Syllabification and the Weight-Stress Principle

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Abstract

- The Weight-Stress Principle (WSP) is one of the most important generalizations in metrical phonology, but it has many apparent exceptions
- I argue that such exceptions result from incorrect syllabification, which is often based on Max Onset
- Most exceptions disappear under an alternative way of syllabification, which is based on WSP
- The WSP is more general than previously though

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Outline

1. The WSP
2. Apparent exceptions: statistic data
3. Alternative syllabification
4. Argument for the new syllabification
5. Summary

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1. The WSP

- The Weight-Stress Principle (not 'Weight to Stress Principle'):
  a. Stressed syllables are heavy.
  b. Unstressed syllables are light.
- The WSP has been proposed by many people, often in slightly different ways (e.g. Prokosch 1939 for WSP-a, Prince 1990 for WSP-b)
- The WSP has many familiar consequences in phonology

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Effects of the WSP

- Heavy syllables attract stress
- Light syllables do not attract stress
- Stressed syllables or vowels lengthen
- Unstressed syllables or vowels shorten
- Latin stress (English stress): 'H2 or 3'
  - Stress the second syllable from right if it is heavy
  - Otherwise stress the third syllable from right

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2. Apparent exceptions to the WSP

- Data from CELEX, which assumes Max Onset
- Initial syllables in disyllabic simplex English morphemes.
- Stress includes both primary and secondary.

Type	Example
Stressed heavy	*cul*.prit
Stressed light	*ci*.ty
Unstressed heavy	*con*.strue
Unstressed light	*to*.day

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Apparent exceptions to the WSP

- 40% stressed syllables are light
- 32% unstressed syllables are heavy

Type	Count	(%)	Example
Stressed heavy	1,388	(60%)	cul.prit
Stressed light	938	(40%)	ci.ty
Unstressed heavy	126	(32%)	con.strue
Unstressed light	267	(68%)	to.day
Total	2,719		

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3. Alternative syllabification

- CELEX assumes Max Onset for syllabification
- This is necessary if syllabification is done before stress assignment
- But syllabification and stress assignment can be seen as the same process, taking place simultaneously, both governed by the Weight-Stress Principle (not 'Weight to Stress Principle')

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Syllabification with WSP

- V= stressed vowel, v = unstressed vowel

Good	Bad	Reason	Example
VC.v	*V.Cv	WSP-a	*cit.y*
VC.VX	*V.CVX	WSP-a	*rabb.i*
v.CVX	*vC.VX	WSP-b	*a.ttack*
v.Cv	*vC.v	WSP-b	*Can.a.da*
VX.Cv	*VXC.v	Max VX	*co.la*

- In this analysis, all stressed syllables are heavy

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Unstressed heavy syllables

- There are 126 unstressed heavy syllables, which fall into several types (X = lax):

Type	Count	%	Example
VN	59	47%	bamboo, employ, compete
VV	55	44%	tycoon, duet, cartoon, create
XC	8	6%	technique, cashmere, ignite
əC	4	3%	object, succeed
All	126	100%	

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VN rimes

- VN rimes can be analyzed in three ways

Vowel	**Analysis**	**Example**
lax	second. stress	*bamboo*
[ə] or [ɪ]	nasal V	*employ*
[ə] or [ɪ]	syllabic N	*compete*

- So, VN rimes present no real problem

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VV rimes

- VV rimes can be analyzed in two ways

Analysis	**Example**
secondary stress	*tycoon*
short tense V	*duet, create*

- So, VV rimes present no problem either

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XC rimes, where X is lax V

- In many analyses, lax V (other than [ə] or [ɪ]) are thought to have some stress
- We can make the same claim here, too
- There are 8 such words:
  doubloon, *technique, poltroon, cashmere, sextette, ignite, ignore, exact*
- They do not present a serious problem.

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[əC] rimes

- There are 4 words with unstressed [əC] rimes in the first syllable:
  object, success, succinct, succeed
- If [ks] is an affricate (Wiese 1996, Duanmu 2009), then three of the words are not a problem
  E.g. [sə][ksɛs] *success*

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Looking at violations again

- All 'stressed light syllables' are heavy
- All 'unstressed heavy syllables' either have stress, or are light
- Under new syllabification, most exceptions to WSP are no longer so

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4. Argument for the new syllabification

- Comparing syllabification proposals
- Allophonic rules
- The CV effect
- Syllable structure as metrical structure

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Comparing syllabification proposals

- Law of Initials and Law of Finals (Vennemann 1988)
- Maximal Onset (or Onset First)
- (Maximal stressed syllable)
- Weight-Stress Principle (WSP) plus CVX (Duanmu 2009)

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Law of Initials and Law of Finals

- Law of Initials (LOI):
  Word-medial onsets should resemble word-initial onsets
- Law of Finals (LOF):
  Word-medial codas should resemble word-final codas

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Ambiguity under LOI and LOF

*[wɪ.ski] whisky	Violating LOF: no word-final [-ɪ].
[wɪs.ki] whisky	OK: *miss, key*
[wɪsk.i] whisky	OK: *risk, even*
[tai.ni] tiny	OK: *tie, negotiate*
[tain.i] tiny	OK: *fine, Iran*

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Maximal Onset

- Put as many consonants in the onset as possible.
- Possible onsets: those that occur in word-initial clusters
- Thus, Max Onset assumes LOI, but not LOF.

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No ambiguity under Max Onset

[wɪ.ski] whisky	OK: even though LOF is violated
*[wɪs.ki] whisky	Onset is not max
*[wɪsk.i] whisky	Onset is not max
[tai.ni] tiny	OK
*[tain.i] tiny	Onset is not max

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Three problems of Maximal Onset

- No respect for LOF, e.g.
  - Max Onset: [wɪ.ski] *whisky* (violating LOF)
  - LOF: [wɪs.ki] *whisky*
- Not supported by intuition, e.g.
  - Max Onset: [wɪ.ski] *whisky*
  - Intuition: [wɪs.ki] *whisky*
- Lack of independent evidence

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Syllabification by WSP and CVX

- The WSP:
  a. Stressed syllables are heavy.
  b. Unstressed syllables are light.
- WSP ensures minimal rhyme length for stressed syllables
- CVX (Duanmu 2009) limits maximal rhyme length
- Onset is not required, but is often available, because an unstressed syllable cannot have a coda
- Both LOI and LOF are satisfied

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Syllabification by WSP and CVX

- An unambiguous solution to syllabification

Good	Bad	Reason	Example
VC.v	*V.Cv	WSP-a	*cit.y*
VC.VX	*V.CVX	WSP-a	*rabb.i*
v.CVX	*vC.VX	WSP-b	*a.ttack*
v.Cv	*vC.v	WSP-b	*Can.a.da*
VX.Cv	*VXC.v	Max VX	*co.la*

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Summary of syllabification

	LOI	LOF	Judgment	Unambiguous
Max Onset	yes	no	no	yes
WSP+CVX	yes	yes	yes	yes

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Allophonic rules

- Kahn (1976) uses allophonic rules to argue for Max Onset
- We re-examine such rules, in particular aspiration and flapping in American English
- We show that the rules are compatible with syllabification by WSP

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Allophonic rules: Kahn 1976

- Rules:
  VCV → V.CV → V<u>C</u>v (ambisyllabic <u>C</u>)
  Aspiration: when not ambisyllabic (and not final)
  Flapping: when ambisyllabic
- Analysis of *potato*

[pə.tei.to]	Maximal Onset rule
[pə.téi<u>t</u>o]	Ambisyllabic rule
[p^{h}ə.t^{h}éi<u>ɾ</u>o]	Aspiration and flapping

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Allophonic rules: Borowsky 1986

- Rules:
  VCV → V.CV → VC.v
  Flapping: when intervocalic and <u>in coda</u>
- Analysis of *potato*

[pə.téi.to]	Maximal Onset rule
[pə.téit.o]	Resyllabification
[p^{h}ə.t^{h}éiɾ.o]	Flapping

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Allophonic rules: Jensen 2000, Davis 2009

- Rules:
  VCV → V.CV (no resyllabification)
  Aspiration: word or foot initial ('super foot' initial)
  Flapping: when intervocalic and not initial
- Analysis

potato	*at ease*	
[pə.téi.to]	[æt.íz]	Syllabification (Max Onset)
[p^{h}ə.t^{h}éi.ɾo]	[æɾ.íz]	Aspiration and flapping

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Allophonic rules: Present

- Rules:
  VC.v v.CV (syllabification by WSP)
  Aspiration: word or foot initial
  Flapping: when intervocalic and not initial
- Analysis

potato	*at ease*	
[pə.téi.to]	[æt.íz]	Syllabification by WSP
[p^{h}ə.t^{h}éi.ɾo]	[æɾ.íz]	Aspiration and flapping

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Comparison of four analyses

at ease	*city*	*potato*	
[æɾ.íz]	[sɪ́ɾi]	[pʰə.tʰéiɾo]	Kahn (1976)
[æɾ.íz]	[sɪ́ɾ.i]	[pʰə.tʰéiɾ.o]	Borowsky (1986)
[æɾ.íz]	[sɪ́.ɾi]	[pʰə.tʰéi.ɾo]	Jense, Davis
[æɾ.íz]	[sɪ́ɾ.i]	[pʰə.tʰéi.ɾo]	WSP

- Summary: Syllabification under WSP can fully account for allophonic rules.

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The CV effect

- Jakobson (1958: 21): 'There are languages lacking syllables with initial vowels and/or syllables with final consonants, but there are no languages devoid of syllables with initial consonants or of syllables with final vowels.'
- Hooper (1976: 199) CV syllables are 'optimal' universally
- Steriade (1982: 78): CV is 'maximally unmarked'.

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Explaining the CV effect

- Max Onset: VCV → V.CV always, which explains the CV effect
- CVX and WSP: There is no requirement for the onset. How can we explain the CV effect?

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Deriving CV effect from CVX and WSP

Two sources of CV syllables:

1. Unstressed rhyme is V, leaving following C as an onset
2. Stressed V can become VV, leaving following C as an onset

String	Initial stress	Final stress
CVCV	[CVC][v], [CV:][cv]	[cv][CV:]
CVCVC	[CVC][v](c), [CV:][cv](c)	[cv][CVC], [cv][CV:](c)
VCVC	[VC][v](c), [V:][cv](c)	[v][CVC], [v][CV:](c)
VCV	[VC][v], [V:][cv]	[v][CV:]

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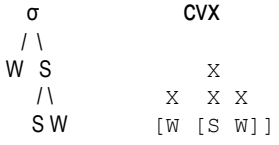
Syllable structure as metrical structure

- Kiparsky (1981): Syllable structure is metrical structure
- The rime is stronger than the onset
- The nucleus is stronger than the coda



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Syllable structure as metrical structure

- Kiparsky (1981): Syllable structure is metrical structure
- CVX is the larges structure without 'clash' or 'lapse'

String	Rhythm	Analysis
*CCV	*WWS	Bad rhythm: lapse of WW
*VCC	*SWW	Bad rhythm: lapse of WW
*VCV	SWS	good rhythm but bad syllable: two peaks
CVC	WSW	good rhythm and good syllable
VC	SW	good rhythm and good syllable
CV	WS	good rhythm and good syllable

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5. Summary

- Syllabification is not governed by Max Onset, but by the WSP
- Stress assignment is a metrical process: each stress implies a foot
- Syllabification is also a metrical process: each heavy syllable is a moraic foot
- WSP is more general than previously thought

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