

The Division of Labor between Segment-internal Structure and Violable Constraints

Freedom of Analysis Workshop

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What?

This talk will present a proposal/vision for what the general structure of a “reasonable” but complex constraint-based phonological grammar might look like

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What?

It will address a range of conceptual and practical issues, including:

- Featural, representational and constraint economy
- Representation versus evaluation
- The line between phonetics and phonology
- Structure preservation
- Categorical perception
- Full-specification versus minimal/contrastive specification
- Richness-of-the-Base
- Infinite candidate set
- Universality of constraints
- The lexicon
- Acquisition

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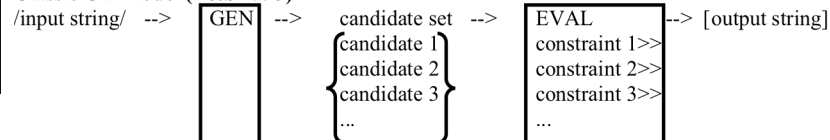
Part I

Conceptual

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Classic OT

Classic OT Model (P&S 1993)



- *Theory of Computation*
- Used extensively in the field of phonology
- Simple and elegant on the surface
- Complicated beneath the surface
- A problem in the literature is that differences in implementing OT are not explicit

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I suggest that:

- The world of “phonology” is both narrower and broader than is usually discussed
- It is partially a lack of concrete assumptions (theories) that is to blame for some of the current confusion in the phonological literature (on OT)

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To help clarify things, I will...

- Present a brief overview of some issues with OT/phonology
- Propose a concrete set of possible roads to follow in search of the “truth” about the phonological grammar

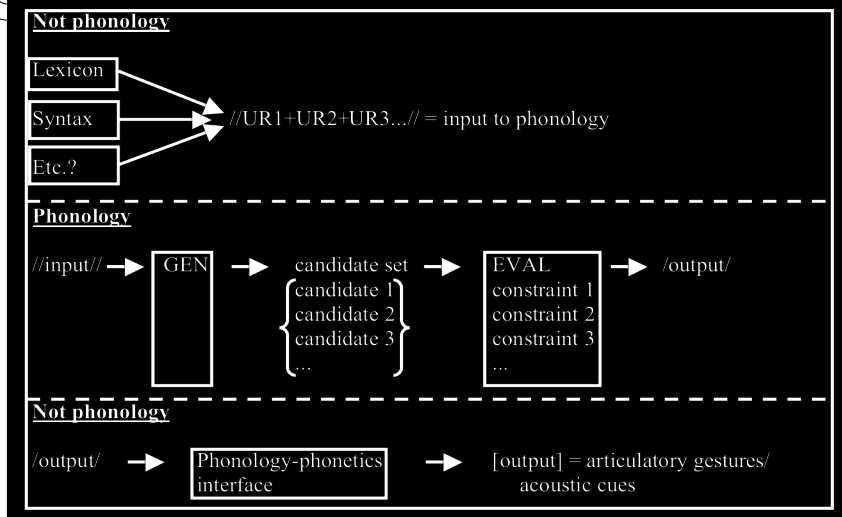
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What is phonology?

- I distinguish between *phonological competence* and what is grammatical in some other sense, i.e. *phonological performance*
- The phonology is a means of building, manipulating and evaluating abstract representations that are for the most part devoid of morphological and phonetic content (substance-free, Hale and Riess 2000)

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A more articulated “phonology”



What is the Lexicon?

Stored items that are NOT composed productively, e.g.

- Phonological material (features, etc.)
- Grammatical category information (noun, etc.)
- Grammatical features (gender, etc.)
- Encyclopedic material (tail, etc.)

Different bits of lexical information are used by different parts of the grammatical/ conceptual system

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What is Syntax?

A computational system by which morpho-syntactic constituents are built/evaluated (minimally)

Morpho-syntactic constituents are submitted to the phonology

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What is the Phonological Input?

Abstract morpho-phonological representations, i.e. phonological and morphological elements that interact with the phonological grammar

Not tied to phonetic implementation, i.e. substance-free
(explicitly not Exemplar Theory)

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What is the Phonological Input?

There are at least four ways to conceive of a substance-free input:

- Option 1 - Unrestricted (non-linguistic)
- Option 2 - Maximal (competence)
- Option 3 - Minimal (performance)
- Option 4 - Economical (performance)

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Phonological Input - Option 1

Unrestricted (non-linguistic)

- Anything (linguistic and non-linguistic), e.g. a meow, a banana, [labial], etc.

I dismiss this option because I believe the grammar manipulates linguistic elements

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Phonological Input - Option 2

Maximal (competence)

- Any configuration of universally available morpho-phonological elements (perhaps only universally available configurations)

This is the strong hypothesis and should be the starting assumption

- Assumed by Classic OT

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Phonological Input - Option 2

Maximal (competence)

- The only restriction is that it is morpho-phonological
- Richness-of-the-Base - a statement about *competence*, not *performance*
- The lexicon is separate from computational phonology, so URs and Lexicon Optimization are irrelevant

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Phonological Input - Option 2

Maximal (competence)

To step away from the strong hypothesis:

- Is to step toward phonological performance
- Requires a substantive *Theory of the Lexicon*, otherwise we are just stipulating inputs

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Phonological Input - Option 3

Minimal (performance)

- Non-redundant/unpredictable morpho-phonological features/structures for which there is overt, positive evidence
- Language-particular under-specification option
- I prefer this as a model of performance

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Phonological Input - Option 4

Economical (performance)

- All surface morpho-phonological features/structures for which there is overt, positive evidence
- Language-particular full-specification option

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Phonological Input - Summary

If we are concerned about modeling *morpho-phonological competence* (divorced from real language data and other grammatical/conceptual systems), then

- Richness-of-the-Base is vital (without a principled way to restrict the input)
- Lexicon Optimization is irrelevant
 - A statement of about acquisition and lexical storage, NOT about morpho-phonological computation

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What is GEN?

A function that produces a set of possible outputs

When asking about GEN, we are really asking what the morpho-phonological candidate set is

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What is the Candidate Set?

There are at least four ways to conceive of a the candidate set:

- Option 1 - Unrestricted (non-linguistic)
- Option 2 - Maximal
- Option 3 - Minimal
- Option 4 - Economical

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Candidate Set - Option 1

Unrestricted (non-linguistic)

- Anything (linguistic and non-linguistic), e.g. a meow, a banana, [labial], etc.

I dismiss this option because I believe the grammar manipulates linguistic elements

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Candidate Set - Option 2

Maximal

- Any configuration of universally available morpho-phonological elements

Without a *Theory of Representations*, this is the strong hypothesis and should be the starting assumption

- Assumed by Classic OT

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Candidate Set - Option 3

Minimal

- Only language-particular configurations of universally available morpho-phonological elements

I will suggest later that the output of GEN is necessarily language-particular along some dimensions if we assume a certain type of *Theory of Constraints*

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Candidate Set - Option 4

Economical

- All universally available configurations of morpho-phonological elements

With a substantive *Theory of Representations*, this is the strong hypothesis

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What is EVAL?

Evaluates sets of candidates with respect to one another and the input via a hierarchy of ranked, violable constraints (CON)

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What are the Constraints?

There are at least four ways to conceive of a the constraint set:

- Option 1 - Unrestricted (non-linguistic)
- Option 2 - Maximal
- Option 3 - Minimal
- Option 4 - Economical

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Constraint Set - Option 1

Unrestricted (non-linguistic)

- Anything (linguistic and non-linguistic) is a constraint

I dismiss this option because I believe the grammar manipulates linguistic elements

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Constraint Set - Option 2

Maximal

- All constraints are universal (and only make reference to morpho-phonological structures)

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Constraint Set - Option 2

Maximal

Without a *Theory of Constraints*

- The strong hypothesis should be the starting assumption
- Assumed by Classic OT

Otherwise, we are stipulating language-particular constraints without a mechanism to derive or restrict them

I will propose part of a *Theory of Constraints* that is consistent with options 3 and 4

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Constraint Set - Option 3

Minimal

- Constraints are built from universally available primitives, on a language-particular basis, from overt, positive evidence

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Constraint Set - Option 4

Economical

- Constraints are built from universally available primitives, on a language-particular basis, from overt, positive evidence
- There is propagation across constraint families

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What is CON?

In Classic OT, THE most important questions are:

- What is the set of *universal* constraints?
- How are they ranked in a given language?

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What is CON?

Unfortunately, rather than setting up a *Theory of Constraints*, most researchers simply make up sets of constraints to solve particular language puzzles they are working on and often *do not concern themselves with the conceptual, formal or typological validity of their constraints*

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What is CON?

While such a laissez-faire attitude is fine as a place to explore the range of constraints one might need...

... a *Theory of Constraints* is vital to give OT phonology credibility/explanatory power

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What is CON?

The closest we seem to be to a *Theory of Constraints*:

- The adoption of constraints that only refer to established morpho-phonological constituents
- “Families” (e.g. Correspondence Theory, Generalized Alignment, Positional Faith)
- Naturalness (e.g. Phonetic grounding)
- Restricted combinations (e.g. Conditions on Local Conjunction)

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What is the Phonological Output?

Phonology literature includes a dramatic range of:

- Structures
- Morphological information
- Phonetic information

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What is the Phonological Output?

If we assume a fairly substance-free phonology, the output is a set of abstract structures with a minimum of morphological and phonetic information

The phonetics-phonology interface maps abstract phonological structures to articulatory gestures/perceptual cues

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Why a Substance-free Output?

1. Signed languages challenge any theory of universal features based on detailed articulatory gestures and/or acoustic cues
 - Segmental phonology is consistent across modalities
 - There are more articulators (and their combinations) used in signed languages

This suggests that the phonological system is more abstract and combinatorial than usually assumed

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Why a Substance-free Output?

2. The same phonological representation can have different phonetic realizations
 - In different phonetic contexts within a language (e.g. Articulatory overlap)
 - Across languages

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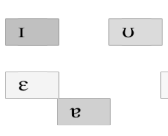
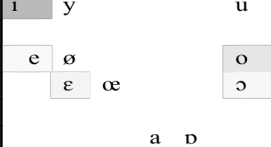
Why a Substance-free Output?

3. The same (or very similar) phonetic realization can map to different phonological representations depending on the contrastive segment inventory of the language

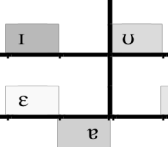
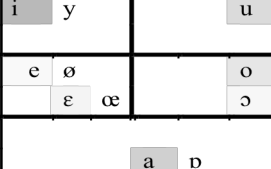
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Illustration: Vowel Systems (ignoring length and nasalization)

Colors indicate phonetic identity

Yiddish	French
	

Colors indicate possible phonological identity

Yiddish	French
	

Summary

1. Classic OT is a simple and elegant *computational system* that assumes the strongest hypotheses with respect to:
 - The input (Richness-of-the-Base)
 - The candidate set (unrestricted)
 - The constraint set (universal)

Summary

2. Many criticisms of Classic OT are correct in that they call for (minimally) a:

- *Theory of the Lexicon*
- *Theory of Representation*
- *Theory of Constraints*

However, these criticisms are fairly empty in not providing viable alternatives/theories

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Summary

3. If we *only* assume a model of morpho-phonological *competence*:

- Richness-of-the-Base is vital
- The exact nature of the underlying representations is irrelevant
- Lexicon Optimization is irrelevant

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Summary

4. Given an acknowledged lack of parity between phonological structure and phonetic realization:
 - It is prudent to assume a fairly substance-free phonology
 - Phonetics-phonology interface maps between abstract phonological structures and articulatory gestures/perceptual cues

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Background: Toward a *Theory of Representation*

The Parallel Structures Model
(Morén 2003, etc.)

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The Parallel Structures Model

This is a synthesis of:

- Sound Patterns of English (Chomsky and Halle 1968)
- Clements' Feature Geometry (1985)
- Clements' Place Model (1991a)
- Clements' Height Model (1991b)
- Steriade's Aperture Model (1993a, b, c, 1994)
- Particle Phonology (Schane 1984)
- Element Theory (Harris and Lindsey 1995)
- Dependency Phonology (Anderson and Ewen 1987)

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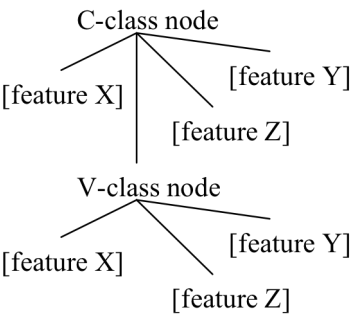
The Parallel Structures Model

- Makes use of structural and featural economy to the greatest extent possible
- Eliminates a large number of features from the grammar
- Provides a unified analysis for
 - Consonants and vowels
 - Place and manner (and laryngeal)
- Captures
 - Consonant-vowel interactions
 - Consonant-vowel alternations
 - Consonant-vowel harmony asymmetries

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The Parallel Structures Model

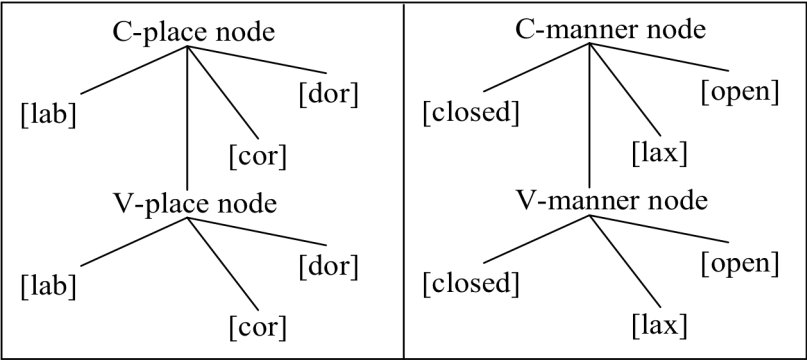
Phonological segments are composed of a limited set of identical structures and a limited set of privative (articulator-based) features



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The Parallel Structures Model

Minimally, there are place and manner features



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The Parallel Structures Model

Assumes an economical view of the grammar

- More complex structures are necessarily built from less complex primitives/structures

This assumption can be mirrored in the building of more complex constraints from less complex primitives/ constraints

- Has an impact on segment categorization
- Has an impact on the *Theory of the Lexicon*
- Has an impact on the *Theory of Representation* (i.e. GEN)

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Background: Toward a *Theory of Constraints*

Building Segments/Inventories
(a modest proposal)

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Building Segments/Inventories

Most OT analyses do not:

- Motivate the feature specifications they assume
- State the mechanism to capture segment inventories

Rather, they:

- Assume particular (usually fully-specified) bundles of SPE-like binary features without questioning the cross-linguistic or language-particular validity of those features

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Building Segments/Inventories

I suggest:

- We return to pre-OT habit of justifying features and segmental structures
- We worry about how contrastive segments/inventories are captured in a constraint-based grammar
- This has interesting consequences for:
 - *Theory of the Lexicon*
 - *Theory of Representation*
 - *Theory of Constraints*

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Building Segments/Inventories

Before moving on, I assume:

- The Parallel Structures Model
- Correspondence Theory (M&P 1995) in which features are treated as autosegments, not attributes
- Feature constraints make reference to both class node and feature specification
- The grammar uses local conjunctions of primitive constraints to form more complex constraints, e.g...

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Building Segments/Inventories

***C-manner[closed]**

The C-manner[closed] configuration is prohibited

MAXC-manner[closed]

Every C-manner[closed] in the input has a correspondent in the output (don't delete)

DEPC-manner[closed]

Every C-manner[closed] in the output has a correspondent in the input (don't add)

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Building Segments/Inventories

Local Conjunction (Smolensky 1997)

The local conjunction of C1 and C2 in domain D, C1&C2, is violated when there is some domain of type D in which both C1 and C2 are violated

***C-manner[closed]&*V-manner[closed]**

Is violated when *C-manner[closed] and *V-manner[closed] are violated by the same segment

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Part II

Implementation
and

~~Refinement~~

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Hawaiian - Consonants, Dispersion and Allophony

Impoverished surface consonant inventory

Phonetic descriptions of 11 surface consonants

	Bilabial	Dental-alveolar	Alveolar	Velar	Glottal
Stop	[p]		[t]	[k]	[ʔ]
Fricative	[v]				[h]
Nasal stop	[m]	[n]			
Lateral			[l]		
Rhotic			[[r]]		
Glide	[w]				

Note: the rhotic is a very limited dialectal variant.

Hawaiian - Consonants, Dispersion and Allophony

Fewer contrastive consonants and more unusual inventory

Phonetic descriptions of 8 contrastive consonants

	Bilabial	Dental-alveolar	Alveolar	Velar	Glottal
Stop	[p]			[k]~[t]	[ʔ]
Fricative					[h]
Nasal stop	[m]	[n]			
Lateral			[l](~[r])		
Glide	[w]~[v]				

Hawaiian - Consonants, Dispersion and Allophony

Bilabial glide allophony [w]~[v] varies in amount of rounding by speaker, speech rate and context

- *Tends* to be more rounded after round vowels
- *Tends* to be less rounded after unrounded non-low vowels
- *Either* word-initially or following [a]

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Hawaiian - Consonants, Dispersion and Allophony

Lateral allophony [l]~[r]

- Ni'ihau speakers sometimes produce "r" in fast speech

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Hawaiian - Consonants, Dispersion and Allophony

Velar stop allophony [k]~[t]

- Some speakers *randomly* produce [t]
- Some speakers *tend* to produce [t] in fast speech following [i]

It is clear that the contrastive segment is velar

- Striking because there are no typical coronal obstruents in the language
- A puzzle for the hypothesis that the unmarked place of articulation is [cor]

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Hawaiian - Consonants, Dispersion and Allophony

Phonetic dispersion:

- 5 places used for only 8 consonants
- 3 places have only 1 consonant each
- Less-sonorous tend to be towards the rear of the vocal tract
- More-sonorous tend to be toward the front of the vocal tract

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Hawaiian - Consonants, Dispersion and Allophony

Phonetic dispersion:

- 5 manners used for only 8 consonants
- 3 manners have only 1 consonant each

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Hawaiian - Consonants, Dispersion and Allophony

Major question:

- Do we need 10 features to contrast only 8 consonants?
- What are the phonological features for each consonant?

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Hawaiian - Consonant Phonological Processes

Has no documented phonological processes involving consonants

- We might expect this from a language with no adjacent consonants

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Hawaiian - Vowels, Dispersion and Allophony

Typical 5-vowel system (ignoring length)

Phonetic descriptions of 5 surface vowels

	Front	Central	Back/ Round
High	[i]		[u]
Mid	[e]		[o]
Low		[a]	

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Hawaiian - Vowels, Dispersion and Allophony

Phonetic dispersion:

- 4 places and 3 heights used for only 5 vowels
- Front-back contrast captured using both tongue position and lip rounding
- Low vowel is central
 - There is no front-back contrast
 - More distinct from non-central

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Hawaiian - Vowels, Dispersion and Allophony

Major question:

- Do we need 7 features to contrast only 5 vowels?
- What are the phonological features for each vowel?
- (17 features for only 13 segments?)

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Hawaiian - Vowel Phonological Processes

Has no documented phonological processes involving vowels (ignoring length)
However, the first vowel of a diphthong must be lower than the second

Diphthongs

		Second V (unstressed)				
		i	u	e	o	a
First V (stressed)	i					
	u					
	e	ei	eu			
	o	oi	ou			
	a	ai	au	ae	ao	

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Hawaiian - Representational Analysis

Given the limited inventory and paucity of interactions/alternations, we might expect:

- A very limited and economical set of features and structures

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Hawaiian - Representational Analysis

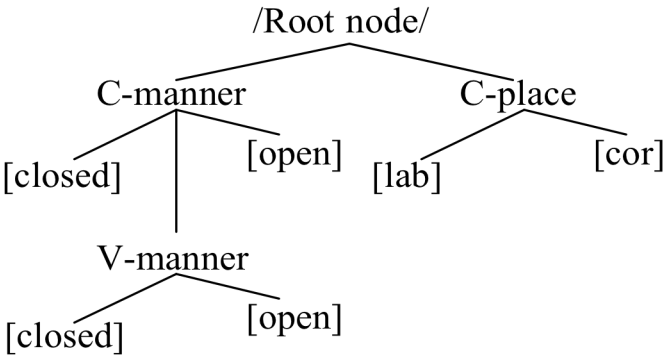
Hawaiian segments defined by PSM features

			C-place		C-manner		V-manner	
			[lab]	[cor]	[closed]	[open]	[closed]	[open]
Mannerless	/w/	[w]~[v]	✓					
	/l/	[l]~[r]		✓				
Stop	/ʔ/	[ʔ]			✓			
	/p/	[p]	✓		✓			
	/t/	[k]~[t]		✓	✓			
Stop+	/n/	[n]			✓	✓		
Continuant	/m/	[m]	✓		✓	✓		
Continuant	/h/	[h]				✓		
High	/i/	[i]					✓	
	/u/	[u]	✓				✓	
High+	/e/	[e]					✓	✓
Low	/o/	[o]	✓				✓	✓
Low	/a/	[a]						✓

Note: Shaded cells indicate segments composed of only a single feature, including mannerless and placeless segments.

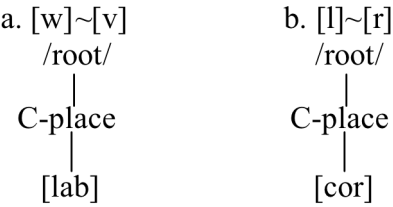
Hawaiian - Representational Analysis

Hawaiian PSM Geometry



Hawaiian - Representational Analysis

Mannerless simple place segments



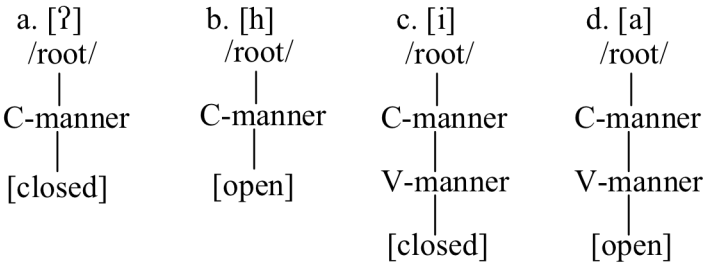
The phonetic variation in [w]~[v] and [l]~[r] is explained by their lack of closure features

- Closure realization can vary freely or by phonetic context

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Hawaiian - Representational Analysis

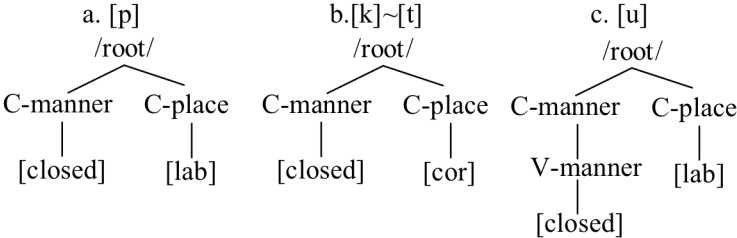
Placeless simple manner segments



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Hawaiian - Representational Analysis

Simple manner with simple place segments.



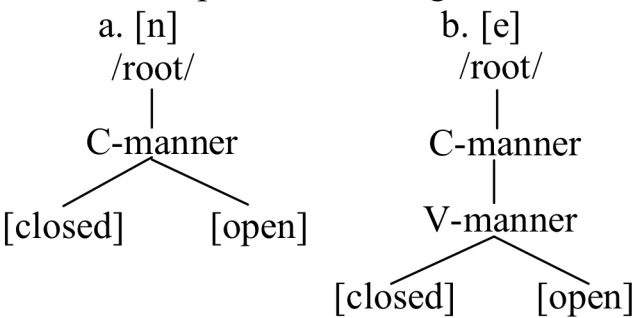
With no sub-distinctions using the tongue as an active articulator, the tongue dorsum makes as good a “coronal” as the tongue blade

The allophony is explained via substance-free phonology and language-particular phonetics-phonology mapping, e.g. [cor] ≈ ‘raise the tongue’

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Hawaiian - Representational Analysis

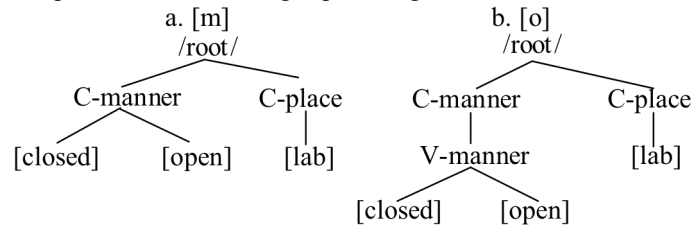
Placeless complex manner segments



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Hawaiian - Representational Analysis

Complex manner and simple place segments



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Hawaiian - Representational Analysis

Summary

- PSM provides a simple account of the phonetic and phonological behavior of Hawaiian segments
- Phonological features cannot be read off of static phonetic descriptions
- Segment behavior determines:
 - Phonological feature specification
 - Phonetics-phonology mapping

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Hawaiian - Representational Analysis

Summary

- The lack of contrastive dental/alveolar/palatal obstruents and the unusual [k]~[t] free variation is:
 - Difficult to account for using 1:1 mapping between features and phonetics
 - Straightforward using more abstract features and language-particular mappings

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Hawaiian - OT Analysis

Simple Contrastive Segments

Hawaiian has six segments composed of only a single feature:

/w/ MAXC-place[lab] >> *C-place[lab]

/l/ MAXC-place[cor] >> *C-place[cor]

/ʔ/ MAXC-manner[closed] >> *C-manner[closed]

/h/ MAXC-manner[open] >> *C-manner[open]

/i/ MAXV-manner[closed] >> *V-manner[closed]

/a/ MAXV-manner[open] >> *V-manner[open]

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Hawaiian - OT Analysis

Simple Contrastive Segments

//C-manner[open]//	//h//	MAX C-manner[open]	*C-manner[open]
--> a.	C-manner[open] /h/		*
b.	---	*!	

//V-manner[open]//	//a//	MAX V-manner[open]	*V-manner[open]
--> a.	V-manner[open] /a/		*
b.	---	*!	

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Hawaiian - OT Analysis

Non-contrastive Features

The Classic OT way to prohibit features from surfacing is to rank markedness constraints above faithfulness constraints, e.g.:

*C-place[pharyn] >> MAXC-place[pharyn]

//C-place[pharyn]//	*C-place[pharyn]	MAX C-place[pharyn]
a.	C-place[pharyn]	*!
--> b.	---	*

However, this strategy *will not work if we assume a substance-free phonology* because non-contrastive features are not available without overt, positive evidence

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Hawaiian - OT Analysis Toward a *Theory of Constraints*

Proposal:

- Featural markedness constraints are developed as part of the acquisition process
 - Contrastive acoustic/visual signals are detected in the speech stream
 - These are mapped to abstract phonological features
 - This triggers a set of constraints referring to those features
 - At some point, the abstract features are mapped to articulatory coordinations

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Hawaiian - OT Analysis Toward a *Theory of Constraints*

This is a major departure of Classic OT,
which assumes universal constraints

It has serious and restricting consequences
for:

- The input (*Theory of the Lexicon*)
- GEN (*Theory of Representations*)
- CON (*Theory of Constraints*)

Only language-particular features/segments
are present in the grammar

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Hawaiian - OT Analysis Toward a *Theory of Constraints*

Additional consequences/support(?):

- Categorical Perception
- Structure Preservation
- Evaluation of undefined segments:

//C-manner[closed]// //ʔ//		MAX C-manner[closed]	*C-manner[closed]
--> a.	C-manner[closed] /ʔ/		*
--> b.	C-manner[closed] /ʔ/ C-place[pharyn]		*
c.	---	/ /	*!

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Hawaiian - OT Analysis Complex Contrastive Segments

As simple feature markedness constraints are acquired, they are made available to the grammar and can be combined to form more complex constraints

- Hawaiian uses 6 simple feature constraints
- Two at a time: $6C2 = 6!/2!(6-2)! = 15$ possible 2nd order segments/constraints
- Only 5 are used

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Hawaiian - OT Analysis

Complex Contrastive Segments

Hawaiian has five segments composed of two features:

- /p/ MAXC-place[lab], MAXC-manner[closed] >>
*C-place[lab]&*C-manner[closed]
- /k/ MAXC-place[cor], MAXC-manner[closed] >>
*C-place[cor]&*C-manner[closed]
- /n/ MAXC-manner[closed], MAXC-manner[open] >>
*C-manner[closed]&*C-manner[open]
- /u/ MAXC-place[lab], MAXV-manner[closed] >>
*C-place[lab]&*V-manner[closed]
- /e/ MAXV-manner[closed], MAXV-manner[open] >>
*V-manner[closed]&*V-manner[open]

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Hawaiian - OT Analysis

Complex Contrastive Segments

//C-place[lab] C-manner[closed]//		//p//	MAX C-place [lab]	MAX C-manner [closed]	*C-place [lab]& *C-manner [closed]	*C-place [lab]	*C-manner [closed]
-->	a. C-place[lab] C-manner[closed]	/p/			*	*	*
	b. C-place[lab]	/w/		*!		*	
	c. C-manner[closed]	/ʔ/	*!				*
	d. ---	/ /	*!	*!			

Note: there is no need to stipulate that the local conjunction is higher-ranked than the simple constraints

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Hawaiian - OT Analysis

Complex Contrastive Segments

Hawaiian uses 2/20 possible segments composed of three features:

- /m/ MAXC-manner[closed], MAXC-manner[open],
MAXC-place[lab] >>
*C-manner[closed]&*C-manner[open]&*C-place[lab]
- /o/ MAXV-manner[closed], MAXV-manner[open],
MAXC-place[lab] >>
*V-manner[closed]&*V-manner[open]&*C-place[lab]

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Hawaiian - OT Analysis

Complex Contrastive Segments

//V-manner[closed] V-manner[open] C-place[lab]//		MAX V-manner [closed]	MAX V- manner [open]	MAX C-place [lab]	*V-manner[closed]& *V-manner[open]& *C-place[lab]
--> a.	V-manner[closed] /o/ V-manner[open] C-place[lab]				*
b.	V-manner[closed] /e/ V-manner[open]			*!	
c.	V-manner[closed] /u/ C-place[lab]		*!		
d.	V-manner[open] C-place[lab]	*!			

Note: the last “candidate” is not a possible output of GEN under this analysis because this language does not allow this combination of features

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Hawaiian - OT Analysis

Summary Ranking

Feature co-occurrence markedness constraints
define the categorical segments of the language

Their ranking with respect to other constraints
determines the surface distribution of those
segments

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Hawaiian - OT Analysis

Summary Ranking

3rd order feature
markedness
constraints

2nd order feature
markedness
constraints

1st order feature
markedness
constraints

MAXC-place[lab], MAXC-place[cor],
MAXC-manner[closed], MAXC-manner[open],
MAXV-manner[closed], MAXV-manner[open]
>>
*C-manner[closed]&*C-manner[open]&*C-place[lab],
*V-manner[closed]&*V-manner[open]&*C-place[lab],
 *C-place[lab]&*C-manner[closed],
 *C-place[cor]&*C-manner[closed],
 *C-place[lab]&*V-manner[closed],
 *C-manner[closed]&*C-manner[open],
 *V-manner[closed]&*V-manner[open],
 *C-place[lab],
 *C-place[cor],
 *C-manner[closed],
 *C-manner[open],
 *V-manner[closed],
 *V-manner[open]

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Hawaiian - Summary

- Explored the sound patterns of Hawaiian
- Proposed an economical set of feature specifications for individual segments
- Proposed a constraint-based account of the inventory facts

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Hawaiian - Summary

- The simplicity of the Hawaiian system makes it a perfect testing ground for hypotheses regarding:
 - Phonological features
 - Segment-internal economy
 - Phonetic and phonological dispersion
 - Phonetics-phonology mapping

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Hawaiian - Summary

- The data suggest that both consonant and vowel inventories are subject to phonetic dispersion
- Assuming a substance-free phonology, we are forced to assume that features are acquired via overt, positive evidence - they are not universal
- This severely restricts the input, the candidate set and the constraint set

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Conclusions

Two main parts:

- Conceptual
- Practical/applied

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Conclusions

Conceptual

- Reviewed the Classic OT model
- Discussed several criticisms as a model of phonology
- Suggested that without Theories of the *Lexicon*, *Representation* or *Constraints*, we are obliged to assume:
 - Richness-of-the Base
 - Unrestricted candidate set
 - Universal set of constraints

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Conclusions

Conceptual

- Suggested that phonology is substance-free
 - Phonetic details are not universally encoded in phonological features (supported by signed and spoken language research)
- We are endowed with a universal set of abstract phonological primitives that combine and map to phonetics during the acquisition process
- This results in language-particular restrictions on:
 - The input/lexicon
 - The candidate set
 - The constraint set

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Conclusions

Practical/implementation

- Showed that integrating an economical and highly restrictive model of segmental-internal structure into OT is possible
 - Introduced the basics of the Parallel Structures Model
 - Applied the PSM to the Hawaiian segment inventory
 - Incorporated the representational analysis of the Hawaiian into a constraint-based account

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Conclusions

We should not throw OT out simply because it is a *Theory of Computation* that provides no explicit *Theory of the Lexicon*, *Theory of Representation* or *Theory of Constraints*

Rather, we should make use of its architectural simplicity and strong hypotheses to work toward a more adequate model of phonology

- Developing a *Theory of Representation* and *Theory of Constraints*
- Considering how the two might interact

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The Division of Labor between Segment-internal Structure and Violable Constraints



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