Balancing Leveling and Composite URs

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Single Surface Base Hypothesis

- Albright (2002; 2008b; 2010 *inter alia*) proposes the single surface base hypothesis.

1. Paradigms are derived from a single cell.
2. The cell is selected early in phonological learning, and retained.
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- Supported by evidence from language change.

Schematic Example

- Take a language with deletion in hiatus and word-final devoicing

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Singular	Plural
badup	badup-i
latip	latip-i
nukap	nukab-i
semap	semab-i
menop	menob-i
nuna	nun-i
pane	pan-i

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- Any unpredictable alternation from plural is prone to change.

Evidence for the theory

- Latin *honor* analogy (Kiparsky 1971, Kenstowicz 1996, Albright 2002; 2005)

Old Latin		Classical Latin
honoːs	>	honor
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- Classical Latin [r] was not the result of sound change.
- One surface allomorph "took over" remainder of paradigm.
- Also successfully applied to:
  - Yiddish paradigm levelling (Albright 2004; 2008b; 2010)
  - Korean alternation propagation (Albright 2008a, Albright and Kang 2008)
  - Lakhota alternation propagation (Albright 2002; 2008c)

Stable Composite URs

- Empirical problem: many paradigms require **composite URs**.
  - Consult different cells for contrastive segments.
- Russian reduction and devoicing (Kenstowicz and Kisseberth 1977).

Form	Cell	Neutralization
pirók	nom.sg	devoicing
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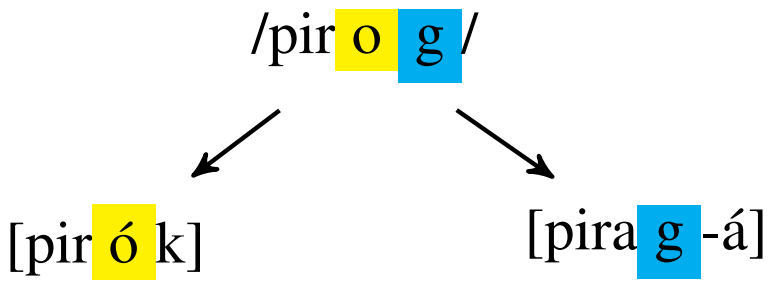

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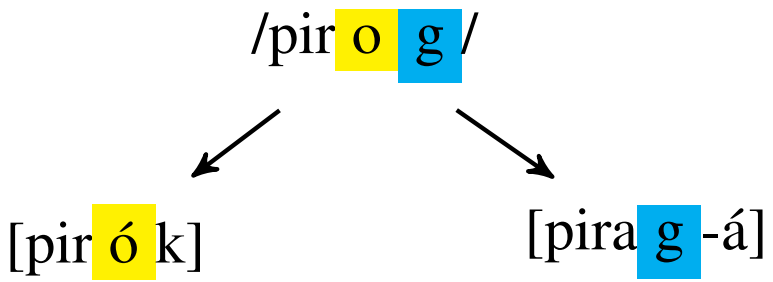

- These alternations are $\sim$ 700 years old (V. Kiparsky 1979, Lunt 1980).

Stating the problem

- We must resolve an apparent contradiction:
- Evidence that learners consult a single cell (single base).
- Evidence that learners consult multiple cells (composite URs).

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    - This has consequences for distinguishing between levelling and stable composite URs.

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- The key ideas of my proposal are:

1. Mechanism for efficiently discovering composite URs taken from Tesar (2008; 2013).
2. Tesar's mechanism is fragile: it breaks down for opaque or exceptionful phonology.
    - This has consequences for distinguishing between levelling and stable composite URs.
3. Decisive cell, reinterpreted from Albright's work
    - Other cells are not derived from this cell. They are derived from a UR.
    - The decisive cell is a criterion of adequacy for UR selection.
    - The decisive cell is selected as Albright has proposed.

Tesar's Framework for Composite URs

- Key idea: order all plausible URs by similarity to an SR.
  - Imposes a lattice-like structure on the UR space.
  - Plausible UR: contains only features observed in paradigm.
- How to navigate UR spaces:
  - Begin with phonotactic ranking (identity map for all words)
  - If UR $\rightarrow$ SR cannot be optimal/requires an inconsistent ranking:
    - Then no less similar UR can map to the SR.

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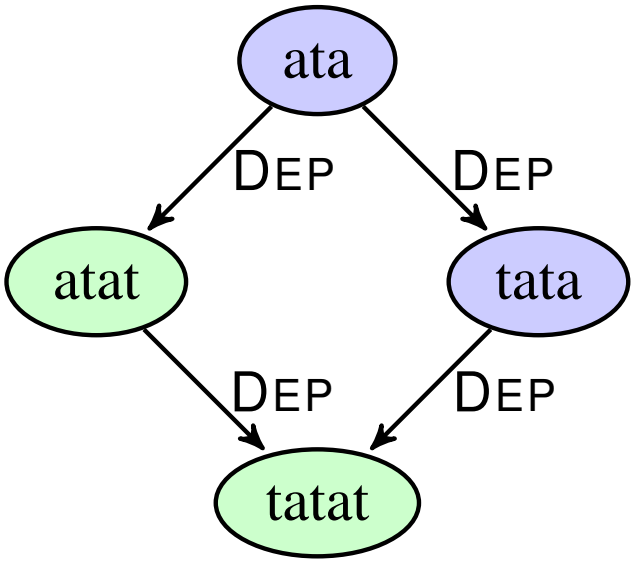

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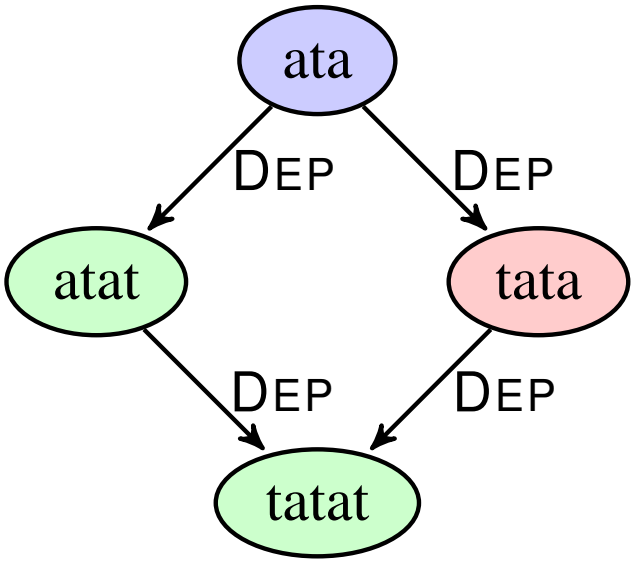

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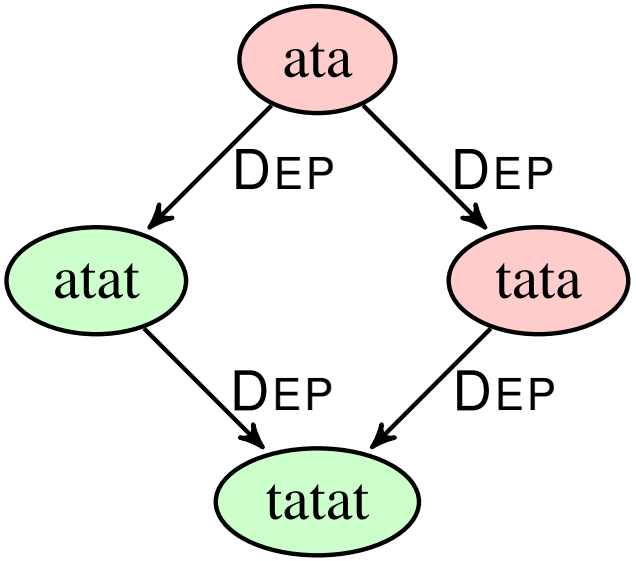


- Failure of epenthesis in /tata/ → [tatat] rules out all URs without final [t].

Learning Composite URs

- Tesar's model quickly determines which features must be underlying in any given surface form.
  - The phonotactic ranking determines what feature values cannot be unfaithfully derived in particular contexts.
- When repeated over allomorphs of a morpheme, the UR hypotheses become more specific.
- The Russian composite URs can be found with this method.

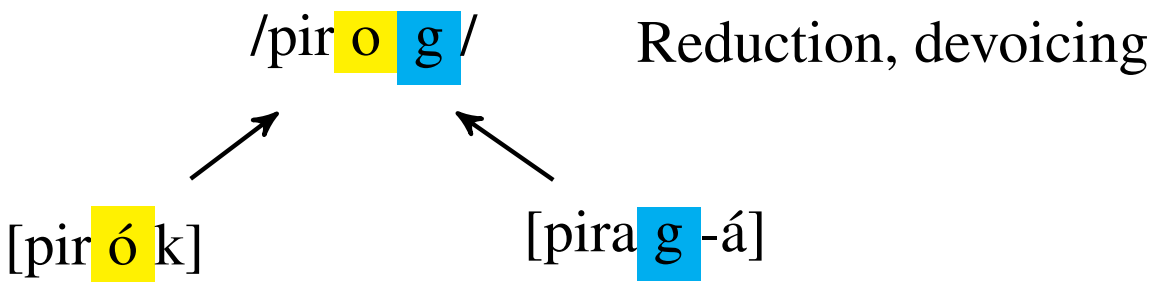
Example: Learning Russian Composite URs

Russian Problem

- Goal: take the following data

nom	gen	Gloss
vrát͡ʃ	vrat͡ʃ-á	‘doctor’
vrák	vrag-á	‘enemy’
stól	stal-á	‘table’
pirók	pirag-á	‘pie’

- And induce the following analysis:



Initial Rankings

- Available constraints:

Alternation	Markedness	Faithfulness
voicing	*D#, *VTV	Id-voi
height	*o , *á	Id-lo

- Identity maps give initial rankings.
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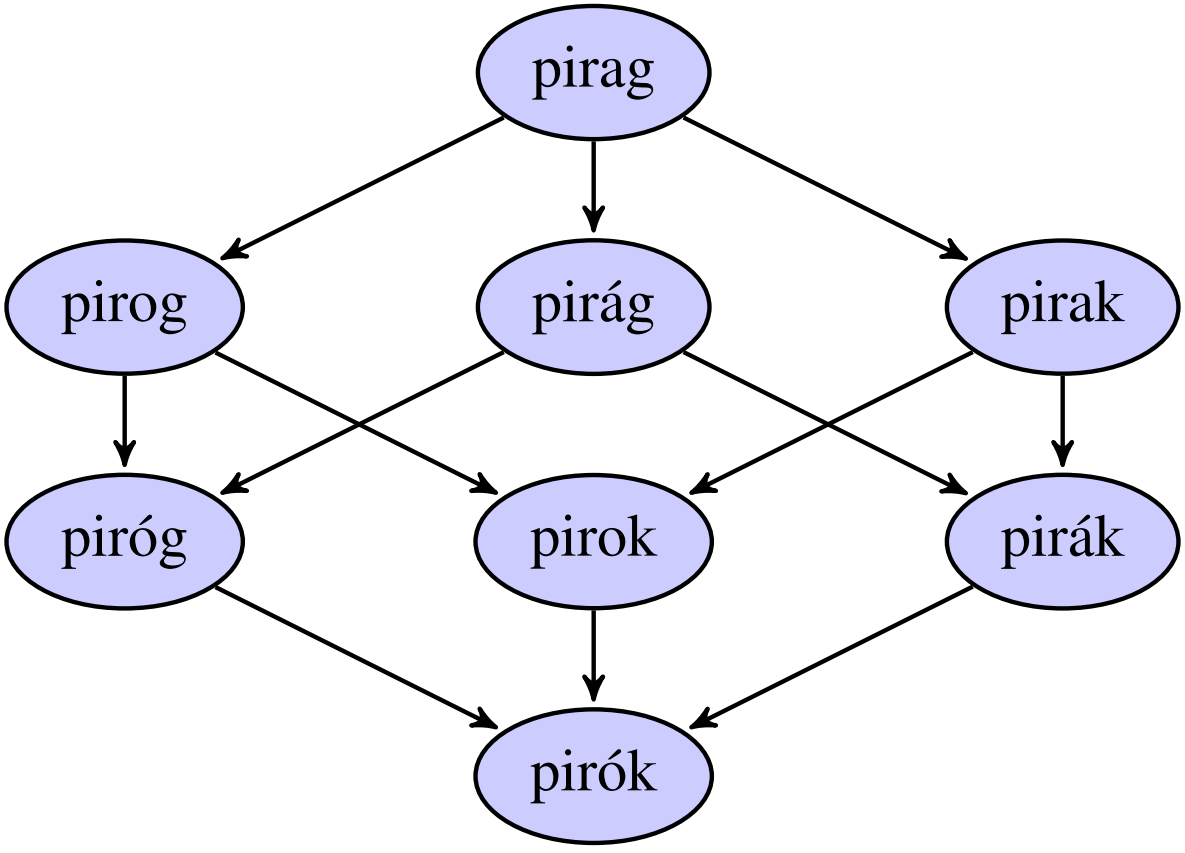
- ID-LO ≫ *á . . . “no raising”
- ID-VOI ≫ *VTV . . . “no inter-V voicing”

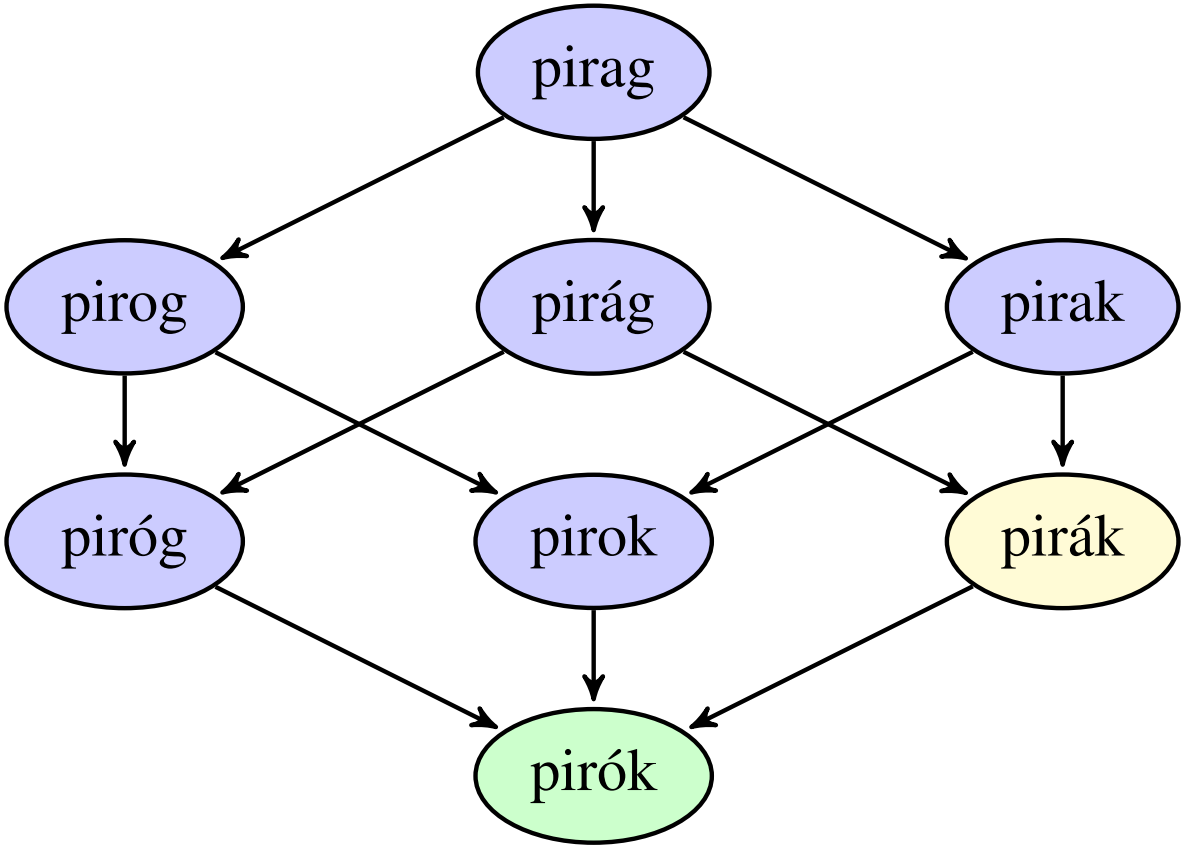
Getting Composite UR

- 3 features alternate in *pirók* - *pirag-á* $\rightarrow$ 8 form lattice



Getting Composite UR

- 3 features alternate in *pirók* - *pirag-á* $\rightarrow$ 8 form lattice
- We know identity map works
- But could the [a] $\sim$ [ó] alternation come from underlying [á]?



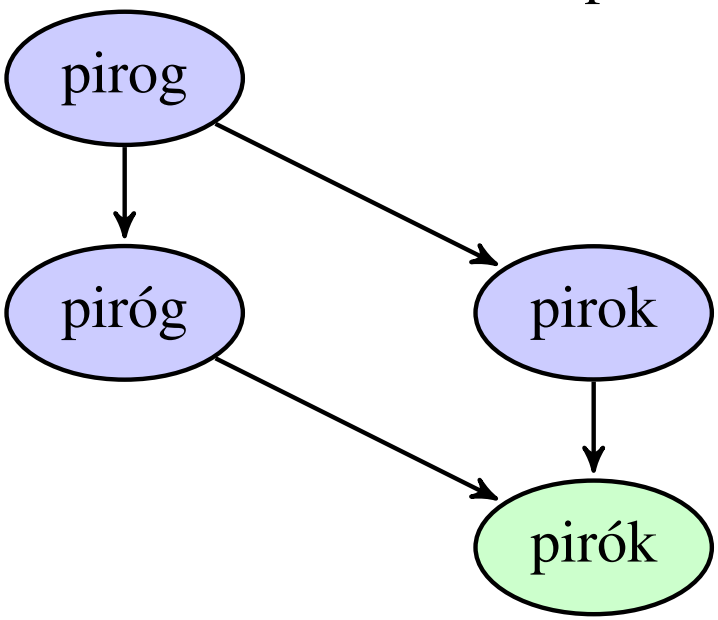
Testing /pirák/ → [pirók]

- Given the phonotactic rankings, underlying /á/ cannot be a source for [ó].

pirák	*VTV	*D#	ID-VOI	*o	*á	ID-LO
a. ☹ pirók						
b. pirák					W	L
c. *inter-v voi	L		W			
d. *raising					L	W

/g/ → [k]

- The available UR space loses all URs with [a].



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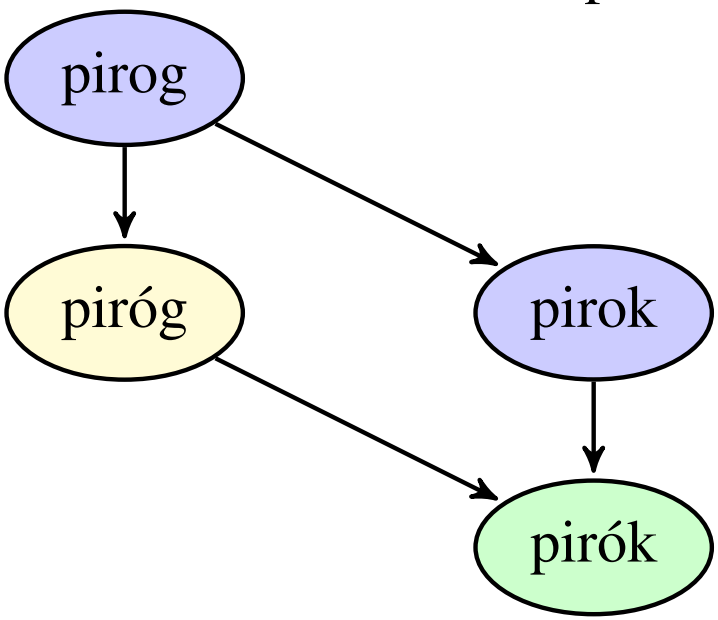


- But could [k] be derived from /g/?

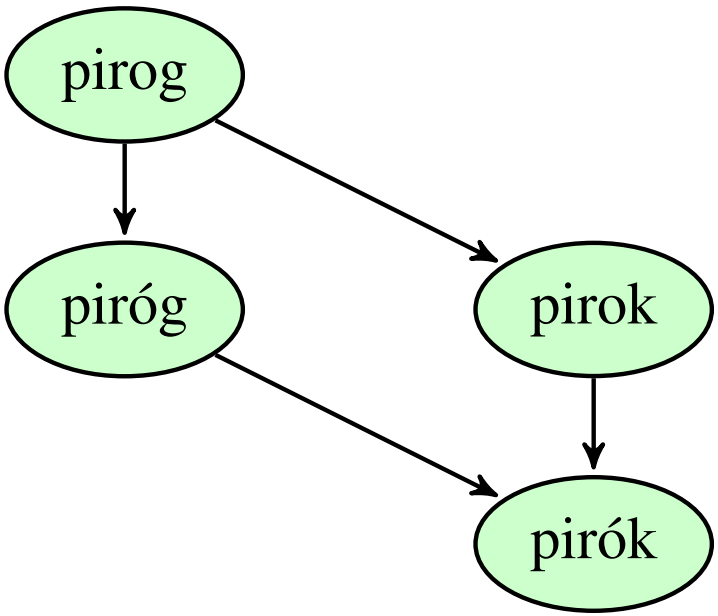
Testing /piróg/ → [pirók]

- The phonotactic rankings do not rule out devoicing.

piróg	*VTV	*D#	ID-VOI	*o	*á	ID-LO
a. ☞ pirók						
b. piróg		W	L			
c. *inter-v voi	L		W			
d. *raising					L	W

Generate *piragá*

- The [ó] in *pirók* must be underlyingly mid.
- The [k] is potentially the result of devoicing.
- We now need to check with *pirag-á* .



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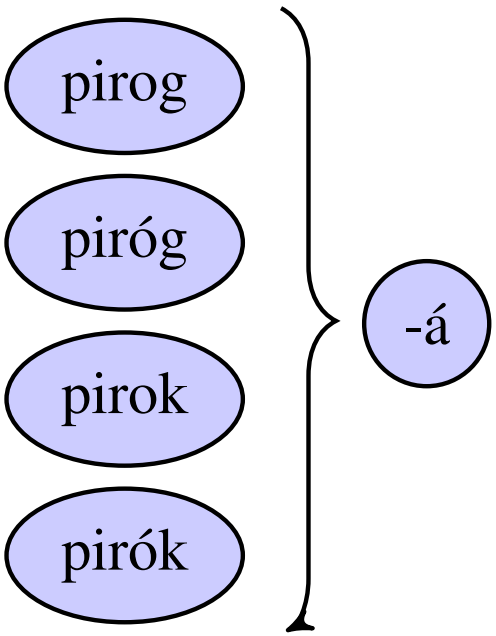

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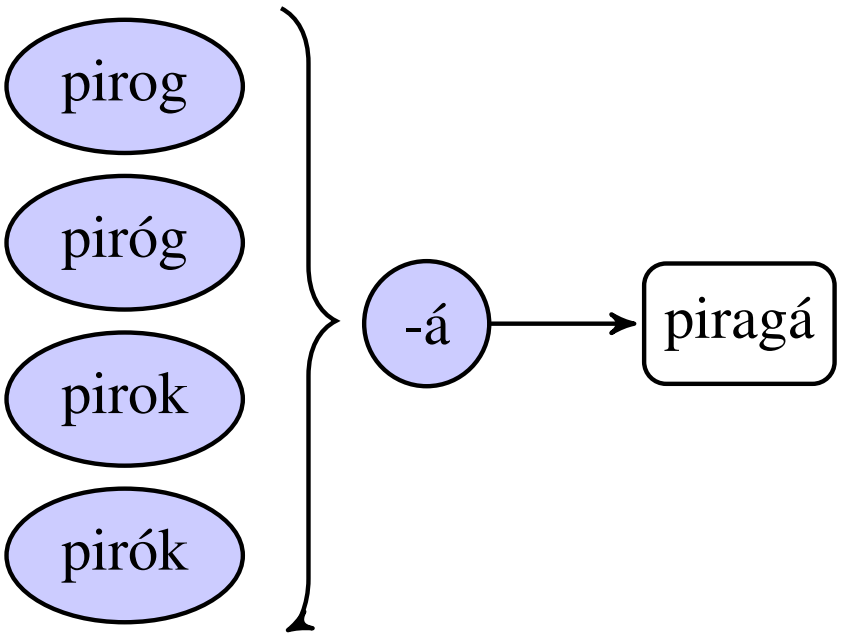

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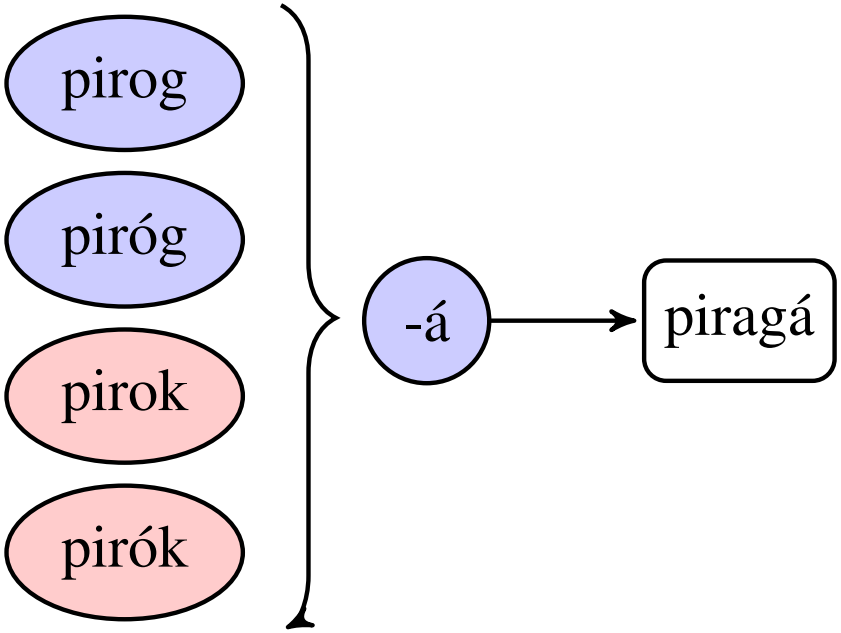

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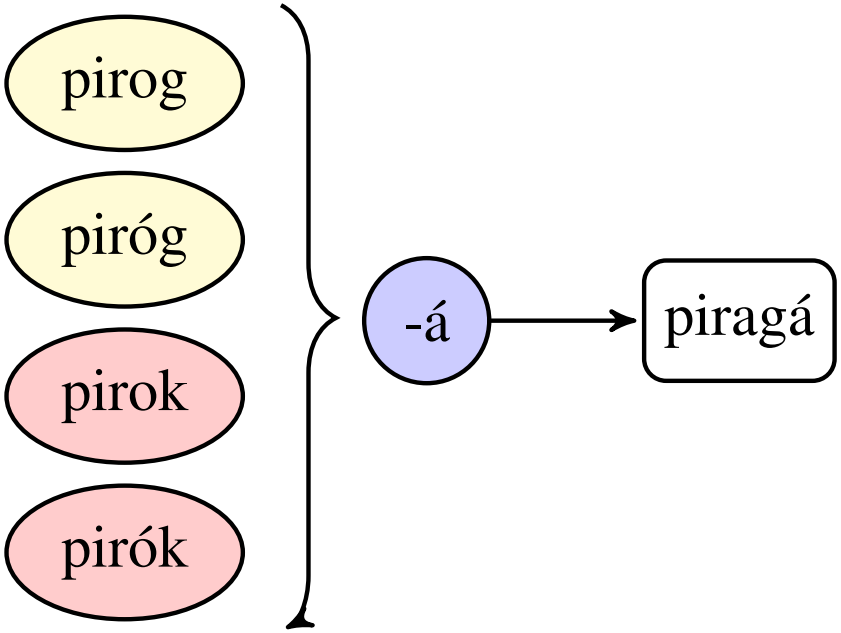

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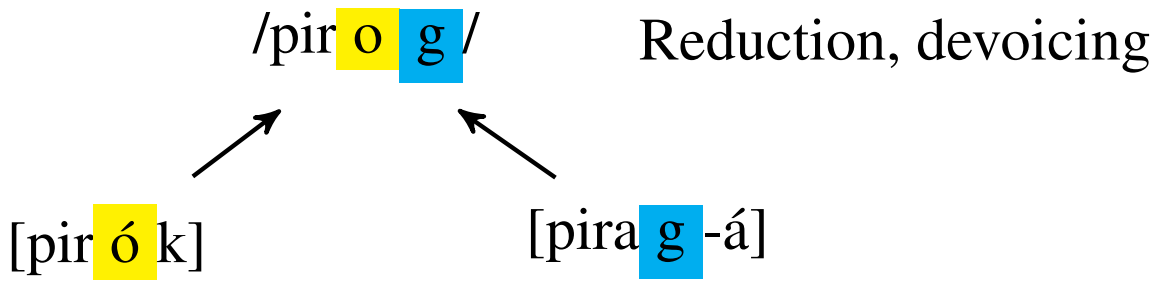
/pirog-á/ → [piragá]

pirog-á	*VTV	*D#	ID-VOI	*o	*á	ID-LO
a. ☞ piragá						
b. pirogá				W		L
c. devoice		W	L			
d. *inter-v voi	L		W			
e. *raising					L	W

- There is a consistent ranking and UR set for *pirók*, *piragá*
- *D# ≫ ID-VOI ≫ *VTV (devoice, not inter-V voicing)
- *o ≫ ID-LOW ≫ *á (reduce, not raise)
- Underlying *piróg*, *pirog*

Russian Wrap-up

- The goal has been met:



- The phonotactics left room for rankings that drive alternations.
- Consulting each form set contrastive features in the UR.

Key Ideas

- For Russian, only Tesar's composite UR discovery mechanism was needed.
  - Fragility, decisive form were not needed.
  - But they matter for cases of levelling.
- In my model, the paradigm is not derived from the decisive cell.
  - It is a filter for the UR space.
  - Whatever happens, URs must be mappable to the decisive cell.
  - Implemented as testing UR $\rightarrow$ SR maps on decisive form first.
- If Tesar's mechanism breaks, the UR will only reflect the decisive cell.

Local Summary

- In sum, my theory:
  - Seeks contrastive segments in multiple forms of the paradigm.
  - Limits URs to just those that can map to the decisive form.
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- Up next: an examination of one of the cases adduced in support of the single surface base hypothesis.

Level Inexplicable Data in Yiddish

Precursor to Levelling

- Middle High German innovated schwa apocope (King 1976, Albright 2008b)
  - Opacating earlier open σ lengthening, word-final devoicing

‘praise’	‘praise-nom.pl’	
/lob/	/lob-ə/	UR
lop	—	Devoicing
—	loːbə	Open σ Lengthening
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[lop]	[loːb]	

- The next generation had no evidence to motivate /-ə/.
  - This is a hopeless phonology problem.
  - Even if you consult both paradigm members to make a composite UR, the alternations don’t make sense

Fallout from MHG

- Response to unsolvable problem: levelling
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sag-st	>	*s aː g-st	>	zɔk-st	'say-2.sg'
s aː g-(ə)	>	*saːg	>	zɔg	'say.1.sg'

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- Plural and 1.sg are the “decisive cells” for our model.
  - Albright’s work shows they were least neutralized cells.

Actuating Levelling

- Phonotactic rankings from MHG after apocope (for more, see Albright 2008b)
  - Id-long $\gg$ *V:C(C)]$_\sigma$ (V: in lo:b is legal)
  - Id-voi $\gg$ *D# (b# in lo:b is legal)

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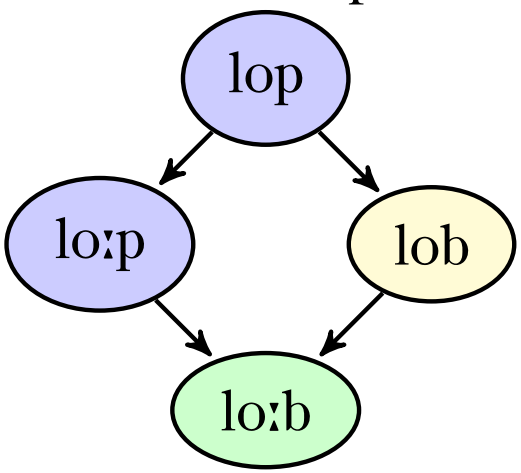

lob	ID-VOI	*D#	ID-LONG	*V:C(C)]$_\sigma$
a. ☹ lo:b		*	*!	*
b. ☞ lob		*		

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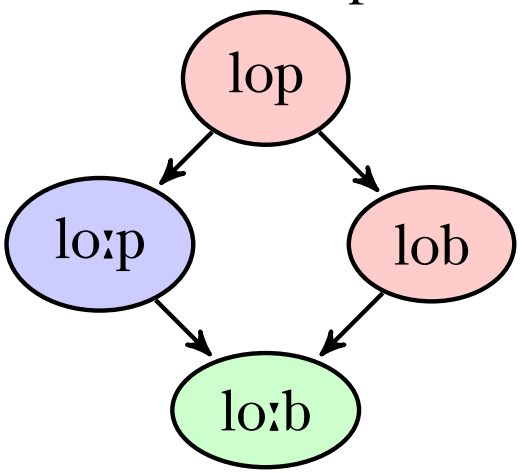

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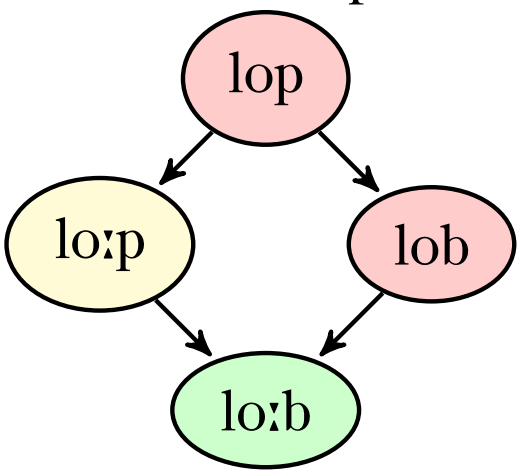

lo:p	ID-VOI	*D#	ID-LONG	*V:C(C)]$_\sigma$
a. ☹ lo:b	*!	*		*
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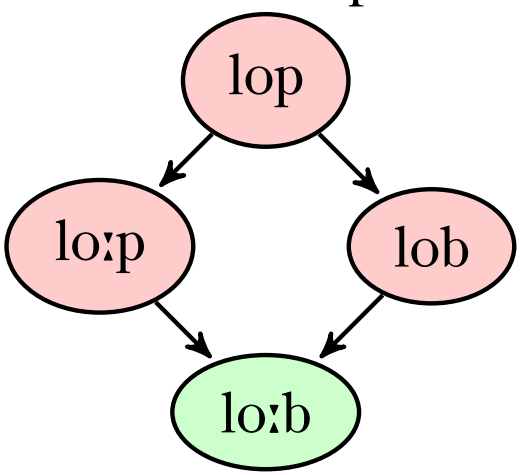

Actuating Levelling II

- The only viable UR /loːb/ can't map to singular [lop] given rankings:

loːb	ID-VOI	*D#	ID-LONG	*VːC(C)]$_\sigma$
a. ☹ lop	*(!)		*(!)	
b. ☞ loːb		*		*

- There are no alternatives. The singular will surface as [loːb].

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a. ☹ lop	*(!)		*(!)	
b. ☞ loːb		*		*

- There are no alternatives. The singular will surface as [loːb].
- The change need not happen overnight. MHG forms could be stored as irregulars and only eventually succumb to the pressures of the grammar-UR combination.

Diagnosis

- The opacity of MHG made former allophones contrastive.
- Tesar's model is too fragile to find the "right" analysis.
- When the model encountered the phones in the decisive cell, they became part of the UR.
- The long vowels and voicing then surfaced everywhere in the paradigm.
- This is not a new perspective for the Yiddish facts.
  - Kiparsky (1968), King (1969; 1976), Albright (2008b; 2010) recognized that opacity was a potential trigger for change.

Local Summary

- The Yiddish change does not require ruling out composite URs.
- With a sensible UR/grammar search, levelling of a hard system was inevitable.

Conclusion

- The problem: how to reconcile evidence for single surface basism with need for composite URs.
- Both Tesar and Albright are correct.
  - Reconstrue the single surface base hypothesis as a criterion of adequacy on UR selection.
  - Make constructive use of the fragility of Tesar's method(or any other framework).
  - The correct deployment of these methods yields a workable solution.
- Composite URs are only possible when a complete phonological analysis is available (see also Bermúdez-Otero in prep; 2014)

References I

Albright, A. (2002). The Identification of Bases in Morphological Paradigms. Ph. D. thesis, University of California, Los Angeles.

Albright, A. (2004). Sub-optimal paradigms in Yiddish. In V. Chand, A. Kelleher, A. Rodríguez, and B. Schmeiser (Eds.), WCCFL 23, pp. 1–14. Cascadilla Press.

Albright, A. (2005). The morphological basis of paradigm leveling. In L. Downing, T. Hall, and R. Raffelsiefen (Eds.), Paradigms in Phonological Theory. Oxford University Press.

Albright, A. (2008a). Explaining universal tendencies and language particulars in analogical change. In J. Good (Ed.), Language Universals and Language Change. Oxford University Press.

Albright, A. (2008b). Inflectional paradigms have bases too: Evidence from Yiddish. In A. Bachrach and A. Nevins (Eds.), The Bases of Inflectional Identity. Oxford University Press.

Albright, A. (2008c). A restricted model of UR discovery: Evidence from Lakhota. MIT manuscript.

References II

Albright, A. (2010). Base-driven leveling in Yiddish verb paradigms. Natural Language and Linguistic Theory 28, 475–537.

Albright, A. and Y. Kang (2008). Predicting innovative variants in Korean verb paradigms. In Proceedings of CIL18: The 18th International Congress of Linguists.

Bermúdez-Otero, R. (2014). French adjectival liaison: Evidence for underlying representations. Handout Given at Oxford University.

Bermúdez-Otero, R. (In prep). Stratal phonology: Arguments for cyclic containment, morphological implications. University of Manchester ms.

Kenstowicz, M. (1996). Base identity and uniform exponence: Alternatives to cyclicity. In J. Durand and B. Laks (Eds.), Current Trends in Phonology: Models and Methods, pp. 363–393. University of Salford Publications.

Kenstowicz, M. and C. Kisseberth (1977). Topics in Phonological Theory. University of Illinois.

King, R. (1969). Historical Linguistics and Generative Grammar. Prentice-Hall.

King, R. (1976). The History of Final Devoicing in Yiddish. Indiana University Linguistics Club.

References III

Kiparsky, P. (1968). Linguistic universals and linguistic change. In E. Bach and R. Harms (Eds.), Universals in Linguistic Theory. Holt, Rinehart and Winston.

Kiparsky, P. (1971). Historical linguistics. In W. O. Dingwall (Ed.), A Survey of Linguistic Science, pp. 576–649. University of Maryland Press.

Kiparsky, V. (1979). Russian Historical Grammar. Ardis.

Lunt, H. (1980). On "akanje" and linguistic theory. Harvard Ukrainian Studies 3/4, 595–608.

Sapir, E. (1915). Notes on Judeo-German phonology. The Jewish Quarterly Review 6, 231–266.

Tesar, B. (2008, March). Output-driven maps. Rutgers Manuscript.

Tesar, B. (2013). Output-Driven Phonology: Theory and Learning. Cambridge University Press.

What Levelled in Yiddish?

- Alternations that ceased due to levelling:

Process	Maintained (v = 1.sg, n = pl)	Replaced (other cells)
Umlaut	traːg	trɛk-st
Preterite presents	vɛɪs	vɪs-ən
Wechselflexion	gɪb	geb-ən
Word-final devoicing	loːb	lop
Open-syllable lengthening	saːg	sag-st
[d]-Deletion	gəfin	gəfind-ən
[ə]-Epenthesis	ʃturəm	ʃturm-ən

Decisive Cells Improve Efficiency

- *Why should there be a decisive cell if all cells are consulted?*
  - The decisive cell by-and-large shows fewest neutralizations.
    - Can be computed via surface-surface maps (Albright 2002).
    - Fewer neutralizations $\rightarrow$ more markedness violations. Perhaps decisive cell can be computed by comparing markedness profiles.
  - Un-neutralized values $\rightarrow$ surface values must be underlying, rather than derived.
  - This cell generally narrows down possible URs the most.
  - "Likely to be down-hill from this form"

Odawa non-surface URs

- Odawa recently leveled out rhythmic syncope alternations: *mkɪzɪn* ∼ *nmʌkzɪn* → *mkɪzɪn* ∼ *pre-mkɪzɪn*.
- But some paradigms kept some evidence of composite URs. *ndoː-d͡ʒeːpɪ̲z* ‘I am lively’ vs *d͡ʒeːpzɪ-d* ‘if he is lively’.
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	d͡ʒ	eː	p	ɪ	z	ɪ		New Odawa UR
	d͡ʒ	eː	p		z	ɪ	d	T. Odawa SR
ndoː	d͡ʒ	eː	p	ɪ	z			T. Odawa SR

- Also:

Unsuffixed	Suffixed	
ndʌ-biːndgeːbɪ̲z	biːndgeːbzʊ-d	zip inside
ndʌ-bkʊdʌ̲b	bkʊdbɪ-d	perch
ndʌ-nd͡ʒɪnʌ̲z	nd͡ʒɪnzʊ-d	dispute