

Stress and flapping

LING 20: Introduction to Linguistic Analysis

UCLA · Winter 2022

Introduction

- As we have already seen, some phonological properties pertain to **syllables** rather than segments (i.e. sounds).
- Such properties are called **suprasegmentals**.
- **Tone** and **stress** are two suprasegmental properties.

- Some syllables are more prominent than others:

(1) [bə.næ.nə] 'banana' → [bə.'næ.nə]
[kæ.nə.də] 'Canada' → ['kæ.nə.də]

- We call prominent syllables **stressed**.
- Stress is indicated in the IPA with a ['] before the syllable.

Primary and secondary stress

- Longer words have more than one stressed syllable:
(2) [tɛ.lə.ɡɹæ.fɪk] 'telegraphic' → [tɛ.lə.'ɡɹæ.fɪk]
- Typically, each word has one syllable with **PRIMARY STRESS** ['] and may have other syllables with **SECONDARY STRESS** [ˌ].

Examples

[mɪ.nə.sôw.tə]

Examples

[mɪ.nə.səʊ.tə] → [mɪ.nə.'səʊ.tə]

Examples

[mɪ.nə.səʊ.tə] → [ˌmɪ.nə.'səʊ.tə]
[mæ.sə.tʃu.sɪts]

Examples

[mɪ.nə.səʊ.tə] → [ˌmɪ.nə.'səʊ.tə]
[mæ.sə.tʃu.sɪts] → [ˌmæ.sə.'tʃu.sɪts]

Examples

[mɪ.nə.səʊ̯.tə]	→	[,mɪ.nə.'səʊ̯.tə]
[mæ.sə.tʃu.sɪts]	→	[,mæ.sə.'tʃu.sɪts]
[θəɪ.mɑ.mɪ.rɪ]		

Examples

[mɪ.nə.səʊ̯.tə]	→	[,mɪ.nə.'səʊ̯.tə]
[mæ.sə.tʃu.sɪts]	→	[,mæ.sə.'tʃu.sɪts]
[θəɪ.mɑ.mɪ.rɪ]	→	[θəɪ.'mɑ.mɪ.rɪ]

Examples

[mɪ.nə.səʊ.tə]	→	[,mɪ.nə.'səʊ.tə]
[mæ.sə.tʃu.sɪts]	→	[,mæ.sə.'tʃu.sɪts]
[θəɪ.mɑ.mɪ.rɪ]	→	[θəɪ.'mɑ.mɪ.rɪ]
[mæ.nə.fə.steɪ.jən]		

Examples

[mɪ.nə.səʊ.tə]	→	[,mɪ.nə.'səʊ.tə]
[mæ.sə.tʃu.sɪts]	→	[,mæ.sə.'tʃu.sɪts]
[θəɪ.mɑ.mɪ.rɪ]	→	[θəɪ.'mɑ.mɪ.rɪ]
[mæ.nə.fə.steɪ.jən]	→	[,mæ.nə.fə.'steɪ.jən]

Stress-conditioned allophony

- We have seen that grammatical rules can be sensitive to stress:

(3) **-freaking- infixation:**

[kæ.lɪ.'fɔɪ.njə] 'California'

a. Cali-freaking-fornia

b. *Ca-freaking-lifornia

- In some cases, allophony is dependent on stress too.

- **Example:**

Vowel reduction

[ɹ] in English

Vowel reduction

[ˈtɛ.lə.ɡræf]	‘telegraph’
[tə.ˈlɛ.ɡrə.ʃi]	‘telegraphy’
[ˌtɛ.lə.ˈɡræ.fɪk]	‘telegraphic’

Vowel reduction

[ˈtɛ.lə.ɡræf]	‘telegraph’
[tə.ˈlɛ.ɡrə.ʃi]	‘telegraphy’
[ˌtɛ.lə.ˈɡræ.fɪk]	‘telegraphic’

- Vowels in unstressed syllables are often realized as schwa ([ə]), or [ɪ].

Vowel reduction

[ˈæ.sɪd]

[ə.ˈsɪd.ɪk]

Vowel reduction

['æ.sɪd]

[ə.'sɪd.ɪk]

Vowel reduction

['æ.sɪd]

['hi.ɹoʊ]

[ə.'sɪd.ɪk]

[hə.'ɹoʊ.ɪk]

Vowel reduction

['æ.sɪd]

[ə.'sɪd.ɪk]

['hi.ɹɔw]

[hə.'ɹɔw.ɪk]

['fɔw.rə.gɹæf]

[fə.'tʰɑ.gɹə.fɪ]

Vowel reduction

['æ.sɪd]

[ə.'sɪd.ɪk]

['hi.ɹɔw]

[hə.'ɹɔw.ɪk]

['fɔw.rə.ɡɹæf]

[fə.'tʰɑ.ɡɹə.fɪ]

['sɪ.vəl]

[sə.'vɪ.li.ən]

Vowel reduction

['æ.sɪd]

[ə.'sɪd.ɪk]

['hi.ɹɔw]

[hə.'ɹɔw.ɪk]

['fɔw.rə.gɹæf]

[fə.'tʰɑ.gɹə.fɪ]

['sɪ.vəl]

[sə.'vɪ.li.ən]

['fɑ̃.nəl]

[fə.'næ.lə.ri]

Vowel reduction

['æ.sɪd]

[ə.'sɪd.ɪk]

['hi.ɹoʊ]

[hə.'ɹoʊ.ɪk]

['foʊ.rə.ɡɹæf]

[fə.'tʰɑ.ɡɹə.fɪ]

['sɪ.vəl]

[sə.'vɪ.li.ən]

['fɑ̃.nəl]

[fə.'næ.lə.ri]

['pleɪ.ɹoʊ]

[plə.'tʰɑ.nɪk]

Vowel reduction

['æ.sɪd]	[ə.'sɪd.ɪk]
['hi.ɹoʊ]	[hə.'ɹoʊ.ɪk]
['foʊ.rə.ɡɹæf]	[fə.'tʰɑ.ɡɹə.fɪ]
['sɪ.vəl]	[sə.'vɪ.li.ən]
['fɑ̃.nəl]	[fə.'næ.lə.ri]
['pleɪ.ɹoʊ]	[plə.'tʰɑ.nɪk]
['tʰɛ.lə.ɡɹæf]	[tʰə.'lɛ.ɡɹə.fɪ]

Vowel reduction

['æ.sɪd]	[ə.'sɪd.ɪk]
['hi.ɹoʊ]	[hə.'ɹoʊ.ɪk]
['foʊ.rə.ɡɹæf]	[fə.'tʰɑ.ɡɹə.fɪ]
['sɪ.vəl]	[sə.'vɪ.li.ən]
['fɑ̃.nəl]	[fə.'næ.lə.ri]
['pleɪ.ɹoʊ]	[plə.'tʰɑ.nɪk]
['tʰɛ.lə.ɡɹæf]	[tʰə.'lɛ.ɡɹə.fɪ]
['sʌb.dʒɛkt]	[səb.'dʒɛk.tɪv]

Vowel reduction

['æ.sɪd]	[ə.'sɪd.ɪk]
['hi.ɹoʊ]	[hə.'ɹoʊ.ɪk]
['foʊ.rə.gɹæf]	[fə.'tʰɑ.gɹə.fɪ]
['sɪ.vəl]	[sə.'vɪ.li.ən]
['fɑ̃.nəl]	[fə.'næ.lə.ri]
['pleɪ.ɹoʊ]	[plə.'tʰɑ.nɪk]
[tʰɛ.lə.gɹæf]	[tʰə.'lɛ.gɹə.fɪ]
['sʌb.dʒɛkt]	[səb.'dʒɛk.tɪv]
['pɑ.lə.tɪks]	[pə.'lɪ.rɪ.kəl]

Vowel reduction

['æ.sɪd]

[ə.'sɪd.ɪk]

['hiː.ɹoʊ]

[hə.'ɹoʊ.ɪk]

['fɒw.rə.gɹæf]

[fə.'tʰɑ.gɹə.fɪ]

['sɪ.vəl]

[sə.'vɪ.li.ən]

['faj.nəl]

[fə.'næ.lə.rɪ]

['pleɪ.ɹoʊ]

[plə.'tʰɑ.nɪk]

['tʰɛ.lə.gɹæf]

[tʰə.'lɛ.gɹə.fɪ]

['sʌb.dʒɛkt]

[səb.'dʒɛk.tɪv]

['pɑ.lə.tɪks]

[pə.'lɪ.rɪ.kəl]

Vowel reduction rule

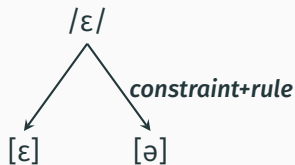
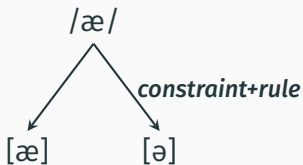
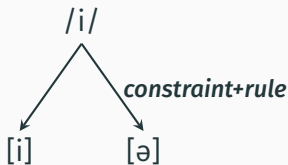
- **Vowel reduction in English:**

Change any vowel to [ə] in an unstressed syllable.

- **In features:**

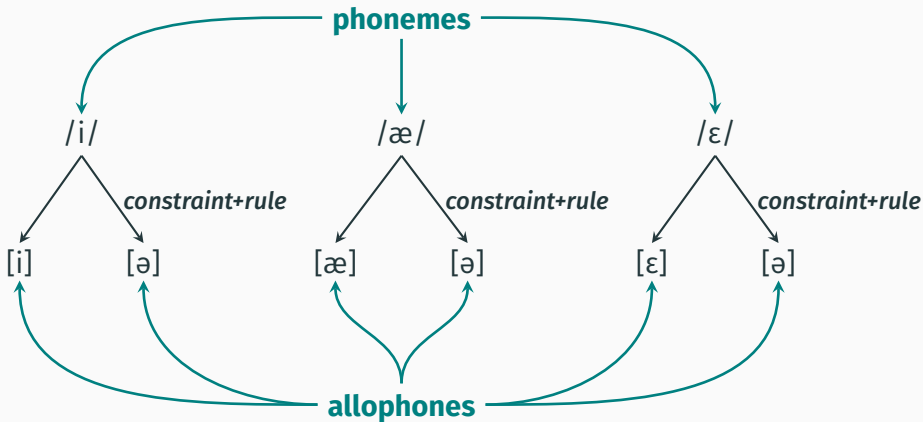
$$\left[\begin{array}{c} +\text{vowel} \\ -\text{stress} \end{array} \right] \rightarrow \left[\begin{array}{c} -\text{low} \\ -\text{high} \\ -\text{back} \\ -\text{front} \end{array} \right]$$

Vowel allophones in English

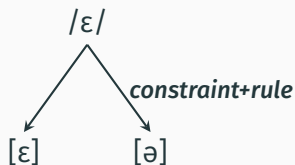
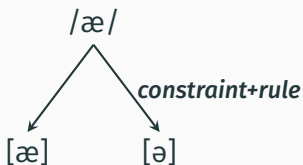
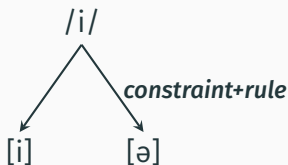


... And so on

Vowel allophones in English



Vowel allophones in English



What are the constraints?

Vowel reduction

- **Constraints:**

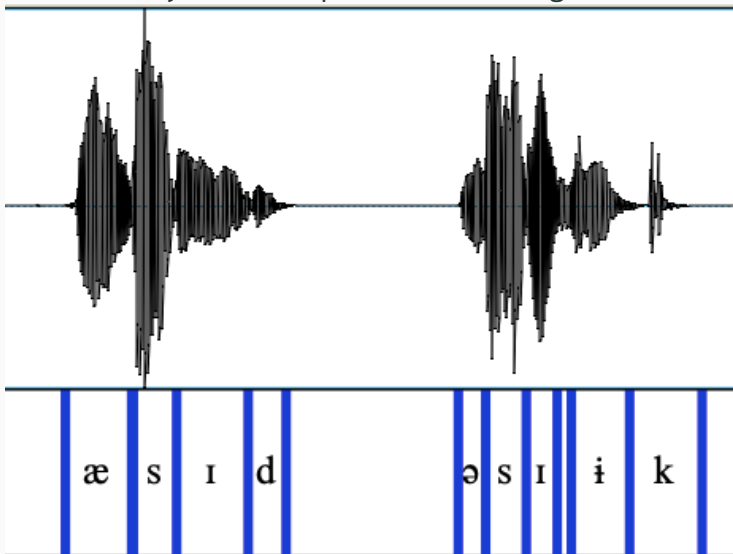
$$* \begin{bmatrix} +\text{high} \\ -\text{stress} \end{bmatrix} * \begin{bmatrix} +\text{back} \\ -\text{stress} \end{bmatrix} * \begin{bmatrix} +\text{low} \\ -\text{stress} \end{bmatrix} \dots$$

- **Or maybe::**

$$* \begin{bmatrix} +\text{long} \\ -\text{stress} \end{bmatrix}$$

Vowel reduction: phonetics

- Schwa is very short compared to other English vowels



Vowel reduction in Catalan

['pa.rə]

[pə.'rɛm]

Vowel reduction in Catalan

['pa.rə]

[pə.'rɛm]

Vowel reduction in Catalan

['pa.rə]

[pə.'rɛm]

['trɛn.tə]

[trən.'te]

Vowel reduction in Catalan

['pa.rə]

[pə.'rɛm]

['trɛn.tə]

[trən.'te]

['ren.tə]

[rən.'tes]

Vowel reduction in Catalan

['pa.rə]	[pə.'rɛm]
['trɛn.tə]	[trən.'te]
['ren.tə]	[rən.'tes]
['ɔ.brə]	[u.bri.'ra]

Vowel reduction in Catalan

['pa.rə]	[pə.'rɛm]
['trɛn.tə]	[trən.'te]
['ren.tə]	[rən.'tes]
['ɔ.brə]	[u.bri.'ra]
['kon.trə]	[kun.'tra.ri]

Vowel reduction in Catalan

['pa.rə]	[pə.'rɛm]
['trɛn.tə]	[trən.'te]
['ren.tə]	[rən.'tes]
['ɔ.brə]	[u.bri.'ra]
['kon.trə]	[kun.'tra.ri]
[,trɛn.tə.'siŋ]	

Vowel reduction in Catalan

['pa.rə]	[pə.'rɛm]
['trɛn.tə]	[trən.'te]
['rɛn.tə]	[rən.'tes]
['ɔ.brə]	[u.bri.'ra]
['kɒn.trə]	[kun.'tra.ri]
[trɛn.tə.'siŋ]	

Vowel reduction in Catalan

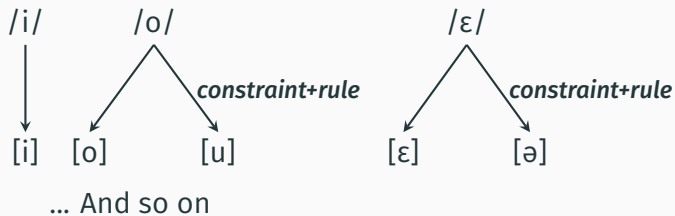
- **Constraints:**

$$* \begin{bmatrix} -\text{high} \\ +\text{front} \\ -\text{stress} \end{bmatrix} * \begin{bmatrix} -\text{high} \\ +\text{back} \\ -\text{stress} \end{bmatrix} * \begin{bmatrix} -\text{high} \\ +\text{low} \\ -\text{stress} \end{bmatrix}$$

- **Or maybe:**

$$* \begin{bmatrix} -\text{high} \\ +\text{long} \\ -\text{stress} \end{bmatrix}$$

Vowel allophones in Catalan



Vowel reduction rule - Catalan

- **Vowel reduction in Catalan:**

Change /a,ɛ,e/ to [ə] in an unstressed syllable. Change /ɔ,o/ to [u] in an unstressed syllable.

- **In features:**

$\left[\begin{array}{l} +\text{vowel} \\ -\text{stress} \end{array} \right] \rightarrow \left[\begin{array}{l} -\text{low} \\ -\text{front} \end{array} \right]$

$\left[\begin{array}{l} +\text{vowel} \\ +\text{back} \\ -\text{stress} \end{array} \right] \rightarrow \left[-\text{high} \right]$

Flapping

- In some cases, [d] or [t] will become a [r] in casual speech:

[sɪt] 'sit'

[sɪɾɪ] 'sitter'

[spɒt] 'spot'

[spɒɾɪ] 'spotty'

[mæd] 'mad'

[mæɾɪ] 'madder'

[dɑ:k] 'dark'

[tʰæp] 'tap'

Flapping

- In some cases, [d] or [t] will become a [r] in casual speech:

[sɪ**t**] 'sit'

[sɪ**r**ɪɹ] 'sitter'

[spɒ**t**] 'spot'

[spɒ**r**i] 'spotty'

[mæ**d**] 'mad'

[mæ**r**ɪɹ] 'madder'

[**d**ɑɹk] 'dark'

[**t**^hæp] 'tap'

Flapping

- In some cases, [d] or [t] will become a [r] in casual speech:

[sɪ t]	'sit'	[sɪ r ɪ]	'sitter'
[spɒ t]	'spot'	[spɒ r i]	'spotty'
[mæ d]	'mad'	[mæ r ɪ]	'madder'
[dɑ k]	'dark'	[t h æp]	'tap'

- **First stab:**

[t] and [d] are changed to [r] between vowels.

The role of stress

[ə.'tʰɑ.mɪk]

['æ.rəm]

[,kʰəm.pʰju.'tʰeɪ.jən]

[kʰəm.'pʰju.rəl]

[ə.'di.jən]

['ɛ.rɪt]

['fɒw.rə.gɹæf]

[fə.'tʰɑ.gɹə.'fi]

[,fɒw.rə.'gɹæ.fɪk]

The role of stress

[ə.'tʰɑ.mɪk]

['æ.rəm]

[,kʰəm.pʰju.'tʰeɪ.jən]

[kʰəm.'pʰju.rəl]

[ə.'di.jən]

['ɛ.rɪt]

['fɔw.rə.gɹæf]

[fə.'tʰɑ.gɹə.ɸɪ]

[,fɔw.rə.'gɹæ.fɪk]

Flapping rule

- **Flapping in English:**

Change [d] and [t] to [ɾ] if it is preceded and followed by a vowel **AND the [d] or [t] occurs in an unstressed syllable.**

- **In features:**

Change [alveolar, plosive] to [voiced, flap] if it is preceded and followed by a vowel **AND the [alveolar, plosive] occurs in an unstressed syllable.**

Flapping rule

- **Flapping in English:**

$\left[\begin{array}{l} +\text{alveolar} \\ +\text{stop} \\ -\text{stress} \end{array} \right] \rightarrow \left[\begin{array}{l} +\text{voiced} \\ +\text{flap} \end{array} \right] / \text{V} _\text{V}$

t/d allophones

