

## Class 9

## Relative Chronology, Rule Ordering, and Chain Shifts

10/10/19

For next week: read Fox Ch. 4

## 1 Hawaiian

- Here's some (cleaned up) data on the development of Hawaiian:

	Proto-Polynesian	Hawaiian	Gloss
	*[tapu]	[kapu]	'forbidden'
	*[taŋi]	[kani]	'cry'
	*[hika]	[iʔa]	'fish'
	*[ʔato]	[ako]	'thatch'
	*[niu]	[niu]	'coconut tree'
	*[takele]	[kaʔele]	'back of canoe'
	*[aka]	[aʔa]	'root'
(1)	*[taŋata]	[kanaka]	'man'
	*[pito]	[piko]	'navel'
	*[paki]	[paʔi]	'slap'
	*[ʔate]	[ake]	'liver'
	*[ŋutu]	[nuku]	'three'
	*[isu]	[ihu]	'nose'
	*[sika]	[hiʔa]	'firemaking'
	*[ono]	[ono]	'six'
	*[sala]	[hala]	'error'
	*[haŋi]	[ani]	'wind'

- (2)
- What are the changes? [All of them are *unconditioned*.]
  - Do any of these changes result in a split and/or merger?
  - Do any of these changes have to be *ordered*?

## 2 Rule Ordering

### 2.1 Types of rule ordering interactions

- There are **four types** of rule ordering interactions, coming in two logical pairs.

#### 2.1.1 Feeding and counter-feeding

- The first basic type is a *feeding* interaction:

(3) **Feeding:**

- Rule A *creates* the input or environment for the application of Rule B, and
  - Rule A is ordered before Rule B, so
- Rule B successfully applies to the output of Rule A.

- The flip side of feeding is: If Rule A feeds Rule B, but you reverse the order, you get a *counter-feeding* interaction:

(4) **Counter-feeding:**

- Rule A *creates* the input or environment for the application of Rule B, **but**
  - **Rule B is ordered before Rule A**, so
- Rule B never gets the chance to apply to the output of Rule A.

- These can be schematized as follows:

(5) Feeding Derivation (Rule A bef. Rule B)

UR	/WXYZ/
Rule A: $X \rightarrow A / W\_Y$	WAYZ
Rule B: $Y \rightarrow B / A\_Z$	WABZ
SR	[WABZ]

(6) Counter-feeding Derivation (Rule B bef. Rule A)

UR	/WXYZ/
Rule B: $Y \rightarrow B / A\_Z$	—
Rule A: $X \rightarrow A / W\_Y$	WAYZ
SR	[WAYZ]

#### 2.1.2 Bleeding and counter-bleeding

- The second basic type is a *feeding* interaction:

(7) **Bleeding:**

- Rule A *destroys* the input or environment for the application of Rule B, and
  - Rule A is ordered before Rule B, so
- Rule B cannot apply to the output of Rule A (even though it would have applied if Rule A hadn't).

- The flip side of bleeding is: If Rule A bleeds Rule B, but you reverse the order, you get a *counter-feeding* interaction:

(8) **Counter-bleeding:**

- Rule A *destroys* the input or environment for the application of Rule B, **but**
  - Rule B is ordered before Rule A, so
- Rule B successfully applies before Rule A can destroy its input or environment.

- These can be schematized as follows:

(9) Bleeding Derivation (Rule A bef. Rule B)	(10) Counter-bleeding Derivation (Rule B bef. Rule A)
UR	UR
Rule A: $Z \rightarrow A / \_ \#$	Rule B: $Y \rightarrow B / X \_ Z$
Rule B: $Y \rightarrow B / X \_ Z$	Rule A: $Z \rightarrow A / \_ \#$
SR	SR
[XYA]	[XBA]

## 2.2 Finnish

- Finnish has two sound changes / phonological rules that interact:

- (11) Rule A — final vowel raising:  $/e/ \rightarrow [i] / \_ \#$   
 (12) Rule B — “assibilation”:  $/t/ \rightarrow [s] / \_ i$

- They interact such that the facts comes out as:

- (13) Finnish (Campbell 2013:202)

<i>Essive singular</i>		<i>Nominative singular</i>	
1. onne-na	‘as happiness’	onni	‘happiness’
2. sukse-na	‘as (a) ski’	suksi	‘ski’
3. vete-nä	‘as water’	vesi	‘water’
4. käte-nä	‘as (a) hand’	käsi	‘hand’
5. tuoli-na	‘as (a) chair’	tuoli	‘chair’

(NOTE:  $/ä/ = [\text{æ}]$ . The *-na* / *-nä* alternation is the result of vowel harmony in Finnish and is of no relevance to the discussion here.)

★ *What kind of interaction is this?*

- We can see this by spelling out the derivations:

(14) Finnish derivations

Pre-Finnish	*vete-nä	*vete	*käte-nä	*käte
Rule A: final raising	—	<i>veti</i>	—	<i>käti</i>
Rule B: assibilation	—	<i>vesi</i>	—	<i>käsi</i>
<b>Modern Finnish</b>	vetenä	vesi	käte-nä	käsi

- Rule A **feeds** Rule B because it *creates a new environment for it to apply*.
- If we reversed the order of the rules, we would end up with something different:

## (15) Hypothetical Finnish' derivations

Pre-Finnish	*vete-nä	*vete	*käte-nä	*käte
Rule B: assibilation	—	—	—	—
Rule A: final raising	—	<i>veti</i>	—	<i>käti</i>
Modern Finnish'	vetenä	veti	käte-nä	käti

- This is a **counter-feeding order**:

- Rule B *would have created a new environment* for Rule A if it had applied first.

- Note that counter-feeding orders end up making one of the rules *non-surface-true*:

- There are observable instances on the surface where the environment for the assibilation rule is apparently met but the rule has not applied.

## 2.3 Middle High German

- Now let's look at changes between Old High German and Middle High German:

	Old High German	Middle High German	Gloss
	[hox]	[hox]	'high'
(16)	[hox-iro]	[høx-ərə]	'higher'
	[hox-isto]	[høx-əstə]	'highest'
	[hox-o]	[hox-ə]	'highly'

- (17)
- What two changes occurred?
  - What order did they occur in?
  - What type of rule ordering interaction is this?

- The counter-bleeding derivation is illustrated here:

(18) Counter-bleeding derivation for Middle High German

Old High German	['hox]	['hox-iro]	['hox-isto]	['hox-o]
Rule A: Umlaut	—	'høx-iro	'høx-isto	—
Rule B: Reduction	—	'høx-ərə	'høx-əstə	'hox-ə
Middle High German	['hox]	['høx-ərə]	['høx-əstə]	['hox-ə]

- We can best see why this is counter-bleeding when we try swapping the order:

(19) Hypothetical bleeding derivation for Middle High German'

Old High German	['hox]	['hox-iro]	['hox-isto]	['hox-o]
Rule B: Reduction	—	'hox-ərə	'hox-əstə	'hox-ə
Rule A: Umlaut	—	—	—	—
Middle High German'	['hox]	['hox-ərə]	['hox-əstə]	['hox-ə]

- Reduction **bleeds** umlaut, because it destroys the environment where umlaut could have applied.
- When these rules are reversed, bleeding fails to occur, because umlaut gets the chance to apply before reduction destroys its environment.  
→ Therefore, the actual MHG derivation is **counter-bleeding**.

## 2.4 Rule ordering change

- According to work by Paul Kiparsky and others, languages tend to prefer feeding orders over counter-feeding orders, because they are *transparent*/surface-true.
- ★ This sometimes results in *rule inversion*, turning counter-feeding into feeding.

- Here's an example from Finnish

(20) Rule A — diphthongization: /e/ → [i] / \_e

e.g.: \*tee > tie

(21) Rule B — consonant deletion: /voiceless stop/ → Ø / V\_V

- In Standard Finnish (22), Rule A precedes Rule B.
  - This reflects the original historical order of the two sound changes.
- However, in certain dialects of Finnish (23), this order has been flipped to B before A, so that it is feeding.

(22) Standard Finnish (counter-feeding)	(23) Dialectal Finnish (feeding)
UR	UR
Rule A: diphthongization	Rule B: consonant deletion
Rule B: consonant deletion	Rule A: diphthongization
SR	SR

- In the dialectal version, each rule gets to apply maximally, and there are no surface counter-examples to either rule.  
⇒ This represents a bias towards *transparency* (no counter-examples) over *opacity* (counter-examples).

- Kiparsky also claims that counter-bleeding orders are preferred to bleeding orders, but this is a little harder to show.

### 3 Chain Shifts

- *Chain shifts* are a special type of counter-feeding interaction.
  - ⇒ A **chain shift** is when a set of sounds all move in one direction along some continuum.
- The most common chain shift involves *vowel height*.

#### 3.1 The Great Vowel Shift

- ★ Perhaps the most famous vowel height chain shift is the English *Great Vowel Shift*:
  - All of the *long vowels* of Middle English raised up one slot (including the change from *a:* to *æ:*).
  - The long high vowels (with nowhere else to go) turned into diphthongs.

(24) The English Great Vowel Shift (and subsequent changes)

Great Vowel Shift (btw. 1400-1600)	Chaucer (c. 1400)	Shakespeare (c. 1600)	Wordsworth (c. 1800)	Modern English
<i>i:</i> > <i>ai</i>	‘bite’ /bi:tə/	/bɔit/	/bait/	/baɪt/
<i>e:</i> > <i>i:</i>	‘beet’ /be:tə/	/bi:t/	/birt/	/bɪt/
<i>æ:</i> > <i>e:</i> (> <i>i:</i> )	‘beat’ /bæ:t/	/be:t/	/bɪt/	/bɪt/
<i>a:</i> > <i>æ:</i> (> <i>e:</i> )	‘name’ /na:mə/	/næ:m/	/ne:m/	/neɪm/
<i>u:</i> > <i>au</i>	‘house’ /hu:s/	/həʊs/	/haus/	/haʊs/
<i>o:</i> > <i>u:</i>	‘boot’ /bo:t/	/bu:t/	/bu:t/	/bu:t/
<i>ɔ:</i> > <i>o:</i>	‘boat’ /bo:t/	/bo:t/	/bo:t/	/bo:t/

- After the main GVS, the non-high front vowels each moved up one more slot.
  - This led to the only merger in this chain, between original *e:* and *æ:* as *i:*.
  - (Whence the two spellings of [i] as <ee> and <ea>, respectively.)
- Lastly, the Early-Modern English long vowels turned into Modern English tense vowels / “inherent” diphthongs.
- Campbell (2013:44) summarizes the changes this way:

(25) Great Vowel Shift diagram

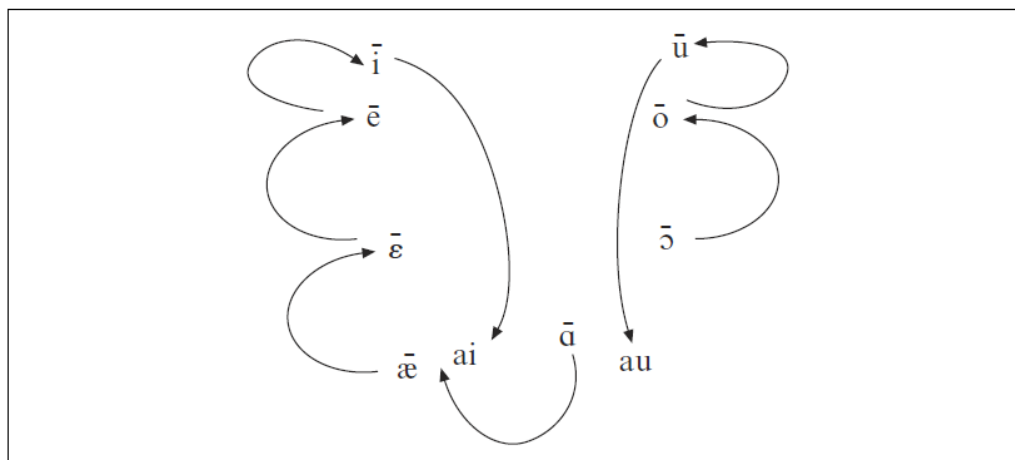
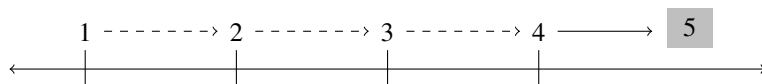


FIGURE 2.1: The Great Vowel Shift in English

### 3.2 Push chains vs. Pull chains

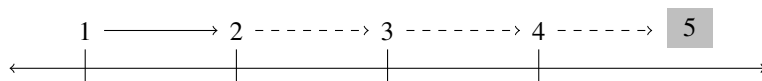
- Chain shifts are sometimes characterized as either “push chains” or “pull chains”.
- If the first change in the chain is at the end of the continuum, extending it beyond its original space — [4] → [5] in the example below — this is a *pull chain*.
  - The first change creates a *gap* in the system, and the next sound along the continuum moves in that same direction to fill the gap, and so on.

(26) Pull chain



- If the first change in the chain is at the beginning of the continuum, encroaching on the space of the next member of the continuum — [1] → [2] in the example below — this is a *push chain*.
    - The first change verges on rendering a contrast indistinct, so the other member of that contrast moves to avoid a merger / maintain the contrast, and so on.
- The idea of maintaining a particular amount of contrastiveness can also explain pull chains.

(27) Push chain



- Which one is the GVS? Phonetically, there might be good reason to think it's a push chain.
- Let's assume that the post-GVS changes of  $e: > i:$  and  $\text{æ}: > e:$  are driven by similar phonetic forces as the main GVS.
- There's no gap above these changes.
  - In fact, the higher change leads to a merger (which is basically a failed chain shift).
- So, nothing is pulling them upward. Therefore, they must be being pushed upward.
- ★ This would suggest that the GVS was probably a push chain, driven by some phonetic pressure for low/mid vowels to raise.

### 3.3 Chain shift as counter-feeding

- But phonologically, maybe you have to view it (and maybe all chain shifts?) as a pull chain.
  - If we take each change as an individual sound change rule, we find that a chain shift must be characterized as *counter-feeding*.
- If we set the rules up in a feeding order (28), all of the vowels would end up going all the way to the end-point, because each change from *lower to higher* would **feed** the following change.

(28) Outcomes of the GVS if it was in a feeding order

	<i>name</i>	<i>beat</i>	<i>beet</i>	<i>bite</i>
Pre-GVS	na:m	bæ:t	be:t	bi:t
Rule 1: a: > æ:	næ:m	—	—	—
Rule 2: æ: > e:	ne:m	bet	—	—
Rule 3: e: > i:	ni:m	bit	bi:t	—
Rule 4: i: > ai	naim	bait	bait	bait
Post-GVS	*naim	*bait	*bait	bait

- But if we set the rules up in a counter-feeding order (29), with the highest raising rule first, we'll end up with each rule just applying once.

(29) Outcomes of the GVS if it was in a counter-feeding order

	<i>name</i>	<i>beat</i>	<i>beet</i>	<i>bite</i>
Pre-GVS	na:m	bæ:t	bet	bi:t
Rule 4: i: > ai	—	—	—	<i>bait</i>
Rule 3: e: > i:	—	—	<i>bit</i>	—
Rule 2: æ: > e:	—	<i>bet</i>	—	—
Rule 1: a: > æ:	<i>næ:m</i>	—	—	—
Post-GVS	næ:m	bet	bit	bait
(plus subsequent changes)	ne:m	bit	—	—

- Therefore, in terms of rule ordering, we would be led to believe that it was really a pull chain, since the highest raising rule has to apply first.
- But maybe this is not the right way to think about chain shifts at all...
  - Maybe there is some kind of unified rule that just raises each one level.

### 3.4 Other kinds of chain shifts

- But there are other kinds of chain shifts that don't so clearly track a single dimension like height.
- If we look back to Hawaiian, we have two chain shifts involving consonants:

(30) a. t > k  
 b. k > ?  
 c. ? > Ø

(31) a. s > h  
 b. h > Ø

- It would be more difficult to characterize these changes as all moving one step on the same continuum.
- So maybe all chain shifts are pull chains?