

1. Assignments

- ## 2. Where we are

- ### 3. Today

- ## 4. Coming up

- ## SUMMING UP THE KIPARSKIAN SCHAFFHAUSEN-KESSWIL EXAMPLE

5. Everything is ok

- ## 6. Diagram showing how Paradigm Uniformity increased gradiently

Kesswill (innovating)

$$y \leftarrow u$$
$$\emptyset \longleftarrow 0$$

œ ← ɔ (allophone)

7. The Kiparskian rule ordering account

Schaffhausen

/bogə/-plural	/bodə/-plural	/bodə/-sg.	UR's
ø	ø	—	Umlaut in plurals
—	—	ɔ	Lowering of /o/ before coronals

Kesswil

/bogə/-plural	/bodə/-plural	/bodə/-sg.	UR's
—	ɔ	ɔ	Lowering of /o/ before coronals
ø	œ	—	Umlaut in plurals

☞ Characterize this in terms of opacity, feeding/bleeding etc.

8. Creation of new “phonemes” by Umlaut: this is not the only time this happened

- Standard German permits two pronunciations of the vowel that is the Umlaut of /a/.
 - A *lautgesetzlich*¹ one, reflecting the fact that the original version of the sound change *raised* [a] to [ɛ] (naturally enough, since the trigger was normally an [i]).
- Conservative dialect

<i>Phonemic form</i>	<i>Surface form of base</i>	<i>Umlauted (surface) form</i>
/naxt/	[naxt] 'night'	[nɛxt-ə] 'nights'
/bet/	[bet] 'bed'	

- Innovating dialect

<i>Phonemic form</i>	<i>Surface form of base</i>	<i>Umlauted (surface) form</i>
/naxt/	[naxt] 'night'	[næxt-ə] 'nights'
/bet/	[bet] 'bed'	

- Where [bet] demonstrates that this is not a sound change of [ɛ]-lowering.

¹ = “as expected under the sound laws”, “the expected result of regular sound change”. *Laut* = ‘sound’, *Gesetz* ‘law’, *-lich* = ‘-ly, -like’

9. A puzzle for me

- Standard German has a “branch” of Umlaut that isn’t fronting:
 - /au/ umlauts as [ɔɪ] or [ɔy], spelled *äu*.
 - I believe this reflects the modern reflexes of a historical alternation like /u:/ → [y:].
- If the relevant dialects had this, it’s a little puzzling that children apprehended the alternation so strongly as fronting.
- Perhaps the origin of standard [æ] and Kesswil [œ] took place at a time when Umlaut was a cleaner process.

10. This was first done by Kenstowicz

- Kenstowicz, Michael (1996). Base identity and uniform exponence: Alternatives to cyclicity. In J. Durand, & B. Laks (Eds.) *Current trends in phonology: Models and methods*. (pp. 363-394). Salford, Manchester: European Studies Research Institute, University of Salford.

THE PRINCIPLE OF PHONOTACTIC LIBERALITY IN PARADIGM UNIFORMITY

11. Trying to express the principle

- If you inspect the inventory of monomorphemic forms, you will get a rather strict phonotactics.
- But when forms occur in paradigms, a wider variety of legal forms emerges.

12. Sources of richer phonotactics in paradigms

- Suppressed phonology
 - like 'monitoring, not *mo'nitoring
- Overapplied phonology, like su₁blimi'nality
- Mere concatenation, like
 - “Hello, my name is Bill *[trɛbd]. I and all the other *[trɛbdz] are very pleased to meet you.”
 - Yet: *rubbed, dubbed, ribbed*, etc.
 - ☞ What constraints could account for this pattern, including Paradigm Uniformity?
 - ☞ More generally, what is the ranking (or weighting) schema that gives rise to richer phonotactics in paradigms?

13. An example from the urtext of Paradigm Uniformity in OT

- Laura Benua (1997) *Transderivational Identity: Phonological Relations between words*. U. Mass dissertation.

- Epenthesis:

- Generally, words in Tiberian Hebrew do not end in consonant clusters.
- There are a tiny number of lexical exceptions,
- plus a larger class of systematic exceptions.

- Example:

Epenthesis in Tiberian Hebrew is demonstrated in (85) with the monomorphemic word [sēφer] ‘book’, which is related to the input root /sɪpr/ (compare [sɪφrɪ] ‘my book’, in which the root’s consonant cluster surfaces intact in a heterosyllabic parse).

- Jussives are formed by final vowel loss from imperfective base, yet often there is no epenthesis:

Jussive Truncation

	<u>Imperfective</u>	<u>Jussive</u>	
a.	yiš.bē	yišb	'take captive'
	yiφ.tē	yiφt	'be simple'
	yēš.te	yēšt	'drink'
	yēβ.ke	yēβk	'weep'
	yiš.ṭe	yēšt	'drink'
	yaš.qe	yašq	'cause to drink'
b.	yiγ.lē	yi.γel	'uncover'
	yiβ.ne	yi.βen	'build'
	tiφ.nē	tē.φen	'turn'
	yiβ.zē	yi.βez	'despise'
	yiš.ʕē	yi.šaf	'gaze'
	not attested	yi.ħad	'rejoice'

- ☞ What is the ranking of

- *CC]
- DEP-IO(V)
- DEP-OO(V)

14. Another Benuavian example

- [lær] is ok in some dialects of English, but only as the truncated hypocoristic for *Larry* ['læri].
- IDENT-OO(low) >> *ær]σ >> IDENT-IO(low)

15. Extreme cases

- Nilotic languages, and sign languages, often have extravagantly richer phonotactics in inflected forms. [xxx add refs.]

WHAT PHONOLOGICAL PROPERTIES TO BE OO-FAITHFUL TO?

16. Background

- IO-correspondence defines phonemicity.
 - Any IO-Faith constraint that accessed a non-phonemic property would have to be ranked very low to produce an adequate grammar.
- In OO-correspondence, we are not as limited on what we can be Faithful to.
 - We will see that this give rise to “quasi-phonemic” effects.

17. Faithfulness to syllable position

- It is widely but not universally believed that there is no IO-faithfulness to syllabification.
 - E.g. /V.CV/ vs. /VC.V/
 - See however Clements, G. N. Syllabification and Epenthesis in the Barra. *The Phonological Representation of Suprasegmentals: Studies on African Languages Offered to John M. Stewart on his 60th Birthday* 4 (2016): 317.
- More generally (beyond OT): syllabification not phonemic.

18. OO-Faithfulness to syllable position in Spanish diminutives

- Refs:
 - Kenstowicz, Michael. 2002. Paradigmatic uniformity and contrast. MIT Working Papers in Linguistics 42:141–163.
 - Kenstowicz, Michael. 2005. Paradigmatic uniformity and contrast. In *Paradigms in phonology*, eds. Laura Downing, T. Alan Hall, and Renate Raffelsiefen, 145–169. Oxford: Oxford University Press.
 - Agüero-Bautista, Calixto. (1998). Cyclic and identity effects in Spanish diminutives and augmentatives. Unpublished Phonology Generals paper, MIT. [not seen, cited by Kenstowicz]

a.	amor	amor-sit-o	'love'
	balkon	balkon-sit-o	'balcony'
	limon	limon-sit-o	'lemon'
b.	koron-a	koron-it-a	'crown'
	libr-o	libr-it-o	'book'
	bark-o	bark-it-o	'ship'
	cokolat-e	cokolat-it-o	'chocolate'
	lava-dor-a	lava-dor-it-a	'washing machine'
	seca-dor-a	seca-dor-it-a	'dryer'

- Assume that *-sit-* and *-it-* are freely insertable allomorphs of the same morpheme.
 - See large literature, e.g. Mascaró, on harmonic choice of lexically-listed allomorphs.
- It can be seen that the deployment of these allomorphs maintains the syllabification of the base form
- No ranking needed, as far as I can tell; but Spanish diminutives can be much more complicated, and dialect-specific.

19. A curious wrinkle for forms that come in masculine and feminine versions

- This differ in the choice of null vs. *-a* for theme vowel.
- Feminines and their diminutives look like they mismatch:

rat-on-a	rat-on-sit-a	'mouse'
ladr-on-a	ladr-on-sit-a	'thief'
yoron-a	yoron-sit-a	'cry baby'
mandon-a	mandon-sit-a	'bossy' f.
trabaja-dor-a	trabaja-dor-sit-a	'worker' f.

- Crazy suggestion: The base of the feminine diminutive must be the masculine form:

rat-on	rat-on-sit-o	'mouse' m.
ladr-on	ladr-on-sit-o	'thief' m.
yoron	yoron-sit-o	'cry-baby' m.
mandon	mandon-sit-o	'bossy' m.
trabaja-dor	trabaja-dor-sit-o	'worker' m.

➤ ☞ Suggest an alternative way to do the bases.

PARADIGM UNIFORMITY AND SUBPHONEMIC DISTINCTIONS

20. An example pointed out by Kiparsky from Leonard Bloomfield's *Language* (1933)

p. 366: "In the Central-Western type of American English, ..."

- [ǣ] is a plain allophone in some environments: / ____ rp, rk
dark, sharp
 ['dǣrk], ['ʃǣp]
- also, "before the clusters [rd, rt] followed by "primary suffix" [-ǣ, -ŋ]"
barter, Carter, garden, marten (Martin)
 ['bǣrǣ], ['kǣrǣ], ['gǣrdŋ], ['mǣrtŋ]
- "Before a secondary suffix [-ǣ, -ŋ], however, the longer variant is used, as in
starter, carter ('one who carts'), harden
 ['stairǣ], ['kairǣ] ['hardŋ]
- "Here the existence of the simple words *start, cart, hard* (whose [a] is not subject to shortening), has leave to the favoring of the normal, longer variant."

['start], ['kart] ['hard]

- Point here: ['stairǣ] is legal only by virtue of Paradigm Uniformity.

21. Modern cases of this type

- Sugahara, M. & Turk, A. (2009) Durational correlates of English sublexical constituent structure. *Phonology* 26:477-524
- This paper used sophisticated modern methods: measure, do statistical testing.
- Who knows how widespread this all is?

22. A methodological challenge

- Modern phonologists know that all claims of neutralization by phonological process² ought to be checked experimentally — maybe they are near-neutralizations.
- Now we see that even *concatenation* is not to be taken for granted! OO effects may make a tiny difference, even though the phoneme strings are the same.

23. Steriade's view (readings)

- She is a radical phoneticist — rich representations.
- The only upper limit I see is that the material you are faithful to must be *reliably* present.

24. Steriade: what is “inherited” when a French schwa drops?

- Steriade, Donca (2000) Paradigm uniformity and the phonetics-phonology boundary. *Papers in laboratory phonology* 5: 313-334.
- *Not* inherited: syllable count, as in poetry or song. So it really is deletion.
- She thinks: allophonic duration. [d] is longer in non-branching onsets than in branching onsets or codas.
 - It is also more fortis, as established by the UCLA EMA machine of the time.
- Key comparisons:

a. /pa də ʁol/ → [pa.də.ʁol]	longish [d], trisyllabic	‘no role’
b. /pa də ʁol/ → [pa d ʁol]	longish [d], disyllabic	‘no role’
c. /pa dʁol/ → [pa.dʁol]	shortish [d], disyllabic	‘not funny’
d. /ʒad ʁoz/ → [ʒad.ʁoz]	shortish [d], disyllabic	‘pink jade’
- Steriade's key constraint: PU(Left: duration)
 - If two consonants, C and C', stand in correspondence and C is morpheme initial in the careful pronunciation of the relevant morpheme, C' is durationally equivalent to C.

25. Braver's work on subphonemic paradigm uniformity

- Braver, Aaron (2013) Degrees of incompleteness in neutralization: Paradigm uniformity in a phonetics with weighted constraints. Rutgers Ph.D. dissertation.
- Maxent phonetics, with penalties for *quantitative* deviation from base values.
- His main argument: all near-neutralizations are phonetic compromises between an existing based form and the concatenative target form.

PARADIGM UNIFORMITY IN EXPERIMENTAL SETTINGS

² At least, fully productive phonological process. I doubt that the [ɛ] of *kept*, unproductively derived from /i/, is different from the [ɛ] of *inept*.

26. Wilson (2006)

- Ref.
 - Wilson, Colin (2006). Learning phonology with substantive bias: an experimental and computational investigation of velar palatalization. *Cognitive Science* 30. 945–982.
- This is the ur-paper for maxent bias modeling, based on limiting paradigm change according to phonetic distance.
- Phonetic distance is greater in [ke] ~ [tʃe] than [ki] ~ [tʃi], with consequent differences in propensity of subjects to extend an alternation past the training data.
- The experiment was not 100% successful in the sense that it found no effect for voicing, even though voicing has effects on phonetic distance in palatalization.

27. Skoruppa et al. (2011)

- Ref.
 - Skoruppa, K., Lambrechts, A. & Peperkamp, S. (2012). The role of phonetic distance in the acquisition of phonological alternations. In Lima, S.; Mullin, K. & Smith, B. (eds.). *Proceedings of NELS* 39, Vol. 2. CreateSpace Independent Publishing Platform. pp. 717-729.
- Artificial grammar learning, six varieties.
- List of alternations:

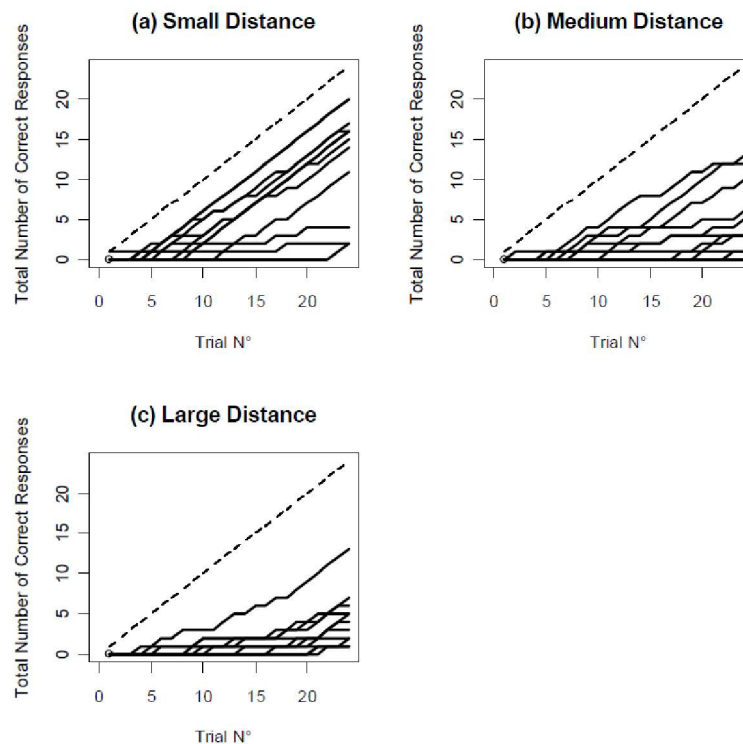
Table 1: Sound alternations in the six languages used in the present experiment.

<i>Phonetic distance</i>	<i>Language</i>	<i>Alternating sounds</i>	
		<i>pair 1</i>	<i>pair 2</i>
Small (place)	S1	p - t	z - ʒ
	S2	ʃ - s	d - b
Medium (place and manner)	M1	p - s	d - ʒ
	M2	ʃ - t	z - b
Large (place, manner, and voicing)	L1	p - z	t - ʒ
	L2	ʃ - d	s - b

- Sample items to be learned:

<i>Language</i>	<i>Alternating phrases</i>	
	<i>pair 1</i>	<i>pair 2</i>
S1	ke p amu – nø t amu	ke z afam – nø ʒ afam
S2	ke ʃ amu – nø s amu	ke d afam – nø b afam
M1	ke p amu – nø s amu	ke d afam – nø ʒ afam
M2	ke ʃ amu – nø t amu	ke z afam – nø b afam
L1	ke p amu – nø z amu	ke t afam – nø ʒ afam
L2	ke ʃ amu – nø d amu	ke s afam – nø b afam

- Learning rate goes down as phonetic distance goes up:



- I am intrigued by the possibility of modeling learning rate — would differing sigmas work?

28. White on saltation

- Refs.
 - White, J. (2017). Accounting for the learnability of saltation in phonological theory: A maximum entropy model with a P-map bias. *Language*, 93(1), 1–36.
 - Hayes, B. & White, J. (2015). Saltation and the P-map. *Phonology*, 32(2), 1–36.
 - White, J. & Sundara, M. (2014). Biased generalization of newly learned phonological alternations by 12-month-old infants. *Cognition*, 133(1), 85–90.
 - White, J. (2014). Evidence for a learning bias against saltatory phonological alternations. *Cognition*, 130(1), 96–115. [List of stimuli]
 - White, J. (2013). Bias in phonological learning: Evidence from saltation. Ph.D. dissertation, UCLA.
- People have trouble learning a $p \rightarrow v$ rule when b does not become v .
- This is modelable with a maxent learning system that places bias against alternations of greater phonetic distance
- Another experiment managed to replicate the result with infants.
- This set of papers and its companions is the poster child for ideas/methods taught in this course.
 - “marked phonology” as the consequence of diachrony
 - biased maxent modeling

29. Young-Ah Do on Korean

- Readings for this time.
- Method: just plain *elicit inflected forms from kids* — no wug, just “speak your language please”.
 - Of course, it’s not just elicitation; there are cute pictures that encourage the kids to give one-sentence narratives.
- Korean imposes phonological alternation on stem-final obstruents.
 - Before nasal ending they become nasals.
 - Before obstruent ending they neutralize to plain stops.

	Vowel-initial suffix	Obs-initial suffix	Nas-initial suffix
/kap ^h -/ ‘repay’	/a ~ə/ kap ^h -a	/ta/ kap-t’a	/nin/ kam-nin
/mat ^h -/ ‘undertake’	mat ^h -a	mat-t’a	man-nin
/sək’-/ ‘mix’	sək’-ə	sək-t’a	səŋ-nin
/s’is-/ ‘wash’	s’is-ə	s’it-t’a	s’in-nin
/is’-/ ‘exist’	is’-ə	it-t’a	in-nin
/mac-/ ‘exist’	madʒ-a	mat-t’a	man-nin

- Korean also has a modest number of irregular forms, which arise from historical processes of lenition etc.
 - The following compares irregulars with similar regulars:

	prevocalic allomorph	pre-obstruent allomorph	pre-nasal allomorph
a-1. /tit-/ ‘listen’	tir-ə	tit-ta	tin-nin
a-2. /tat-/ ‘close’	tad-a	tat-ta	tan-nin
b-1. /top-/ ‘help’	tow-a	top-ta	tom-nin
b-2. /cap-/ ‘catch’	cab-a	cap-ta	cam-nin
c-1. /is-/ ‘connect’	i-ə	it-k’o	in-nin
c-2. /pis-/ ‘brush’	pis-ə	pit-k’o	pin-nin
d-1. /hiri-/ ‘flow’	hill-ə	hiri-go	hiri-nin
d-2. /iri-/ ‘reach’	iri-ə → ir-ə ⁶	iri-go	iri-nin

- Results:
 - Little kids sometimes get the form wrong.
 - They often use a *contextually-inappropriate ending*, starting with a vowel, so that they can avoid alternation.
 - They do this most often to avoid irregular alternation.
 - kuw- / ____ V, kup- / ____ C — so use a wrong vowel ending

- But sometimes even to avoid irregular alternation.
cap- / ____ V, but use a vowel to avoid cam / ____ N
- For similar results on English Tapping, see Jinyoung's M.A. thesis from Seoul National University.

THE HIERARCHY OF LEVELS OF OO-FAITH

30. Levels

- I mean, informally, things like Root < Stem < Word < Phonological Word < Phrase.

31. Conjecture

- OO-Faith increases the higher you go on this hierarchy.
- This must have been proposed somewhere but I'm not sure where.

32. An Argentinian Spanish example from Harris (1983)

- Ref: *Syllable Structure and Stress in Spanish*, MIT Press.
- [dʒ] is (sort of) an allophone of /j/, occurring in onset position.
- Caveat: the single learned word *paranoia* [para'noja] is an exception.
- Paradigm uniformity is enforced from word to phrase, not stem to word:

[lej] 'law'
 [leʒes] 'laws'
 [lej es], syllabified [le.j es] 'law is'

- From UCLA Argentinian-speaking undergraduates I have obtained [le.jes] for 'laws' as well.
- Since PU is usually from misacquisition I'm tempted to call this a younger-generation innovation.
- I doubt there could be a dialect that has:

[leʒ es] 'law is'
 [lejes] 'laws'

33. The general law?

- Faithfulness to an element at some prosodic level implies Faithfulness to all higher levels.
- This is a stringency hierarchy, which you can read about how to enforce in the work of Alan Prince and Paul Delacy — the best way is to put cutoffs in the constraints.

34. English /l/ darkness

- This is an embarrassingly sloppy paper by me from the days of low standards, but I think the generalization is correct.
 - Hayes, Bruce (2000) "Gradient well-formedness in Optimality Theory". In Joost Dekkers, Frank van der Leeuw and Jeroen van de Weijer, eds., *Optimality Theory: Phonology, Syntax, and Acquisition*, Oxford University Press, pp. 88-120.
- The higher the level of the base form, the stronger the urge to be faithful to darkness in /l/.
 - N.B. the main cue to darkness may be allophony of preceding vowel
- “Light l goodness score” is obtained by subtracting subject ratings for light [l] vs. dark [ɫ] in the same context.

<i>Context</i>	<i>Examples</i>	<i>“Light l goodness score”</i>
Word initial	<i>light, Louanne</i>	4.62
Suffix-initial	<i>gray-ling, gai-ly, free-ly</i>	1.78
Medial ambisyllabic	<i>Mailer, Hayley, Greeley, Daley</i>	0.74
Stem-final pre-suffix	<i>mail-er, hail-y, gale-y, feel-y</i>	-0.97
Word-final pre-clitic	<i>mail it</i>	-3.30
Phonological word final	<i>mail Alice a letter</i>	-5 (not tested, my own guess)
Absolute final	<i>mail, help</i>	-5.47

- So, the weight of PU-XO([back] in [+lateral]) must go up as we promote X from stem, to word, to Phonological Word.

35. Bashing derivational approaches: optional cyclicity

- The primary derivational approach is Stratal OT, notably in the work of Kiparsky and Bermudez-Otero.
 - Swoop the forms through a series of levels, each an independent OT grammar.
 - See e.g. Kiparsky, Paul. "Stratal OT: A synopsis and FAQs." *Capturing phonological shades within and across languages* 2 (2015): 1-45.
- “Optional cyclicity”: a process must be made optional at an earlier level, then obligatory at a later one.

ailing [ˈerɫɪŋ] ~ [ˈerlɪŋ] vs.

grayling [ˈgreɪlɪŋ]

“later”: *ail* [ˈerɫ]

- We also saw “optional cyclicity” in Japanese with the [g] ~ [ŋ] example.
- This seems at least inelegant to me: what is actually optional is whether you carry forward the effects of the base form on the derived form, per the principle of constraint ranking.
- Indeed, the /l/ example seems to need probabilistic cyclicity.

36. Weaknesses of OO-Correspondence theory

- The “missing base” problem
 - Mascaró, Joan. "Morphological exceptions to vowel reduction in Central Catalan and the problem of the missing base." *Catalan Journal of Linguistics* 15 (2016): 27-51.
- Mascaro notes that various learned prefixes in Catalan are “word-like” in that they don’t under Vowel Reduction in atonic position:

[a]nglo-franc[é]s	‘Anglo-French’	[ɔ]vi-f[ó]rme
m[ε]ta-llengu[á]tge	‘metalanguage’	c[ɔ]rtico-ester[ó]ide
l[a]bio-dent[á]l		[ε]cto-pl[á]sma
h[ε]li-oc[é]ntric		p[a]ra-norm[á]l
p[ε]tro-d[ó]lar		t[ε]tra-pl[é]gia
[ɔ]rto-tipograf[í]a		c[a]rdio-vascul[á]r
p[ɔ]li-traumat[í]sme		n[ε]o-cl[á]ssic

- E.g., not *[ə]nglo-frances, *h[ə]liocentric.
- This seems a lot like the analogous cases in English: *heliocentric* is like a compound (note final stressless [ou]), but we don’t say *helio* by itself.
- Hence, a minimal pair, as it were, with Japanese example.

37. What might we say?

- At least in English, the “beefy” prefixes tend to become (perhaps slangy) words: *hetero*, *poly*, *Anglo*, *cardio*, *meta*
- A sensible computational word-detector would be likely to parse a word from e.g. *metalanguage*.
- Are these somehow words that (per Halle 1970) are lexically marked as not usable?