Today's topics:

- **Markedness constraints**
- **Too-many-solutions: problem?**
- **Inductive bias vs. channel bias**

Background preparation (review):

- *Zec (2007), McCarthy (2007) markedness constraints*

0. Today's objectives

After today's class, you should be able to:

- Discuss some considerations in formalizing markedness constraints
- Describe the too-many-solutions problem, give an example, and explain why it poses a challenge for classic OT
- Explain the potential role for channel bias as a source of typological patterns / phonetics-in-phonology

1. Formalizing markedness constraints

- Markedness constraints
  - formalize **predictable patterns** in phonological data
  - are often based on **phonetic** or **typological** factors / generalizations
  - are expressed in terms of the representational inventory of the phonological model

- What other restrictions (theoretical or empirical) are there?

1. Formalizing markedness constraints

- Thought exercise, level 1:
  - Suppose we know that some languages have voiced and voiceless obstruents in surface forms, and others have only voiceless obstruents
  - How can we model this **typological** pattern in OT?

1. Formalizing markedness constraints

- We need a constraint like this:

  *VOIOBST Assign one * for every segment that is [–son, +voi]

- What faithfulness constraints conflict with this?
- What ranking is needed for each language pattern discussed above?
- How do we rule out a language with **only** voiced obstruents? (What does this tell us about CON?)

1. Formalizing markedness constraints

- Thought exercise, level 2:
  - Some languages allow voiced and voiceless obstruents in onsets, but only voiceless obstruents in codas
  - How can we model this **(positional) neutralization** pattern in OT?

1. Formalizing markedness constraints

- Do we put special requirements on codas?

  *VOIOBST[Cod] Assign one * for every segment in a coda that is [–son, +voi]

- Do we put special protection on onsets?

  IDENT[±voi][Ons] Assign one * for every output segment in an onset whose [±voi] value differs from its input correspondent

- Are we now predicting any problematic constraint types?

1. Formalizing markedness constraints

- Thought exercise, level 3:
  - Consider a language that prefers to have a syllable nucleus be a vowel, but will use a liquid if no vowel is available, and will use a nasal if no liquid is available
  - How can we model this **implicational hierarchy** pattern in OT?
  - How does this relate to the **typological observation** that a language will typically allow syllabic nasals only if it also allows syllabic liquids?

1. Formalizing markedness constraints

- Thought exercise, level 3:
  - What constraints should we propose?
  - How can we make them predict the correct typology?

  - See McCarthy (2008: §4.5.3) for more on “harmonic alignment” to scales

1. Formalizing markedness constraints

- What we've observed:
  - Some logically possible **M constraints** seem never(?) to be active
  - Some cases of logically possible **positional constraints** seem never(?) to be active
  - Some M constraints may be ranked in universal hierarchies = some logically possible **rankings** are never(?) (or rarely?) attested
- How do we account for these observations?

1. Formalizing markedness constraints

- How do we account for logically possible constraints that never seem to be active?
  - They are **not part of CON**
  - They are part of CON, but **no one uses them**
- Essentially, there is a choice between
  - a **smaller** CON that requires **conditions** on possible constraints
  - a **formally simpler** CON that predicts **unattested patterns**

2. Gaps in factorial typology

Review:

- What is the **factorial typology** of a set of constraints?
- How does it make **predictions**?

2. Gaps in factorial typology

- To satisfy a M constraint (2), OT predicts a wide range of F violations (3) that could be used (from Myers 2002)

(2) *Nç: A nasal cannot be followed by a voiceless obstruent.

(3) (a) IDENT-LAR: If an output segment has an input correspondent, the two must agree in all laryngeal feature specifications (i.e. [voice], [spread glottis], [constricted glottis]).

(b) IDENT-NASAL: If an output segment has an input correspondent, the two must agree in [nasal].

(c) IDENT-MAJOR: If an output segment has an input correspondent, the two must agree in the major class features [consonantal] and [sonorant].

(d) MAX: Every segment in the input must have a correspondent in the output.

(e) DEP: Every segment in the output must have a correspondent in the input.

(f) LINEARITY: If a string of output segments have input correspondents, the two strings must correspond in all linear order relations among their members.

2. Gaps in factorial typology

- What actually happens in lgs with *NT effects?

attested		*not attested*	
(a)	voicing assimilation	(e)	**epenthesis**
(b,c)	denasalization	(f)	**metathesis**
(d)	deletion		

- There are **gaps** in the predicted factorial typology
  - But, it's hard to argue that this is because we are assuming the **wrong constraints**!
- Gaps in factorial typology: also known as the ***too-many-solutions problem*** (Steriade 2008)

2. Gaps in factorial typology

- Is there a connection between … ?
  - Gaps in factorial typology
  - Universal ranking hierarchies
  - Logically possible constraints that never seem to be active

2. Gaps in factorial typology

- Myers (2002) proposes:
  - NT sequences are not always accurately produced and/or perceived
  - This kind of **variability in the transmission** includes things that *look like* assimilation, denasalization, deletion
  - But **not** things that look like epenthesis or metathesis

2. Gaps in factorial typology

- The core idea: Some gaps in factorial typology are there for **diachronic** reasons
  - What causes a language to change its phonological grammar? → Breakdown in transmission due to **misperception** by learners
  - But, only certain types of misperception arise
  - Some patterns predicted by factorial typology will never have a chance to be learned

2. Gaps in factorial typology

Okay then…

- Can diachronic change explain *everything* about phonology? Can we essentially get rid of the idea that we have a synchronic mental grammar entirely?
  - Yes! (Blevins 2004, Blevins & Garrett 2004)
  - No! — but diachronic change may explain *some* things (Kiparsky 2006)
    - Can you think of any arguments?
    - See also Smith (2007) on B&G 2004

3. Implications

- Can we solve some of the too-many-solutions problems by **changing** the way OT works?
  - **Harmonic Grammar / MaxEnt** (Pater 2009, etc.)
    - Maybe the constraints are not ranked in terms of strict domination, but **weighted**
    - Lower-weighted constraint violations can, in some cases, “gang up” on a higher-ranked one

3. Implications

- Can we solve some of the too-many-solutions problems by **changing** the way OT works?
  - **Harmonic Serialism** (McCarthy 2000, 2016)
    - Maybe GEN makes "one change at a time"
    - The OT grammar **proceeds serially** until the output is completely faithful to the input

3. Implications

- These alternatives to classic OT have been proposed for multiple reasons
- But: The too-many-solutions problem is one category of argument you will see

3. Implications

- Is the too-many-solutions problem really a *problem* if we **model** the way factorial typology **interfaces** with factors like phonetics and diachronic change?
  - Moreton (2008: 83-84) uses these terms:
    - ***channel bias*** — "phonetically systematic errors in transmission between speaker and hearer, caused largely by subtle phonetic interactions which serve as precursors for phonologisation…"
    - ***analytic bias*** — "cognitive biases which facilitate the learning of some phonological patterns and inhibit that of others. One hypothetical type of analytic bias [is] Universal Grammar…"

3. Implications

- On this view, can we see factorial typology as a way of studying **analytic bias** specifically?
  - This, or any, model of analytic bias would need to be combined with a model of **channel bias**

- Does this state of affairs make it harder to evaluate constraints on the basis of their factorial typology?
  - Yes, because now the constraint set is just one of the factors predicting observed typology
  - It’s arguably still worth considering…

3. Implications

- Another interesting question:

  If features, or constraints, are **emergent** (learned, as in Mielke 2004), what does “factorial typology” of segmental distribution look like?

References

(some are available online; check also author web pages)

Blevins, Juliette. 2004. *Evolutionary phonology: The emergence of sound patterns*. Cambridge: CUP.

Blevins, Juliette, and Andrew Garrett. 2004. The evolution of metathesis. In Bruce Hayes, Robert Kirchner, and Donca Steriade (eds.), *Phonetically Based Phonology*, 117-156. Cambridge: CUP.

Kiparsky, Paul. 2006. Amphichronic linguistics vs. Evolutionary Phonology. *Theoretical Linguistics* 32: 217-236. Preprint version: <http://www.stanford.edu/~kiparsky/Papers/blevins.pdf>

McCarthy, John J. 2000. Harmonic serialism and parallelism. *NELS* 30:501-524.

McCarthy, John J. 2016. The theory and practice of Harmonic Serialism. In John McCarthy and Joe Pater (eds.), *Harmonic Grammar and Harmonic Serialism*. London: Equinox Press.

Moreton, Elliott. 2008. Analytic bias and phonological typology. *Phonology* 25(1):83-127.

Myers, Scott. 2002. Gaps in factorial typology: The case of voicing in consonant clusters. Ms, UT Austin. ROA 509.

Pater, Joe. 2009. Weighted constraints in generative linguistics. *Cognitive Science* 33: 999-1035.

Pater, Joe. 2016. Universal Grammar with Weighted Constraints. In John McCarthy and Joe Pater (eds.), *Harmonic Grammar and Harmonic Serialism*. London: Equinox Press.

Smith, Jennifer L. 2007. Review of Bruce Hayes, Robert Kirchner, and Donca Steriade (eds.), 2004. *Phonetically Based Phonology* (Cambridge: CUP). *Language* 83(4): 886-889.

Steriade, Donca. 2008. The phonology of perceptibility effects: The P-map and its consequences for constraint organization. In Kristin Hanson & Sharon Inkelas (eds.), *The nature of the word: studies in honor of Paul Kiparsky*, 151-180. Cambridge, MA: MIT Press.