Metrical Models

1. "**grid-only**" (Prince '83, Selkirk '84, Goldsmith '93, Gordon '02): stress as rhythmic alternation of peaks and troughs in prominence grid with no internal grouping.

Hayes '81 typology of alternating stress:

Maranungku	"s s 's s	"s s 's s 's	"s = main stress
Warao	's s "s s	s 's s "s s	's = secondary stress
Weri	s 's s "s	's s 's s "s	s = syllable
Araucanian	s "s s 's	s "s s 's s	

$$x \quad x \quad x$$

- primitive rhythmic alternation of peaks and troughs: ....x x x x x x x .....
- parameters of initial association to {peak/trough} and {left/right} edge of word;
- one-to-one mapping of remaining syllables

Maranungku:	peak-first, left-to-right
Warao:	trough-first, right-to-left
Weri:	peak-first, right-to-left
Araucanian:	trough-first, left-to-right

"Grid-only" model abandoned in face of empirical arguments for grouping on the basis of stress shifts under deletion and insertion of vowels and conceptual arguments for particular types of rhythm.

2. Alternative **foot** theory: stress reflects a parsing of syllables into asymmetric units called feet. There are two basic types of feet: a **trochee** in which the first element is strong and the second weak and an **iamb** in which the first is weak and the second strong. Feet are optimally disyllabic but a monosyllabic foot can be created as a marked option.

x		x		x	
(x x)	trochee	(x x)	iamb	(x)	degenerate

- Maranunku: left-to-right trochaic parse; degenerate foot option exercised
- Warao: right-to-left trochaic parse; degenerate foot option not taken

- Weri: right-to-left iambic parse; degenerate foot option taken
- Araucanian: left-to-right iambic parse; degenerate foot option not taken
- Pintupi: left-to-right parse; degenerate foot option not taken
- Passamaquoddy: right-to-left iambic parse; degenerate foot option not taken

Evidence for grouping

3. stress shifts resulting from deletion of stressed syllable

Central Yupik: stress syllables with a long vowel and initial syllables closed by a consonant; otherwise assign alternating left-to-right pattern to remaining syllables.

qayáni 'his own kayak', sagúyáani 'in his (another's) drum', qayápigkáni 'his own future authentic kayak', qánrútkaqa 'I speak about them' < /qánrutékaqa/ by deletion of stressed vowel and retraction of stress to the left--not to the right where it might otherwise be expected. (Jacobson '85: 30-34)

```
                  x                        x    x
 x x x    (x x) x        x x x x x      (x x)(x x) x
qayani ->               qayapigkani ->


                 x    x           x      x
qanrutekaqa    x x x x x     ( x ) (x x) x x
                   ➤
                   Ø
```

4. quantity changes to yield a bimoraic foot

- Latin –io verbs (Mester 1994)

aud-i:-mus	'hear'	root+theme+desinence	i: ≈ i
sent-i:-mus	'feel'		
aper-i:-mus	'open'		
sepel-i:-mis	'bury'		
cáp-i-mus	'catch'		
fác-i-mus	'make'		

- allomorphs distributed to promote exhausative parsing

5. Alternating stress typology and binary foot parsing

- Parsing: left-to-right/right-to-left
- Foot type: trochaic/iambic
- Degenerate foot option: (*)
- Seven of eight languages attested (Kager 2005)[*]

(37) *Overview of uni-directional systems*

	trochees (45 languages)		iambs (9 languages)	
	left-to-right (32 lgs)	right-to-left (13 lgs)	left-to-right (4 lgs)	right-to-left (5 lgs)
strictly binary feet (29 lgs)	('σ σ) (ˌσ σ) ('σ σ) (ˌσ σ̲) σ̲ Pintupi (final lapse) 14 languages	(ˌσ σ) ('σ σ) σ (ˌσ σ) ('σ σ) Warao (perfect grid) 12 languages	(σ'σ) (σˌσ) (σ 'σ) (σˌσ) σ Araucanian (perfect grid) 3 languages	(σˌσ) (σ 'σ) σ̲ (σ ˌσ) (σ 'σ) *unattested* (initial lapse)
mixed binary + unary feet (25 lgs)	('σ σ) (ˌσ σ) ('σ σ) (ˌσ σ) (ˌσ) Murinbata (perfect grid) 18 languages	(ˌσ σ) ('σ σ) (ˌσ̲)(ˌσ̲ σ) ('σ σ) Biangai (initial clash) 1 language	(σ'σ) (σˌσ) (σ'σ) (σˌσ̲) (ˌσ̲) Ojibwa (final clash) 1 language	(σˌσ) (σ 'σ) (ˌσ) (σ ˌσ) (σ 'σ) Weri (perfect grid) 5 languages

6. Optimality Theoretic alternative (McCarthy & Prince 1993)

- Constraints:

    Parse Syll: penalize any syllable that is not parsed into a foot

    Foot-Binarity: penalize and foot that is not composed of two syllables

    All-Feet L/R: assign violations marks for the number of syllables that intervene between

      the foot and the left/right edge of the word

    Iambic/Trochaic: foot is right/left headed

- Exemplification of trochaic systems: Trochiac » Iambic

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[*] Buckley (2010) finds that Kashaya fills this cell.

Pintupi: left to right binary parse:

Ft-Bin » Parse-Syll » All-Ft left » All-Ft right

/12345/	Ft-Bin	Parse syll	All-Ft-L	All-Ft-R
> (12)(34)5		*	**	***,*
(12)3(45)		*	***!	***
1(23)(45)		*	*,***!	**
(12)345		**!*		***
(12)(34)(5)	*!			***,*

Maranungku: left-to-right parse with no lapse

Prase-Syll » Ft-Bin » All-Ft-L » All-Ft-R

/122345/	Parse-Syll	Ft-Bin	All-Ft-L	All-Ft-R
(12)(34)5	*!		**	***,*
(12)3(45)		*	***!	***
1(23)(45)		*	*,***!	**
(12)345		**!*		***
> (12)(34)(5)		*	**,****	***,*
(12)(3)(4)(5)		*	**,***,***!*	***,*

Warao: right-to-left binary parse

Ft-Bin » Parse-Syll » All-Ft-R » All-Ft-L

/12345/	Ft-Bin	Parse-Syll	All-Ft-R	All-Ft-L
>1(23)(45)		*	**	*,***
(12)(34)5		*	***!,*	**
(12)3(45)		*	***!	***
(1)(23)(45)	*!		***!*,**	*,***

Biangai: right-to-left binary parse with clash

Parse-Syll » Ft-Bin » All-Ft-R » All-Ft-L

/12345/	Parse-Syll	Ft-Bin	Align-L	Align-R
>(1)(23)(45)		*	*,***	****,**
1(23)(45)	*!		*,***	**
(12)(3)(45)		*	**,***!	***,**
123(45)	*!**		***	

7. in many languages syllables divided into heavy vs. light as relevant for stress

- heavy: CV:
- light: CV
- variable: CVC

8. quantity-sensitive parses (Hayes 1995)

- rhythmic templates
- iambic: [L L], [L H], [H]
- trochee: [L L] [H] Latin

9. quantitative trochee: Classical Cairene Arabic (Mitchell 1962)

- syllables

    | light | CV |
    | heavy: | CVV, CVC |
    | super-heavy: | CVVC, CVCC   (limited to final syllable) |

- classical pronunciation (Al-Azrah University)

    ∫ájara   ?adwiyatúhu

    ∫ajarátun   ?adwiyatúhumaa

    ∫ajarátuhu

    ∫ajaratuhúmaa

darábt ?a9máal

mustáʃfaa, mu9állim, muqáatil, ʃaabáatun

kaatába, qattálat, maktábah, wálad, rá?aa, híya, kátaba, ?inkásara, bulahníyatun, murtabiTátun

- Mitchell & Langendoen Generalizations
    - i. stress a final supra-heavy syllable

    - ii. otherwsise, stress a penultimate heavy

    - iii. otherwise, stress the penult or the antepenult depending on which is separated from the begeniing of the word or a previous heavy syllable by an even number of light syllables

- Metrical analysis

    left-to-right moraic trochee parse with (main) stress on final foot
    final mora is "extrametrical"
    head foot is interpreted phonetically with duration
    no secondary stress

project	line 0	* * * * *	* * * * * *
parse-LR	line 0	(* *) (* *) *	(* *) (* *) (* *)
head-L	line 1	(* *)	(* * *)
unbounded-R	line 2	*	*
		ʃajarátuhu	ʃajaratuhúmaa

Project	line-0	* * * * *	* * * * * *
Parse-LR QS	line-0	(*) (* *)(* *)	(*) (* *)(* *) *
Head-L	line 1	(* * *)	(* * *)
Unbounded-R	line 2	*	*

?adwiyatúhu   ?adwiyatúhumaa

10. OT analog

- constraints

    Weight-to-Stress: a heavy syllable occupies the head of a foot

    Ft-Bin: feet are bimoraic

    Final Mora of heavy and supraheavy syllable ignored

- ranking

    Trochaic » Iambic

    Ft-Bin » Parse-Syll » All-Ft left » All-Ft right

- tableaux

/ ʃajarátuhu /	Ft-Bin	Parse-syll	All-Ft-left
> (12)(34)5		*	**
(12)(34)(5)	*!		**,****
1(23)(45)		*	*,**!*
(12)345		**!*	

/ ?adwiyatúhu /	Ft-Bin	Parse-syll	All-Ft-left
> (1)(23)(45)			*,***
(12)(34)5		*	**
(1)(23)45		**!	*

24.901 Language and Its Structure I: Phonology
Fall 2010