

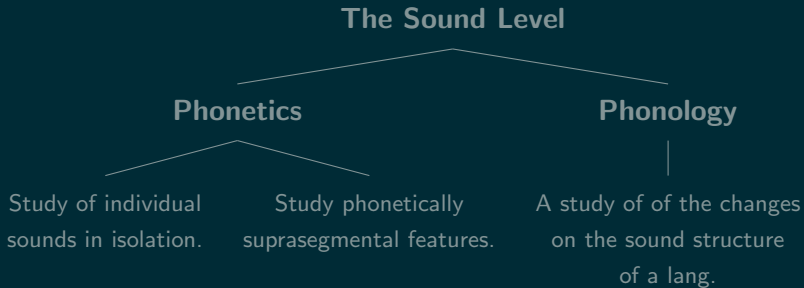
Phonology

General Linguistics

Oujda Linguistics Club

www.oujdalinguistics.club

Phonology vs. Phonetics



Phonology?

Phonology: the study of mental representations of speech sounds, and the rules governing systematic variation in speech sounds.

Phoneme is the smallest contrastive, meaningful unit of sound in a given language.

It is called so because:

- ▶ It is articulated differently.
- ▶ It occurs in the same environment. (contrastive)
- ▶ The change affects the meaning.

The History of Phonology

- ▶ SPE Model (Chomsky & Halle, 1968):
 - Linear approach to phonology.
 - Focus was on features.
 - Disregarded the existence of a syllable, and stress was assigned to the vowel.
- ▶ Autosegmental Phonology (Goldsmith, 1970s)
 - Non-linear approach to phonology.
 - Focus was on the tonal phenomenon (Igbo).
 - Features are placed on separate 'tiers' which are connected by 'association lines'.

The History of Phonology (cont.)

Metrical Phonology (Lieberman, 1970s)

- Recognizes syllable as a 'significant unit' in phonological theory.
- Initially developed as a theory of stress.

Optimality Theory (Prince & Smolensky, 1990s)

- Constraint-based rather than rule-based.
- A universal set of constraints are ranked differently by the phonologies of different languages.
- The functions generative and evaluation produce possible surface form candidates and determine which one is 'optimal' based on the constraint rankings.

Allophone

Allophone is the phonetic variety of a phoneme in a particular language.

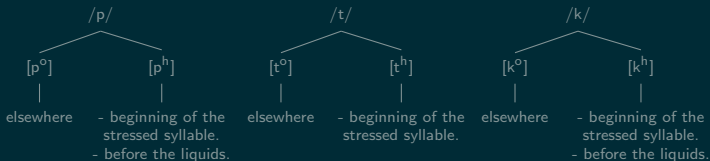
Allophones are:

- ▶ Articulated differently.
- ▶ Never occurs in the same environment. (complementary distribution¹)
- ▶ Do not change the meaning of the word.

¹If two sounds never occur in the same environment, we say that they are in complementary distribution.

Example of Allophony: Aspiration

- ▶ In English, voiceless stops ([p], [t], [k]) are **aspirated** in certain positions. This means that there is a short delay between the release of the stop and the point at which the voicing of the next vowel starts.
- ▶ Aspirated stops are transcribed with a superscript 'h': [p^h], [t^h], [k^h].



Minimal Pair Test

- ▶ A simple test to check if two sounds are contrastive, and hence belong to different phonemes, is the **minimal pair test**.
- ▶ If you can find two words that *only* differ with respect to the two sounds you are investigating, you may conclude that they are belonging to different phonemes.

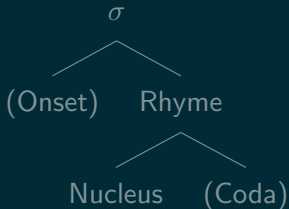
[tɪp]	[dɪp]
[p ^h ej]	[wej]
[rɪd]	[lɪd]

Narrow vs. Broad transcription

- ▶ **Narrow transcription** (or phonetic transcription) is a transcription that includes allophonic detail. It is written between slashes, only represents phonemic contrasts: /hawz/, /haws/.
- ▶ **Broad transcription** (or phonemic transcription) is a transcription that includes only phonemic segments and less phonetic detail. It is written between square brackets, represents allophonic contrasts: [hawz], [haws].

Syllable Structure

- ▶ A **syllable** is a peak of sonority that is surrounded by less sonorous sounds.
- ▶ The vowel (or syllabic consonant) part of the syllable is called the nucleus . Every syllable has a **nucleus**.
- ▶ Consonants in a syllable preceding the nucleus constitute the **onset**, consonants following the nucleus form the **coda**.



Phonotactics

- ▶ Part of a speaker's phonological knowledge has to do with which sequences of consonants are possible. This part of the grammar is called **phonotactics**.
- ▶ English speakers know that [blik] is a possible (but non-existing) English word, but that *[lbik] is not.
- ▶ Every language has different phonotactic constraints. For example, Russian allows more clusters than English does:

(1) [rtut] 'mercury', [mgla] 'fog'

Syllable Structure

- ▶ **Sonority** has to do with the amount of acoustic energy that a sound has.
- ▶ **Sonority hierarchy:**
stops < affricates < fricatives < nasals < liquids < glides
- ▶ **Sonority principle:** Within a syllable, sonority is increasing towards the nucleus, and falling after the nucleus.

Example:



Syllable Structure

- ▶ The sonority principle does not work for all words.
- ▶ Only certain sequences of sounds of the same sonority class are allowed in English. This is not predicted by the sonority principle:

(2) a. [k^hrɪpt] , [k^hɔn.dʌkt]

b. *[ptlk] , *[ktɪp]

- ▶ The [s] sound often forms an exception. The following words all violate the sonority principle:

(3) [skɪp] , [stri:p] , [k^hrʌsts]

Syllable Constraints

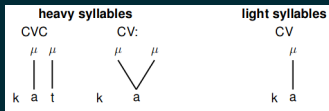
- ▶ English allows various complex types of onsets and codas with up to three consonants in an onset, and up to four consonants in a coda.

(2) [skrim], [tɛksts]

- ▶ The general syllable pattern of English can therefore be represented as (C)(C)(C)V(C)(C)(C)(C).
- ▶ Syllables that do not have a coda are called **open**. These have the shape (C₀)V. Syllables that have a coda are called **closed**. These have the shape (C₀)VC(C₀).

Syllable Weight

- ▶ **Mora** (μ) is a phonological unit larger than a segment, but typically smaller than a syllable. It measures the syllable weight (whether heavy or light).
- ▶ A **light syllable** consists of a single mora, while a heavy syllable consists of two.
- ▶ The mora appears to be an important rhythmic element in some languages, such as Japanese and Ancient Greek, but is possibly of no relevance in others.



Prosodic Hierarchy

Suprasegmental features (stress, tone...) are the bearing units of prosodic units in Figure ??

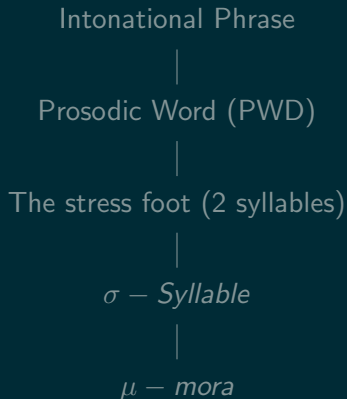


Figure: Prosodic Hierarchy (projected by *Prosodic Licensing Principle*)

Features

Distinctive features: encodes the physical articulation of a sound. Phonemes are bundles of simultaneous distinctive features.

Their functions are:

- ▶ Contrastive.
- ▶ Classificatory: To classify segments into **natural classes**.

Segments can be represented by a collection of features, which we write in a **matrix**.

Major Class Features (also Major Phonetic Classes)

- [\pm consonantal]: all consonants, except glides and glottal consonants, are [+consonantal]
- [\pm syllabic]: vowels and syllabic consonants (nasals & liquids) are [+syllabic]
- [\pm sonorant]: obstruents are [-sonorant] sonorants are [+sonorant]

Manner Features

- [\pm continuant]: sounds made with air flowing through the *oral* cavity. (vowels, glides, liquids, fricatives)
- [\pm delayed release]: affricates
- [\pm nasal]: nasals and nasalized sounds are [+nasal]
- [\pm lateral]: laterals ([l]-like sounds) are [+lateral]

Other Features

- [\pm high]: high vowels are [+high], low vowels are [-high]
- [\pm low]: this is needed for mid vowels [-high, -low]
- [\pm back]: back vowels are [+back], front ones are [-back]
- [\pm round]: round back vowels are [+round]
- [\pm long]: long vowels are [+long], short ones are [-long]
- [\pm voiced]: voiced consonants and all vowels are [+voiced]
- [\pm stressed]: for stressed vowels only

Natural Classes

- ▶ **Natural classes** are sounds that have one or more features in common.

Examples

$/p, t, k/ \rightarrow \left[\begin{array}{l} \text{-continuant} \\ \text{-voiced} \end{array} \right]$

$/t, p, k, f, \int, t\int, \theta/ \rightarrow \left[\text{-voiced} \right]$

Rules and Derivations

- ▶ The phonemic representation of speech is also called **underlying representation** (UR). This presentation is stored in the lexicon, but never actually pronounced.
- ▶ Part of our grammar is a set of **phonological rules**. These rules represent all the systematic phonetic variation that is part of our phonological knowledge (unconsciously).
- ▶ The rules apply to the underlying representation, and yield the **surface representation**. This is the form that is actually pronounced.

Example

Underlying representation /pæn/, apply Aspiration rule, surface representation [p^hæɪn].

Rules and Derivations (cont.)

UNDERLYING REPRESENTATION



SURFACE REPRESENTATION

Rules and Derivations

- ▶ Rules have the following shape:

$$(3) \quad A \rightarrow B / \underline{X_Y}$$

- ▶ A is the segment that the rule applies to, B represents the output of the rule. The slash means “when” and it introduces the conditioning environment.
- ▶ A,B,X,Y are given as feature matrices (or, if a feature matrix represents a single segment, you can just write that segment).
- ▶ The horizontal line represents the place of the input segment, so X and Y are the phonetic environment before and after the input segment.

Rules and Derivations: Examples

► Nasalization in English:

$$[+syllabic] \rightarrow [+nasal] / - \left[\begin{array}{l} +consonantal \\ +nasal \end{array} \right]$$

► Consonant Deletion in French:

$$\left[\begin{array}{l} +consonantal \\ +nasal \end{array} \right] \rightarrow \emptyset / \left[\begin{array}{l} +syllabic \\ +nasal \end{array} \right] -$$