Phonological processes: Assimilation

- Last year, in LNGS 301, we noted that phonological rules are due to phonological processes.
- In other words, every phonological process produces at least one phonological rule, and every phonological rule (except default rules) is a reflection of a phonological process. You can't have one without the other.
- Many phonological processes also produce variants/allophones of a phoneme.
- As we noted last year, the allophones are typically not noticed by the native speaker, even though they are produced: we perceive phonetically different sounds as one, we even sometimes perceive things that are not there. Examples are illustrated below, showing some (not all) of the different realisations of English [t].

**Different realisations of English /t/:**

Plain [t]: stem [stem]
Aspirated [t]: ten [tʰən]
retroflexed [t]: strip [ʃtɹp]
flapped [t]: atom [aɾəm] (in North American dialects)
nasal flapped [t]: panty [paɾ̃ɪ] (in North American dialects)
glottalised [t]: hit [hitˀ] (in some British and North American dialects)
glottal stop: bottle [boʔl] (in some North American dialects)
zero: pants [pans]

- There is at least, one rule to account for each of the above, but our focus today is on one category of phonological rules: assimilation.

**Assimilation**

- A process by which a sound becomes more like another neighbouring sound.
- The assimilating sound takes on a new feature originally not part of the sound.
- Thus when sound A undergoes assimilation, it adopts a new phonological feature from a neighbouring sound B without sound B losing that feature.

- Which features are involved in assimilation? Which features can a sound assimilate to?
- Virtually every feature we come across from our description of sounds.
- For instance, from the 3-term label, we get three categories of features in our description of each of the following: /p/, /t/ /g/ etc. (place of assimilation features, manner of assimilation features, voicing features).
- Any sound can assimilates to any feature belonging to any of these category of features.¹
- We will illustrate assimilation involving features under each of these categories using English data.

¹ Consult Chapter 4 of Hayes (2009) for details on features. The feature chart in that chapter is what we will be using in this course.
Assimilation to place of assimilation features

1. Assimilation of alveolar consonants:

General rule:
When an alveolar consonant precedes a non-alveolar, a POA assimilation is likely.

A. Dentalisation: An alveolar consonant \([t, d, n, l]\) becomes dental before a dental consonant like /θ, ð/

- eat\(t\) this;  the\(t\) thing;  get\(t\) those;  to\(g\)th;  wi\(g\)th;  heal\(t\)hy

B. Labial articulation: In many native dialects, an alveolar becomes labial before a labial in casual speech.

- /that person/ → [thap person];  /meat pie/ → [meap pie];  /light blue/ → [light blue]
- /wait paper/ → [waip paper]

C. Velar articulation: Before velar consonants, alveolars become velar in casual speech

- /k\(wa\)it good/ → [k\(wa\)it good];  /bright colour/ → [bright colour]  /that key/ → [thak key]

D. Palatalisation: Before \(/ʃ\) and \(/ʒ\), \(/s\) and \(/z\) become \(/ʃ\) and \(/ʒ\)

- /h\(ɔ\)ːs \(ʃ\)u/ → [h\(ɔ\)ːʃ\(ʃ\)u];  /mis \(ʃ\)u/ → [miʃ\(ʃ\)u];  /John’s shorts/ → [ʃohn\(ʃ\) shorts]

Velar and labial consonants (k, g, p, b) also become palatalised before \(/ʃ\).

- /k\(i\ː\)n/ → [k\(ʃ\)iːn]  /giv/ → [giːv]  /pil/ → [piːl]  /bit/ → [biːt]

E. Labialisation: Before round vowels consonants of different places of articulation, are rounded

- /kuːl/ → [k\(uː\)l],  /bum/ → [b\(uː\)m]  /tuː/ → [t\(uː\)]

F. Nasal place assimilation/homorganic nasal assimilation: Nasals assume the same place of articulation as following consonants.

- un-deserving  in-decent
- im-possible  um-paid
- in\(g\)ratitude  un\(g\)-grateful  in\(g\)-curable

All these are examples of nasals in prefixes assimilating to the place of the following consonant. But we also see NPA when the nasals occur in non-affixes.

under, interview, umbilical, umbrella, un\(g\)kempt, in\(g\)crease

MOA Assimilation

Stop articulation: Sometimes a fricative is produced as a stop when following/preceding a stop, especially in casual speech.

/give me/ → [gim m],  /get them/ → [get dem]  /read these/ → [read deese]

\(^2\) In the examples shown here, only the affected sounds are transcribed consistently. Some of the remaining sounds in the words are shown in orthography. By way of practice, try to do the transcription or the remaining sounds in each word. The background you have in levels 200 and 300 phonetics and phonology should be enough for you to do the transcription. Seek the help of your TAs or colleagues if you face any difficulty.
Voicing Assimilation.

Assimilation of plural and third person suffixes.

Certain English suffixes assimilate to the voicing specification of the final sound of the word to which they are added. Two of them are (1) the plural marker and (2) the third person singular suffix. Below, the data on the left column show cases where these two suffixes surface as voiced [-z]; those in the middle column show cases where these suffixes surface voiceless [-s]. The data on the right column show that sometimes these morphemes surface as [-əz], but they do not illustrate voicing assimilation. For the purpose of analysing the various allomorphs of these morphemes, they are important. But for the purpose of analysing voicing assimilation, you can ignore them and focus on those in the first two columns.

| beið-z | mauθ-s | dʒʌŋ-əz |
| bor-z | gɑut-s | mætʃ-əz |
| skæl-z | stik-s | bʧ-əz |
| dog-z | buk-s | nəʊs-əz |
| hænd-z | mæp-s | brίz-əz |
| houm-z | houp-s | bɛntʃ-əz |
| dʒɔb-z | sΙf-s | |
| louv-z | kʌf-s | |
| weiv-z | mʊθ-s | |
| slŋ-z | brιf-s | |

Practice exercises on assimilation

1. Study the data on the different realisations of [t] in English, repeated below. Which of the realisations of [t] are due to assimilation?

   Plain [t]: stem [stɛm]
   Aspirated [t]: ten [tʰɛn]
   retroflexed [t]: strip [stɾɪp]
   flapped [t]: atom [aɾm]
   nasal flapped [t]: panty [pɑɾti]
   glottalised [t]: hit [hɪt]
   glottal stop: bottle [bɒʔl]
   zero: pants [pans]

2. Describe the category of sounds that precede the various allomorphs of the plural and third person singular suffixes ([s] and [z]) shown above. Based on the sounds preceding each allomorph, which of these sounds is the main phoneme? Which of them is the allophone.

3. Using the data on the various patterns of assimilation in English presented in the preceding sections, provide data on similar patterns of assimilation in your mother tongue or any language you can speak fluently.

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3 This exercise is meant to get you to revise your study of phonemes and allophones in Level 300. Get help from your TAs if you cannot answer this question.
More on the concept of assimilation

- Let us now move on to look at a number of key issues central to assimilation. First, there is the fundamental question regarding how assimilation takes place.
- How does assimilation take place? The idea is that, it is a case of co-articulation between two adjacent segments. Remember that in articulating a segment, there are three fundamental phonetic components: the place of articulation, manner of articulation and voicing.
- The idea is that, when two adjacent segments are different with respect to any of these phonetic components, articulating each segment using its unique place, manner of voicing specification is a tedious task. To make it easier, the place, manner or voicing specification of one sound is sacrificed, so that that sound is articulated using the specification of the other.
- For instance, when the underlying representation of a nasal is [n], and the following sound is velar [k] (as in the word in-correct), it is difficult to articulate the nasal at the alveolar ridge and immediately reposition the tongue to make a velar articulation for the next sound. What most languages in the world do is to sacrifice the unique place of articulation of the nasal and articulate it alongside the following [k].
- In the process, the two are co-articulated. In other words, the two sounds are produced with one (instead of two different) articulatory gesture. That is why assimilation is also known as (phonetic) co-articulation.4

- There are three other fundamental issues in assimilation:
  1. Trigger and target:
  2. direction of assimilation
  3. domain of assimilation.

1. Triggers and targets
- In every process of assimilation there is a sound which plays the role of trigger, and another which is the target of assimilation.
  - The segment that causes the change in the feature specification of another segment is the trigger of assimilation.
  - The segment that is affected or changes is the target of assimilation.
  - Thus if within a sound sequence in a word, sound A and sound B are co-articulated in such a way that sound A maintains original features whereas sound B changes its features to look like sound A. Sound will be described as the trigger, and sound B the target.

Practice exercise:
- Go back and look through the data we've already seen and determine the trigger and target in each pattern of assimilation.
- Also study the data below. First determine the pattern of assimilation in each word, then identify the trigger and target in each pattern of assimilation. Note that it is not the case that every word has an assimilatory process. Some of the words are meant to guide you to understand the assimilatory patterns found in others.

  - twelve [twelv] twelfth [twelfθ]
  - eight [eit] eighth [eitθ]
  - ten [ten] tenth [tenθ]

4 You will see why this description is important when we come to look at harmony, which is also a form of assimilation.
2. Directionality:
   - This relates to the location of the target relative to the trigger.
   - When the target is to the left of the trigger, we get regressive or right-to-left assimilation. It is also known as anticipatory assimilation.
   - When the target is to the right of the trigger, we get progressive or left-to-right.

3. Domain of assimilation:
   - This relates to the unit within which assimilation is restricted.
   - In some instances, assimilation can only take place when the trigger and target are part of the same syllable (e.g. nasalisation of English vowels).
   - In such cases, the syllable is the domain of assimilation. Beyond the boundary of the syllable, assimilation will not take place. In other words, when the potential trigger is in one syllable and the potential target sound is in a different syllable, no assimilation will take place.
   - In other cases, the word is the domain.
   - Still in others, it is the phrase.

Practice exercise: Identify the domain of assimilation in each of the various patterns of assimilation shown in this handout. Also do the same exercise on the assimilation data that you come up on the languages you speak.