GT, the stress pattern can be analyzed as below:

(19) a. Construct one trochee [σ σ] initially, another trochee [σ σ] finally.
b. Heavy syllables that remain unparsed by bisyllabic trochees under clause a. are parsed into monosyllabic heavy feet $[\sigma_{\mu\mu}]$.

This correctly predicts the stress patterns of roots of one, two, four, and five syllables, e.g.:

(20)

```
a.  (*  .) . (*  .)          b.  (*    .) (*     .)
     σ  σ  σ  σ  σ               σ    σ  σ      σ
    lá.wa.gi.má.na               ngí.ddi.wárn.di

c.  (*  . ) (*     .)         d.  (*     .)
     σ  σ    σ     σ               σ     σ
    bá.boo.ddóo.nggoo              dóo.mboo

e.  (*    . ) (*  .)          f.  (*)   g.  (*   .)
     σ    σ    σ  σ               σμμ        σ   σ
    já.mbin.bá.roo                máa       ngá.boo
```

In trisyllabic roots, we observe a conflict between both clauses of (19a), i.e. the initial vs. the final trochee. Depending on factors to be examined below, such words may be parsed either as [(σ σ) σ] or ασ [σ (σ σ)]. Variable stress patterns in trisyllables are a common phenomenon in other Australian languages, such as *Anyula* (Kirton 1967). Let us inventarize the attested stress patterns in Gooniyandi trisyllables of different skeletal types:

(21)

a.	$[\sigma_\mu\ \sigma_\mu]\ \sigma_\mu$	ngá.dda.gi	d.	$[\sigma_{\mu\mu}\ \sigma_\mu]\ \sigma_\mu$	bál.nga.rna
	$\sigma_\mu\ [\sigma_\mu\ \sigma_\mu]$	---		$[\sigma_{\mu\mu}][\sigma_\mu\ \sigma_\mu]$	---
b.	$[\sigma_\mu\ \sigma_\mu][\sigma_{\mu\mu}]$	ngá.dda.nyóo	e.	$[\sigma_{\mu\mu}\ \sigma_\mu][\sigma_{\mu\mu}]$	góo.dda.ngóol
	$\sigma_\mu\ [\sigma_\mu\ \sigma_{\mu\mu}]$	---		$[\sigma_{\mu\mu}][\sigma_\mu\ \sigma_{\mu\mu}]$	---
c.	$[\sigma_\mu\ \sigma_{\mu\mu}]\ \sigma_\mu$	dá.goor.la	f.	$[\sigma_{\mu\mu}\ \sigma_{\mu\mu}]\ \sigma_\mu$	---
	$\sigma_\mu\ [\sigma_{\mu\mu}\ \sigma_\mu]$	ma.ndáa.dda		$[\sigma_{\mu\mu}][\sigma_{\mu\mu}\ \sigma_\mu]$	bil.gáa.li
d.	$[\sigma_\mu\ \sigma_{\mu\mu}][\sigma_{\mu\mu}]$	---	g.	$[\sigma_{\mu\mu}\ \sigma_{\mu\mu}][\sigma_{\mu\mu}]$	góo.roo.ngál
	$\sigma_\mu\ [\sigma_{\mu\mu}\ \sigma_{\mu\mu}]$	---		$[\sigma_{\mu\mu}][\sigma_{\mu\mu}\ \sigma_{\mu\mu}]$	---

The generalizations for trisyllabic words can be phrased as follows. Firstly, initial stress is always an option, except in f., which may simply be due to lack of data. Of course, initial stress is consistent with McGregor's predictions. Secondly, in trisyllables with initial stress, the final syllable is always stressed when it is heavy, and unstressed when it is light, fully according to the predictions by the generalized trochee (cf. 19b). Thirdly, second-syllable stress occurs only when the second syllable is heavy, and the first is light[2]. This suggests avoidance of the trochee $[\sigma_\mu\ \sigma_{\mu\mu}]$, a tendency which we have observed in several other generalized trochee languages. Some generalized trochee languages with dominant initial stress have second-syllable stress in words that start with light-heavy. Examples are *Guugu Yimidhirr* (Haviland 1979) and *Yindjibarndi* (Wordick 1982), both discussed in Kager (1992b). Such systems avoid $[\sigma_\mu\ \sigma_{\mu\mu}]$ initially. Other generalized trochee systems, such as *Finnish*, avoid $[\sigma_\mu\ \sigma_{\mu\mu}]$ under secondary stress, as we will see below.

Let us now consider the two forms in (15) that are not derived by our analysis, incidentally both place names. Firstly, final stress in *ngá.tha.dda.mány* may, again, be due to the avoidance of [σ_{μ} $\sigma_{\mu\mu}$], as the root ends in light-heavy. Secondly, *ngá.wa.li.mí.li.ja*, which has antepenultimate stress, is a six-syllable root, a rare class (cf. 0.1%) which is probably outside the learner's initial data set.

4. The generalized trochee in Finnish

A second example of the generalized trochee is found in Finnish secondary stress, as reported on Kiparsky (1991), whose description we follow here (a slightly different pattern of secondary stresses is described by Carlson 1978). Main stress is strictly initial, and the second syllable is stressless regardless of its weight. Interestingly, secondary stresses in the remainder of the word partly depend on quantity, where long-voweled and closed syllables are heavy. Secondary stresses fall on alternate non-final syllables, except when a light syllable would be stressed directly preceding a heavy syllable. Then, the preferred pattern is for the light syllable to be stressless, and a secondary stress to fall on the heavy syllable. Iteration resumes on the heavy syllable, producing a locally ternary pattern. Final syllables are stressed only when heavy, and no clash arises with the penult.

(22)	a.	˘ ˘ ˘ ˘	ló.pe.tè.ta	"finish (neg.)"
	b.	˘ ˘ - ˘ ˘	ló.pe.tèt.ta.va	"to be finished"
	c.	- - ˘ ˘	téu.ras.tà.mo	"slaughterhouse"
	d.	˘ ˘ - -	ló.pe.tèt.tiin	"one finished"
	e.	- - - ˘ - ˘	púo.lus.tèt.ta.vìs.sa	"defensible"
	f.	˘ - ˘ ˘ ˘ ˘	á.loit.tè.li.jà.na	"as a beginner"
	g.	˘ - ˘ ˘ ˘ ˘ ˘	ó.pet.tè.le.mà.na.ni	"as something I have been learning"
	h.	˘ ˘ ˘ -	ló.pe.te.tàan	"one finishes"
	i.	˘ - ˘ - ˘	rá.kas.tu.nèi.ta	"infatuated lovers"
	j.	˘ - ˘ - -	ló.pet.ta.jài.set	"concluding ceremonies"
	k.	˘ ˘ - ˘ ˘ - ˘	lú.e.tùt.te.lu.tèl.la	"to gradually cause to have been read"

The secondary stress pattern of Finnish is captured by constructing generalized trochees from left to right, avoiding [σ_{μ} $\sigma_{\mu\mu}$]. The avoidance mechanism is *skipping* (cf. Kager 1992a)[3]:

(23)

a.
```
(*                  )
(*   .)  (*  .) (*  .)
 –    –    –   ˘   –   ˘
púo.lus.tèt.ta.vìs.sa
```

b.
```
(*                    )
(* .)  (*  .) (* .)  .
˘   –   ˘   ˘   ˘  ˘   ˘
ó.pet.tè.le.mà.na.ni
```

c.
```
(*          )
(*  .) (*   .)
˘   ˘   –   –
ló.pe.tèt.tiin
```

d.
```
(*          .)
(*  .)  .  (*)
˘   ˘   ˘   –
ló.pe.te.tàan
```

e.
```
(*               )
(*  .)  .  (*   .)
˘   –   ˘   –   –
ló.pet.ta.jài.set
```

f.
```
(*                      )
(* .) (*   .)  .  (*  .)
˘  ˘   –   ˘   ˘   –   ˘
lú.e.tùt.te.lu.tèl.la
```

Interestingly, the relative ill-formedness of [σ_{μ} $\sigma_{\mu\mu}$] is confirmed by some Finnish dialects which repair initial [σ_{μ} $\sigma_{\mu\mu}$] into [$\sigma_{\mu\mu}$ $\sigma_{\mu\mu}$] by gemination (examples taken from Kiparsky 1991):

(24) a. mí.tään=> mít.tään "anything"
b. á.jaa => áj.jaa "drive"

Apparently, these dialects avoid [σ_{μ} $\sigma_{\mu\mu}$] during foot parsing in secondary stress feet, and repair it elsewhere, i.e. in the main stress foot. Apart from skipping and weight addition (gemination), a third reaction to [σ_{μ} $\sigma_{\mu\mu}$] has been observed in trochaic systems such as *Latin* (Allen 1973, Mester 1991) and *English* (Allen 1973, Kager 1989). Instead of lengthening the first syllable in [σ_{μ} $\sigma_{\mu\mu}$], these systems shorten the second syllable, producing [σ_{μ} σ_{μ}] (see also Prince 1991).

5. Conclusions

Summarizing, we have provided evidence for Hayes' (1991) *Generalized Trochee Hypothesis* from two sources: a typological survey of Australian languages, and case-studies of Gooniyandi and Finnish. We have observed three manifestations of syllable weight in trochaic systems with quantitative contrasts and syllabic styles of alternation:

(25) a. Heavy monosyllabic feet [$\sigma_{\mu\mu}$].
b. Bimoraic (instead of bisyllabic) word minima.
c. Avoidance of [σ_{μ} $\sigma_{\mu\mu}$].

Observed reactions to [σ_{μ} $\sigma_{\mu\mu}$] include:

(26) a. *Skipping* (Gooniyandi, Guugu Yimidhirr, and Yindjibarndi second syllable stress; Finnish secondary stress).
b. *Shortening* the second syllable in [σ_{μ} $\sigma_{\mu\mu}$] (Latin, English).
c. *Lengthening* the first syllable in [σ_{μ} $\sigma_{\mu\mu}$] (Finnish initially).

A formal interpretation of the avoidance of [σ_{μ} $\sigma_{\mu\mu}$] will appear in Kager (1992b), where it is analyzed as a prohibition against *clash* on the *mora* level in a two-layered theory of foot parsing. This paper also addresses other formal aspects of generalized trochaic parsing, and contains case-studies of two more Australian systems, *Yindjibarndi* and *Guugu Yimidhirr*.

Notes

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1. Transcription key: **rn** = apico-palatal nasal; **ny** = lamino-palatal nasal; **ng** = velar nasal; **dd** = alveolar flap, **rd** = apico-palatal stop; **mb** = bilabial prenasalized stop; **nd** = alveolar prenasalized stop; **ngg** = velar prenasalized stop.

2. The single form with second-syllable stress that starts with a heavy syllable is *bil.gáa.li*. However, its initial syllable is closed, and universally closed syllables are somewhat variable in their weight, cf. Hayes (1991).

3. Kiparsky opts for a mixed iambic-trochaic analysis, where the choice of iambic vs. trochaic prominence is triggered by the quantity of the syllables that are scanned. As far as we can see, this analysis requires an extra assumption over ours, i.e. avoidance of syllable-level clashes.

References

Allen, W.S. (1973), *Accent and Rhythm*. Cambridge: Cambridge University Press.
Ariste,P.(1968), *A Grammar of the Votic Language*. New York:Humanities Press.
Carlson, L. (1978), *Stress in Finnish*. Ms., MIT.
Crowley, T. (1981), "The Mpakwithi dialect of Anguthirmi", in: Dixon and Blake (1981), 147-194.
Dixon, R.M.W., and B.J. Blake (eds.), *Handbook of Australian Languages, Vol. 1* (1979), *Vol. 2* (1981), *Vol. 3* (1983). Amsterdam: John Benjamins.
Donaldson, T. (1980), *Ngiyambaa: The Language of the Wangaaybuwan*. Cambridge: Cambridge University Press.
Hansen, K.C., and L.E. Hansen (1969), "Pintupi phonology", *Oceanic Linguistics* 8, 153-170.
Haviland, J. (1979), "Guugu Yimidhirr", in: Dixon and Blake (1979), 27-180.
Hayes, B. (1991), *Metrical Stress Theory: Principles and Case Studies*. Ms., UCLA.
Hercus, L.A. (1984), *The Baagandji Language, Pacific Linguistics Series B*, #67.
Hint, M. (1973), *Eesti Keele Sonafonoloogia I*. Tallinn, Estonia: Eesti NSV Teaduste Akadeemia.
Hore, M. (1981), "Syllable length and stress in Nunggubuyu", *Work Papers of SIL-AAB, Series A*, #5.
Jakobson, R. (1962), "Contributions to the study of Czech accent", in: *Selected Writings*, Part I, 614-625. The Hague: Mouton.
Kager, R. (1989), *A Metrical Theory of Stress and Destressing in English and Dutch*. Dordrecht: Foris.
_______. (1992a), "Alternatives to the Iambic-Trochaic Law", to appear in *NLLT*.
_______. (1992b), "Shapes of the Generalized Trochee", paper to be presented at *WCCFL* XI, UCLA, February 22.
Kálmán, B. (1965), *Vogul Chrestomathy*. Indiana University, Bloomington.
Kerek, A. (1971), *Hungarian Metrics: Some Linguistic Aspects of Iambic Verse*. The Hague: Mouton.
Kiparsky, P. (1991), "Quantity-sensitivity and the nature of templatic parsing", *BLS* 17.
Kirton, J.F. (1967), "Anyula phonology", *Pacific Linguistics Series A, #10, Papers in Australian Linguistics* #1, 15-28.
Marsh, J. (1969), "Mantjiltjara phonology", *Oceanic Linguistics* 8.2, 131-152.
Matteson, E. (1965), *The Piro (Arawakan) Language*. Berkeley and Los Angeles: University of California Press.
McCarthy, J., and A. Prince (1986), *Prosodic Morphology*. Ms., University of Massachusetts, Amherst, and Brandeis University, Waltham, Massachusetts.
McGregor, W. (1990), *A Functional Grammar of Gooniyandi*. Amsterdam: John Benjamins.
Mester, A. (1991), "The quantitative trochee in Latin", to appear in *NLLT*.
Prince, A. (1980), "A metrical theory for Estonian quantity", *LI* 11, 511-562.
_______. (1991), "Quantitative consequences of rhythmic organization", to appear in *CLS* 26, Vol. 2.
Tryon, D.T. (1967a), *Dehu Grammar, Pacific Linguistics, Series B, #7*. The Australian National University, Canberra.
_________. (1967b), *Nengone Grammar, Linguistic Circles of Canberra Publications, Series B*, #6. Canberra.
Wordick, F.J.F. (1982), *The Yindjibarndi Language. Pacific Linguistics Series A*, #51.