Class 6
Types of sound changes (and phonological processes)
10/1/19

Reading: Finish Campbell Ch. 2

1   Introduction

⋆ **Working hypothesis:** The range of possible sound changes is basically the same as the range of possible synchronic phonological processes.
  ↪ Sound changes result from the adoption of a synchronic phonological process.
⋆ *Corollary:* We shouldn't find sound changes that don't have equivalents among synchronic phonological processes.
    ○ If we do appear to find them, they should be explicable in other ways, for example:
        ▪ They are not a single change but rather a combination of changes, or
        ▪ They are the result of analogy/borrowing/re-interpretation/etc., not sound change proper.

• **Today:** We'll take a quick tour through the various kinds of sound changes and phonological processes, illustrating both types whenever we can.

1.1   Sound change notation

• The notation for sound changes parallels the notation for synchronic phonological rules.

(1)   Sound change notation (abstract)
        Language1 $^{(*)}X$ > Language2 $^{(*)}Y$ (/ A_B)

• Typically, when we talk about sound changes we're talking about changes in *phones*.
    ○ It takes more work to talk about changes to the phoneme/allophone system.
• " * " indicates a *reconstructed* form.
    ○ (Distinct usage from " * " to mean *ungrammatical*.)

(2)   Examples of actual sound changes
        a.   **Old English y: > Modern English i**
        b.   **Proto-Indo-European $*d^{\text{ɦ}}$ > Ancient Greek t^{h}**
        c.   **Pre-Greek $*g^{w}$ > Ancient Greek d / _i**

2 Assimilation

• Assimilation is a process where one sound becomes *more similar* to an adjacent sound.

2.1 Characterizing assimilation

• We can characterize each assimilation (and dissimilation — see below) process/change in terms of three dimensions:

(3)   Dimensions of variability for assimilation
   a.   Total vs. Partial
        ↪   Assimilation in all features vs. one/some feature(s)
   b.   Local vs. Non-Local (Campbell 2013:24: "Contact vs. Distant")
        ↪   Assimilation to an adjacent sound vs. a non-adjacent sound
   c.   Regressive vs. Progressive (= anticipatory vs. perseveratory)
        ↪   Assimilation to the following sound vs. the preceding sound

• Each combination is attested — at least in one of the two domains (sound change, synchronic process) — but some are better attested than others.

2.1.1 Partial Local Regressive

• Consider this data from related Australian languages:

(4)   *ḻ : t* correspondence in the Karnic languages of the Lake Eyre Basin in Australia

                                                                    (Crowley & Bowern 2010:39, from Austin 1990)

	Yawarrawarrka	Yandruwandha	Diyari
'language'	patpa	paḻpa	—
'eyebrow'	pitpa	piḻpa	piḻpa
'hole'	witpa	—	wiḻpa
'whistle'	witpi	—	wiḻpi

• What's going on here?

• This kind of assimilation is all over the place in synchronic grammars.
   ○ Take, for example, nasal place assimilation in English:

(5)   Nasal place assimilation in English (some examples from Crowley & Bowern 2010:40)

Environment	Phonetic transcription	Gloss	
__V	[ɪn-ədmɪsəbl̩]	'inadmissible'	
__alveolar	[ɪn-dəvɪzəbl̩]	'indivisible'	
__bilabial	[ɪm-bælns̩]	'imbalance'	
__velar	[ɪŋ-kənsɪdəɹət]	'inconsiderate'	(variant: [ɪn-kənsɪdəɹət])
__labiodental	[ɪɱ-fæləbl̩]	'infallible'	(variant: [ɪn-fæləbl̩])

   ○ Also, voicing and palatalization assimilation in Lithuanian:
        ▪ Consonants assimilate to following consonants for *palatalization*, and
        ▪ Obstruents (stops, fricatives, affricates) assimilate to following obstruents in voicing.

(6)   Lithuanian verbal prefixes: voicing and palatalization assimilation (Baković 2005:290)

	/at-/ prefix		/ap-/ prefix	
a.	**Voiceless non-palatalized**			
	at-praʃʲiːtʲi	'to ask'	ap-ʃaukʲtʲi	'to proclaim'
	at-koːpʲtʲi	'to rise'	ap-kalʲbʲetʲi	'to slander'
	at-rasʲtʲi	'to find'	ap-raʃʲiːtʲi	'to describe'
b.	**Voiced non-palatalized**			
	ad-bukʲtʲi	'to become blunt'	ab-drasʲkʲiːtʲi	'to tear'
	ad-gautʲi	'to get back'	ab-gautʲi	'to deceive'
c.	**Voiceless palatalized**			
	atʲ-pʲautʲi	'to cut off'	apʲ-tʲemʲdʲiːtʲi	'to obscure'
			apʲ-kʲelʲautʲi	'to travel through'
d.	**Voiced palatalized**			
	adʲ-bʲekʲtʲi	'to run up'	abʲ-ʒʲelʲtʲi	'to become overgrown'
			abʲ-gʲiːdʲiːtʲi	'to heal'
	atʲ-lʲeisʲtʲi	'to forgive'	apʲ-lʲenʲkʲtʲi	'to spare'

2.1.2   Total Local Regressive

(7)   Place assimilation into Italian (Latin <c> = [k])

Latin	>	Italian	
o**c**to	>	o**t**to	'eight'
no**c**tem	>	no**t**te	'night'
fa**c**tum	>	fa**t**to	'done'
se**p**tem	>	se**t**te	'seven'
a**p**tum	>	a**t**to	'apt, fit for'

- How do we formulate the assimilation sound change?

- But note that this only involves a change in a single feature, so it's not so different from partial assimilation.

- "Double consonants" are also called **geminates**. Total local assimilation (involving consonants) by definition creates geminate consonants.

- Arabic has a synchronic assimilation pattern that better shows total assimilation:
  - The definite article *l-* **totally** assimilates to a following coronal (8), but doesn't assimilate at all to a following non-coronal (9).

(8)   Total assimilation of *l-* to coronals in Cairene Arabic (Watson 2002:217, ex. 41)

/il-turki/	[it-turki]	'the Turk'
/il-deːl/	[id-deːl]	'the tail'
/il-tˤamaːtˤim/	[itˤ-tˤamaːtˤim]	'the tomatoes'
/il-dˤarb/	[idˤ-dˤarb]	'(the) hitting'
/il-sitt/	[is-sitt]	'the woman'
/il-ʃams/	[iʃ-ʃams]	'the sun'
/il-sˤalsˤa/	[isˤ-sˤalsˤa]	'the tomato paste'
/il-loːn/	[il-loːn]	'the colour'
/il-nasˤsˤ/	[in-nasˤsˤ]	'the text'
/il-raːs/	[ir-raːs]	'the head'

(9)   No assimilation of *l-* to non-coronals in Cairene Arabic (Watson 2002:217, ex. 43)

/il-ħaːl/	[il-ħaːl]	'the state'
/il-hilaːl/	[il-hilaːl]	'the crescent'
/il-xeːl/	[il-xeːl]	'the horses'
/il-ɣada/	[il-ɣada]	'lunch'
/il-qurʔaːn/	[il-qurʔaːn]	'the Qur'an'
/il-mudarris/	[il-mudarris]	'the teacher'
/il-bint/	[il-bint]	'the girl'
/il-ism/	[il-ʔism]	'the name'

- This illustrates the principle that things which are already somewhat similar tend become even more similar.

2.1.3 Total Local Progressive

- This a relatively rarer kind of assimilation.

- Icelandic has a regular assimilation rule that totally assimilates *coronal obstruents* to preceding *coronal sonorants*.

(10)   Total assimilation in Icelandic (Crowley & Bowern 2010:40)

Pre-Icelandic	>	Icelandic	
*fin**d**an	>	fin**n**a	'find'
*gul**θ**	>	gul**l**	'gold'
*hal**θ**	>	hal**l**	'inclined'
*mun**θ**	>	mun**n**	'mouth'
*un**θ**an	>	un**n**a	'love'

- Some more sporadic examples from other languages:

(11)   a.   Proto-Indo-European **kul**n**is* > Latin *col**l**is*
         b.   Proto-Indo-European **kol**n**is* > Proto-Germanic **hul**n**is* > Old English *hy**ll*** > Modern English *hill*
         c.   Old Finnish **ʃal**n**a* > Finnish *hal**l**a* 'frost'

2.1.4 Partial Non-Local Regressive

- Non-local assimilation often has to do with vowels in adjacent syllables affecting one another.
  - ○ This is often referred to as *vowel harmony* (especially when it is iterative).

- The umlaut change/process in Old English is this kind of assimilation pattern.
  - ○ The same facts can be characterized either as a sound change (12) or as a synchronic process (13).

(12) Umlaut sound change *into* Old English
- a. Pre-Old English *muːsi > Old English *myːsi*
- b. Pre-Old English *foːti > Old English *føːti*

⇒ Pre-Old English $V_{[+back,-low]}$ > Old English $V_{[-back]}$ / _CV$_{[+high,-back]}$

(13) Umlaut phonological process *in* Old English
- a. Old English /muːs-i/ → [myːsi]
- b. Old English /foːt-i/ → [føːti]

⇒ Old English /V$_{[+back,-low]}$/ → [V$_{[-back]}$] / _CV$_{[+high,-back]}$

2.1.5 The other combinations

- If you look hard enough, you'll find examples of the other four types of assimilation. For completeness, they are :

(14) Remaining combinations of assimilatory dimensions (in no particular order)
- a. Partial Local Progressive
- b. Total Non-Local Regressive
- c. Total Non-Local Progressive
- d. Partial Non-Local Progressive

2.2 A special type of assimilation: Palatalization

- Palatalization refers to assimilatory changes where a consonant takes on some kind of palatal articulation.
  - → Not always super easy to characterize this in terms of traditional phonological features.
- Palatalization is normally triggered by things that are *front*, especially things that are *high and front*.

(15) Common palatalization triggers
- a. High front vowels: [i,ɪ,(y,ʏ)]
- b. The palatal glide: [j]
- c. Mid front vowels: [e,ɛ,(ø,œ)]

  - ○ Sometimes other kinds of vowels can trigger it too. It is often the case that such vowels used to be front, or that the language has extended the set of palatal triggers from *front vowels* to *all vowels*.

- There are many different degrees of palatalization, ranging from simply the addition of a secondary palatal articulation, all the way to changing the place and manner.

(16) Stages of palatalization
- a. Secondary articulation: C > C^j, esp. velars $k > k^j$
- b. Affrication and "coronalization": k^j > ʧ   ← typical endpoint
- c. Further fronting or "de-occlusion": ʧ > {ts, ʃ} > s

  - ○ Palatalization applies most frequently to velars, but also relatively frequently to alveolars: $t > t^j > $ {ʧ,ts}

- This trajectory probably represents individual stages that each palatalization change goes through diachronically.

2.2.1 Palatalization as secondary articulation

- Russian makes a contrast between *palatalized* and *non-palatalized* consonants.
- The palatalized versions results from the original presence of a high front vowel following the consonant:

(17)   Old Russian palatalization rule (synchronic):
        $C \rightarrow C^j$ / _ ĭ
        a.   Applies to the /v/ in [krovʲĭ] 'blood'
        b.   Doesn't apply to the /v/ in [krovŏ] 'shelter'

- Later in the history of Russian: [ĭ,ŏ] > Ø
- But the palatalization distinction is retained, creating distinct phonemes.

(18)   Palatalization contrast in Russian
        a.   /krovʲ/ → [krovʲ] 'blood'
        b.   /krov/ → [krov] 'shelter'

- This process/change applied to basically all consonants in Russian.

2.2.2 Palatalization as affrication

- Palatalization is how we got most of the [tʃ]'s in English:

(19)   English palatalization (image courtesy of David Goldstein)

Old English	PDE (RP)	Gloss
keaf	tʃɑːf	'chaff'
keːse	tʃiːz	'cheese'
keːap	tʃiːp	'cheap'
kiːld	tʃaɪld	'child'
kirike	tʃɜːtʃ	'church'
kiːdan	tʃaɪd	'chide'
keastər	'tʃestə	'chester'
keːosan	tʃuːz	'choose'
kuman	kʌm	'come'
kandəl	'kændl	'candle'
korn	kɔːn	'corn'
kreːodan	kraʊd	'crowd'
kweːn	kwiːn	'queen'
klɑːθ	klɒθ	'cloth'
kuː	kaʊ	'cow'
kałd	kəʊld	'cold'
klɪf	klɪf	'cliff'
kleːofan	kliːv	'cleave'

- How do we formalize the sound change?

- Can we tell anything about relative chronology of changes?

3 Dissimilation

- Dissimilation is the opposite of assimilation: one sound becomes *less* similar to a nearby sound.
  - We have some instances of *regular* dissimilatory sound changes, but frequently we find *sporadic* dissimilations.
  - Dissimilation is often *non-local*.

3.1 Aspiration dissimilation: Grassmann's Law

- One feature that frequently dissimilates is *aspiration*.

- The most well-known case is from Ancient Greek (and Sanskrit) — Grassmann's law:

(20) Grassmann's Law and its interaction with other Greek changes (Campbell 2013:27, Table 2.3)

	hair-NOM.SG	hair-GEN.SG	rear-FUT-1.SG	rear-1.SG
	'hair'	'of hair'	'I will rear'	'I rear'
Pre-Greek	$*t^h rik^h\text{-}s$	$*t^h rik^h\text{-}os$	$*t^h rep^h\text{-}s\text{-}o{:}$	$*t^h rep^h\text{-}o{:}$
deaspiration before *s*	t^hriks	—	t^hrepso:	—
Grassmann's Law	—	trik^{h}os	—	trep^{h}o:
Ancient Greek	$t^h riks$	$trik^h os$	$t^h repso{:}$	$trep^h o{:}$

- The two sound changes / phonological processes involved are:

(21) a. Deaspiration before *s*: **$C^h > C$ / _s**
      b. Grassmann's Law: **$C^h > C$ / _...C^h**   ← *dissimilation of aspiration*

- Grassmann's Law is bled by deaspiration before *s*.
↪ The alternations in (20) illustrate that Grassmann's Law was an active phonological process in Ancient Greek.
  - Similar evidence in Sanskrit

3.2 Manner dissimilation in Finnish and Afrikaans

- Finnish has a phonological process that turns *k* to *h* before a coronal stop (Campbell 2013:27):

(22) Finnish /k/ → [h] / _{t,d}

  - This is dissimilatory because it makes the *manner* of the /k/ less similar to the manner of the conditioning sound /t,d/: *stop* ([-son,-cont]) → *fricative* ([-son,+cont]).
  - This process is unusual because
    - It is local dissimilation
    - It is regular dissimilation involving manner

- This process can be seen in the following examples:

(23) a. /te**k**-dæ/ $\xrightarrow{\substack{\text{Manner Dissimilation} \\ \text{k}\to\text{h}/\_\{\text{t,d}\}}}$ [te**h**dæ] 'to do'   (cf. [te**k**e-e] 's/he does')

      b. /ka**k**te-na/ $\xrightarrow{\substack{\text{Manner Dissimilation} \\ \text{k}\to\text{h}/\_\{\text{t,d}\}}}$ [ka**h**te-na] 'as two'

- This dissimilation can be *bled* by other phonological processes:

(24) /ka**k**te/ $\xrightarrow{\substack{\text{FinalRaising} \\ \text{e}\to\text{i}/\_\#}}$ *ka**k**ti* $\xrightarrow{\substack{\text{Assibilation} \\ \text{t}\to\text{s}/\_\text{i}}}$ [ka**k**si] 'two'

- Afrikaans shows a dissimilation sound change in the other direction:
  → a fricative (*x*) became a stop (*k*) after a fricative (*s*) (Crowley & Bowern 2010:44).

(25) a. Old Afrikaans *sxoːn* > Afrikaans *skoːn* 'clean'
      b. Old Afrikaans *sxoudər* > Afrikaans *skouər* 'shoulder'
      c. Old Afrikaans *sxœlt* > Afrikaans *skœlt* 'debt'

4 Deletion

- Another very common kind of sound change / phonological process is *deletion*.
- There are special names for different kind of deletion, depending on where in the word it occurs.

4.1 Syncope

- **Syncope** means *deletion in the middle of a word*.
- Most commonly, syncope refers to deletion of a medial vowel, that is either (i) *unstressed* and/or (ii) in a "two-sided open syllable".

(26) Syncope in a "two-sided open syllable":
      a. $C_1V_2.C_3\mathbf{V_4}.C_5V_6 > C_1V_2C_3.C_5V_6$
      b. $V_4 \rightarrow \emptyset$

- Many medial unstressed vowels were syncopated from Latin into the Romance languages (Campbell 2013:28):

(27) a. Latin *pópulu-* 'people' > Proto-Romance **poplV-* > French *peuple* 'people', Spanish *pueblo* 'people, town'
      b. Latin *fābulare* 'to talk' > Proto-Romance **fablar(e)* > Spanish *hablar* [ablar]

- Tonkawa has a synchronic pattern of syncope in two-sided open syllables. (There's lots of stuff going on in (28); we'll come back to some more of it in a minute.)
  ○ Look first at (28h,i,n)
  ○ And then look at (28e,g)

(28) Tonkawa syncope (Gouskova 2007:371)

a. /kaa-na-oʔ/	(káa)(nóʔ)	'he throws it away'
b. /nes-kaa-na-oʔ/	(nés)(káa)(nóʔ)	'he causes him to…'
c. /kaa-na-n-oʔ/	(káa.na)(nóʔ)	'he is throwing it…'
d. /jaaloona-oʔ/	(jáa)(lóo)(nóʔ)	'he kills him'
e. /naahewe-an-haaʔas/	(náa)(hóo)(náa)(ʔás)	'town, city'
f. /jaatse-oo-ka/	(jáa)(tsóo.ka)	'you see him'
g. /jaatse-aatewa-n-oʔs/	(jáa)(tsáa.to)(nóʔs)	'I will see him'
h. /taa-notoso-oʔs/	(táa)(nót)(sóʔs)	'I stand with him'
i. /we-tasa-soojan-oʔs/	(wét.sa)(sóo.ja)(nóʔs)	'I swim off with them'
j. /sool-tooxa-oʔ/	(sóol)(tóo)(xóʔ)	'it drips on him'
k. /sʔeelʔ-oʔs/	(sʔée)(lʔóʔs)	'I scratch it'
	shortening after CV-	
l. /xa-kaa-na-oʔ/	(xá-ka)(nóʔ)	'he throws it far away' (cf. (a–c))
m. /ke-jaaloona-oʔ/	(ké-ja)(lóo)(nóʔ)	'he kills me' (cf. (d))
n. /ke-taa-notoso-oʔ/	(ké-ta)(nót)(sóʔ)	'he stands with me' (cf. (h))
o. /we-seel-oʔs/	(wé.sʔe)(lʔóʔs)	'I scratch them' (cf. (k))

4.2   Apocope

- **Apocope** means *deletion at the end of a word*.
- This is an extremely common *sound change*, especially losing final (unstressed) vowels.

- At some point in the history of English, most final unstressed vowels were lost.

(29)   Apocope in English (Campbell 2013:29)

Old English	>	Modern English
sticca		*stick*
sunu		*son*
mōna		*moon*

- Estonian had a conditioned apocope sound change:
  - ○ Final vowels were lost when the penultimate syllable was *heavy* (**CVCC** or **CV:C**).
  - ○ Final vowels were retained when the penultimate syllable was *light* (CV).

(30)   Estonian (Campbell 2013:29)

a.   Apocope after heavy syllables

Pre-Estonian		Estonian	
*jalka	>	*jalk*	'foot, leg'
*hærkæ	>	*hærk*	'bull'
*ho:li	>	*ho:l*	'care, worry'
*le:mi	>	*le:m*	'broth'

b.   Retention of final V's after light syllables

Pre-Estonian		Estonian	
*kala	>	*kala*	'fish'
*lumi	>	*lumi*	'snow'

- Lardil (Australian) is well-known for having a synchronic apocope process that ends up deleting both consonants and vowels.
  - ○ Words are not allowed to end in a vowel, or in a consonant cluster.
  - → Apocope rule: Delete from the end until you achieve this.

(31)   Lardil apocope (Round 2011:333, ex. 6)

	UR	Surface	
a.	/waŋalk/	waŋal	'boomerang'
b.	/cilwirk/	cilwir	'wet'
c.	/makark/	makar	'anthill'
d.	/jukarpa/	jukar	'husband'
e.	/karwakarwa/	karwakar	'tree sp.'
f.	/kantukantu/	kantukan	'red'
g.	/kiruɭʈa/	kiruɭ	'bird sp.'
h.	/ŋuku-ŋarpa/	ŋukuŋar	'water-NONFUT'

4.3　Aphaeresis

- **Aphaerisis** means *deletion at the beginning of a word*.
  - ○ Also usually applies to vowels.

- An example from the Sapaliga dialect of Tulu (Dravidian): initial vowels that are still present in the Shivalli dialect have been lost in the Sapaliga dialect.

(32)　　Aphaerisis in Tulu (Campbell 2013:29–30)

Sapaliga Tulu	Shivalli Tulu	
dakki	aḍakki	'throw'
lappu	aḷappu	'plough'
latti	eḷatti	'tender'
latʃtʃiⱡ	oḷatʃtʃiⱡ	'stumble'
dattⱡ	eḍattⱡ	'left'

4.4　Hiatus-resolving vowel deletion

- Languages tend not to like having two vowels next to each other ("hiatus").
- There are many ways that they repair this problem. One typical way is by deleting one of the vowels.
→ This is exemplified in Tonkawa: see all of the examples where the /-oʔs/ suffix is preceded by a vowel in (28) above.

5　More next time...

- More types of deletion (syllable-structure–driven consonant deletion, haplology)
- Insertion (epenthesis/anaptyxis, excrescence)
- Metathesis
- Lenition, fortition, drift

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