

Phonology – Sound Patterns

I. Phonology Bits and Pieces

- A. Phonology
 - a. the part of the grammar that determines the selection of speech sounds
 - b. governs sound patterns of a language & **systematic** phonetic variation found in language
- B. patterns at different levels
 - a. **feature** level (ex: [± voiced])
 - b. **segment** level (ex: [t] vs. [d])
 - c. **syllable** level (ex: [tow] vs. [dej])

II. Segments

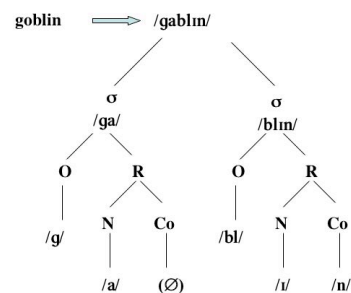
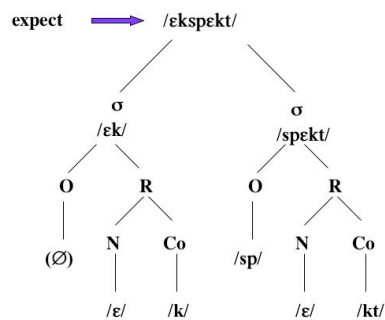
- A. the power of **contrast** = presence of a particular segment alone distinguishes forms with different meaning from one another. Ex: [tuw] vs. [duw], [hij] vs. [hejt], [nat] vs. [nak]
- B. **minimal pair** = 2 different forms with distinct meanings which differ by only a *single* segment found in the *same* position in each form. Ex: [hij] vs. [hejt]. (“heat” vs. “hate” – notice that the English spelling of these hides the fact that they differ by only one segment.)
- C. **environment** = phonetic context in which sound occurs. Ex: [hij] vs. [hejt]
- D. **phoneme** = contrastive phonological units of a language, which can be determined from the minimal pairs. Ex: [i] and [e] are phonemes of English because they can be found in minimal pairs.

II. Allophones and Such

- A. **allophones** = noncontrastive sounds in language. These are sounds which are phonetically distinct but phonologically the same. Ex: [p^h] vs. [p] never distinguishes words in English. [p^hæt] vs. [pæt]: these are not different words in English. Allophones are said to be in **free variation**.
- B. **complementary distribution** = two phonemes appearing in different environments but which are interpreted as the *same* by speakers. Ex: [p^h] in [p^hat], [p^hit] vs. [p] in [spat], [spit]. Environments: [p^h] in #_a, #_ i while [p] in s_a, s_ i.
- C. To determine which sound of a set of allophones is the “underlying” phoneme, look at the details of the complementary distribution. If one allophone occurs only in a very specific environment while the other occurs everywhere else, the allophone which occurs everywhere else is the underlying form.
 - Example: In Gascon (spoken in Southwest France), [β] and [b] are allophones. [β] only occurs between 2 vowels or between a vowel and a glide. [b] occurs everywhere else. Therefore, we say that [b] is the underlying phoneme for Gascon.
- D. The **allophonic** distribution varies from language to language – the sounds which are allophones in one language may be distinct phonemes in another language. Ex: In some languages, [p^h] and [p] would be separate phonemes and would be found in minimal pairs.
- E. Phonetic vs. phonemic transcription. Phonetic: [kænt] vs. Phonemic: /kænt/. Why? [æ̃] and [æ] are both allophones in English of [æ].

III. Syllables

- A. suprasegmental units – they are units “above” segments because more than one can make up a syllable.
- B. syllable = sonorant segment + non-sonorant (obstruent) associates.
Syllable examples: **g**o • **bl**in /gablin/, **b**o • **tl**e /batəl/
- C. syllable symbol: σ
- D. syllable components.
 - a. Syllable \rightarrow onset + rhyme. $\sigma \rightarrow O + R$. Onset is composed of the obstruent segments before the nucleus. (Can use pig latin to find this: “sprint” onset is **spr** because pig latin for “sprint” is “int-**spr**ay”.) Rhyme is the part that needs to be rhymed with. We can see that the “sprint” rhyme is **int** \rightarrow “sprint” rhymes with “**lint**”.
 - b. Rhyme \rightarrow Nucleus + Coda. $R \rightarrow N + Co$. The nucleus is the sonorant segment that is the base of any syllable. All syllables need a nucleus. The nucleus of “sprint” is **i**. The coda is any remaining obstruents after the nucleus (as long as they can’t be put in the following syllable’s onset.) The coda of “sprint” is **nt**.
 - c. Example: goblin. /gablin/. Two syllables: /ga/ and /blin/.
 - i. /ga/: Onset = /g/. Rhyme = /a/. Nucleus = /a/. Coda = \emptyset . Notice that the syllable is *not* /gab/ or /gabl/ because the /bl/ can be put into the onset of /in/ to make /blin/.
 - ii. /blin/: Onset = /bl/. Rhyme = /in/. Nucleus = /i/. Coda = /n/.
 - d. Example: expect. /ɛkspekt/. Two syllables: /ɛk/ and /spekt/.
 - i. /ɛk/: Onset = \emptyset . Rhyme = /ɛk/. Nucleus = /ɛ/. Coda = /k/. The coda includes the **k** because this segment cannot be put at the front of the following syllable’s onset. **ksp/* as onset in English.
 - ii. /spekt/: Onset = /sp/. Rhyme = /ekt/. Nucleus = /ɛ/. Coda = /kt/.
 - e. syllable “trees”



- f. How do we know what segments can be in an onset of English? **Phonotactics** are constraints on how sequences of segments pattern.
- g. Phonotactics of English onsets: s *[p t k] * [(l) r (w) j]
 - i. Ex: **spl**endid. **str**ike. **sk**ater.
 - ii. Ex: **pl**easeure. **tr**ee. quick = /kwɪk/. cure = /kjʊr/

IV. Gaps and Constraints

- A. accidental gaps: non-occurring forms which are possible in the language. (They don't violate phonotactic rules.) Ex: gleep, murgle, plimmed.
- B. systematic gaps: exclusion of certain sequence within a syllable.
Ex: /pt/. pterodactyl = /tɛ row dæk təl/. helicopter = /hɛ lə kap tər/
- C. universal constraints – constraints which apply to all languages. Ex: /lp/ sequence within a syllable is forbidden in all languages.
- D. Syllables across languages: each language defines its own syllable structure through the interaction of universal and language-specific constraints. Each has own rules for nucleus formation, onset formation, and coda formation. Ex: some languages don't allow any codas at all or more than one segment in the onset. Words borrowed into the language which don't follow these constraints on syllable formation are altered so that they do.
"Christmas" → /krɪ sməs/ becomes /ku ri sa ma su/.

V. The Brief Return of Syllables

- A. Why do we care about them? They're relevant for stating generalizations about the distribution of allophonic features.
Ex: aspirated stops like [p^h] vs. [p]. We can classify where they show up by using syllable structure → aspirated stops show up at the beginning of a syllable and unaspirated stops show up everywhere else in the syllable.
- B. **heavy syllables**: syllables with a coda (aka *closed* syllables) and syllables with 2 elements in the nucleus (aka diphthongs like /aj/). (**Light** syllables have no coda and a single element in the nucleus).

VI. Features (see chart)

- A. features = the smallest unit of phonology.
- B. examples of features: [± voice], [labial], [± continuant]
- C. **natural classes**: classes of sounds which share a feature (or features) and which *pattern together* in sound systems. Example natural classes below.

	[-sonorant]	
	[- voice]	[+voice]
[-continuant]	p t k	b d g
[+continuant]	f s ʃ	v z ʒ

- D. **distinctive feature**: feature which is a source of phonemic contrasts in the language.
Ex: /tow/ vs. /dow/ = minimal pair. /t/ and /d/ are phonemes. [-voice] and [+voice] are distinctive features. (Or, really, [± voice] is a distinctive feature.)
- E. English class features (see chart)
 - a. major classes
 - i. [± consonantal]
 1. [+consonantal] = major obstruction in the vocal tract
 2. [-consonantal] = vowels & glides.
 - ii. [± syllabic]
 1. [+syllabic] = acts like a syllable peak (can be nucleus)

2. [-syllabic] = can't be nucleus.
- iii. [± sonorant]
 1. [+sonorant] = singable/hummable
 2. [-sonorant] = obstruent, not singable/hummable
- b. manner classes
- i. [± continuant]
 1. [+continuant] = free or nearly free airflow through the mouth
 2. [-continuant] = “stopped” airflow through the mouth
 - ii. [± delayed release] ([±del rel])
 1. [+del rel] = affricates
 2. [-del rel] = everything else
 - iii. [± nasal]
 1. [+nasal] = lowered velum (no air through mouth)
 2. [-nasal] = raised velum (air through mouth)
 - iv. [± lateral]
 1. [+lateral] = /l/
 2. [-lateral] = everything else
- c. laryngeal classes
- i. [± voice]
 1. [+ voice] = vibrating vocal folds
 2. [- voice] = no vibrating vocal folds (can be whispered)
- d. place of articulation classes
- i. [LABIAL]: with lips
 1. [± round]
 - a. [+round] = made with protruding lips (/w/)
 - b. [-round] = made without protruding lips (/p b f v/)
 - ii. [CORONAL]: with tongue tip/blade raised
 1. [± anterior]
 - a. [+anterior] = interdental & alveolar
 - b. [-anterior] = alveopalatal
 2. [± strident]
 - a. [+strident] = noisy (/s z ʃ ʒ tʃ dʒ/)
 - b. [-strident] = /θ ð/
 - iii. [DORSAL]: made with body of tongue (/k g ŋ/)
 - iv. [± tense] (for vowels)
 - v. [± reduced] for vowels (/ə/ is the only [+reduced] vowel)

Exercises

1. Minimal Pairs and Such

Below are words from *Inuktitut*, along with their English translations.

[iglumut]	'to a house'	[pinna]	'that one up there'
[ukiaq]	'late fall'	[ani]	'female's brother'
[aiviq]	'walrus'	[iglu]	'(snow)house'
[aniguvit]	'if you leave'	[panna]	'that place up there'
[aglu]	'seal's breathing hole'	[aivuq]	'she goes home'
[iglumit]	'from a house'	[ini]	'place, spot'
[anigavit]	'because you leave'	[ukiuq]	'winter'

- A. List all the minimal pairs in this data.
- B. Based on the minimal pairs, list all the contrastive pairs of vowels.

2. More Fun with Phonemes

Below are words from *Plains Cree*, along with their English translations.

Note: the : symbol means that whatever proceeds it is pronounced "long". Ex: [o:] ≈ [oo]

[niska]	'goose'	[nisto]	'three'
[kodak]	'another'	[tʃi:gahigan]	'axe'
[asaba:p]	'thread'	[a:dim]	'dog'
[wasko:w]	'cloud'	[mi:bit]	'tooth'
[paskwa:w]	'prairie'	[pime:]	'lard'
[ni:gi]	'my house'	[mide]	'heart'
[ko:gos]	'pig'	[o:gik]	'these'
[tahki]	'often'	[tʃihtʃij]	'finger'
[namwa:tʃ]	'not at all'	[wa:bos]	'rabbit'
[ospwa:gan]	'pipe'	[na:be:w]	'man'
[midʒihtʃij]	'hand'	[mi:dʒiwin]	'food'

- A. List the environments in which [p] and [b] are found. Do the same for [t] and [d], [k] and [g], and [tʃ] and [dʒ].
- B. For each set of sounds you listed the environment for, state whether these sounds appear to be in complementary distribution.
- C. Based on your answer from B, state whether you think each set of sounds represents two separate phonemes or two allophones of the same phoneme.
- D. Can you see a pattern in the environments among [b], [d], [g], and [dʒ]? If so, state what it is.

3. Syllable Formation

Draw the syllable trees for the following words. Then, state how many heavy and how many light syllables each word has.

(For example trees, refer to *goblin* and *expect* from section III.)

Example syllable count: *goblin* = /ga/ • /blɪn/ = (1 light and 1 heavy syllable)

- | | | |
|------------------|--------------|----------------|
| 1) breathe | 3) enchant | 5) crystallize |
| 2) inconceivable | 4) mountains | 6) striking |

4. More Syllables

Canadian French has the following constraints on syllable formation:

- 1) maximum number of consonants in onset = 2. If there are 2, first must be an obstruent and the second must be a sonorant or fricative.
- 2) Each vowel forms a syllable nucleus.
- 3) Maximum number of consonants in coda = 2.

Given this, break the following words into syllables, and explain why you broke them as you did.

Example: /grimas/ → gri * mas

Explanation:

1. /gr/ in first syllable's onset because nowhere else to go, and g = obstruent, r = sonorant so conforms to rule 1.
2. /i/ in first syllable because of rule 2.
3. /m/ in second syllable onset because can have 1 consonant in onset, by rule 1.
4. /a/ in second syllable because of rule 2.
5. /s/ in second syllable's coda because it has nowhere else to go.

- | | | |
|------------|---------------|----------|
| 1) /erite/ | 2) /pudroəri/ | 3) /liʃ/ |
|------------|---------------|----------|

5. Features

List the feature(s) which distinguish(es) the sounds below.

Ex: [m] vs. [n] = [LABIAL] vs. [CORONAL]

Ex: [s] vs. [z] = [voice]

- | | |
|-----------------|----------------|
| 1) [f] vs. [p] | 4) [u] vs. [ʊ] |
| 2) [θ] vs. [s] | 5) [i] vs. [e] |
| 3) [ʒ] vs. [dʒ] | 6) [e] vs. [æ] |

6. Classification by Feature

List the English phoneme described by the feature classifications given below.

Ex: [-voice, +consonantal, LABIAL] = [p]

- 1) [+consonantal, +sonorant, DORSAL]
- 2) [-consonantal, -syllabic, +sonorant, -voice]
- 3) [+anterior, -continuant, -voice]
- 4) [+lateral]
- 5) [+syllabic, -high, -low, -back, +tense]

7. Description by feature

Give enough features to unambiguously pick out the following phonemes.

Example: [tʃ] = [-voice, +del rel]

- 1) [g]
- 2) [r]
- 3) [z]
- 4) [θ]