

Chapter 7: phonological features.

* phonological features $\begin{cases} \text{Patterns} \\ \text{Alteration} \end{cases}$

$[t] \rightarrow [t']$

$[+Release] \rightarrow [-Release]$

* Natural classes $\rightarrow$ class of sounds that shared features.

+ Alveolar $\rightarrow$ it can't be interdental

* Phonemic features $\rightarrow$ distinction

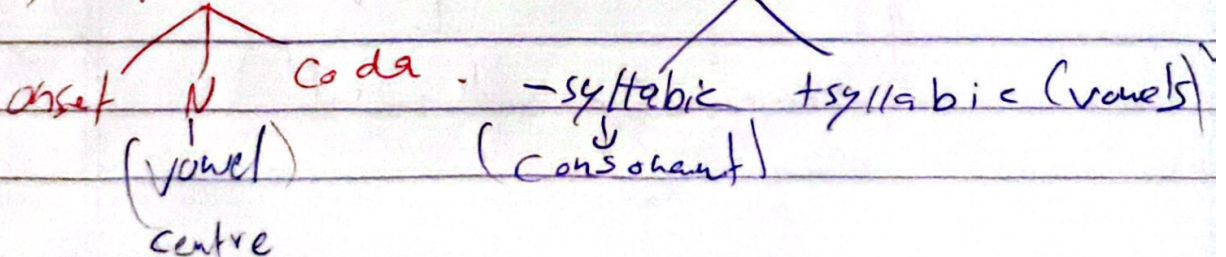
- 1) Major class of features
- 2) Consonantal
- 3) Vocalic

$\rightarrow$ Major class features

1) Voicing $\begin{cases} +v \\ -v \end{cases} [p, f, t, s, \theta, k, h]$

2) Nasalization $\begin{cases} +N \\ -N \end{cases} [m, n, \eta]$

3) Syllabic $\rightarrow$ sounds that occupy peaks



4) consonantal $\left\{ \begin{array}{l} \text{+cons} \rightarrow \text{all consonants except Glides [w, j]} \\ \text{-cons} \rightarrow \text{All vowels + Glides (NO obstruction)} \end{array} \right.$
 [-syllabic] $\rightarrow$ Consonant + Voiced
 Voiced consonants

phonological features to create natural classes.

Ex: [-syllabic] $\times$, it's not a natural class
 consonantal includes all consonant except [w, j].

+ Vowel naturally $\rightarrow$ Voiced.

5) sonorant $\rightarrow$ what makes sounds audibly passage w/.

Sonority (+son) $\rightarrow$ All vowels + approximants + Nasals
 non Sonority (-son) $\rightarrow$ oral stop (plosives),
 fricatives, Affricates (voiceless)

higher voicing / vibration $\rightarrow$ more sonority
 less voicing / vibration $\rightarrow$ less sonority

$\leftarrow$ bigger passage way $\rightarrow$ more sonority.

* Feature matrix $\rightarrow$

Ex: [+son, -syll] = Vowels + [w, j, l, r, m, n, ŋ]
 (approximants and nasals)

* Place of Articulation Features :

1) Anterior $[+/-Ant]$ → bilabial + Dental + Alveolar
 ↳ front of the vocal tract

2) Coronal $[+/-Cor]$ → front of the tongue → Interdental, palatal, Alveolar

-Cor → labial + velar, Glottal

-Ant → palatal + velar, Glottal

$\begin{bmatrix} -Ant \\ +son \end{bmatrix} \rightarrow [j, ɟ]$
 ↳ natural class

↓
 changes features to actual sounds

$\begin{bmatrix} -son \\ +cons \\ +v \end{bmatrix} = \begin{bmatrix} p, b, f, v, θ, ð, t, d, s, z \\ ʃ, ʒ, tʃ, dʒ, k, g, ŋ \end{bmatrix}$
 ↳ irrelevant

↓
 $[b, v, θ, d, z, ʒ, dʒ, ɟ]$

$\begin{bmatrix} +cor \\ +cons \end{bmatrix} = [θ, ð, t, d, s, z, n, l, ɹ, ʃ, ʒ, tʃ, dʒ]$

* Manner of articulation features: (consonants)

(1) Continuant → there is a continuing air flow inside the vocal tract.

$[-\text{cont}]$ = stops & Affricates

$[+\text{cont}]$ = fricatives & Approximants.

(2) Strident. when the muscle of the tongue has more than one constriction (multiple).

$[s, z, \int, ʒ, tʃ, dʒ, f, v]$

↳ except $[θ, ð, h]$

→ Affricates & fricatives without $[θ, ð, h]$

(3) Lateral → $[-l]$ All consonants except $[l]$

↓
 $[+l]$ → $[l]$

(4) Delayed release → we stop and release sounds, continuous released but there's a stop.

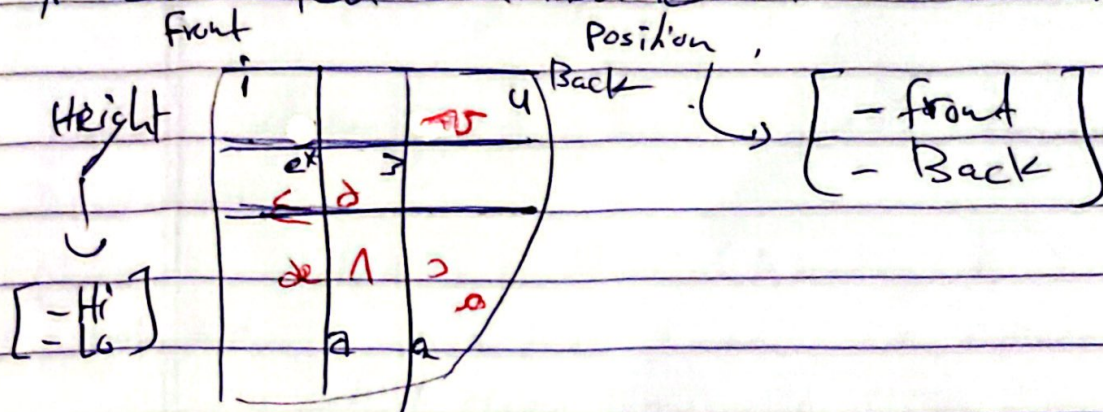
$[+Del\ Rel]$ → Affricates $[tʃ, dʒ]$ (delayed)

$[-Del\ Rel]$ → All consonants except Affricates

All back tense vowels have roundedness except $[a]$ → means all rounded vowels are back

$[ɔ, ʌ] = \begin{bmatrix} \text{Tense} \\ \text{Front} \\ \text{back} \end{bmatrix}$

* Vocalic features (features of vowels):



shape of the tongue (roundness) $\left[\begin{array}{c} + \\ - \end{array} \text{R} \right]$

Tension

~~tense~~ ~~lax~~

$\left[\begin{array}{c} + \\ - \end{array} \text{Tense} \right]$

If we don't have Central, Mid.

Example: $\left[w, j, l, ɹ \right] = \left[\begin{array}{c} + \text{son} \\ + \text{v} \\ + \text{cont} \end{array} \right] =$

vowels
approximants
nasals

$\rightarrow \left[\begin{array}{c} + \text{son} \\ - \text{syll} \\ - \text{nasal} \end{array} \right]$

2) $\left[2, 3 \right] = \left[\begin{array}{c} - \text{R} \\ + \text{syll} \\ - \text{cons} \\ + \text{Tense} \\ - \text{front} \\ - \text{Back} \end{array} \right]$

Chapter 8: Phonological analysis

Phonological analysis → analysis of sounds changes
Alternations -

Phoneme → not actual sounds (Abstract).

Allophone → actual sound, can replace each other without change meaning → physical.

→ Store sound on the brain.

Phoneme → contrastive (original sound)

Allophone → non-contrastive / different shapes

How we do identify allophones of phoneme

1) Commutation Test

City [sɪti]
[sɪdɪ]
[sɪtɪ]

→ replaces one allophone with another allophone
and with minimal pair / set

comparing the meaning between minimal pair / set

If I have a minimal pair, result

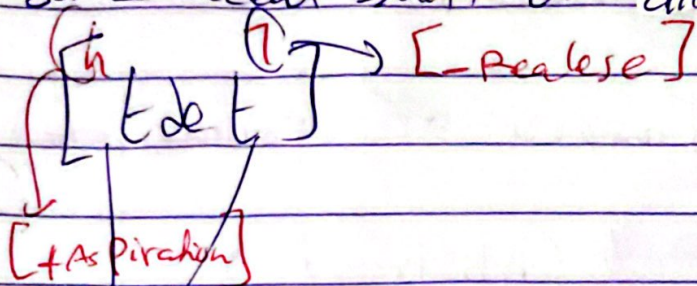
Free Variation

with no change in the
meaning / with same phoneme

Replacing one allophone to another → change the
meaning → contrastive distribution.

→ we have different meanings → (multiple phoneme)

same accent $\rightarrow$ different allophones.



* 2 allophones that belong of the same phoneme [t] occupy different positions.

called (complementary Distribution)
Allophones

different accents. different positions

Phonemic analysis
phonetic similarity
pattern structure
rules

$\rightarrow$ Phonological
rules
 $\downarrow$
creates symbols

$$\text{Exercise 2} \left[\begin{matrix} +\text{son} \\ +\text{Tense} \\ -\text{Hi} \\ -\text{Lo} \end{matrix} \right] = \left[\begin{matrix} \text{ɪ}, \text{e}, \text{ɜ}, \text{a}, \text{ʌ} \end{matrix} \right] = \left[\begin{matrix} \text{ɜ} \end{matrix} \right]$$

$\text{ɪ} \rightarrow$ only long lax vowel
 $\text{ɜ} \rightarrow$ shortest lax vowel

chapter 8: phonemic analysis → how we select the underlying form.

[wɪp l r]

Square [skweɪd] → /w/ or /ɪ/

were [wɜː]

[underlying form] just → symbolizing [t/]

3 different criteria → the symbol based on these criteria
phoneme → original state.

widest distribution → if a natural class of sound is common as a voiced sound then naturally the phoneme is voiced.

most common kind of environment -

[t], [t̪], [d], [tʰ], [ʔ] → we select the underlying form from group of

most common

(phoneme)

pass → [p] [j] → you

alveolar

palatal

we replace /s/ with /ʃ/

[+ant
+cor]

don't

[-ant
+cor]

Preservative (articulation)

phonological features.
the place of articulation is different.

→ If we have an alveolar followed by a Palatal
it's much easier to produce a Palatal followed by a Palatal

$\{j\}$ more similar to $[j]$
 $\{j\}$ $\hookrightarrow$ have the same place

Parallel

(the same feature)

If a sound is less similar / common → original
to environment (what phoneme
comes after and what underlying
comes before → underlying form)

[obstruent cluster voicing uniformity principle]

Ex: skt ✓ → all of them have to be voiced or voiceless.

~~h~~^g ~~ch~~^{ly} obstruent have completely to be voiceless

(if doesn't break as allophone but breaks as phoneme) → change in single feature (Diacritic) → used to make change in the feature

It can't follow incorrect patterns in English

3) Pattern Congruity correctness / soundness

- Following the patterns of sounds.
- Phoneme can't break the patterns that are correct.
- Example of it → (obstruents cluster voicing uniformity principle)

to note: the underlying form has to be the one is phonetically (natural)

means: if the sound most common and if the sound is the one less similar to the environment → it must be the widest distribution

→ The allophone that is the least similar to the environment → is going to be used as the symbol form of phoneme

to there are a clusters when they are pronounced in a sequence → A cluster is broken if we have a vowel.

→ if we have any sequence of consonants and all of these consonants are obstruents → we have to have all of these consonants either as voiced or voiceless → [obstruents cluster voicing uniformity principle]

Note: /h/ → is the only glottal fricative that doesn't have a voiced counterpart

Voiced sounds are more sonorant than voiceless so the sound that have a high complexity of sonority can't be voiceless.

pattern congruity → patterns that are allowed in English.

These patterns not only apply to allophones it also applies to phonemes.

What to consider when choosing an underlying form:
phonetically natural (frequently found across language)

- 1) same symbol, Ex: /p/ for [p^h] and [p]
- 2) widest distribution

phonetic naturalness, phonological analysis and phonetic similarity

phonetic analysis → uncovers what is natural

phonetic similarity → insightful, feature based on similarity amongst allophones:

[p], [p^h], [p'] → similar (related through minimal pairs test).

[m] (syllable initially → -nasal, +obstruent, +continuant)
[ŋ] (syllable finally → +nasal, +sonorant, -continuant)
→ only common feature is +consonant = not natural class.

Examples: this year [ʔɪʃ jɪr] vs [ʔɪs jɪr]

[ʃ] is derived from /s/ or [s] derived from /ʃ/

1) immediate phonetic environment: [s] appears in more environments.
2) phonetic characteristics [s], [ʃ], [j] → Palatal
alveolar → +cor, -cont
Palato-Alveolar → +cor, -cont

pattern congruity → the systematic organization of a set of phonemes and their distribution
* since aspiration is found on voiceless stops which occur at the beginning of a stressed syllable except when stop is preceded by [s], would [p] or [b] be appropriate in apt2,

/-ft, -pt, -ps, -kst, -sp → ex: daff, apt, apse, next, asp.

-bt, d2, 2d, v2 → ex: robbed, adze, phased leaves.

* /-fd, bt, p2, ds.

* Phonemic Level → abstract clusters have uniform voicing in English.

Based on the overall patterns found in the phonological system (Pattern congruity) - not by phonemic similarity or the communication test → the choice of voiceless phonemes for aspirated stops is made in terms of the overall patterns found in the phonological system of English; in terms of pattern congruity, since [p] is naturally **voiceless** [dɛpt] → would be appropriate choice, in contrast to [dɛpt].

قواعد الصوت

* Linking levels: phonological rules → How we represent alternating phonology → the concept of Alternation (how the sound change without change in meaning)

* How represent Phonological Alternation using rules of alternation (phonological rules).

→ A phoneme represents an entire feature matrix, which is stored in the lexicon

* A rule represents:

① The item(s) affected (Phoneme)

② The change that takes place (allophone)

③ The environment in which the change occurs (context, or neighboring sounds)

Example: instead of saying a vowel, becomes a certain other vowel in a certain environment.

↳ ex: /e/ → [ẽ] — /n/ ([ɛn] → [ẽn])

→ we going to use symbol, so in the example

we use symbols → [+syllabic] → [+nasal] / - [+nasal]

↓ Generalization based on previous rule

when we talk about alternation of sound →

we look at 3 parts → 1) what is the original form?

2) How does change?

3) what causes that change to happen?

* phonetic environment (what comes after and before sound)

use the sound itself that changing.

↳ [+syllabic] → [+nasal] / - [+nasal]

pre-nasalization
coarticulation

Anticipatory Coarticulation

* Rule: vowels become nasal before a nasal. → vowels are phonemically oral but they become nasal if they are followed by a nasal sound.

Ex: /de/ → becomes nasal /ɛ̃/ in a certain environment (if it followed by nasal) → [ɛ̃n], [ɛ̃n]

↳ so instead of saying del ^(h) → I would use [+syllab

$[+Syll] \xrightarrow{\text{becomes}} [+Nasal] / - [+Nasal]$ All vowels

Alternativen

عملية التغير

process

(Attention)

بِمَا سَبَّبَ التَّغْيِيرَ (Why does it happen?)

The reason for alteration

instead of write [+syllabic] → we leave a blank (this blank indicate [+syllabic])

۴۔ والدہ کی نصیر کا فائدہ
اعلیٰ اور فہم

→ I would read this rule → A vowels becomes nasal before a nasal or when it follows by a nasal → this is a phonological rule → it contains 3 aspects → 1) the phoneme
2) the Allophonic variation
3) the environment

→ : indicates a change

1: separates the environment to be right.

— : this blank is for phoneme

and what comes after or before the blank environment

Also the previous example is a format of physical language

* Phonetically and morphologically conditioned Alternation

There are a few certain irregularities.

↳ Examples: - rat [s] vs warthog [z] → the [s] becomes [z]

hors [z]

fence [fɛns] & base [beɪs]

why [s] changes?

rat [s] } → After [t] and [k] it was a [s] and
yak [s] } this [s] is a plural

bee [z] } → plural
hors [z]

base → [beɪs]

↳ Voiced diphthong followed by [s]

* Why base is different than bee [z]?

↳ The letter [s] in bee [z] is actually plural but [s] in base is actually part of the original form of the word [base]

* plural, singular.

↳ Affixes, morphemes.

* Note: the letter [s] or the phoneme [s] behaviour differently if the plural s then it is a part of the original form of the word.

↳ means in order for [s] to become [s], [z], [ɪz] it has to be a plural (s).

we have a natural class called (sibilant) $\rightarrow [s], [z]$
 $[ʃ], [ʒ], [tʃ], [dʒ]$

(sibilant sounds).

rule: if the plural $[s]$ is attached to a word that ends with sibilant $\rightarrow$ plural $[s]$ becomes $\rightarrow [ɪz]$

if plural $[s]$ attached to a sound that is not sibilant (non-sibilant) $\rightarrow$ any other sound other than sibilant and it's voiceless $\rightarrow$ plural $[s]$ becomes $\rightarrow [s]$

if it attaches to a word that ends with non-sibilant and it's voiced becomes $[z]$

Examples: rat

non-sibilant - and voiceless $\rightarrow$ so plural $[s]$ became $[s]$.

bee

non-sibilant and voiced $\rightarrow$ which makes plural $[z]$.

hero

sibilant - voiceless $\rightarrow$ so we get the form $[ɪz]$

base $\rightarrow$ we don't have $[z]$ because $[s]$ is not a plural $[s]$ it's original.

rule: we only change $[s]$ into $[z]$ or $[ɪz]$ if it's voiced non-sibilant or if it's sibilant sound. that's only happened in plural $[s]$.

$\hookrightarrow$ this phonetic environment morphology only works if there's a plural $[s]$ $\rightarrow$ we have a (morphological environment).

So the alternation of plural [s] → [s], [z], [ɪz]
is not only phonetically condition but also
morphologically condition.
→ phonetic environment which includes 3 different
environments resulting in 3 different alternations.

we can't represent morphological environment /
conditioning → because in phonology we only discuss
phonetic reasons / conditioning, but we don't
discuss morphological reason / conditioning.

we can have alternation that caused only
by phonetic environment such as: the
nasalization of vowels.
or dentalization of Alveolar → an alveolar
becomes dental when it's followed by Alveolar
→ it doesn't matter if this is plural or
singular or past tense (morphology doesn't matter
in this case).

The same can apply in past tense → [ed]
(can be [d], [t], [ed]) depending on
previous environment
The forms of [ed] → past tense verb is
phonetically and morphologically condition.

Morpheme Boundary → the final fricative represents plural marker, → final fricative agrees in voice with preceding segments.

→ productive: automatically applied in predictable ways even to new words.

* phonetically, morphologically and lexically conditioned Alternants

→ fricatives are voiced between voiced segments.

* velar stop [k] is fronted and fricativised into [s] before a high front (Palatal) vowel segment (velar softening).

Example: leaf [f] vs leaf [v]es

↓ original

form (voiceless sibilant)

→ plural form.

leaf

vs

leaf

irregular

with plural es, but

↓ original form

↓

morphological

also replaces [f]

plural form

condition

with [v]

↓ plural [s] normally we don't have the last sound in the original form

if the last sound is changed → the rule is going to change

irregularity → something that doesn't happen normally but only happens in the case of irregular words

↓ called lexical conditioning

↓ Ex: wife → wives → morphological condition

we replace [f] to [v]

[v] → voiced-non sibilant → phonetically condition

* when we have plural form, and we change the last sound in the original sound → this doesn't only include phonetic and morphological conditioning but also include lexical conditioning
(irregular).

* **Non-Phonological Alternation** → we can't find a phonetic environment that explains the change
→ No phonetic conditioning + morphological conditioning (Plural, Past tense) + specific lexical items = **Suppletion**: the introduction into a set of alternations (a Paradigm) of form that is not obviously related, which is not part of our phonological knowledge (**No phonological basis**).

Ex: Go vs Went لَمْ يَذْهَبُوا

→ we see a change in sound (we have a consonant followed by vowel, then consonant followed by a vowel and 2 consonants).

→ we can't explain the environment (change) so we don't have phonetic conditioning but we have (morphological conditioning)

↓ change from present tense to past (go → went) الْمَذْهَبُوا

it's not regular because we add (ed) normally
→ so this lexical conditioning

Note (rule): when we have something that only morphologically and lexically conditioned a change.
→ this change called **suppletion**.

Suppletion → when we have an alternation that's not phonetically conditioned but morphologically and lexically conditioned.

Ex: mouse vs mice → irregular (lexically conditioned)

↓ but I can't explain why [ɔɪ] becomes → [i] in mice phonetically (there's no condition).

(we don't have a phonetic environment that causes the change) → so this is a non-phonetic alternation which is called suppletion.

* Alternation types: one or more allophones involved in alternation — restricted set of environments: (nasalized vowels only before nasal consonants)

- 1) Alternation may occur in a certain phonetic environment.
- 2) Alternation may only be in the presence of certain suffixes.
- 3) Alternation may only be in the presence of certain lexical items.
- 4) Alternation may be optional, or determined by factors other than immediate phonetic environment.

→ in most cases the alternation is only covered by phonetics.

Example: when aspiration happens at the beginning of the word (that's phonetic environment)

or nasalization happens before a nasal (phonetic environment) → we could have lexical conditioning by itself.

Suppletion → removing one form and adding another form

without an explanation of phonetic environment

conditioning → الضبط والقيود

(lexical) الضبط القيود الضبط القيود

ضبط

Formal rules: how to write formula for alternants

Ex: oral stops are devoiced before a vowel,
word initially
→ voiceless

→ we start with the phoneme → then we indicate how the phoneme changes in a certain feature
→ then we create an allophone that indicates when that's happen (in which environment)

Translate it into formal rule using symbols.

oral stops → $\left[\begin{array}{l} -\text{Nasal} \\ -\text{cont} \\ -\text{del. Rel} \end{array} \right]$
 $[p, b, t, d, k, g]$

$\left[\begin{array}{l} -v \end{array} \right] / \# \left[\begin{array}{l} +\text{syll} \end{array} \right]$

Alternation

→ position → indicate absence before or after

initial position

Notes: if we add # (position) next to natural class or sound

$\left[\begin{array}{l} +\text{syll} \end{array} \right] \#$

but if it's next to blank $\rightarrow$ phoneme itself

→ final vowel

$\# \left[\begin{array}{l} +\text{syll} \end{array} \right]$ → initial vowel → it's preceded by position

oral stops are devoiced that preceded by an

initial vowel. → $[p^h]$ $[b^h]$

Feature matrix → $\left[\begin{array}{l} -\text{Nasal} \\ -\text{cont} \\ -\text{del. Rel} \\ +\text{voiceless} \end{array} \right]$

oral stops are devoiced before a final consonant

↳ $[-v] \quad [-syll] \#$

↳ oral stops are devoiced before a consonant or a vowel and after an initial consonant or initially $[+syll]$

$\left\{ \begin{array}{l} [-syll] \\ [+syll] \end{array} \right\}$

ما يربط الـ It connects

→ Either/or

→ we use a (notation device)

↓ we select

one and only one

like if I want to create

options → I use braces

(either, or)

الاقواس
بغير
الاقواس
الاقواس

$\left\{ \begin{array}{l} \# \quad [-syll] \\ [-syll] \\ [+syll] \end{array} \right\}$

→ simpler way,
looks more

economic

initial

* notation devices

→ they are devices that allows to combine different environments either by providing options with braces (either, or) or circular brackets

$\{ \}$

$()$

↳ oral stops are devoiced before 1, 2, 3 or 4

consonant stops, vowels

$C \quad (C) \quad (C) \quad (C)$

$C^4 \rightarrow$ maximum

$C^1 \rightarrow$ minimum

$[-v] \rightarrow C$

$(c) = c'$ → we don't have a consonant if it's zero.
 ↓ ordinal

Rules voiceless obstruents has al before a ^① vowel or word ^② finally and after ^③ 2 to 4 consonants

↳ means either it's followed by a vowel or it's at the end of the word.

phoneme → Allophone
 $[-son]$ → $[+nasal]$

C_2^4 → $\{ [+nasal] \}$
 ↓ Blank means phoneme

* Alpha Notation → Alpha (α): Replaces the (+ or -) value of feature

↳ Matching features → This specific sound is going to followed copy the place features of the following sound

Ex: Im possible

$[mp] \rightarrow \text{Bilabial} \rightarrow [+Aut_{con}]$

In complete

$[gk] \rightarrow \text{velar} \rightarrow [-aut_{con}]$

unreleased Alveolar → $[+Aut_{con}]$
 $[j]$

$[m, n, \eta]$

one phoneme that is change into 3 different Allophones

$[n] \rightarrow [\alpha \text{ aut } p \text{ cor}]$

similar alternates to environment

$\alpha = +/-$ means the verbal that used to indicate selecting options but these options are depending on environment (the environment is copied into allophone) of alternation.

the feature copy the feature that followed $\rightarrow$ we use Alpha notation. (+ - - - -)

$[+syll] \rightarrow [-Nasal]$

Phonetic process/operations and rules:-

[1] Assimilation $\rightarrow$ one allophone become more similar to another allophone that follows it or precedes it

Example $[dend]$ $\rightarrow$ d becomes nasal $\rightarrow$ it becomes more similar to environment.

another Ex: $[skweɪs]$ $\rightarrow$ w becomes devoiced because it's preceded by a voiceless oral stops

[2] Dissimilation $\rightarrow$ it's not very common

Ex: chinney $[tʃɪnli]$

$\rightarrow$ n become less similar to m this make it dissimilation

$\rightarrow$ it's less similar to the environment

$\rightarrow$ phonetic environment

$\rightarrow$ what follows and what comes before

[3] Addition → when it's difficult for someone to pronounce something, if we add some sounds that are not existing.

[pɛrhɛps] → [pɛrhɛpsɪ]

additional vowel

[4] Deletion (Elision) → if we remove a sound

Ex: [pɪzɪndɪ] → [pɪzɪnd]

remove vowel

[5] Metathesis → observing change beyond the sound.

something beyond the sound

observing change

Bird → [bɪzɪd] → [bɪzɪd]

this movement of sounds called Metathesis.
→ reversal of a sequence of elements, segments in a word.

[6] Reduplication: copying part of a word and attaching it to the original word.

Ex: bon = sweet (French) (adj) → bon bon (n).
↓ [bɔ̃n] [bɔ̃nbɔ̃n]

if we copy the 3 sounds and repeat them → we create a new word.