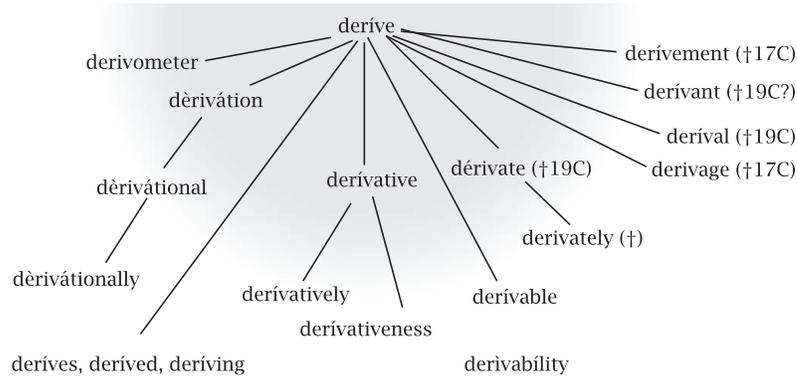


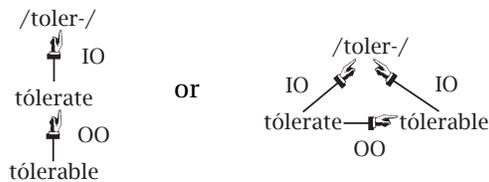
Paradigm uniformity

(1) What we have seen so far: (extensive summary to counteract spring break)

Correspondence between derivationally related words



- Phonological form of derived words often depends on form of constituents
 - E.g., *dérivátionally* [dɛ.ɪˈveɪʃənəli] σ σ 'σ σ σ, not *[dɛ.ɪˈveɪʃənˈæli] (cf. *Àpalàchicóla, ònomàtopóeia* σ σ σ σ σ σ) or *[dɛ.ɪvəˈʃounæli] (cf. *Mèditerrànean, Mèsopotámia* σ σ σ σ σ σ) or *[dɛ.ɪvəˈʃounəli] (*acétamínophen* σ σ σ σ σ σ)
- Some affixes leave base “more intact” than others
 - Level 1 affixes: act as part of word, lexical phonology applies normally; generally unproductive
 - Level 2 affixes: base word left intact, lexical phonology does not apply; generally productive
- Captured with OO Faithfulness (derived form to base; Base Identity, Kenstowicz 1996; TCT, Benua 1997)
 - Derived forms may be faithful to base but not vice-versa (phonology is “inside-out”)
 - In the usual case, \mathcal{F} to most immediate base (*dérivátionally* \Rightarrow *dérivátion*, not *derive*, predicting something like *dérivátionally* (cf. *acétamínophen*)
 - Some affixes have higher-ranked OO Faith than others (Level 2 $\mathcal{F} \gg$ Level 1 \mathcal{M})
 - (Relationship between productivity and faithfulness unexplained; more next time)
- Open questions: OO Faithfulness to what?
 - \mathcal{F} to more distal bases? or even to related forms not bases?
E.g., *tólerable* σ σ σ σ with lapse, not **tolérable* (*Arápaho, Connécticut, aménable*, σ σ σ σ)



- Simultaneous OO and IO faithfulness? (e.g., does *derivationally* still have access to UR of *derive*?)

(2) OO effects also found (abundantly) within inflectional paradigms

Example: Russian *yer* vocalization

- Russian has two “fleeting” vowels (*yers*), [e] ~ Ø and [o] ~ Ø, which show up...
 - (historically) when the following vowel was also a *yer*
 - (synchronically) when the following syllable has no vowel (no syl, or vowel-less syl)

E.g., /d'En'/ 'day', /ogOn'/ 'fire'

	sg.	pl.		sg.	pl.
nom.	d'én'	dn'í	nom.	ogón'	ogn'í
gen.	dn'á	dn'éj	gen.	ogn'á	ogn'éj
dat.	dn'ú	dn'ám	dat.	ogn'ú	ogn'ám
acc.	d'én'	dn'í	acc.	ogón'	ogn'í
instr.	dn'é ^m	dn'ámi	instr.	ogn'é ^m	ogn'ámi
loc.	dn'é	dn'áx	loc.	ogn'é	ogn'áx

- In many words, a vowel that was historically a *yer* shows up in all forms (Kenstowicz & Kisseberth 1977; Hermans 2002)

- /m'Est'/ 'feud, vengeance': expected forms¹

	sg.	pl.
nom.	m'est'	mst'i
gen.	mst'i	m'st'ej
dat.	mst'i	mst'am
acc.	mest'	mst'i
instr.	mst'u	mst'ami
loc.	mst'i	mst'ax

- /m'Est'/ 'feud, vengeance': actual forms

	sg.	pl.
nom.	m'est'	m'est'i
gen.	m'est'i	m'est'ej
dat.	m'est'i	m'est'am
acc.	m'est'	m'est'i
instr.	m'est'u	m'est'ami
loc.	m'est'i	m'est'ax

- *Yer* vocalization overapplies (Cf. related forms: [mstit'] 'avenge', [mstislav] (name))

- Similarly /tOftj/ 'meager' > (expected) [toftj] ~ [tjftja] (masc ~ fem nom sg) ⇒ [toftj] ~ [toftja]

(3) A similar example: Latin rhotacism

- Pre-classical Latin sound change: *s* > *r* / V__ V

'honor'	sg.	pl.
<i>nom.</i>	hono: s	hono: re:s
<i>gen.</i>	hono: ris	hono: rum
<i>dat.</i>	hono: ri:	hono: ribus
<i>acc.</i>	hono: rem	hono: re:s
<i>abl.</i>	hono: re	hono: ribus

¹I'm not 100% sure about whether the gen/dat/instr/loc sg are expected to have [e] or Ø.

- Subsequent change: *r* extended to nom. sg. as well

	<i>sg.</i>	<i>pl.</i>
<i>nom.</i>	honor	hono:re:s
<i>gen.</i>	hono:ris	hono:rum
<i>dat.</i>	hono:ri:	hono:ribus
<i>acc.</i>	hono:rem	hono:re:s
<i>abl.</i>	hono:re	hono:ribus

- Rhotacism overapplies in the nom. sg. (cf. related *hones-tus* ‘honest’ (“honorable”))
- (4) The phenomenon: *paradigm leveling* (*paradigm uniformity*)
- A phonologically expected alternation is suspended within (at least a portion of) an inflectional paradigm
- (5) Two important caveats
- “Phonologically expected,” and the relation between synchrony and diachrony
 - The Russian and Latin cases described above are typical: we infer regularization because an expected alternation does not actually occur
 - From a synchronic point of view, these cases are highly prone to relexicalization ([m’est’] no longer has an underlying *yer*, [honor] no longer has underlying /s/)
 - Evidence for a *synchronic* effect is often thin (depends on whether you think speakers continue to derive [honor] and [honestus] from a single UR)
 - “Portion of an inflectional paradigm”
 - We haven’t given a definition of “inflectional paradigm”
 - Intuitively, a paradigm is a set of forms all related by sharing the same stem + inflectional morphology
 - * Unfortunately, this definition is too broad; we often see regularization within smaller “sub-paradigms” (one tense, one mood, just the diminutives, etc.)
 - For now, we will follow Kenstowicz & Kisseberth (1977), and use the term vaguely (something like “all the case forms of a noun”, or “all persons and numbers of one verb tense”)
 - ☞ This is an important issue, which deserves more attention; cf. K&K 1977, p. 74: “... the notion ‘paradigm’ will have to be much more rigorously defined in order for the appeal to paradigm regularity to have much explanatory force.”
- (6) Some issues in the analysis of paradigm uniformity
- IO vs OO effects (uniformity because of a common UR, or uniformity because morphologically related)
 - Formalization of uniformity: base-prioritizing identity vs. global uniformity conditions
 - Direction of regularization: overapplication vs. underapplication
 - Incomplete uniformity: regularization of some alternations but not others, regularization within limited subparadigms, regularization of only some lexical items, etc.

Motivating uniformity constraints

- (7) Distinguishing OO from IO effects
- When we observe unexpected resemblance between paradigmatically related forms, it seems natural to attribute this to identity conditions between those surface forms
 - In practice, however, it can be quite difficult to show that OO constraints are actually needed to capture paradigm regularization

(8) Example: overapplication of *yer* deletion

m'est' m'est'
 mst'i ⇒ m'est'i
 mst'i ⇒ m'est'i
 mest' m'est'i
 mst'u ⇒ m'est'u
 mst'i ⇒ m'est'i

Constraints: (highly schematic)

- PEAK: syllables must have a vocalic peak
- *YER: no surface yers (schematically: penalize any surface vowel corresponding to underlying *yer*)
- DEP(V)
- *TERRIBLEONSET (in particular, [mst-])

(9) Prior to change: normal application

/m' ₁ E ₂ s ₃ t' ₄ /	DEP	PEAK	*YER
☞ a. m'e ₂ st'			*
b. m'st'		*!	
c. m'ə ₅ st'	*!		

/m' ₁ E ₂ s ₃ t' ₄ -i/	DEP	PEAK	*YER	*TERRIBLEONS
a. m'est'i			*!	
☞ b. mst'i				*
c. m'əst'i	*!			

(10) Capturing regularization with OO constraints

☞ Let's assume for the moment (counterfactually) that overapplication of *yer* vocalization affected all words in Russian

Two possible formulations

- Base-prioritizing uniformity: BASE-IDENT (Kenstowicz 1996, Benua 1997)
- Global optimization: Uniform Exponence (Kenstowicz 1996, 1997), PARADIGM UNIFORMITY (Steriade 2000), Optimal Paradigm (McCarthy 2005) (see also Burzio 1994 et seq.)

We'll assume a global Paradigm Uniformity constraint (more on this below)

(11) Normal application: Paradigm Uniformity ranked low

/m'Est'/, /m'Est'-i/, ...	DEP	PEAK	*YER	PU
☞ a. m'est', mst'i			*	*
b. m'st', m'st'i		*!		
c. m'est', m'est'i			*!*	

Change: PU comes to be ranked high

/m'Est'/, /m'Est'-i/, ...	PU	DEP	PEAK	*YER
a. m'est', mst'i	*			*
b. m'st', m'st'i			*!	
☞ c. m'est', m'est'i				**

- Learner has somehow failed (or refused) to learn that paradigms of certain words have vowel alternations
- McCarthy (2000): suggests that OO constraints are ranked high in initial state
- Result: learner infers a grammar in which such alternations are impossible

(12) Recast as an IO effect:

- Since paradigmatically related forms share a common UR, any OO Ident violations necessarily involve IO Ident violations
- "Failure to learn alternations" could be either:

- Failure to learn that the UR contains a *yer*, rather than an /e/

/m'est' /, /m'est'-i/, ...	MAX	DEP	PEAK	*YER
a. m'est', mst'i	*			*
b. m'st', m'st'i	*!*		*!	
☞ c. m'est', m'est'i				**
d. m'əst', m'əst'i	*(!)*	*(!)*		

- Or, failure to learn the ranking that derives them: *YER ≫ *TERRIBLEONS

/m'Est' /, /m'Est'-i/, ...	DEP	PEAK	*TERRIBLEONS	*YER
a. m'est', mst'i			*!	*
b. m'st', m'st'i		*(!)	*(!)	
☞ c. m'est', m'est'i				**
d. m'əst', m'əst'i	*!*			

- Either way, regularization results from a change in the input or mapping from input to output (no need for uniformity constraints)

(13) Diagnosis

- The IO-oriented analyses in (12) both rely on the fact that after the change, the phonological process has changed or died (either no *yers*, or radically different interpretation of *yer* deletion)
- This is not an accident: regularization often signals death for phonological processes, since alternations among inflectionally related forms provide the most abundant and clear-cut evidence for learning them
- A chicken-and-egg problem:

Paradigm uniformity takes effect, depriving learners of crucial data; process dies in the language, leaving behind only fossilized remains outside paradigms.

OR

The process dies (for some other reason), making it hard to explain alternations in the input data. Without a way to encode the alternations, learners regularize.

Is regularization a synchronic force in phonology, or a natural side effect of imperfect learning?

(14) What would constitute unambiguous evidence for an OO effect?

- Cases where there's better evidence that the process remains regular outside of paradigms, but shows an unexpected pattern within paradigms

Example: Spanish stress

- Stress always falls on one of last three syllables; default is final if it's heavy (closed), otherwise penultimate

canzón	'song'	fruta	'fruit'
ayer	'yesterday'	comida	'food'
raíz	'root'	tarjeta	'ticket'
relóx	'watch'	centávo	'cent'

Stress may also fall on antepenult, but this is relatively less common (claimed to be irregular, exceptional)

cómodo	'comfortable'
kilómetro	'kilometer'
próximo	'next'
satélite	'satellite'

- In verbs, the imperfect 1/2 plural forms always have antepenultimate stress:

	sg	pl
1st	amába	amábamos
2nd	amábas	amábais
3rd	amába	amában

(Would be even more convincing if unexpected form in verb paradigms was otherwise totally impossible—e.g., fourth from end)

- Regularization of non-contrastive properties
 - In such cases, UR is learned perfectly²
 - Leveling of non-contrastive features sometimes claimed to be rare or even nonexistent
 - Steriade (2000) (building on Withgott 1983): *capí[r]alistic* vs. *mili[t]aristic*
 - * Preservation of [t] is not due to loss of flapping process (viz. *capitalistic*)
 - * Almost certainly not due to creation of phonemic contrast (flapping /t/ vs. non-flapping /t/), either
 - * Difference due solely to existence of base with [t] (*mili[t]ary*, but *capí[r]al*)
- Some cases of partial regularization (certain properties regularized, but not others) also bear on this issue
 - Logic: if a certain part of the paradigm is too infrequent or inaccessible to reliably provide evidence about URs, then *all* types of information from that form should be lost.
 - Example: suffixed forms in Russian provide information not only about *yer* alternations, but also about stress alternations, voicing of stem-final obstruents, etc. Yet none of these properties is claimed to have been regularized.³
 - If true, this casts doubt on the idea that learners simply didn't have enough exposure to suffixed forms to learn their properties and integrate information into the UR of the noun
- Cases where paradigmatically related forms *don't* share a common UR (suppletion), but become more similar in certain respects
 - As far as I know, there hasn't been much discussion of such cases

(15) The upshot:

- There does seem to be evidence for output-output effects that go beyond what IO faithfulness or imperfect learning predict
- Pinning them down can require some care, however; many cases of “paradigmatic effects” in the literature are actually ambiguous

Base priority, or global optimization?

(16) Assuming we accept the need for paradigmatic OO effects, how should they be formalized?

- Paradigm Uniformity: all members of the paradigm must be identical w.r.t. property *p*
- Base Identity: all members of the paradigm must match form *x* w.r.t. property *p* (and hence, be identical with each other, as well)

²Caveat: we must rule out the possibility that the non-contrastive feature is actually becoming contrastive.

³Huge, HUGE caveat: regularization in Russian is only a tendency (not all words with *yer* alternations have been regularized). The end result is that *yer* alternations are present, but statistically under-represented. What needs to be checked, therefore, is whether other alternations are similarly under-represented.

(17) Returning to Russian:

m'est' m'est'
 mst'i ⇒ m'est'i
 mst'i ⇒ m'est'i
 mest' m'est'i
 mst'u ⇒ m'est'u
 mst'i ⇒ m'est'i

- Paradigm Uniformity: paradigm is evaluated as a whole, decision is determined by high-ranking \mathcal{M} constraints

/m'Est'/, /m'Est'-i/, ...	PU	DEP	PEAK	*YER
a. m'est', mst'i	*			*
b. m'st', m'st'i			*!	
☞ c. m'est', m'est'i				**

(Here, PEAK rules out regularization to [mst'])

- Base-Identity: designated base is evaluated first, other forms evaluated w.r.t. base (as in TCT)

/m'Est'/	BASEIDENT	DEP	PEAK	*YER
☞ a. m'est'				*
b. m'st'			*!	
c. m'əst'		*!		

/m'Est'-i/	BASEIDENT	DEP	PEAK	*YER
☞ a. m'est'i				*
b. m'st'i	*!			

(PEAK rules out base form [mst'], which in turn eliminates it in rest of paradigm)

(18) Relative merits of the two approaches (a priori)

- PARADIGM UNIFORMITY doesn't require a designated base
 - Appealing because inflectionally related forms don't seem to be “built off of one another” in the same way that derivationally related forms are
 - Also appealing because different languages seem to require different designated bases (compare Latin vs. Russian); can't simply designate some “unmarked form” (nom. sg./3sg. pres./unsuffixed form/etc.) as the base
- BASE IDENTITY more parallel to treatment of identity effects in derivational morphology
 - Doesn't require theoretical division between inflectional and derivational morphology
 - Doesn't require technique for evaluating entire paradigms as candidates
 - Doesn't necessarily require deciding how many forms to include in the “paradigm” (just singular, just present tense, etc.)

(19) McCarthy (2001/2005) “Optimal paradigms”

In addition to avoiding the issue of which form is the base, McCarthy points out that a more egalitarian system makes some strong predictions about the direction of regularization

1. Overapplication only
2. Attraction to the unmarked
3. Majority rules

(20) Overapplication only; e.g., Latin rhotacism

- *VsV: no intervocalic [s] (motivates rhotacism)
- IDENT
- OP-Ident: for every form in the paradigm, corresponding elements in every other form in the paradigm must be identical

/hono:s/, /hono:s-is/, /hono:s-i/, /hono:s-em/, ...	OP	*VsV	IDENT
a. hono:s, hono:ris, hono:ri:, hono:rem,	6*!		
b. hono:r, hono:ris, hono:ri:, hono:rem,			4*
c. hono:s, hono:sis, hono:si:, hono:sem,		3*!	

- The only way for [s] paradigm to win is if IDENT \gg *VsV; that is, for rhotacism to be lost altogether
- As long as we still have evidence that rhotacism is active in the language, regularization should choose [r]

(21) A caveat about overapplication: compare Russian (same as PU analysis above, constraint just re-named and evaluated OP-style)

/m'est', /m'est'-i/, ...	OP	DEP	PEAK	*YER
a. m'est', mst'i	**			*
b. m'st', m'st'i			*!	
☞ c. m'est', m'est'i				**

- Underapplication of *yer* deletion is actually overapplication of *yer* vocalization
- In other words, apparent underapplication effects can emerge by means of third-party over-application

(22) A related prediction: attraction to the unmarked

- In Russian, PEAK \gg *YER (as in (21)); [mest'] is less marked than [mst']
- This blocks OP from selecting the [mst'] paradigm; no number of “legal [mst'-]” forms (like [mst'i]) can change the fact that unsuffixed [mst'] is simply not allowed.
- Thus, regularization is to the *least marked* allomorph (meaning the one with the fewest violations of the highest ranked \mathcal{M} constraint)

(23) Majority rules effects

- Since the entire paradigm is evaluated simultaneously, it is occasionally possible to set things up so that the paradigm is pushed towards the candidate paradigm that requires as few modifications as possible to transform a normal application into a uniform paradigm
- Details are a bit intricate; see McCarthy (2002/2005)

Global optimization makes strong predictions about the direction of regularization; are they right?

(24) Overapplication only: possible counterexample from Polish diminutives (Kraska-Szlenk 1995, Kentowicz 1996)

- Raising: /o/ \rightarrow [u] in closed syllables (except nasals)

'ditch'	sg.	pl.	'cow'	sg.	pl.
<i>nom.</i>	[duw]	[dɔwi]	<i>nom.</i>	[krɔva]	[krɔvi]
<i>gen.</i>	[dɔwu]	[dɔwuf]	<i>gen.</i>	[krɔvi]	[kruf]
<i>dat.</i>	[dɔwovi]	[dɔwom]	<i>dat.</i>	[krɔvjɛ]	[krɔvom]
<i>acc.</i>	[duw]	[dɔwi]	<i>acc.</i>	[krɔvɛ]	[krɔvi]
<i>instr.</i>	[dɔwem]	[dɔwami]	<i>instr.</i>	[krɔvɔ]	[krɔvami]
<i>loc.</i>	[dɔle]	[dɔwax]	<i>loc.</i>	[krɔvjɛ]	[krɔvax]

- Diminutive paradigms: raising underapplies in masc., overapplies in fem.

	sg.	pl.		sg.	pl.
<i>nom.</i>	[dɔwek]	[dɔwki]	<i>nom.</i>	[krufka]	[krufki]
<i>gen.</i>	[dɔwka]	[dɔwkuf]	<i>gen.</i>	[krufki]	[kruvek]
<i>dat.</i>	[dɔwkovi]	[dɔwkom]	<i>dat.</i>	[krufɬsɛ]	[krufkom]
<i>acc.</i>	[dɔwek]	[dɔwki]	<i>acc.</i>	[krufkɛ]	[krufki]
<i>instr.</i>	[dɔwkjem]	[dɔwkami]	<i>instr.</i>	[krufkɔ]	[krufkami]
<i>loc.</i>	[dɔwku]	[dɔwkax]	<i>loc.</i>	[krufɬsɛ]	[krufkax]

Why is this case a problem for a global optimization approach? If one wanted to pursue an OP analysis, how would you go about trying to analyze the underapplication cases? How about the difference between masc. and fem. forms?

What would a base-prioritizing analysis look like? Which form serves as the base? What is left unexplained in such an analysis?

(25) Attraction to the unmarked: possible counterexample from Yiddish

- Stage 1: regular process of final devoicing, creating paradigmatic alternations
 - /veg/ *vek* ~ *vege* ‘way-sg./pl.’; /held/ *helt* ~ *helde* ‘hero’; /varb/ *varp* ~ *varber* ‘woman’
- Stage 2: final [e] in the plural drops off, at least in colloquial speech
 - /veg/ *vek* ~ *veg* ‘way-sg./pl.’; /held/ *helt* ~ *held* ‘hero’; /varb/ *varp* ~ *varber* ‘woman’
- Paradigm regularization: attraction to the unmarked predicts [–voi]
 - CODACONDITION = cover constraint for “no voiced obstruents in coda position”

/varb/, /varb-er/	OP-IDENT	CODACOND	IDENT-IO
a. <i>varp</i> , <i>varber</i>	*!		*
b. <i>varb</i> , <i>varber</i>		*!	
☞ c. <i>varp</i> , <i>varper</i>			**

- As with Latin case above, the only way that the more marked paradigm in (b) could ever win is if CODACONDITION is demoted below IDENT-IO ($\mathcal{F} \gg \mathcal{M}$, final devoicing is lost)
- Actual outcome of regularization:
 - More marked paradigm in (b), with voicing throughout ([varb], [varber])
 - Crucially, final devoicing remains active elsewhere: [veg] ‘way’, but morphologically related [avek] ‘away’ (not regularized to *[aveg])
 - As always, caveat that we don’t want the whole argument to rest on the question of whether *veg* and *avek* are actually morphologically related.
 - There are a number of other arguments that final devoicing remained active outside paradigms (CODACOND \gg IDENT-IO, at least in some form); too complex to get into here.

(26) Summary

- Evidence that paradigm regularization seems to require constraints on the relation between surface forms (not just inputs and input-to-output mapping)
- Suggestive evidence that inflectional paradigms may show base priority, in spite of the fact that they don’t have obvious “base-derived” structure
- Arguments for both claims can be subtle, and tricky to pin down

Next: continue discussing generalizations about directionality of regularization, and possible reasons for these effects

(27) Some things to keep in mind while looking at cases of paradigm regularity

- Evidence for a synchronic constraint, or has relexicalization occurred?
- Can it be analyzed as overapplication/attraction to the unmarked, using global optimization constraints? (Keep in mind that cases of apparent underapplication could actually be *over-application* of a different process that you haven’t identified yet)
- If base identity is needed, what form serves as the base?