Cyclic Morphosyntax Meets Parallel Phonology

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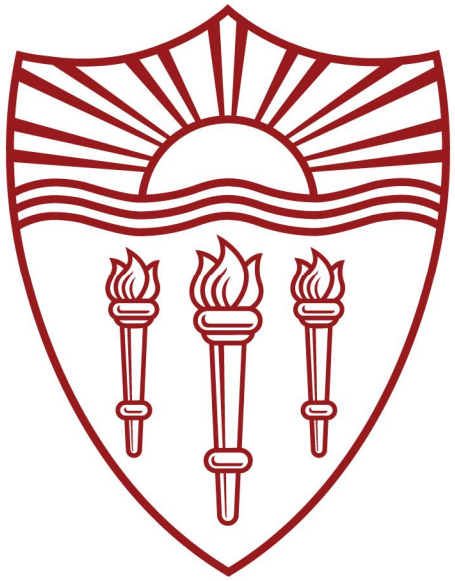
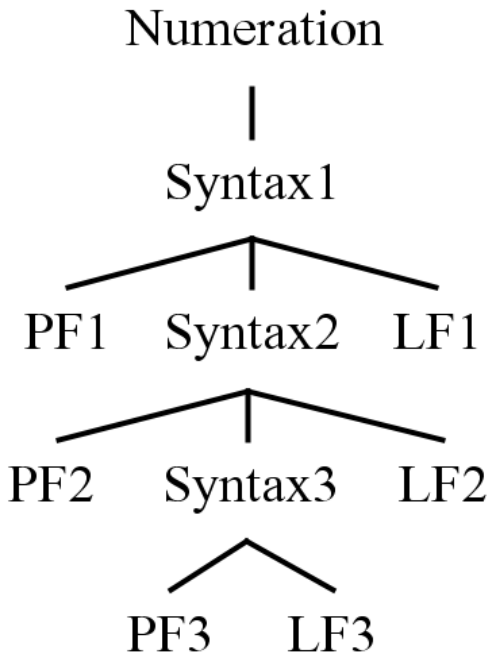


Cyclic Morphosyntax …

- Syntax builds words and sentences cyclically = in **discrete chunks** (Ross 1967, Chomsky 1973, *inter alia*)
- **Discrete chunks** sent to **interfaces** with sound (phonology) and meaning (semantics)
- Question: How do the **interfaces** (specifically phonology) maintain these **discrete chunks**?
  - How are discrete chunks from syntax reflected in phonology?

Cyclic Morphosyntax …



Multiple spellout of **discrete chunks** to **interfaces**

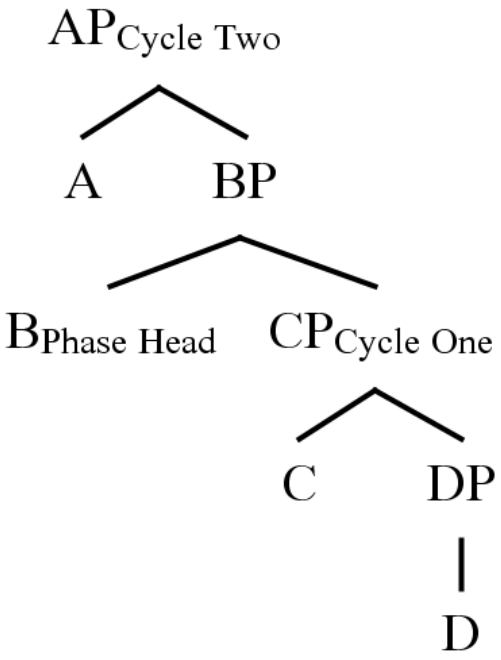
(Uriagereka 1999, Chomsky 2000, 2001, Nissenbaum 2000)

… Meets Parallel Phonology

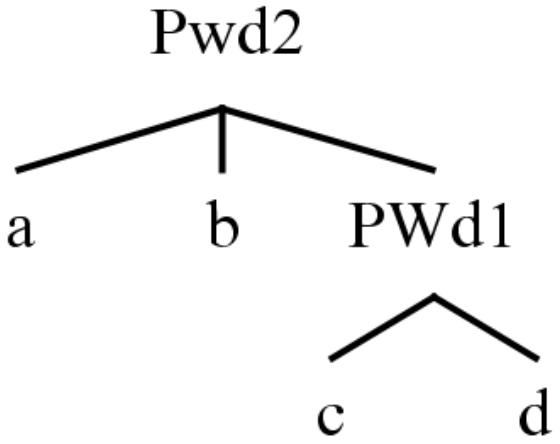
- Claim 1: Phonology reflects discrete chunks as **recursive prosodic structure**
- Claim 2: Phonology evaluates recursive structure in **one whole chunk**
  - Rather than evaluating each discrete chunk in turn

… Meets Parallel Phonology

Cyclic Morphosyntax



Parallel Phonology



Competing Models: Serial vs. Parallel Phonology

Phonology: Parallel or Serial?

- Longstanding disagreement over whether phonological derivation is **parallel** or **serial**
  (Kiparsky 1973, 1982, Mascaró 1976, Prince & Smolensky 1993/2004, McCarthy 2008, *inter alia*)
- **Parallel Derivation**:
  - Initial input → Final output
- **Serial Derivation:**
  - Initial input → Intermediate Steps → Final output
  - Intermediate steps = output of previous step, input of next step
  - E.g., Stratal OT (Kiparsky 2000, Bermudez-Otero 2011)

Cyclic Morphosyntax → Phonology

- Two possible models of sending discrete chunks from morphosyntax to phonology
- **Model One: Serial Phonology**
  (e.g., Marvin 2002, Newell 2008, Samuels 2010)
  - Phonology operates on **each chunk sent by syntax in turn**
- **Model Two: Parallel Phonology**
  (e.g., Cheng & Downing 2012)
  - Once all chunks from syntax are sent, phonology operates on **all of them at once**
  - Multiple chunks = **recursive prosody**

Comparison of Two Models

Cyclic Morphosyntax → **Serial Phonology**

1. Syntax sends Cycle 1 = PWd_1
2. **Phonology evaluates PWd_1**
3. Syntax sends Cycle 2 = PWd_2
4. **Phonology evaluates PWd_2**

Cyclic Morphosyntax → **Parallel Phonology**

1. Syntax sends Cycle 1 = PWd_1
2. Syntax sends Cycle 2 = PWd_2
3. **Phonology evaluates PWd_1 & PWd_2**

Evidence for Parallel Phonology: Chukchansi Yokuts Templates

Part 1: (L'H) Iambs

Chukchansi = Parallel Phonology

- Stress & fixed templates in Chukchansi Yokuts favor second model
  - Cyclic Morphosyntax → **Parallel Phonology**
- **Serial phonology** predicts wrong form for (L'H) template (= internal PWd)
  - Non-final stress **at all stages** → no (L'H) PWd
- **Parallel phonology** predicts correct form for template
  - Non-final stress applies **once** → internal PWd can be (L'H)

Chukchansi Stress: Iambs …

- Chukchansi Stress = Iambs + Non-finality
  (Guekguezian to appear)
- Stress = penultimate + heavy pre-penultimate
- Can be modeled by **Left-to-Right Iambs**
- Heavy Penults – Iambs: **(ˈH)**σ, **(L ˈH)**σ

[(ˈ**pa:**).ya]	‘child’-ACC
[(ˈ**bok’**).toʔ]	‘had found’
[(he.ˈ**je:**).ma]	‘long ago’
[(ʧi.ˈ**ʃa:**).lat]	‘just made cut’
[(ʔa.ˈ**le:**).(ʤa.ˈ**law**).ʃit]	‘just made oneself crazy’

… with Trochaic Reversal

- No word-final stress → stress on light penults
  - **Trochaic reversal**

    (Prince and Smolensky 1993/2004, McCarthy and Prince 1993b)
- Light Penults – Final **(ˈLσ)** Trochee

[(ˈ**pi**.ʃit)]	‘just lit’
[(ˈjun).(ˈ**ʃu**.nut)]	‘just shook’
[(ˈʧe:).(ˈ**xa**.ʔan)]	‘dog-ACC’
[(li.ˈhim).(ˈ**wi**.ʃeʔ)]	‘will run with each other’
[(ˈle:).(ˈleʔ).(ˈ**hi**.jaw)]	‘at school’

Iambs, not Trochees

- With trochaic reversal, trochaic stress may seem better fit for Chukchansi
- However, iambs = better model than trochees
- Evidence:
  - Vowel epenthesis
  - Lexical root inventory
  - Templatic morphology

Iambs, not Trochees

- Vowel epenthesis: /VCCCV/ → [V.C**i**C.CV]
  - Epenthetic vowel positioned to create good iambs
  - /lihm+ta?/ 'run'-REM.PAST → (li.ˈ**him**).ta? – **IAMB**
  - Not *(ˈlih)(ˈ**mi**.ta?) – ***TROCHEE**
- Lexical Root Inventory: Skew away from roots parsed into two initial Light syllables
  - **LL Roots:** fewer observed than expected
  - **HL, LH Roots:** more observed than expected
  - LL = Poor **Iamb** but Good **Trochee**

    (Prince 1990, Kager 1993, Hayes 1995)

Templates in Chukchansi

- Templatic morphology: more evidence for **iambs**
- Templatic forms have **recursive prosodic structure** (Guekguezian 2015)
- Roots with one underlying vowel get fixed **(L'H)** template
  - No matter what their UR
- Templates triggered by several suffixes
  (e.g., CAUSATIVE /-la-/, /-e-/)
- If no triggering suffix → no fixed template
- Atemplatic shapes = predictable phonotactics

Templatic vs. Atemplatic Forms

Root UR	Templatic Form: (L'H)	Atemplatic Form
/wan/ 'give'	(wa.'na:)-la-t	('wa.n-it)
/ʧiʃ/ 'cut'	(ʧi.'ʃa:)-la-t	('ʧi.ʃ-it)
/ma:x/ 'collect'	(ma.'xa:)-la-t	('ma:).x-it
/ʃawg/ 'buy'	(ʃa.'wa:).g-e-t	('ʃaw).g-it
/be:wn/ 'sew'	(be.'we:).n-e-t	('bew).n-it

Evidence for Parallel Phonology: Chukchansi Yokuts Templates

Part 2: Cyclic Morphosyntax = PWd Recursion

Templates = Cyclic Morphosyntax

- Templates triggers send roots to phonology early = **syntactically cyclic**
- Syntactically cyclic = phase heads
  (Chomsky 2000, 2001)
- Relevant phase head = **active little *v***
  (Chomsky 2000, 2001, Marantz 2001, Den Dikken 2007)
- Active little *v* sends complement (= verb root in VP) to phonology

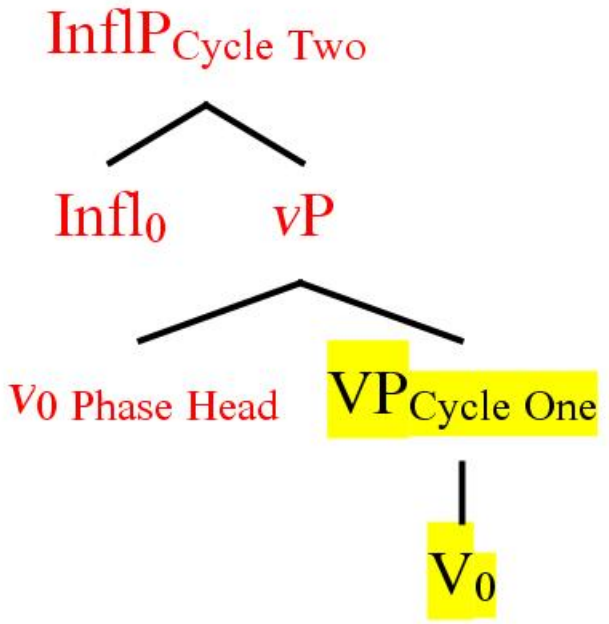
Templates = Cyclic Morphosyntax

Cycle One:

VP spelled out by v_0

Cycle Two:

InflP spelled out



Template Triggers: Active Little *v*

- Active little *v* has semantics of **agenthood, initiation, dynamicity**

  (Burzio 1986, Harley 1995, Kratzer 1996)

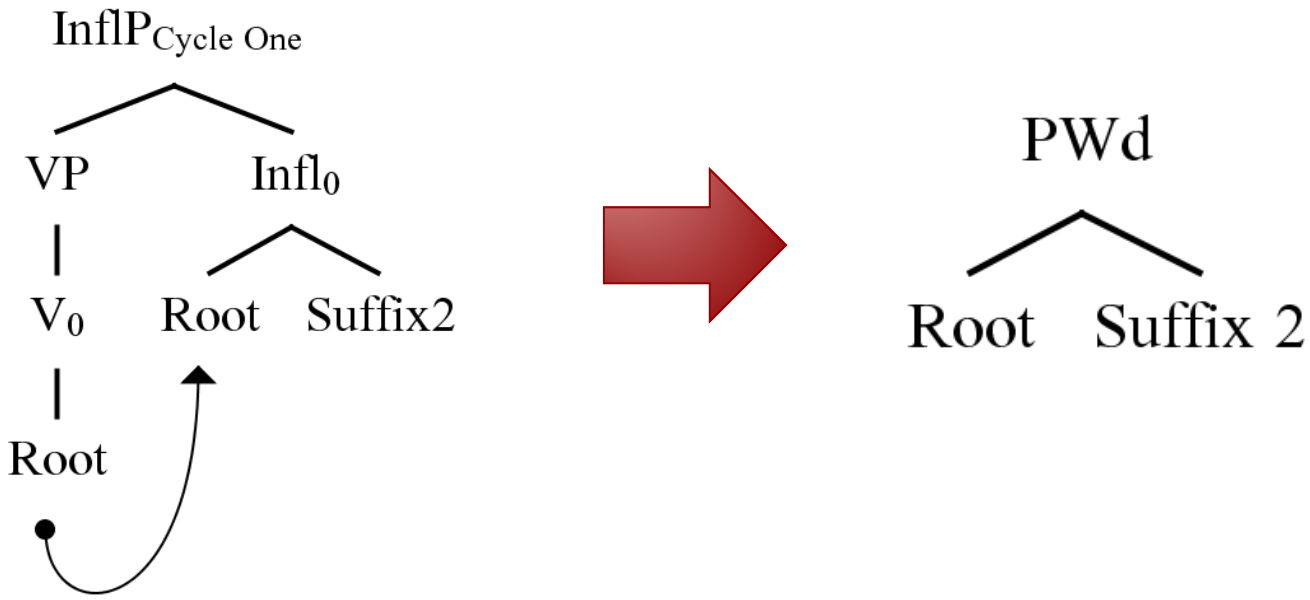
- Active little *v* triggers:
  - Causative /-la-/, /-e-/
  - Inchoative /-a-/
  - Durative /-ʔa-/
  - Distributive /-a-/, /-e-/
  - Agentive Nominal (*v* + *n*) /-ɬʼ-/
  - Adjunctive Nominal (*v* + *n*) /-ʔhij-/

Syntax Matching Phonology

- General **correspondence** between syntactic "words" (X_0) and phonological "words" (PWd)
- Modeled by **Match** constraints (Selkirk 2009, 2011)
  - $X_0 \approx$ PWd
- **Head movement** forms single X_0 out of multiple X_0s (Travis 1984)
  - Lower X_0 adjoins to higher X_0
  - Multiple adjoined X_0s matched to single PWd

Atemplatic Verb

- Chukchansi: Root head-moves to $Infl_0$, spelled out together with Suffix2 in Cycle One
- Root + Suffix2 = Single PWd



Cyclic Syntax = Recursive Phonology

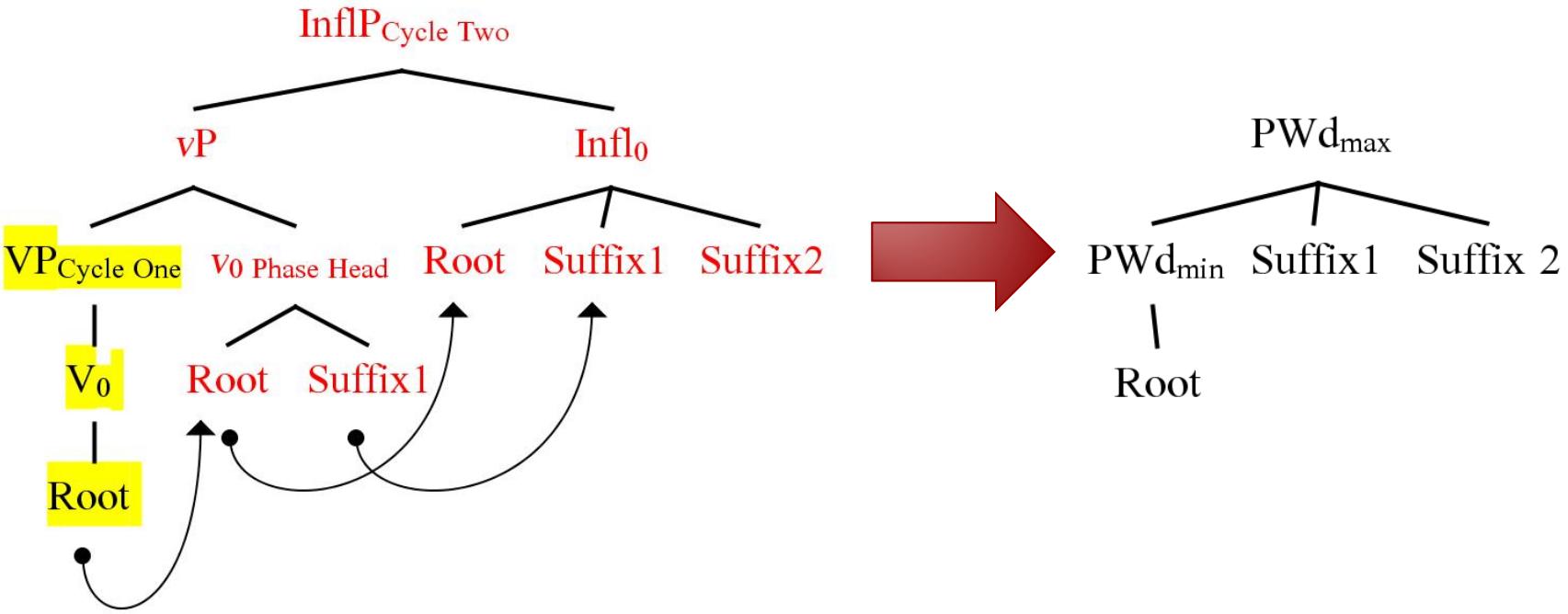
- Proposal: Complex X_0 spans syntactic cycles = matched to **recursive PWd**
- Due to copy theory of movement (Chomsky 1993)
  - Highest copy in cycle spelled out (Nunes 2004)
- Chukchansi: verb root spelled out twice
  - Lower copy: Cycle One (VP)
  - Higher head-moved copy: Cycle Two (InflP)

Cyclic Syntax = Recursive Phonology

- Claim: X_0 argument of Match constraint = defined by **spellout domains**
- **Two** copies of root in **two** different X_0s = PWds
- Chukchansi: only **one** exponent of root inserted
- One exponent in two PWds = **PWd recursion**

Cyclic Syntax = Recursive Phonology

- Copies of root spelled out in Cycles One & Two
- Exponent of root in PWd_{min} & PWd_{max}



Evidence for Parallel Phonology: Chukchansi Yokuts Templates

Part 3: Non-Final Stress → Parallelism

Templates = Minimality + Prosody

- Templates: one-vowel roots → LH when they form PWd_{min}
- Template = **minimality** effect: disyllabic PWds
- One-vowel roots augmented to disyllables
- Epenthetic material → forms **optimal** disyllable
- Optimal disyllable in Chukchansi: **(Lˈ H) Iamb**
  - Also reflected in stress, epenthesis, lexical root inventory

Problem: Non-final Stress

- Template = internal PWd (PWd_{min}) with emergent (L'H) shape
- BUT: disyllabic words cannot have final stress
  - $[(\text{ˈLσ})]_{Pwd}$, not *$[(\text{Lˈ H})]_{Pwd}$
  - $[(\text{ˈ}\underline{\textbf{pi}}\text{.ʃit})]_{Pwd}$ vs. *$[(\text{pi.ˈ}\underline{\textbf{ʃit}})]_{Pwd}$
- Problem:
  - Non-final stress **allowed** in PWd_{min}
  - Non-final stress **avoided** in PWd_{max}

Solution: Recursion-Sensitivity

- Phonological processes can be sensitive to level of recursive prosody (maximal vs. non-maximal)
  - Including OT constraints (Itô & Mester 2012, Elfner 2015)
- **Non-final stress** only applies to **PWd_{max}**
  - NONFINALITY(PWd_{Max}): assign a violation mark for a stressed syllable at the end of a maximal PWd (see Prince & Smolensky (1993/2004) for NONFINALITY(PWd))

Parallel vs. Serial

- No PWd_{max}-final stress: works for **parallel** derivation, not **serial** derivation
- **Parallel:** both PWds evaluated simultaneously
  - /Root+Suffixes/ →
    $[[Root]_{PWdmin}$+Suffixes$]_{PWdmax}$
  - Non-final stress **avoided** in Root PWd (PWd_{min})
- **Serial:** Each PWd evaluated once sent by syntax
  - /Root/ → $[Root]_{PWdmax}$ + /Suffixes/ →
    $[[Root]_{PWdmin}$+Suffixes$]_{PWdmax}$
  - Non-final stress **applies** in Root PWd (PWd_{max} in first cycle)

Parallel vs. Serial

- Example: cyclic input /wan+la$_{\text{CYCLIC}}$+it/
- **Parallel:** /wan+la+it/ →
  [**[(wa.ˈna:)]$_{\text{PWdmin}}$** lat]$_{\text{PWdmax}}$
- **Serial:** /wan/ → **[(ˈwa.na)]$_{\text{PWdmax}}$** + /la+it/ →
  [**[(ˈwa.na)]**$_{\text{PWdmin}}$ lat]$_{\text{PWdmax}}$
- **Serial stipulation:** final stress allowed at first cycle
  - /wan/ → **[(wa.ˈna:)]$_{\text{PWdmax}}$**

Problem with Serial Account

- Serial account must **divide** stress rules
- Non-final stress cannot apply **at first cycle**
  - Must only apply at second, final cycle
- Other stress rules apply **at all cycles**
  - Iambic parsing, disyllabic minimality
- In OT terms: NONFINALITY(PWd_{Max}) has different ranking at different cycles
  - **Sacrifices unity of grammar**

Parallel Derivation: Templatic Verb

- Templatic Verb: $[[(L\text{'}H)]_{PWdmin}\ \sigma\ \dots\ ]_{PWdmax}$
- /wan-la_{CYCLIC}-it/ $\rightarrow [[(wa.\text{'}na:)]_{PWdmin}\ lat]_{PWdmax}$

/wan-la_{CYCLIC}-it/	DISYLL	NONFINALITY (PWd_{Max})	IAMB
☞ $[[(wa.\text{'}na:)]_{PWdmin}\ lat]_{PWdmax}$			
$[[(\text{'}wa.na)]_{PWdmin}\ lat]_{PWdmax}$			1 W
$[[(\text{'}wan)]_{PWdmin}\ lat]_{PWdmax}$	1 W		

Parallel Analysis: Atemplatic Verb

- Atemplatic Verb $[(\text{ˈL}\sigma)]_{\text{PWdmax}}$
- /wan-it/ → $[(\text{ˈwa.n-it})]_{\text{PWdmax}}$

/wan-it/	DISYLL	NONFINALITY (PWd_{Max})	IAMB
☞ $[(\text{ˈwa.n-it})]_{\text{PWdmax}}$			1
$[(\text{wa.ˈn-it})]_{\text{PWdmax}}$		1 W	L

Serial Analysis: Problem

- Templatic Verb: *[[(ˈLL)]$_{\text{PWdmin}}$ …]$_{\text{PWdmax}}$
- /wan/ → [(ˈwa.na)]$_{\text{PWdmax}}$ + /-la$_{\text{CYCLIC}}$-it/ → *[[(ˈwa.na)]$_{\text{PWdmin}}$ lat]$_{\text{PWdmax}}$

/wan/	DISYLL	NONFINALITY (PWd_{Max})	IAMB
💣 [(ˈwa.na)]$_{\text{PWdmax}}$			1
☹ [(wa.ˈna:)]$_{\text{PWdmax}}$		1 W	L
[(ˈwan)]$_{\text{PWdmax}}$	1 W		

Summary

Cyclic Morphosyntax & Parallel Phonology

- Claim 1: Word with Cyclic Morphosyntax = **Recursive PWds**
  - Each discrete chunk from syntax = PWd
- Claim 2: Recursive PWds evaluated in **parallel**, not serially
  - Supports Cheng & Downing (2012), contra, e.g., Marvin (2002), Newell (2008), Samuels (2010)

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Further Details

Phonotactics and Atemplatic Forms

- Shape of atemplatic forms: depends on whether following suffix is Consonant- or Vowel-initial
- Can trigger **vowel shortening** or ***vowel epenthesis***

Root UR	C-initial /-taʔ/	V-initial /-it/
/wan/ ‘give’	(ˈwan).-taʔ	(ˈwa.n-it)
/ɸiʃ/ ‘cut’	(ˈɸiʃ).-taʔ	(ˈɸi.ʃ-it)
/ma:x/ ‘collect’	(ˈm**a**x).-taʔ	(ˈma:).x-it
/ʃawg/ ‘buy’	(ʃa.ˈw***i***g).-taʔ	(ˈʃaw).g-it
/be:wn/ ‘sew’	(ˈbe:).(ˈw***i***n).-taʔ	(ˈb**e**w).n-it

Transitive Verbs = Atemplatic

- Problem: transitive verbs have active little v, but no template
- Proposal: transitive little v = subject to Domain Suspension (Bobaljik & Wurmbrand 2013) = doesn't act like phase
  - Transitive little v forms unit with root at PF & LF
    - Unit = phonological form and semantic meaning not compositional (see Marantz 2001)
  - $\{v + \sqrt{}\}$ = unit at interfaces → v's phasehood suspended

Transitive Verbs = Atemplatic

- PF Evidence: different URs of nominalized (n + √) and verbalized (v + √) roots
- LF Evidence: non-compositional meaning of lexical root and categorizers

Nominalized Root (n+√)	**Verbalized Root (v+√)**	**Unit @**
/so:nop/ 'snot'	/sonp'/ 'be snotty'	PF
/gadya/ 'hungry'	/gada:y/ 'be hungry'	PF
/ʃe:ʔal/ 'rain' (n.)	/ʃeʔe:l/ 'rain' (v.)	PF
/hoy'no/ 'plane'	/hoy'n/ 'fly'	PF, LF
/dehel'/ 'scissors'	/dihl'/ 'cut with scissors'	PF, LF
/balk'/ 'stomach'	/balk'/ 'become full'	LF