Linguistics 201A Winter 2023
Phonological Theory I B. Hayes

Class 3, 1/17/2023: Opacity and Other "Derivational" Effects

1. Assignments

- For Thursday, 1/19/2023: read
  - Bakovic, Eric, 2011. Opacity and ordering. *The handbook of phonological theory*, pp. 40-67.
  - on course web site
  - no summary necessary
- Homework 1, Ilokano, is due Thursday 1/21.

A BIT ON THE RICH BASE

2. Phonotactics

- = phonological legality, grammaticality
- Chomsky and Halle (1965, *Journal of Linguistics*):

  [bɹɪk] is possible and exists
  [blɪk] is possible and doesn't exist
  *[bnɪk]is impossible

- Phonotactic well-formedness is gradient (?[pɔ͡ɪk]), but (since we are working with classical OT) we will idealize for the moment to a grammatical/ungrammatical distinction.
- Phonotactics is learned in the absence of negative evidence: from what we do hear, we figure out what would should never expect to hear.

3. Why do we have phonotactic knowledge?

- One theory is that it helps guide speech perception: we prefer phonotactically well-formed interpretations of the waveform.
- A famous paper:
  - Massaro, Dominic W., and Michael M. Cohen (1983) Phonological context in speech perception. *Perception & psychophysics* 34: 338-348.
  - A synthesized [r]-[l] F3 continuum is biased to be heard as [r] after [t], as [l] after [s].

4. The standard OT account of phonotactics: the Rich Base (Prince and Smolensky 1993[1])

- Assume that the set of possible inputs is *every conceivable phonological representation*.
- An adequate grammar converts any unpronounceable input into a pronounceable one — thus expressing the phonotactics.

5. Pseudo-derivations in Rich Base theory

- For bad things: Markedness outranks at least one Faithfulness constraint whose violation could repair an input that is bad.
- This assumes fictional "derivations", like English /qæt/ → [kæt]
  - (BH recite the Parable of the Space Aliens.)
- Such grammar is often (harmlessly, I think) indeterminate — we don't know what repair "would be" used.[2]
- Socrates: what other Faithfulness constraints could be violated in repairing /qæt/?

6. Rich Base theory challenges analyses in ways they were not previously challenged

- You need to cover not just the attested patterns, but explain why some patterns are not attested.
- Journal reviews can say, "what if X were an underlying represention? Why don't we see the pattern that X would imply?"

OPACITY AND SIMILAR PHENOMENA IN OT

7. Remark

- How can I squeeze this huge topic into 10 handout pages? This will cover only what I see as essential.

8. The diachronic origin of phonology

- There is a fairly standard story for the diachronic origin of phonology.
  - For discussion and review see Hayes and White, *Phonology* (2015)
- Sound changes swoop in historical order, usually as phonetic and/or postlexical changes that become phonological/obligatory.
  - See the examples below, which all have this kind of origin

[1] They attribute the idea to David Stampe, who thought of it for his theory of Natural Phonology, a rule-based precursor to OT (univeral rule set!).

[2] Though we can make an educated guess (work of Steriade, later): default is repair to the phonetically closest legal entity.

- *SPE*, following e.g. Bloomfield 1939,[3] assumes that human learners do something like recapitulation of this history.
- Classical OT says no, human learners develop non-derivational systems to deal with data that has a "diachronic-derivational" origin.
- For a classical-OTist, all discussion of ordering is, in principle, about the diachronic origin.

9. Intellectual history

- In the 1970's, Paul Kiparsky and colleagues sought to develop an explanatory theory of historical linguistics.
- Key focus: *predicting breakdown* of systems, due to difficulty of acquisition.
- Opacity was developed by Kiparsky as a property that made breakdown likely.

10. Some classical references on opacity

- Kiparsky, Paul (1982) *Explanation in Phonology*, Foris. [reprinting of Kiparsky's work from 60's and 70's on rule ordering and historical change]
- Kenstowicz, Michael and Charles Kisseberth (1977) *Topics in Phonological Theory*, Chap. 4, "Natural Rule Interactions"

11. Modern taxonomy diverges slightly from Kiparsky

- Baković, Eric. "A revised typology of opaque generalisations." Phonology 24, no. 2 (2007): 217-259.
- Bakovic readings.

12. Opacity and standard correspondence theory

- It emerged that there was a remarkable, if incomplete, overlap:
  - Cases described in Kiparskian terms as opaque
  - Cases not derivable with mainstream OT[4]

13. Overview

- To the extent that opacity phenomena are real, then classical Correspondence theory is not a good basis for phonological theory.
- There is, perhaps, theoretical interest in exploring what could supplement it or take its place.

14. The landscape I: taking breakdown seriously

- Kiparskyan language changes

[3] "Menomini morphophonemics", *Travaux de cercle linguistique de Prague xxx*

[4] The only important exception is counterbleeding, where two processes target the same segment.

- Lexically-specific opacity (Mayer)

15. The landscape II: the paradigm

- Output-to-output correspondence and Stratal OT give alternative analyses for some opacity cases — and are abundantly supported elsewhere.

16. The landscape III: richer theories of Faithfulness

- The P-map bias (Steriade, Zuraw, White) has independent support and gives us leverage on many cases of opacity.
- Two-level constraints (Kager) can cover anything, without giving up on OT (but look horrific).

17. Bibliography: some of the work addressing opacity in OT

- **Candidate chain theory** (basically, do OT where candidates are derivations)
  - McCarthy, John (2007) Hidden Generalizations: Phonological Opacity in Optimality Theory. Equinox.

- **Stratal OT**: be derivational to the extent that you derive stems from input, words from stems, sentences from words. This has much support, also addressed by OO-Correspondence.
  - Kiparsky, Paul (2015) Stratal OT: A synopsis and FAQs. In Yuchau E. Hsiao and Lian-Hee Wee (eds.) *Capturing Phonological Shades*. Cambridge Scholars Publishing, 2015.
  - Bermúdez-Otero, Ricardo. 2018. Stratal Phonology. In S.J. Hannahs & Anna R. K. Bosch (eds), *The Routledge handbook of phonological theory*, 100-134. Abingdon: Routledge.

- **Output-to-output correspondence**: be faithful to surface members of the paradigm — often gets around opacity problems. In competition with Stratal OT.
  - Benua, Laura. 1997. *Transderivational identity: Phonological relations between words.* Doctoral dissertation, University of Massachusetts, Amherst. Rutgers Optimality Archive ROA-259, http://ruccs.rutgers.edu/roa.html.
  - Burzio, Luigi. 1996. *Multiple correspondence*. Ms. Johns Hopkins University, Baltimore, Md.
  - Kager, René. 1999. Surface opacity of metrical structure in Optimality Theory. In *The Derivational Residue in Phonology*, ed. Ben Hermans and Marc van Oostendorp. Amsterdam: John Benjamins.
  - Kenstowicz, Michael. 1997. Uniform exponence: Exemplification and extension. 1997. In V. Miglio & B. Moren, eds., *Selected papers from the Hopkins Optimality Workshop* 1997, University of Maryland Working papers in Linguistics 5, 139-54; and on line.
  - Steriade, Donca. 2000. Paradigm Uniformity and the phonetics-phonology interface. *Papers in laboratory phonology V*. Cambridge: Cambridge University Press.

- **Stratal OT**: be derivational to the extent that you derive stems from input, words from stems, sentences from words. In competition with OO-Correspondence.
  - Kiparsky, Paul (2015) Stratal OT: A synopsis and FAQs. In Yuchau E. Hsiao and Lian-Hee Wee (eds.) *Capturing Phonological Shades*. Cambridge Scholars Publishing, 2015.
  - Bermúdez-Otero, Ricardo. 2018. Stratal Phonology. In S.J. Hannahs & Anna R. K. Bosch (eds), *The Routledge handbook of phonological theory*, 100-134. Abingdon: Routledge.

- **Harmonic serialism**: iterated OT optimization. Good for cases (if they exist) of putative faithfulness to *intermediate* phases of the derivation; also lots of restrictiveness argumentation.
  - General

    The theory and practice of Harmonic Serialism, in McCarthy and Joe Pater, *Harmonic Grammar and Harmonic Serialism* (2016)
    An introduction to Harmonic Serialism *Language and Linguistics Compass* (2010)
  - Papers covering empirical areas:

    McCarthy, John J. (2008). The serial interaction of stress and syncope. *Natural Language & Linguistic Theory* 26. 499-546.
    McCarthy, John. 2008. The gradual path to cluster simplification. *Phonology* 25(2):271–319. (Readings) [segment reductions]
    McCarthy, John. 2006. Restraint of analysis. In Eric Bakovic, Junko Ito, and John McCarthy (eds.) *Wondering at the Natural Fecundity of Things: Essays in Honor of Alan Prince*. Santa Cruz, CA: Linguistics Research Center. Pp. 213-239. [Too Many Solutions]
    Reduplication in Harmonic Serialism (2012) with Kimper and Mullin, *Morphology* [Prosodic Morphology]

  - Critiques

    Bowers, Dustin. "The Nishnaabemwin restructuring controversy: New empirical evidence." Phonology 36, no. 2 (2019): 187-224.
    Stanton, J., 2020. Gurindji nasal cluster dissimilation as trigger deletion. Journal of Linguistics, 56(1), pp.157-195.

- **Be faithful in UR, not SR environments**.
  - Kager on two-level constraints: his text *Optimality Theory*
  - Daniel Albro, 1997 UCL dissertation
  - John McCarthy (1996) Remarks on phonological opacity in Optimality Theory. In Jacqueline Lecarme, Jean Lowenstamm, and Ur Shlonsky, eds., *Studies in Afroasiatic Grammar. Papers from the Second Conference on Afroasiatic Linguistics, Sophia Antipolis*, 1994. The Hague: Holland Academic Graphics. Pp. 215–243.
  - Hauser, I. and Hughto, C., 2020. Analyzing opacity with contextual faithfulness constraints. Glossa: a journal of general linguistics, 5(1).

18. Three cases of alternation not treatable in standard OT

- Counterfeeding chains

  /n#/ → [#,] but /nt#/ → [n#] in Catalan

  /plen/ → [ple] 'full-masc.' (cf. feminine [plen-ə]

  /bint/ → [bin] '20' (cf. [bint-e] 'twentieth')

- Extravagant repair (counterbleeding)

  English Tapping (Chomsky 1964 and much further work)

  /ɹaɪtɚ/ → [ɹʌɪɾɚ], where [ɹaɪɾɚ] would avoid *[aɪ] + voiceless

- Saltation

/p/ → [β], where [b] would be fine (Campidanian Italian)

19. Bruce's recipe for opacity study

This relates to the theme of "scientifization" mentioned in Class 1.
1. Do rule based analysis.
2. Is the phenomenon opaque, and in what way?
3. Is the phenomenon well-studied?
4. Is the phenomenon diachronically stable?
5. What analyses might be compatible with all the facts?

CASE 1: CLUSTER SIMPLICATION IN CATALAN

20. The basic facts

Sample paradigms from Yang and Hayes (in progress):

	UR	*m.sg.*	*m.pl.*	*f.sg.*	*f.pl.*	
a.	/kru/	kru	kru-s	kru-ə	kru-ə-s	'raw'
e.	/sant/	san	san-s	sant-ə	sant-ə-s	'holy'
f.	/fort/	for	for-s	fort-ə	fort-ə-s	'strong'
g.	/bon/	bo	bon-s	bon-ə	bon-ə-s	'good'
h.	/klar/	kla	kla-s	klar-ə	klar-ə-s	'plain'

21. Rule-based analysis

Cluster Simplication

$C_2 \rightarrow \varnothing$ / C_1 ___ $]_{word}$

where (roughly) C1 and C2 are homorganic (see Wheeler for details)

/r/ Deletion

r → ∅ in coda

/n/ Deletion

n → ∅ / ___ $]_{word}$

22. Is it opaque, and if so how?

By the Kiparskyan criterion this is "Type I opacity"

The rule

$A \rightarrow B / C \_\_ D$

is opaque to the extent that there are cases of A in the context / C ___ D

[☞ Identify the general formula with the specific case.]

23. Rule ordering

Rule 2 **counterfeeds** rule 1 if it creates novel instances of A in the context / C ___ D

[☞ Identify applicability.]

24. Bruce's recipe: is the case well-documented?

- Max Wheeler's (2004) *Phonology of Catalan* is an careful and detailed study, which relies on much earlier literature (notably work of Mascaró).
- Catalan is a industrialized language with dictionaries, linguists, and (I suspect) corpora.
- I know of no wug-testing work on Catalan (and am tempted to try some …)

25. Bruce's recipe: Is the phenomenon diachronically stable?

- Wheeler claims that both /n/ Deletion and (similar) /r/ Deletion are not productive, and suffer from an approximately 25% exception rate.

a. *Lexically-specific* /n/ *Deletion*

m.sg.	*m.pl.*	*f.sg.*	*f.pl.*	*Gloss*
bo	bon-s	bon-ə	bon-ə-s	'good'
ple	plen-s	plen-ə	plen-ə-s	'full'
prəgo**n**	prəgon-s	prəgon-ə	prəgon-ə-s	'proclamation'

b. *Lexically-specific* /r/ *Deletion*

m.sg.	*m.pl.*	*f.sg.*	*f.pl.*	*Gloss*
du	du-s	dur-ə	dur-ə-s	'hard'
kla	kla-s	klar-ə	klar-ə-s	'plain'
pu**r**	pur-s	pur-ə	pur-ə-s	'pure'

- He believes the output of the rules is lexicalized (memorized).

26. What analyses might be compatible with the facts?

- The McCarthy/Prince system of faithfulness constraints is atomistic, banning the smallest possible phonetic changes.

27. OT analysis

Opacity defeats the McPrincian constraint set:

		*Complex	*Final r	MaxR	Max(t)
Vrt	Vrt	1			
	Vr	1	1		1
	V			1	
Vr	Vr		1		
	V	1		1	

If the vowel-final candidate defeats the Vr candidate for /Vr/, it will do so for /Vrt/ as well.

28. Naturalness based on minimizing alternation

- Some key references:
  - Steriade, Donca (2001) Directional asymmetries in place assimilation. In E. Hume and K. Johnson (eds.) *Perception in Phonology*, Academic Press
  - Zuraw, Kie (2007). The role of phonetic knowledge in phonological patterning: Corpus and survey evidence from Tagalog. *Language* 83: 277-316.
  - Zuraw, Kie (2013) *Map constraints. http://www.linguistics.ucla.edu/people/zuraw/dnldpprs/star_map.pdf
- We will keep returning to this idea, which is of fairly ancient provenance.

29. Applying this to Catalan

- Here, the "long journey" — cluster removal — is forbidden, and the "short journeys" that comprise it are ok.
- So, we try a complex Faithfulness constraint, ranked high.
- Here, we need MAX(CC)
- Or, in terms devised by Zuraw (2007, 2013): *MAP(CC ~ ∅)
- The "ban long journey" strategy originated with Kirchner:
  - Kirchner, Robert. "Synchronic chain shifts in Optimality Theory." *Linguistic Inquiry* 27, no. 2 (1996): 341-350.

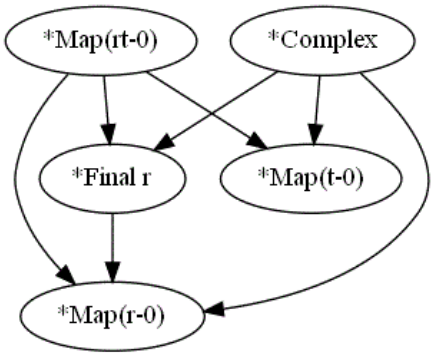
30. Tableaux using Max(CC)

/Vrt/:

	*Complex	*Map(CC-0)	*Map(t-0)	*Final r	*Map(r-0)
>Vr			1	1	
V		1!			1
Vrt	1!				

/Vr/:

	*Complex	*Map(rt-0)	*Map(t-0)	*Final r	*Map(r-0)
>V					1
Vr				1!	



31. More general discussion of counterfeeding

- For all counterfeeding, the transparent solution is actually *more costly* in terms of paradigm uniformity — you have to allow the long journey.

32. Why might Catalan be unstable?

- Kirchner's (1993) cases are very simple ones (one segment) a → æ → e → i — and I suspect such shift are historically stable, since the constraints are simple (they can just be IDENT(), or single segment *MAP.)
- The Catalan Faithfulness constraint is complex and perhaps hard to discover — "complexity bias".

CASE 2: CANADIAN ENGLISH TAPPING AND RAISING

33. The basic facts in rule-based phonology

East Coast English /aɪ/ Raising precedes Flapping

/aɪ/ *Raising*

$$aɪ \rightarrow ʌɪ \,/\, \_\_\_ \begin{bmatrix} \text{–syllabic} \\ \text{–voice} \end{bmatrix}$$

Tapping

$$\begin{bmatrix} \text{+coronal} \\ \text{–continuant} \end{bmatrix} \rightarrow [\text{+son}] \;/\; [\text{–consonantal}] \;\_\_\_ \begin{bmatrix} \text{+syllabic} \\ \text{–stress} \end{bmatrix}$$

34. Derivations

/raɪt/	/raɪd/	/raɪt-ɪŋ/	/raɪd-ɪŋ/	UR
ʌɪ	—	ʌɪ	—	Raising
—	—	ɾ	ɾ	Tapping
[rʌɪt]	[raɪd]	[rʌɪɾ-ɪŋ]	[raɪɾ-ɪŋ/	SR

35. This example is famous

- Brought to the attention of the field in 1964 by a native-speaker linguist, Noam Chomsky.
- Tons of work on it.
- Almost all of it takes the facts at face value and theorizes.

36. Bruce query: Is the phenomenon opaque, and in what way?

Yes indeed, and it is the *other* kind of Kiparskyan opacity.

Given Rule 1, A → B / C ___ D

Rule 1 is opaque if we have B derived from A *not* in the environment / C ___ D.
The usual source of such opacity is Rule 2, which applies later and messes up the environment / C ___D.

And the ordering type is **counterbleeding**: Rule B, order after A, arrives too late to keep A from applying.

37. Classical OT is no good for this

- I did a quick run in OTSoft, with these inputs and candidates:

		Don't not tap *NoTap	*aIt *alt	Ident(low) Ident(low)	Ident(voice) Ident(voice)	Ident(son) Ident(son)
raitR	raitR		1	1		
	r^itR		1		1	
	raiDR					1	1
	r^iDR	1			1	1	1
raɪdɚ	raidR		1			
	r^idR		1		1	
	raiDR	1				1
	r^iDR				1		1

Program output:

```
There's a problem with the constraint set.

For input #1, /raitR/, losing candidate [raiDR]
```

```
harmonically bounds winning candidate [r^iDR].

Therefore, a grammar with just these constraints won't work.
```

- The key pattern in counterfeeding opacity is **extravagant repair**.
- Why fix the unraised diphthong if you've already removed the voiceless consonant?

38. What analyses might be compatible with all the facts?

- This appears to be a classical case for paradigm effects (see, e.g. work of Bermudez-Otero[5])
- [ˈrʌɪɾɚ] is inheriting the raised diphthong of [ˈrʌɪt].
- Let us assume that the isolation form is the base, and add IDENT-OO(low).
- Then everything swims:

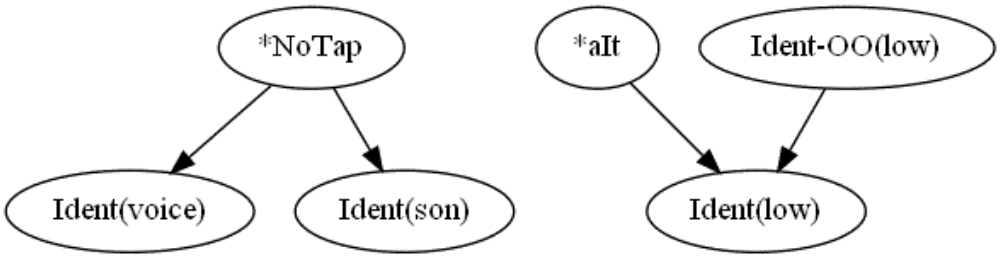
```
/rait-R base r^it/:
       *NoTap¦*aIt¦Ident-OO(low)|Ident(voice)¦Ident(son)¦Ident(low)
>r^iɾR       ¦    ¦             |     1      ¦    1     ¦    1
 raiɾR       ¦    ¦     1!      |     1      ¦    1     ¦
 r^itR   1!  ¦    ¦             |            ¦          ¦    1
 raitR   1!  ¦ 1  ¦     1       |            ¦          ¦


/raɪd-R base raɪd/:
       *NoTap¦*aIt¦Ident-OO(low)|Ident(voice)¦Ident(son)¦Ident(low)
>raiɾR       ¦    ¦             |            ¦    1     ¦
 r^iɾR       ¦    ¦     1!      |            ¦    1     ¦    1
 raidR   1!  ¦    ¦             |            ¦          ¦
 r^idR   1!  ¦    ¦     1       |            ¦          ¦    1


/rait/:
      *NoTap¦*aIt¦Ident-OO(low)|Ident(voice)¦Ident(son)¦Ident(low)
>r^it       ¦    ¦             |            ¦          ¦    1
 rait       ¦ 1! ¦             |            ¦          ¦
 raiɾ   1!  ¦    ¦             |            ¦          ¦
```

[5] Bermúdez-Otero, Ricardo. "Raising and flapping in Canadian English: Grammar and acquisition." In *Handout of paper presented at the CASTL Colloquium, University of Tromsø*, vol. 2. 2004.

/raid/:						
	*NoTap	*aIt	Ident-OO(low)	Ident(voice)	Ident(son)	Ident(low)
>raid						
r^id						1!



39. Doing OO-correspondence carefully

- Proclaim your assumptions about basehood.
- You should include tableaux that derive the base, too.
- List the base in the input of the derived form.

40. What about monomorphemic forms?

- E.g., *spider* is not derived from anything; it has no base.
- If we just follow the diachrony, *spider* should have a [aɪ], *mitre*[6] should have [ʌɪ].

41. Is the phenomenon diachronically stable?

- In morphological derived forms, I believe it is: the [ʌɪ] is reliably inherited.
- In monomorphemic forms: NO

42. Words in the *spider* class drift all over the map!

- The key study (three native speakers, hundreds of words):
  - Vance, Timothy J. 'Canadian Raising' in some dialects of the northern United States. *American Speech* 62, no. 3 (1987): 195-210.
- In monomorphemic words, [aɪ] is plainly phonemic; not predictable.
- Many native speakers have [ˈspʌɪɾɚ] for *spider*, [ˈsnaɪɾɚ] for *Snyder*; these are non-etymological pronunciations
- The words with these diphthongs have been "set adrift": for diphthongs before tap there is a great deal of inter-speaker variation, lexical variability, subgeneralizations etc.

43. Is the phenomenon well-studied?

- I would say, no; I don't know any other work like Vance's pioneering work.

[6] 'hat worn by bishop' or 'type of joint used in woodworking'

- The last word has not been said.

44. Upshot for /aɪ/ Raising

- The morphological analysis looks pretty solid to me (no exceptions).
- The opacity seems to have set forth a wave of instability, suggesting Kiparsky was right in suggesting counterbleeding opacity is hard to learn.

45. More on counterbleeding opacity

- If OO isn't available to help, counterbleeding[7] is by far the hardest form of opacity.
- To do it at all in OT, you may need brute-force two-level constraints:

  *[aɪ] on the surface, when preceding a voiceless consonant in UR.

- My sense is that this kind of opacity is very unstable diachronically, but I only keep a few cases in my head — research needed

46. Bibliography from breakdown of counterbleeding opacity

- Hebrew: Sumner, Meghan Marie. *Testing the abstractness of phonological representations in Modern Hebrew weak verbs*. State University of New York at Stony Brook, 2003.
- Polish: Sanders, Nathan. *Opacity and sound change in the Polish lexicon*. University of California, Santa Cruz, 2003.
- Mayer, Connor (2021) Issues in Uyghur backness harmony: Corpus, experimental, and computational studies. UCLA dissertation. Also, a ms.: A large-scale corpus study of phonological opacity in Uyghur

47. Connor Mayer's new wrinkle

- In his Uyghur case:
  - Frequent words are opaque
  - Rarer words are transparent
  - Ditto in pilot findings on Korean, from Jinyoung Jo and Canaan Breiss
  - This could readily be checked in other languages! (term paper topic)
- Is the writing perhaps on the wall?
  - Productive phonology is transparent, per classical OT.
  - Bad opacity is lexical listing — a house of cards

CASE 3: SALTATION IN CAMPIDANIAN

48. Saltation

A becomes C

[7] More specifically, counterbleeding in the environment; see Bakovic reading.

B, which is "phonetically intermediate" between A and C, is stable.

49. An example of a saltatory alternation: Campidanian Sardinian

- Source: Bolognesi, Roberto (1998) *The Phonology of Campidanian Sardinian*, Holland Institute of Linguistics

Intervocalic lenition of voiceless stops /p, t, k/ and the voiceless affricate /tʃ/ (underlying forms justified by appearance in isolation):

bɛlːu [p]iʃːi	→	bɛlːu [β]iʃːi	'nice fish'
sːu [t]rintaduzu	→	sːu [ð]rintaduzu	'the thirty-two'
dɛ [k]uatːru	→	dɛ [ɣ]uatːru	'of four...'
sːu [tʃ]ɛʁu	→	sːu [ʒ]ɛʁu	'the heaven'

Preservation of underlying intervocalic /b, d, g/:

sːa [b]ia	→	sːa [b]ia	'the road'
sːu [g]atːu	→	sːu [g]atːu	'the cat'
donːia [d]ominiɣu	→	donːja [d]ominiɣu	'every Sunday'

50. The Campidanian saltatory alternation is productive

sːa [p]olonia	→	sːa [β]olonia	'(the) Poland'
sːu [k]omputːɛ	→	sːu [ɣ]omputːɛ	'the computer'
sːu [t]asːi	→	sːu [ð]asːi	'the taxi'

51. Rule based analysis

This is amazingly easy in SPE! No one even noticed it as a problem.

$$\begin{bmatrix} -\text{sonorant} \\ -\text{voice} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{voice} \\ +\text{continuant} \end{bmatrix} / \text{V} \_\_\_ \text{V}$$

52. Classical OT can't handle this (work of Ito/Mester, Lubowicz)

			Id(cont)	Id(voice)	*V[-cont]V	*V[-vce]V	*B
apa	apa				1	1	
	aba			1	1		
	aBa	1	1	1			1
aba	apa			1	1	1	
	aba	1			1		
	aBa		1				1
Ba	Ba						1
	ba	1	1				

- Software will tell you there is no ranking that works.
- Intuition: if stops are bad intervocalically, and the Faithfulness cost of /b/ → [β] is less than the Faithfulness cost of /p/ → [[β], why shouldn't /b/ become [β]?

53. Is the phenomenon opaque, and in what way?

- It is not.
- There are no surface exceptions to Spirantization, and the environment remains clear on the surface.
- But it's problem for OT, as has been known for a long time.
  - Ito, Junko & Armin Mester (1998). Markedness and word structure: OCP effects in Japanese. Ms, UCSC. Available at Rutgers Optimality Archive, 225, www.roa.rutgers.edu.
  - Ito, Junko & Armin Mester (2003). On the sources of opacity in OT: coda processes in German. In C. Féry & R. van de Vijver (eds.) The syllable in Optimality Theory. Cambridge University Press. 271–303.
  - Lubowicz, Anna (2002). Derived environment effects in Optimality Theory. Lingua 112. 243–280.
  - Lubowicz, Anna (2003). Local conjunction and comparative markedness. Theoretical Linguistics 29. 101–112.

[more next time]