

# Contextual information in phonology

## Day 2: Cophonologies

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# Onto the theories

- So where in the analysis - in the grammar - can we put the various types of extraphonological information?

Basic option A) Each distinct morphological/lexical/social context conditions a separate phonological grammar.

Safe within its limited context, the phonology itself does not refer directly to non-phonological information.

- Cophonologies
- Stratal phonology

# Basic Option A

- Cophonologies

Assimilated loans in Japanese: FAITH >> No-P, No-DD

Sino-Japanese words: No-P >> FAITH >> No-DD

Native Japanese words: No-P, No-DD >> FAITH

- **Stratal** phonology deals with phonology conditioned by levels of morpho(phono)logical derivation

[ [ [ Stem ] Word ] Phrase ]

# Basic Option B

The phonology itself can refer directly to morphological, lexical, or maybe even social context.

- Indexed constraints (ex from Ito & Mester 1999:73)

**FAITH-AssimLoan** >> No-P >> **FAITH-SinoJ** >> No-DD >> **FAITH-Yamato**

- Output-output correspondence (ex from Davis 2005)

/capital + istic/ (cápital)	StressClash	OO-foot structure	Footing constraints
☞ a. (càpita)(lístic)			*
b. (càpi){t <sup>h</sup> a(lístic)}		*!	
c. (càpi)(t <sup>h</sup> à)(lístic)	*!	*	

# How many phonologies?

- A distinct phonology = a mapping algorithm that gives a contradictory result to some other algorithm for the same input.

<i>How many</i>	Many	usually 3	by default, 1
<i>Which ones</i>	One for each morphological construction, etc.	Derivational levels: Stem, Word, Phrase	The one
<i>Why</i>	Empirical need for many	No empirical need for more	Phonology refers to grammar, so not an issue
<i>Theories</i>	Cophonologies	Stratal	Indexed constraints, O-O correspondence

# Cophonologies

- Each morphological construction is an independent algorithm that tells you everything you need to know to make it
  - Morpheme concatenation
  - Phonological constraints and operations
- Italian affrication: A morphologically conditioned process  
 $t(:) \rightarrow t(:)s \quad / \_ [i]$  (Nespor 1993:146)

Applies: Nominalization

*-ione*

sottra[t:]o	sottra[t:s]-ione
moltiplica[t]o	moltiplica[ts]-ione
spedi[t]o	spedi[ts]-ione

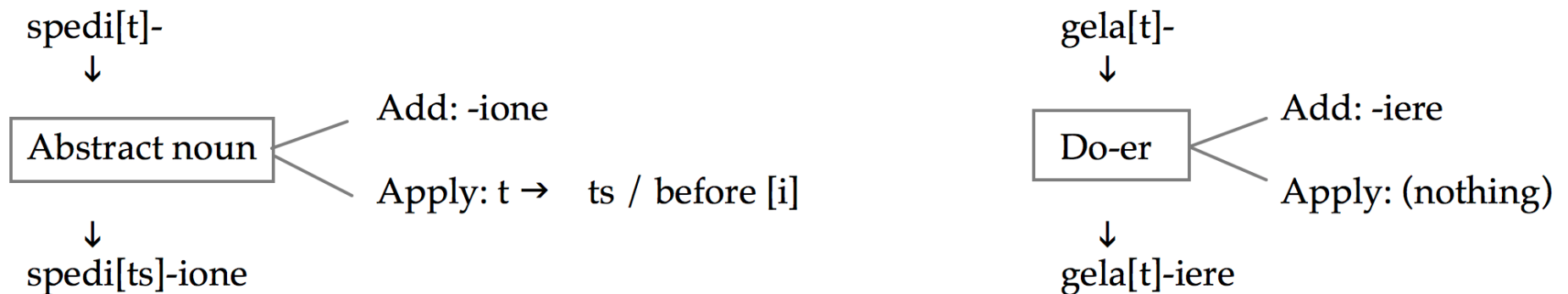
Does Not Apply: "Doer" suffix

*-iere*

porta	port-iere	*por[ts]iere
argento	argent-iere	*argen[ts]iere
gelato	gelat-iere	*gela[ts]iere

# Cophonologies

- Each construction has two parts
  - Concatenative morphology
  - Associated phonology



- Phonology makes no direct reference to morphology: its domain is determined by where it is placed in the overall grammar

Do we need cophonologies? What are the arguments in favor of proliferating phonological grammars within the same language?

Talking points:

Cophonology theory permits a *unified analysis* of various phenomena, so it actually anti-proliferates theoretical devices.

Cophonology theory makes some correct predictions about when a morphologically complex word is built up via multiple constructions.



# Argument 1: Lexically conditioned phonology

- Japanese: a theory must allow multiple incompatible phonologies

	voiced geminates	singleton [p]	nt, mp, ŋk
Yamato (native)	x	x	x
Sino-Japanese	x	x	<i>hantai</i>
Older loans	x	<i>sepaado</i>	(ok)
Newer loans	<i>roddo</i>	(ok)	(ok)

Native Japanese: No-NT >> FAITH

/jom-te/ 'read-GERUNDIVE' --> [jonde]

Sino-Japanese: FAITH >> No-NT

/den-pa/ 'electric wave' --> [dempa]

# Japanese cophonologies

- When constraints are ranked *below* FAITH (less important), they can be violated within that group of words (prefer to obey FAITH)

Unassimilated loans:                      **FAITH** >> No-DD, No-P, No-NT

Assimilated loans:                        No-DD >> **FAITH** >> No-P, No-NT

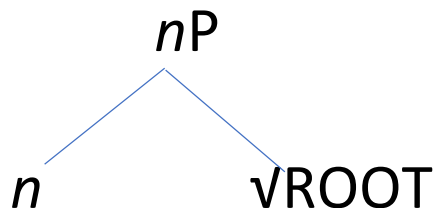
Sino-Japanese words:                      No-DD >> No-P >> **FAITH** >> No-NT

Native Japanese words:                    No-DD, No-P, No-NT >> **FAITH**

- Lexical entries must contain a tag to trigger the correct phonology

# A note on part-of-speech conditioning

- Noun, verb, etc. cophonologies could be lexically conditioned, assuming that lexical items have assigned word-class categories
  - Cophonologies triggered by [+noun], [+verb]
- Several newer theories define word class morphosyntactically: in Distributed Morphology, an acategorial root combines with an often-abstract category head



We could think of this as a morphological construction triggering a cophonology for nouns.

# Other lexical conditioning

- Sublexicons: Becker & Gouskova (2016)
  - Russian yer-deletion is lexically conditioned, but partially predictable based on phonotactics
  - "Gatekeeper grammar": a model of morphophonological learning that productively funnels novel lexical items into the likeliest cophonology
- Inkelas & Zoll (2007) count free variation as another type of multiple-phonology situation that is independently attested

## Argument 2: Morphological conditioning

- Morphologically conditioned phonology: a natural extension of the fact that a language has multiple phonologies

Turkish vowel hiatus resolution: \*VV

Progressive suffix *-Ijor* : VV resolved by deletion (DEP >> MAX)

/gel/

gel-ijor

'come'

/anla/

anl-ujor

'understand'

Facilitative suffix *-Iver* : VV resolved by epenthesis (MAX >> DEP)

/gel/

gel-iver

'come'

/anla/

anla-juver

'understand'

Progressive suffix: Cophonology A	/anla-ujor/	*VV	DEP-C	MAX-V
a.	anlaujor	*!		
b.	anlajujor		*!	
☞ c.	anlujor			*

Adverbial suffix: Cophonology B	/anla-undza/	*VV	MAX-V	DEP-C
a.	anlauundza	*!		
☞ b.	anlajuundza			*
c.	anluundza		*!	

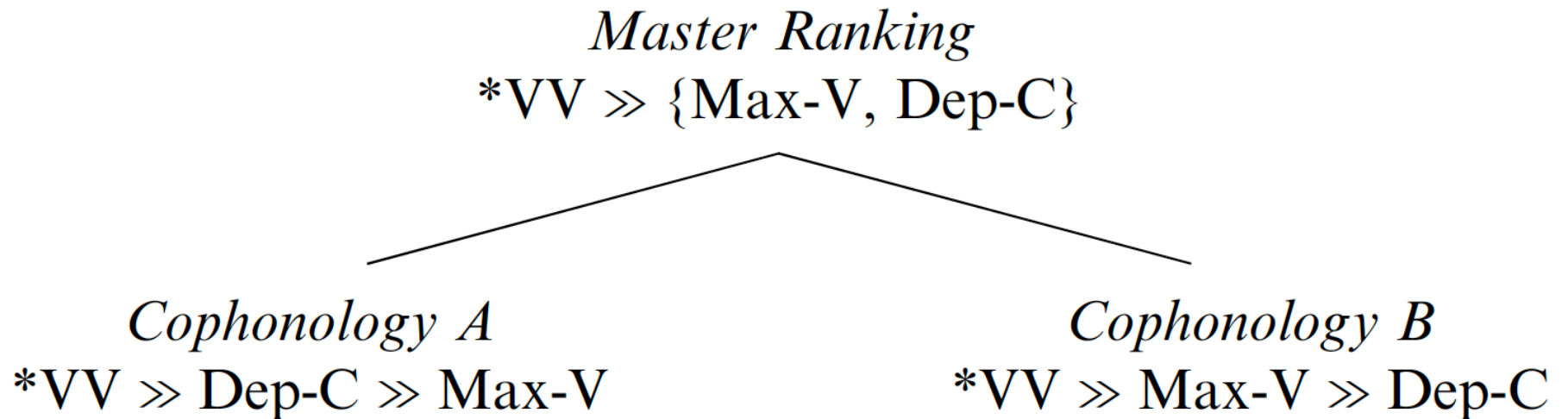
(Inkelas & Zoll 2007)

# Psycholinguistic plausibility

- How many cophonologies can a language have?
- More relevant question: how wildly different can cophonologies be within the same language?
- No absolute synchronic limits are proposed, but learnability and diachrony lead to relative within-language homogeneity
- In other words, much phonology is *shared* across constructions
  - (But how can we study learning biases?)

# Grammar Lattices

- Shows fixed vs variable constraint rankings (Anttila 2002)



- Unspecified rankings mean that there is scope for variation - either within a construction ("variation proper"), or parcelled out across the language



## Argument 3: Process morphology

- Deletion in Tohono O'odham perfective (Zepeda 1984)

<u>Imperfective</u>	<u>Perfective</u>	
síkon	síko	'hoe object'
híwa	híw	'rub against object'
hi:nk	hi:n	'bark'

- Dinka length polarity in plural formation (Malou 1988)

<u>Singular</u>	<u>Plural</u>	
ti:t	tit	'mahogany'
ñi:m	ñim	'dorsal fin of fish'
tak	ta:k	(kind of bread)

# The "Division of Labor" problem

- But... when there is phonological mutation, and you also happen to add stuff, is the phonology still process morphology, or is it morphologically conditioned phonology?

Barasana suffixes + tone patterns:

non-3rd subject	- <i>bi</i> + tone	baa - bi	'I/you/we swim'
		HH H	

interrogative	- <i>ri</i> + tone	baa - ri	'did (s)he/they swim?'
		H	

(Gomez-Imbert & Kenstowicz 2000)

# Division of labor: not a problem

- CLAIM: no real distinction between morphologically conditioned phonology and process morphology. Same status: phonological operations that happen within a construction
  - see also templatic morphology, like in Semitic
- Barasana *-bi* (non-3rd subj) and *-ri* (interrogative) cannot cooccur.
  - How do you say 'did I/you/we swim'?

baa-ri

H H H

affixation of interrogative...

... and tone pattern of non-3rd subj!

- Doesn't make sense to classify as morphology vs phonology

# Predictions: Morphologically complex words

- The phonology of each construction should apply exactly as the morphology applies, if they are really inextricable.

Turkish (Inkelas & Orgun 1995):

<i>Level:</i>	1	2	3	4	5
<i>Morphology</i>	root	passive aspect relative negative	plural possessive	case	tense agreement interrogative
<i>Phonology</i>	[μμ]				
		[σσ]			
			intervocalic velar deletion		

# Turkish

- Velar /k g/ deletion only if a level 3 or 4 suffix is present

<i>Level:</i>	1	2	3	4	5
<i>Morphology</i>	root	passive aspect relative negative	plural possessive	case	tense agreement interrogative
<i>Phonology</i>	[μμ]				
		[σσ]			
			intervocalic velar deletion		

## Level 2:

birik-en 'accumulate-REL'  
gedzik-ir 'be late-IMPF'

## Level 3/4:

bebe(k)-i 'baby-3POSS'  
olu(k)-u 'gutter-ACC'

# Turkish: Not a conveyor belt

- Disyllabic minimality only if a level 2 or 3 suffix is present

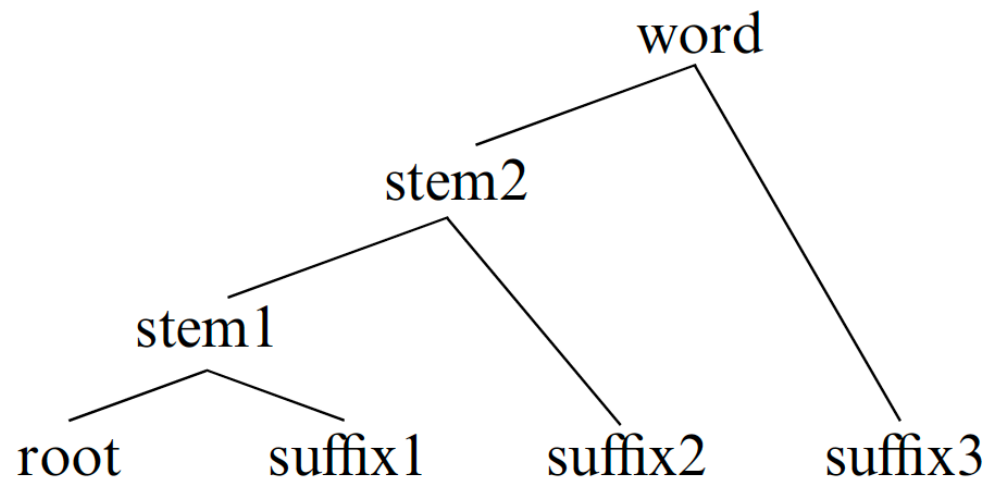
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<i>Phonology</i>	[μμ]				
		[σσ]			
			intervocalic velar deletion		

\*je-n      eat-PASSIVE      jen      'defeat'

\*fa:-m      note.fa-1SG.POSS      ham      'unripe'

# Prediction: Ordering and Layering

- Bracket Erasure: stem2 doesn't see morphemes or morphological boundaries inside stem1 (constraints are purely phonological)



- stem2 cophonology should not affect suffix3

# Ordering and Layering in Hausa

(Inkelas 1998, Inkelas & Zoll 2007)

- Ventive *-o*: **replaces** stem tone with H

fítá: (LH)

'go out'

fít-ó: (H)

'come out'

- Nominalizer *-wa*: **adds** LH to existing stem tones

káràntá: (HLH)

káràntâ:-wá: (HLH+LH)

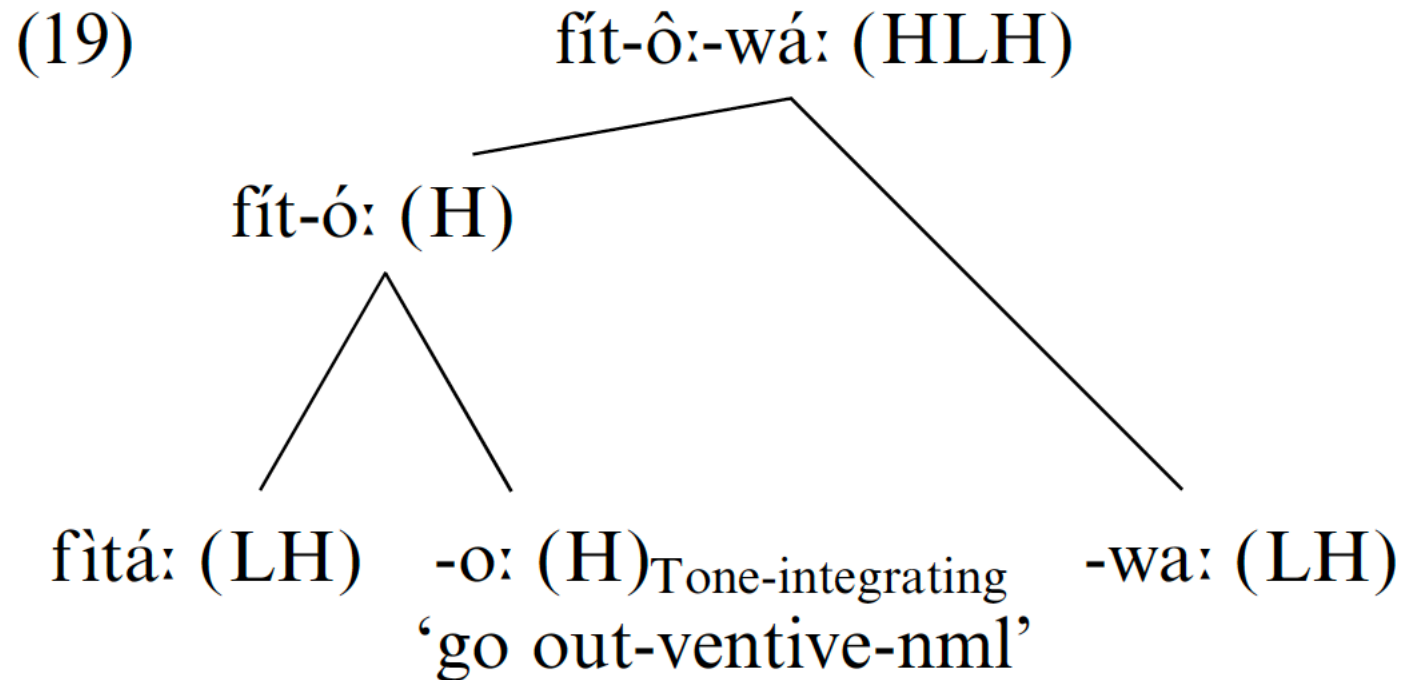
'read'

What are the tones when we add the ventive, then nominalize?

fit-o:-wa:



# Cophonologies in Hausa



- A theory where phonological effects are only loosely associated with morphology doesn't make these ordering predictions

# Cophonologies in Hausa

- Ventive -o: **replaces** stem tones with H

fítá: (LH)  
'go out'

fít-ó: (H)  
'come out'

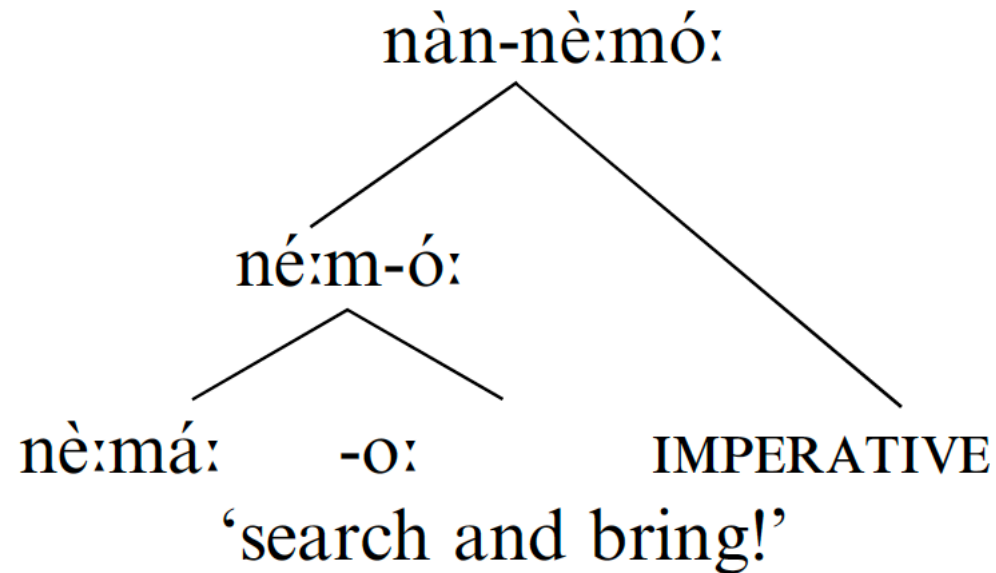
- Imperative: **replaces** stem tones with LH

táshì (HL)	-->	tàshí (LH)	'get up'
kàràntá: (HLH)	-->	kàràntá: (LLH)	'read'

How about the imperative of the ventive form of *nè:má:* (LH) 'seek'?

# Cophonologies in Hausa

(ignore the prefixal reduplicant)



- Again, phonology is sensitive to the ordering of the morphology, not just its presence

# Summary

- Cophonologies formalize the independent need for multiple phonologies, and extend the same idea to morphophonology
- Each phonology refers just to sounds, but is embedded within a morphological construction
- No division between word-formation processes and "associated" phonology
- Cophonologies make specific predictions about morphologically complex words