

# Phonological alternations, word-and-paradigm morphology, and proportional analogy

David Fertig, U. at Buffalo (SUNY)

fertig@buffalo.edu

Dept. of Linguistics Workshop:

Morphology and the Lexicon

April 1, 2011

# Introductory quote: On the venerable tradition of not reading Paul's *Prinzipien der Sprachgeschichte*

- "It appears to me, Curtius has so far only very cursorily leafed through this book [Paul's *Prinzipien*]." (Brugmann 1885:92, referring to the great 19th c. linguist and critic of the Neogrammarians, Georg Curtius)

# Motivations for this talk

- An interest in word-and-paradigm (=“proportional”) models of inflectional morphology (e.g. James Blevins 2004; Matthews 1991; Paul 1886) and (the [alleged] limits of) their ability to account for “analogical” change.

# The project:

- Examine claims of the inability of “proportional” theories to account for particular kinds of analogical change, e.g.:
- “[...] morphophonemic analogy operates with all the regularity of the neogrammarian’s sound change. It is for this reason that any theory which treats it as a change in lists of morphemes, and this includes the proportional model of analogy, cannot account for it.” (Kiparsky 1973:12)

# Hale and Reiss on *nn~ð* in Old Icelandic

	1. Pre-OI	2. Oldest manuscripts	3. Later OI
man'	*mannr / manna	maðr / manna	maðr / manna
battle'	*guðr / gunna	guðr / gunna	gunnr / gunna
URs	/mann/, /gunð/	/manð/, /gunð/	/manð/, /gunn/

(I will assume that H & R are correct that *nn* > ð/\_\_\_r reflects an analogical development rather than a sound change.)

# An example closer to home...

- A young American tennis player hears that they're doing the **seeding** for a tournament he's entered and that one of his friends has been **seeded** first.
- He asks: "I wonder where they'll **seat** me."

# Hale and Reiss's account

“Parsing basis of analogical change: ambiguity  
→ *restructuring*

Given a grammar  $G_1$ , URs  $/a,b/$  and a surface form  $\phi$  s.t.  $G_1(a) = G_1(b) = \phi$ ,  $\phi$  is ambiguous for a learner constructing  $G_2$  using the output of  $G_1$  as PLD.” (2008:239)

# Alleged inadequacy of proportional accounts (I)

- “analogy is not necessarily based upon any existing surface form within the paradigm, but rather on the neutralizing effect of the grammar which must be constructed once a learner acquires the *-nn-/-ǫ-* alternation for some morphemes. In fact, the change of etymological *nn* sequences to underlying */nǫ/* sequences which alternate is attested in adjectival and verbal paradigms, as well as nominal paradigms.” (H&R 2008:240)

## Alleged inadequacy of proportional accounts (2)

- “Typically (e.g. in Hock 1991) [analogical] replacement is assumed to be morphologically motivated. This assumption will prove to be unnecessary in the discussion below.” (2008:238n. 19)
- “Parallel changes are also attested in adjectival and verbal paradigms, which demonstrates that four-part or proportional analogy need not be based on a morphologically parallel relationship among participants [sic] forms, as Hock (1991:172) suggests is normally the case.” (2008:239n.21)

# But a few pages later in Hock...

- “[...] although the developments in (47) and (48) are instances of (very) systematic proportional analogy, they do not conform to the definition of four-part analogy adopted earlier. For [...] they apply not to related morphological forms, but only to morphophonemic alternations within certain [...] phonological environments.” (Hock 1986:188)

# And if we look at Paul's theory a little more closely...

- Paul posits “material-phonetic proportional groups” (1886:87) specifically to deal with analogical extension and leveling of purely phonologically conditioned stem alternations (“Lautwechsel”).

# Paul's material-phonetic proportions (2)

- Paul emphasizes that the defining characteristic of material-phonetic proportional groups is precisely that the terms do not stand in “a morphologically parallel relationship”:
- “The alternation must, if it is to be included here, occur in cases which, with respect to the functional relationship [between the two terms in each pair], have nothing to do with each other and thus show themselves to be independent of meaning.” (1886:87, my translation)

# Two kinds of proportional equations

Material-formal (-∅ in sg. : -s in plur.)

boy = girl = dog = cat = horse  
-----  
boys = girls = dogs = cats = horses

Material-phonetic (-t- elsewhere : -r-/[in tap env.])

write = start = late = bat = wit  
-----  
writing = starter = latest = batted = witty

# A persistent myth:

- That there is a fundamental difference between analogical change in **morphology** and analogical change involving **phonological** or morphophonemic alternations, such that traditional "proportional" theory may work fine for the former but can't deal with the latter.

# Accounting for the myth:

- Textbook caricatures of proportional theory generally focus on morphologically motivated change.
- Many theoretically minded phonologists: 1) believe lexical entries contain abstract underlying stems; and 2) are much more interested in phonological alternations than in morphological patterns.
- They thus wrongly assume that the “traditional” theory was ok for the kinds of changes they are not very interested in, but their theories are needed to account for the changes they are interested in.

# Debunking the myth

- As mentioned above, Paul (1886) provides a lengthy, explicit discussion of how the proportional model works for phonological alternations.
- The theoretical issues regarding the appropriateness of the proportional model are essentially the same for phonological and morphological analogy.

# 2 approaches to analogical innovation

- Word-and-paradigm/proportional and lexeme- or morpheme-based approaches are in complete agreement up to a point:
- The possibility for lexical analogical innovation arises when learners are confronted with a wordform that is ambiguous w.r.t. which of 2 (or more) lexical categories the lexeme belongs to.

# Examples I: morphological

- An English learner hears a present tense form of *dive.* - Is this verb regular or irregular?
- A Latin learner hears a nom. sg. form of a masc. noun ending in *-us*. Is this a 2nd decl. noun or a 4th decl. noun?

# Examples 2: phonological

- A Latin learner hears the gen. sg. form *roboris* 'power'.
  - Does this lexeme belong to the class of words in which intervocalic *-r-* alternates with *-s* (nom. sg. *robus*) or to the class that has *-r(-)* throughout the paradigm (nom. sg. *robur*)?

# At this point, the theories diverge:

- What do learners do based on their answers to the questions on the preceding slides?

# Proportionalist/WVP

answer:

- the learner constructs one or more leading forms for the lexical item in question (either immediately upon hearing the ambiguous form or later, in production)
- i.e. they “solve the proportional equation”

# Morpheme- or lexeme-based answer:

- The learner sets an abstract property of the lexical entry:
- Phonological analogy: the learner constructs an abstract underlying representation.
- Morphological analogy: the learner (un)marks the lexical entry for non-default inflectional properties.

# In the latter approach...

- ...the solving of the proportional equation is not part of the innovation.
- The innovation itself is covert, it's outcome is a new abstract underlying form or a change in "diacritic class features to cross-reference lexical entries with exponents or rules" (Blevins 2004:47).

# A close reading of Hale and Reiss's assertion:

- “analogy is not necessarily based upon any existing surface form within the paradigm, but rather on the neutralizing effect of the grammar which must be constructed once a learner acquires the -nn-/-Ń- alternation for some morphemes. In fact, the change of etymological nn sequences to underlying / nŃ/ sequences which alternate is attested in adjectival and verbal paradigms, as well as nominal paradigms.” (H&R 2008:240)

“In fact, the change [...] is attested in adjectival and verbal paradigms, as well as nominal paradigms.”

- The belief that this fact is problematic for proportional theory is apparently based on a lack of awareness of Paul’s “material-phonetic” proportions.

“analogy is [...] based upon [...] the neutralizing effect of the grammar [...]”

- (Compare: “We believe that the partial indeterminacy of parsing provides a straightforward explanation for the diachronic process commonly referred to as analogy [...]” (238))
- No one would dispute this; the whole point of Paul’s model is that an ambiguous surface form is the crux of every proportional equation.

“analogy is not necessarily based upon any existing surface form within the paradigm[...]” (part I)

- What if your theory posits that lexical entries contain **no phonological or morphological information besides** surface forms from the paradigm? (as in word-and-paradigm/proportional models)

“analogy is not necessarily based upon any existing surface form within the paradigm[...]” (part 2)

- ...“but rather on the neutralizing effect of the grammar which must be constructed **once a learner acquires the -nn-/-ñ- alternation for some morphemes.**”
- What is the difference between saying that phonological analogy depends on learners acquiring an alternation “for some morphemes” and saying that it is based on surface forms within a paradigm???

# But recall...

- “In fact, the change [...] is attested in adjectival and verbal paradigms, as well as nominal paradigms.”
- Compare: “Parallel changes are also attested in adjectival and verbal paradigms, which demonstrates that four-part or proportional analogy need not be based on a **morphologically parallel relationship** among [...] forms, [...].” (2008:239n.21, emphasis mine)

# Compare Pierce on the “exceptions” to Sievers’ Law in Gothic:

- “**While analogy may indeed play a role** in some such cases, the bulk of these exceptions can **instead** be attributed to the elimination of the underlying archiphonemes [sic: he presumably means “morphophoneme”] such that those forms that preserve Sievers’ Law contain an underlying archiphoneme ([...] *sōkeis*), while those forms that have eliminated Sievers’ Law contain an underlying glide ([...] *arbjis*) [...]” (2006:313)

# What I've found so far:

- lots of linguists claiming they've found some type of analogical change that proportional theory cannot account for...
- ...when in reality the issue is just that proportional theory does not account for it **in the same way** that their theory does.
- Which account is “better” may be largely in the eye of the beholder...

# A synchronic issue with the Hale & Reiss account

- The  $nr \sim r$  alternation is of a rather uncommon type because it is not predictable in either direction.
- H & R must posit abstract underlying stems ending in  $-nr$  that do not (and cannot) surface anywhere.
- A “proportional” (word-and-paradigm) account: the lexical entries for items that are potential candidates for this alternation must include at least 2 leading forms: one where the relevant segments are followed by  $-r$  and one where they are not.

# Kiparsky on Sievers' Law in Gothic

- The explananda (overt analogical changes related to Sievers' Law):

1) nom. sg. *\*haris* > *harjis* (light *ja*-stem masc. nouns)

2) imper. 2 sg. *\*nasi* > *nasei*; *\*sōki* > *sōkei* (?)  
(class-I weak verbs)

3) gen. sg. *reikeis* > *reikjis* (heavy *ja*-stem neut. nouns)

# The debate over the adequacy of proportional theory...

- ...would benefit greatly if all parties involved were clear on the substance of that theory:
  1. That representations of surface wordforms are the **only** kind of phonological and morphological information in lexical entries (no abstract URs, no class features).
  2. That the rules (aka proportions, exemplary/schematic paradigms) of **morphology** and of **phonological alternation** are essentially functions that map these leading forms in the lexicon onto the rest of the paradigm.

# Diachrony of Sievers' Law in Gothic (I)

- The pre-Gothic sound change(s) that gave rise to the alternation:

$CjV > CijV$  after a heavy syllable

??and the “converse”:  $C\bar{I} > Cji$  after a light syllable

- The further development of the *ij* sequence is dependent on the nature of the following segments and the chronology of the Auslautgesetze.

# Expected Sievers' Law alternations in Gothic

- Former alternate expected after light syllables, latter after heavy syllables or two syllables [  $\bar{i}$  = Gothic orthographic <ei>]:
  - 1)  $iC \sim \bar{i}C$ : expected (but nowhere attested as such) wherever - following the operation of Sievers' Law -  $iji > ij > \bar{i}$  because the vowel following the glide was lost before the regular deletion of intervocalic glides had a chance to operate.
  - 2)  $jiC \sim \bar{i}C$ : expected and attested:
    - a) where Sievers' Law yielded  $-iji-$   $>$   $-\bar{i}-$  after a heavy stem vs. unlengthened  $-ji-$  after light
    - b) where IE  $-eje-$   $>$  Gmc.  $-iji-$   $>$   $-\bar{i}-$ , which then  $>$   $-ji-$  by the "converse" after light syllables only.

# No alternation is expected:

- Where IE \**eje(C)#* > Gmc. *iji(C)#* > *ij* >  $\bar{i}$  (Gothic <ei>) regardless of syllable weight, as in:
  - 1) nom. pl. of *i*-stem nouns: *gasteis*; *naweis*
  - 2) ??? 2nd sg. imper. of class-I weak verbs: *sōkei*; *nasei* ???
  - 3) ??? voc. sg. of *ja*-stem nouns (but  $\bar{i}$  > *-i* by analogy to general identity: acc.=voc. ???)

# -ei(-) also found regardless of stem weight:

- throughout the paradigm of the  $\bar{i}n$ -stem feminine nouns: *hráinei(-)*, *marei(-)*
- in the pret. opt.: *-eis*, *-eima*, etc.
- in the relative pronoun: *þáimei*, *þatei*, etc.

# analogical(?) -ji- (usually) found regardless of stem weight in:

- gen., dat. sg. of *jan*-stem masc. nouns and the parallel weak adj. decl. of masc./neut. *ja*-, *i*- and *u*-stems: *bandjins* ‘prisoner’; *gudjin(s)* ‘priest’; *fauragaggjins* ‘steward’, *dulgahaitjin* ‘creditor’, *niujin* ‘new’, *fairnjin* ‘old’ *unhráinjin* ‘unclean’, *framapjin* ‘fremd’, *unsēljins/unsēleins* ‘wicked’
- gen. sg. of neut. *ja*-stem nouns: *reikjis* ‘kingdom’, *kunþjis* ‘knowledge’, *gawairþjis* ‘peace’

# Gothic light *ja*-stem masc. nouns

	sg.	pl.
nom.	<b>harjis</b>	harjōs
gen.	harjis	harjē
dat.	harja	harjam
acc.	hari	harjans
voc.	hari	-

- All forms reflect expected regular phonological development except nom. sg. *harjis* for expected *haris*.

# Gothic heavy ja-stem masc. nouns

	sg.	pl.
nom.	haírdeis	haírdjōs
gen.	haírdeis	haírdjē
dat.	haírdja	haírdjam
acc.	haírdi	haírdjans
voc.	haírdi	-

- All forms reflect expected regular phonological developments. Sievers' Law has resulted in peculiar identity of nom. and gen. sg.

# Kiparsky on *haris* > *harjis* (I)

- Peculiar heavy stem nom. sg. *háirdeis* is analyzed as being *háirdei*+s, consistent with regular *a*-stems with nom. sg. -s. All other forms in the paradigm except acc. sing. *hairdi* are ambiguous as to whether the underlying stem-final vowel is short or long. Based on the nom. sg., they are analyzed as also having underlying stem-final -ei; acc. sg. *háirdi* is simply treated as a listed stem allomorph.

# Kiparsky on *haris* > *harjis* (2)

- In the absence of direct evidence for older nom. sg. \**haris*, learners assume the light stems have an underlying stem-final long vowel as well, yielding *harjis*, with *-ji-* rather than *-ei-* because the latter would violate either FOOT-FORM, a highly ranked prosodic constraint, (if syllabified *ha.rei(s)*) or ONSET (with any other plausible syllabification).

# Kiparsky on *haris* > *harjis* (3)

- Along with the analogical model of the reanalyzed heavy stem nouns, Kiparsky argues that his proposed STEM-FORM constraint is an additional important factor motivating the analysis of the light stems as having an underlying stem-final long vowel.

# Traditional analogical account of *haris* > *harjis*

- the **identity** relation between the nominative and genitive singular in the heavy *ja*-stem nouns is extended to the light stems (no analysis [segmentation] required for this extension):

háirdeis (gen. sg.)      harjis (gen. sg.)

----- :: -----

háirdeis (nom. sg.)

X

X=*harjis* (nom. sg.)

# Problems with Kiparsky's account (I)

- The strange double role of STEM-FORM:
- In Kiparsky's account STEM-FORM is both:
  - 1) a constraint on abstract underlying stems, influencing how learners/speakers analyze the surface forms they are exposed to; AND
  - 2) a constraint on the stem portion of surface wordforms, influencing the input-to-output mapping.

# Problems with Kiparsky's account (2)

- "The [V ~ VV alternation of the *ja*-stems] falls in with a system of free/bound stem allomorphy that runs through the whole nominal morphology. In particular, there is a closely parallel V ~ VV-alternation in the  $\bar{o}$ - and  $j\bar{o}$ -stems:" (23)

# Gothic $\bar{o}$ -stems:

	sg.	pl.
nom.	herda	herdōs
gen.	herdōs	herdō
dat.	herdai	herdōm
acc.	herda	herdōs

- Free/bound V~VV stem allomorphy???
- Looks more like a constant stem in *-a*, which coalesces with certain vowel-initial endings to yield *-ō-*.
- (*jō*-stems are identical except for the extra *-j-* throughout.)

# Kiparsky on *\*nasi* > *nasei*; and *\*sōki* > *sōkei*

- As with the masc. *ja*-stem nouns, the crucial initial (covert) development is a reanalysis of the heavy-stem items as having underlying stem-final long vowels.
- Again, this reanalysis is then extended from the heavy stems to the corresponding light stems.

# Traditional analogical account of *\*nasi* > *nasei*; and *\*sōki* > *sōkei*

- It is not clear that these are really analogical changes at all. (IE *\*eje(C)#* > Gmc. *iji(C)#* > *ij* > *ī* (Gothic <ei>) regardless of syllable weight??)
- 2) If they are, Kiparsky himself offers a proportional account, rejecting it because it “could only be represented as a chain of two proportional analogical changes” (33)

*reikeis* > *reikjis*

- The most interesting of the 3 (alleged) changes because it results in an “exception” to Sievers’ Law.

# Kiparsky on *reikeis* > *reikjis* (I)

- The reanalyses in the masc. nouns and the verbs is crucial because it meant that the neuter *ja*-stems were no longer morphologically analogous to the classes where Sievers' Law remains intact.

# Kiparsky on *reikeis* > *reikjis* (2)

- Once again, Kiparsky sees STEM-FORM playing a crucial role: *reikeis* would be *reiki* +*is* (w/ stem-final *-i*); *reikjis* (*reikj*+*is*), with stem-final *-j* is thus preferable.

# Traditional analogical account of *reikeis* > *reikjis* (I)

- The reanalysis part of Kiparsky's account can be reformulated in terms of alternations and schematic paradigms:

	sg.	pl.
nom.	Xs	Xōs
gen.	Xs	Xē
dat.	Xa	Xam
acc.	(Y)	Xans

Alternation:

$\bar{i}/\_\_\_C \rightarrow j/\_\_\_V$

(arrow indicates unidirectional predictability)

# Traditional analogical account of *reikeis* > *reikjis* (2)

- This reanalysis eliminates all evidence of the Sievers' Law condition on the stem-final  $j \sim i$  alternation.
- The output side of STEM-FORM is unnecessary.

# Note also the following generalization:

- The categories with *-ji-* after both light and heavy stems are not distinct inflectional classes in any way. They are simply stems that happen to end in *-j/-i* but are perfectly regular in their inflectional properties (neut. *ja-* stems, masc. wk. nouns and masc./neut wk. adj.)
- The categories with the light *-ji-* vs. heavy *-ei-* pattern are all inflectionally distinctive in some other way as well (as in nom. sing. *háirdeis*, *harjis*).

# Interim conclusions: Kiparsky on Sievers' Law

- Kiparsky's insights on reanalysis are valuable, but can be captured equally well in a proportional (word-and-paradigm) model.
- The side of STEM-FORM that is unavailable to "output-oriented theories" is unnecessary.

# General conclusions

- The search for analogical changes that cannot be accounted for at least as well by proportional/word-and-paradigm models of morpho(phono)logy as by theories that posit abstract underlying representations continues.

## Selected references (1):

Becker, Thomas (1990). *Analogie und morphologische Theorie, (Studien zur Theoretischen Linguistik 11)*. Munich: Fink.

Blevins, James P. 2004. "Inflection Classes and Economy." *Explorations in Nominal Inflection*, ed. by Gereon Müller, Lutz Gunkel, and Gisela Zifonun, 41-85. New York: de Gruyter.

Blevins, James P. and Juliette Blevins, eds. 2009. *Analogy in Grammar: Form and Acquisition*. Oxford: Oxford University Press.

Bloomfield, Leonard. 1933. *Language*. New York: Holt.

## Selected references (2):

Brugmann, Karl. 1885. *Zum heutigen Stand der Sprachwissenschaft*. Straßburg: Trübner.

Cole, Jennifer. 1995. 'The Cycle in Phonology.' *The Handbook of Phonological Theory*, ed. by John A. Goldsmith, 70-113. Oxford: Blackwell.

Garrett, Andrew and Juliette Blevins. 2009. 'Analogical Morphophonology'. *The Nature of the Word Studies in Honor of Paul Kiparsky*, ed. by Kristin Hanson and Sharon Inkelas, 527-545. Cambridge, MA: MIT Press.

Hale, Mark and Charles Reiss. 2008. *The Phonological Enterprise*. Oxford: Oxford University Press.

Selected references (3):

Heusler, Andreas. 1962. *Altisländisches Elementarbuch*. Heidelberg: Winter.

Hock, Hans Henrich. 1986. *Principles of Historical Linguistics*. Berlin: Mouton de Gruyter.

Kiparsky, Paul. 1973. 'Phonological Representations.' *Three Dimensions of Linguistic Theory*, ed. by O. Fujimura 1-136, Tokyo: TEC Co.

Kiparsky, Paul. 1976. 'Abstractness, Opacity, and Global Rules.' *The Application and Ordering of Grammatical Rules*, ed. by Andreas Koutsoudas, 160-186. The Hague: Mouton.

Kiparsky, Paul (1992). 'Analogy', *International Encyclopedia of Linguistics*, vol. 1, ed. by William Bright, 56–61. New York: Oxford Univ. Press.

Kiparsky, Paul. 2000. "Analogy as optimization: 'exceptions' to Sievers' Law in Gothic." *Analogy, Levelling, Markedness*, ed. by Aditi Lahiri, 15-46. Berlin: Mouton de Gruyter.

## Selected references (4):

Krahe, Hans and Wolfgang Meid. 1969. *Germanische Sprachwissenschaft*, 3 vols., 7th ed. Berlin: de Gruyter.

Lahiri, Aditi. 2000b. Introduction. *Analogy, Levelling, Markedness*, ed. by Aditi Lahiri, 1-14. Berlin: Mouton de Gruyter.

Paul, Hermann. 1886. *Principien der Sprachgeschichte*, 2nd ed. Halle: Niemeyer.

Pierce, Marc. 2006. Syllable Structure and Sievers' Law in Gothic. *Journal of Germanic Linguistics* 18.275-319.

Streitberg, Wilhelm. 1920. *Gotisches Elementarbuch*, 5th and 6th ed. Heidelberg: Winter.

Wurzel, Wolfgang Ullrich (1984). *Flexionsmorphologie und Natürlichkeit*, (*studia grammatica* 21). Berlin: Akademie-Verlag.