English Phonology

The Phoneme

- Phonetics: the study of speech sounds

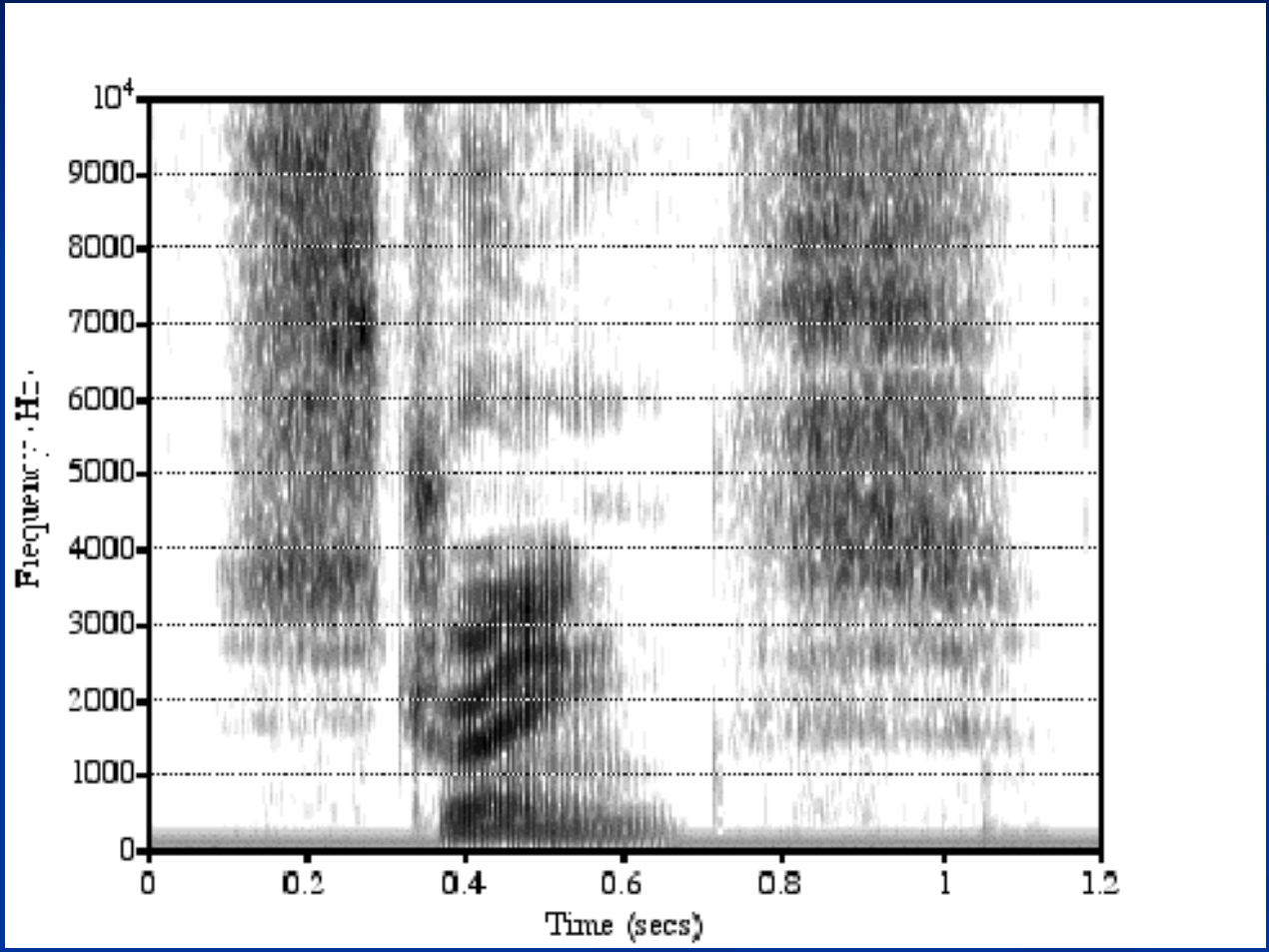
- Phonetics: the study of speech sounds
- concerned with the acoustical and articulatory properties of sounds

- Phonetics: the study of speech sounds
- concerned with the acoustical and articulatory properties of sounds
- It is difficult to work with acoustic representations of sounds when describing the regular system of English

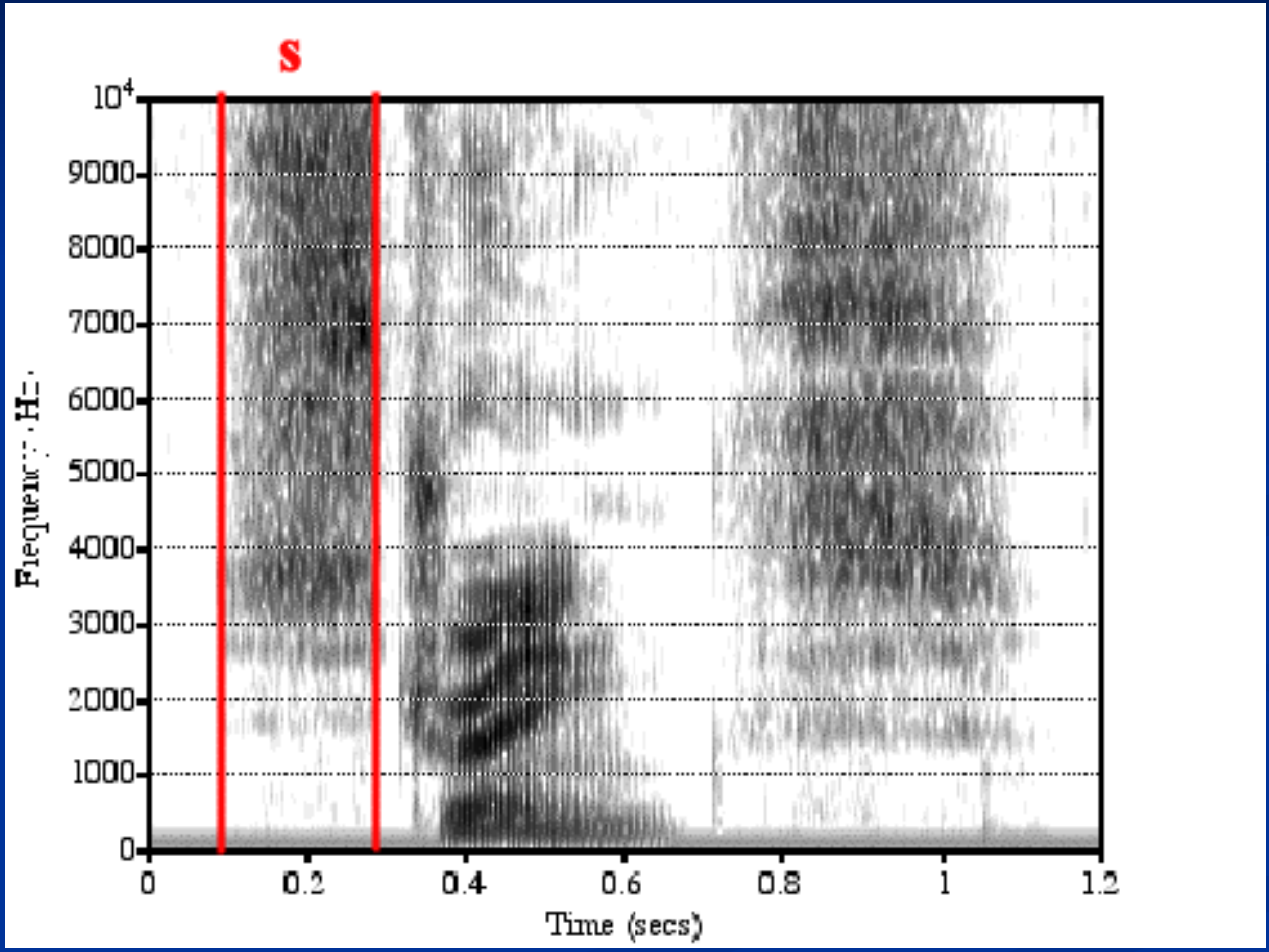
- Phonetics: the study of speech sounds
- concerned with the acoustical and articulatory properties of sounds
- It is difficult to work with acoustic representations of sounds when describing the regular system of English
- we reduce this graphic representation to an abstract alphabet

- Phonetics: the study of speech sounds
- concerned with the acoustical and articulatory properties of sounds
- It is difficult to work with acoustic representations of sounds when describing the regular system of English
- we reduce this graphic representation to an abstract alphabet
- an example of the acoustic representation is the following:

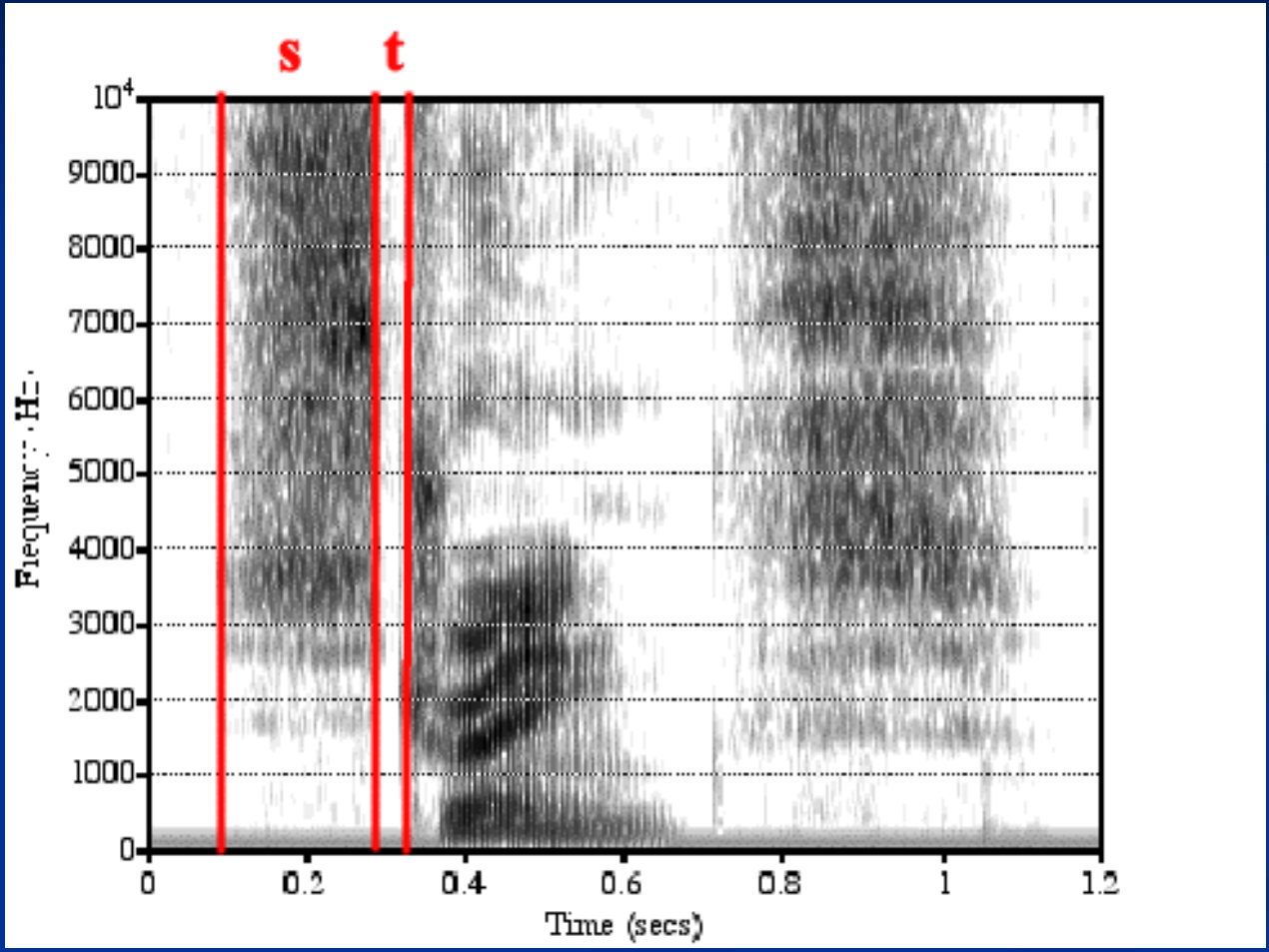
‘strengths’


10^4
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

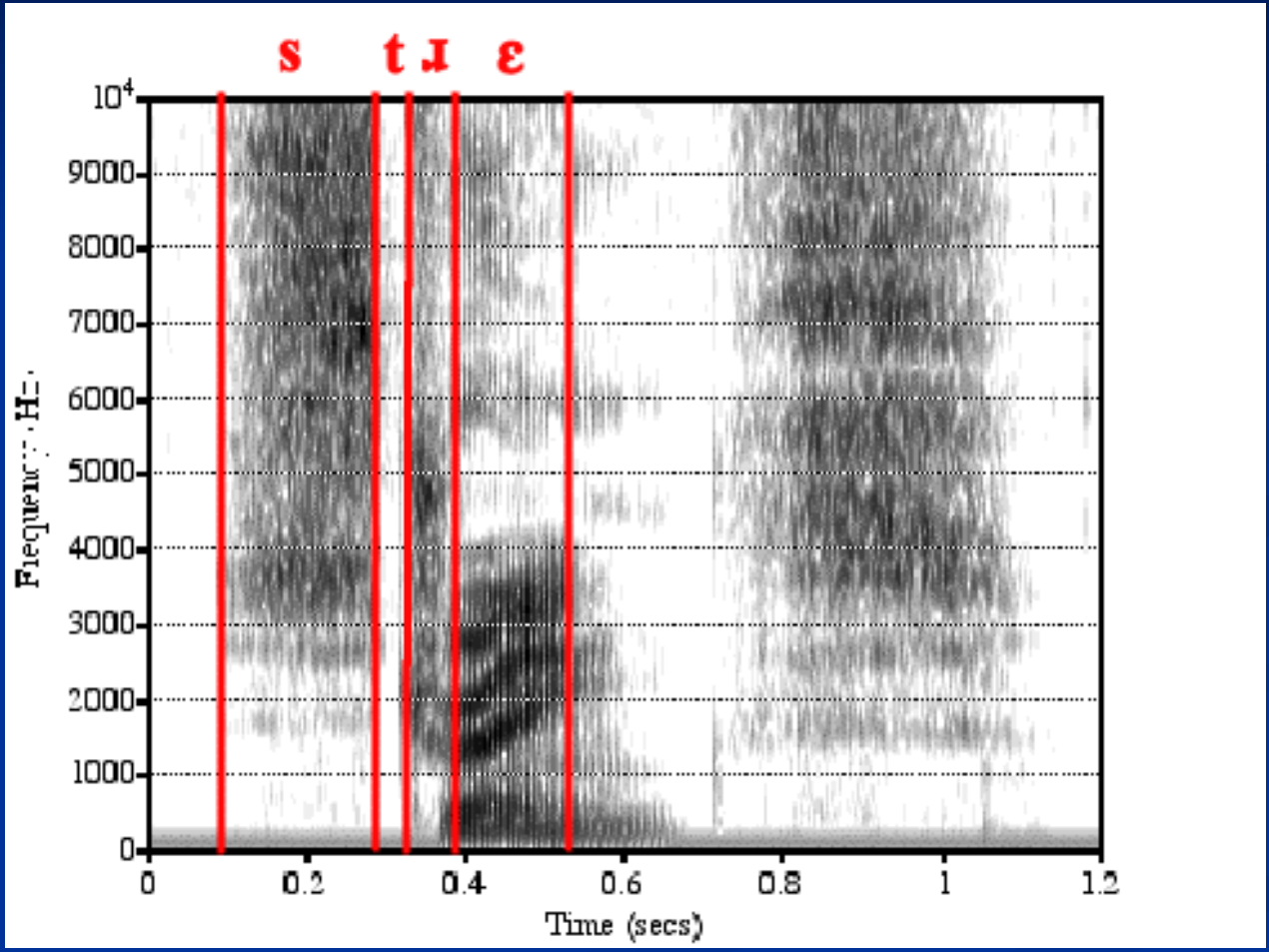
‘strengths’


s
10^4
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency Hz
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

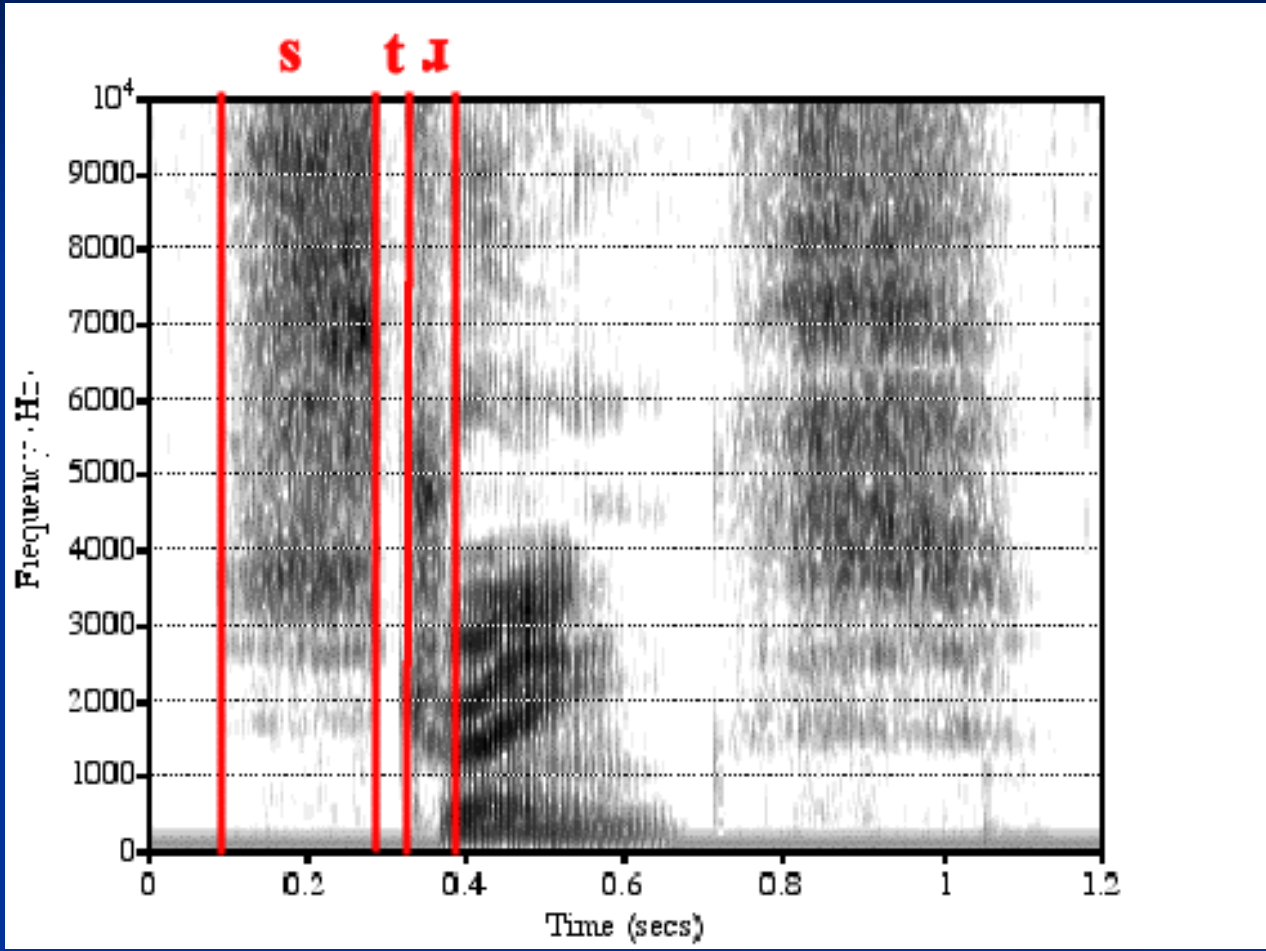
‘strengths’


s
t
10^4
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency Hz
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

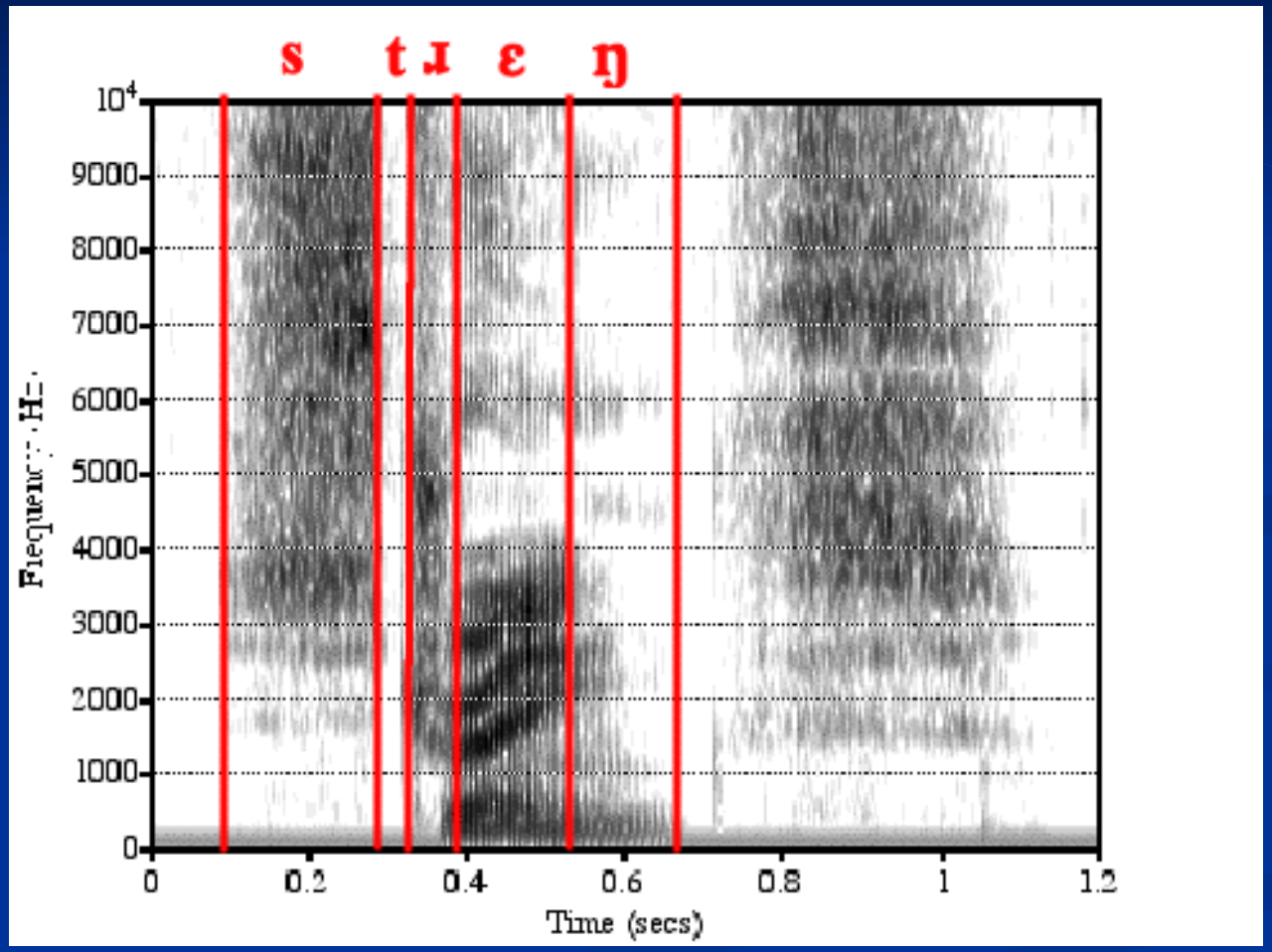
‘strengths’


s
t
ɹ
ɛ
10⁴
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

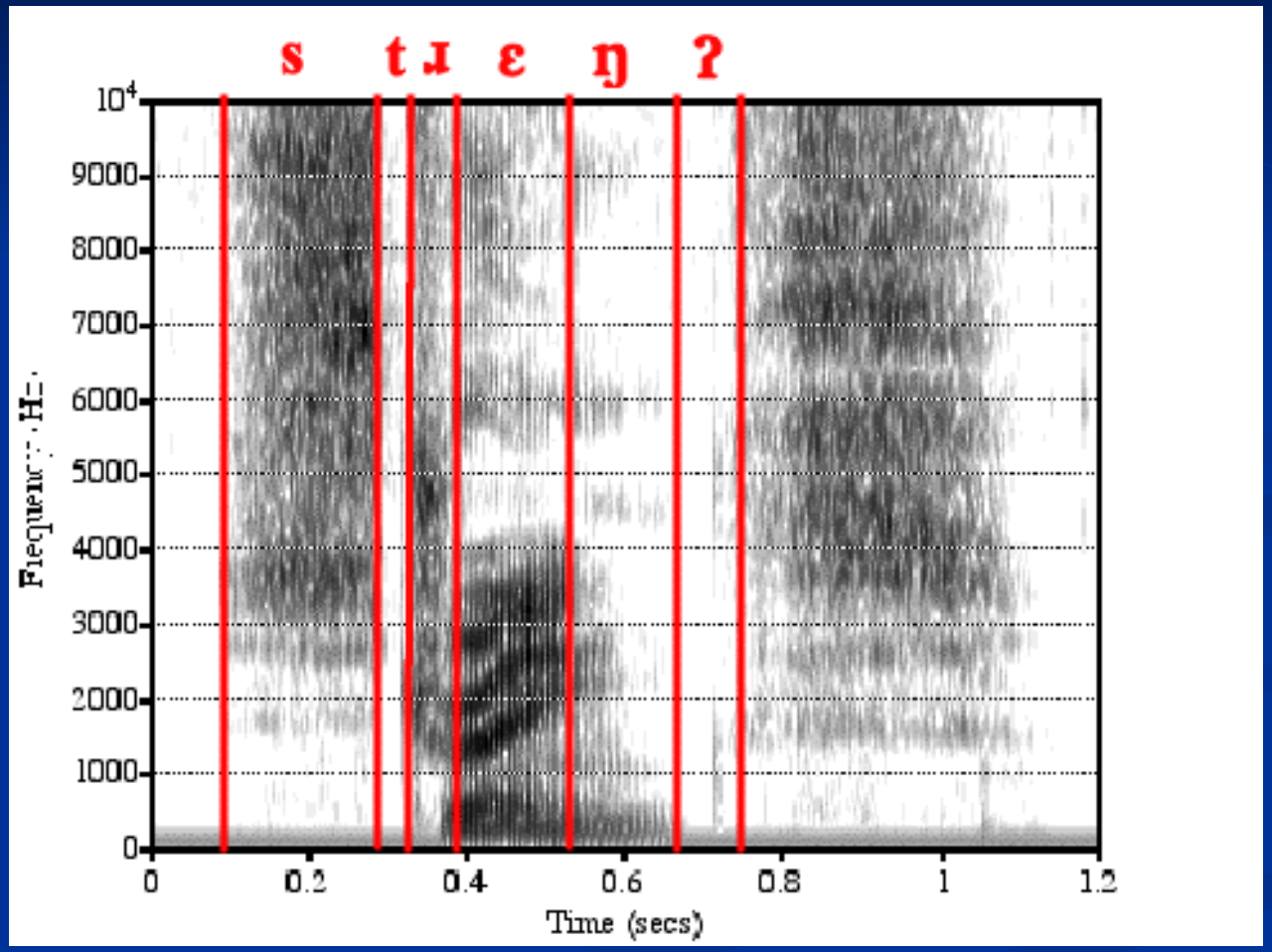
‘strengths’


s
t
r
10^4
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

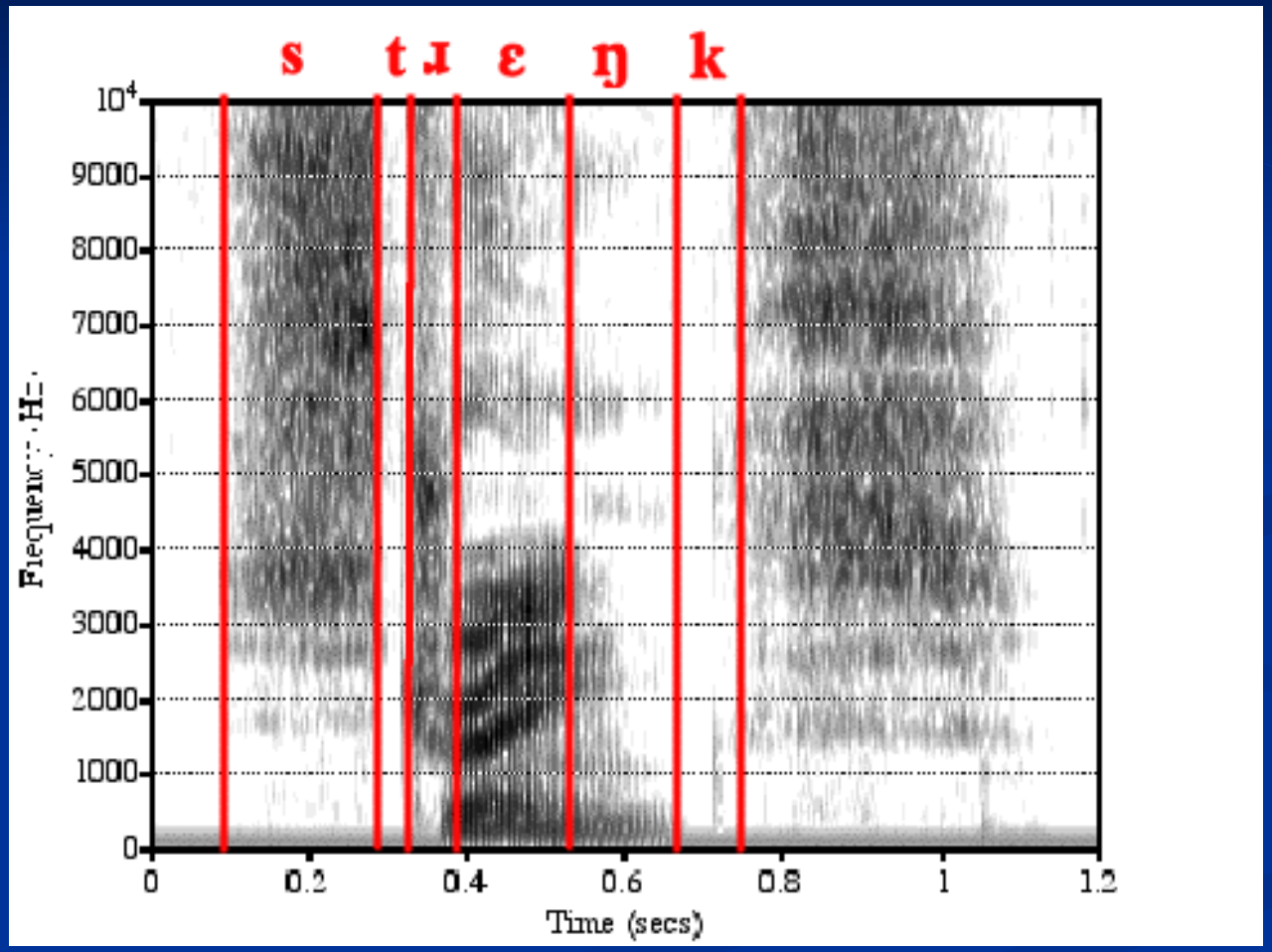
‘strengths’


s
t
ɹ
ɛ
ŋ
10⁴
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

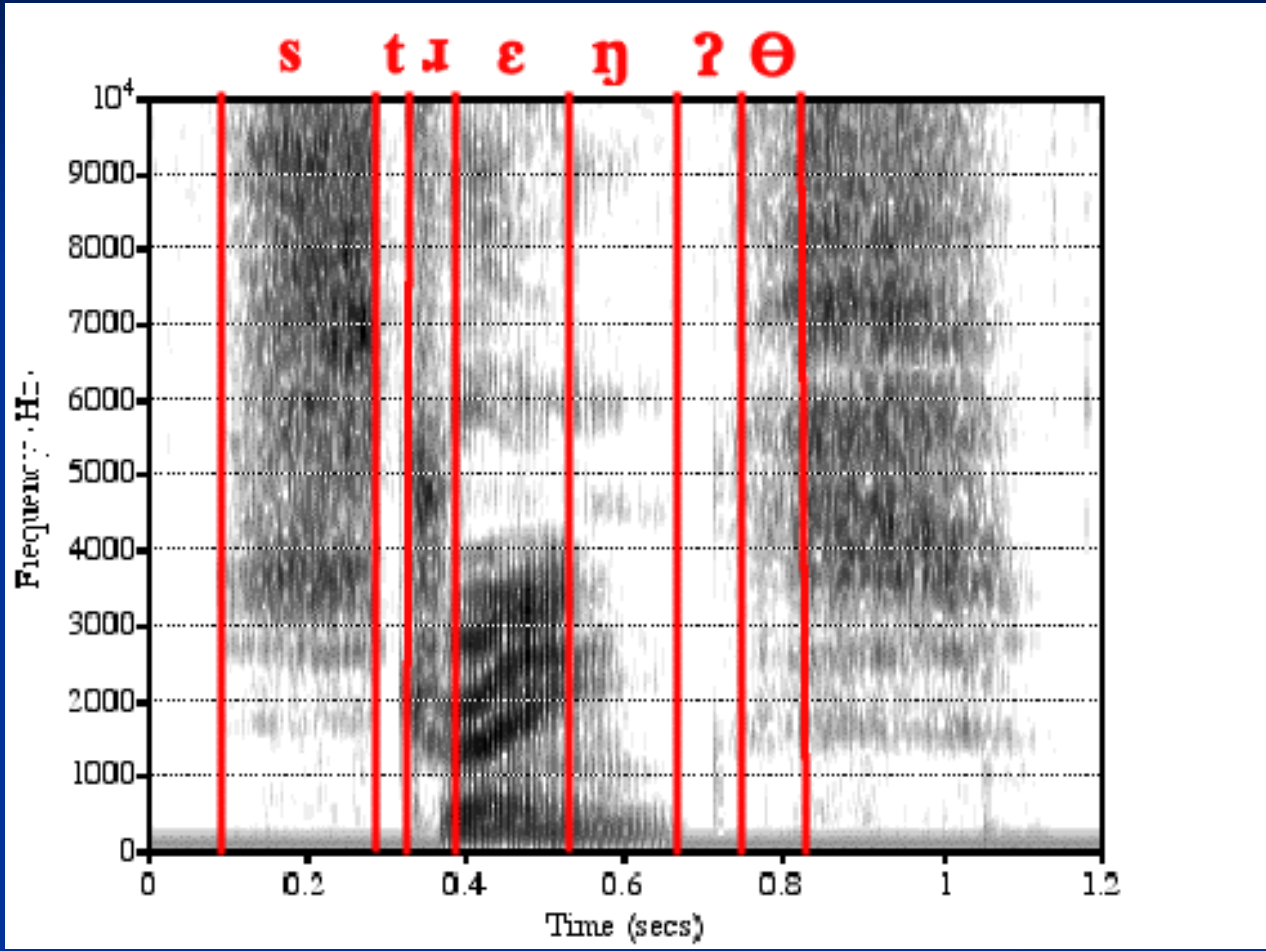
‘streng?ths’


s
t
ɹ
ɛ
ŋ
ʔ
10⁴
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

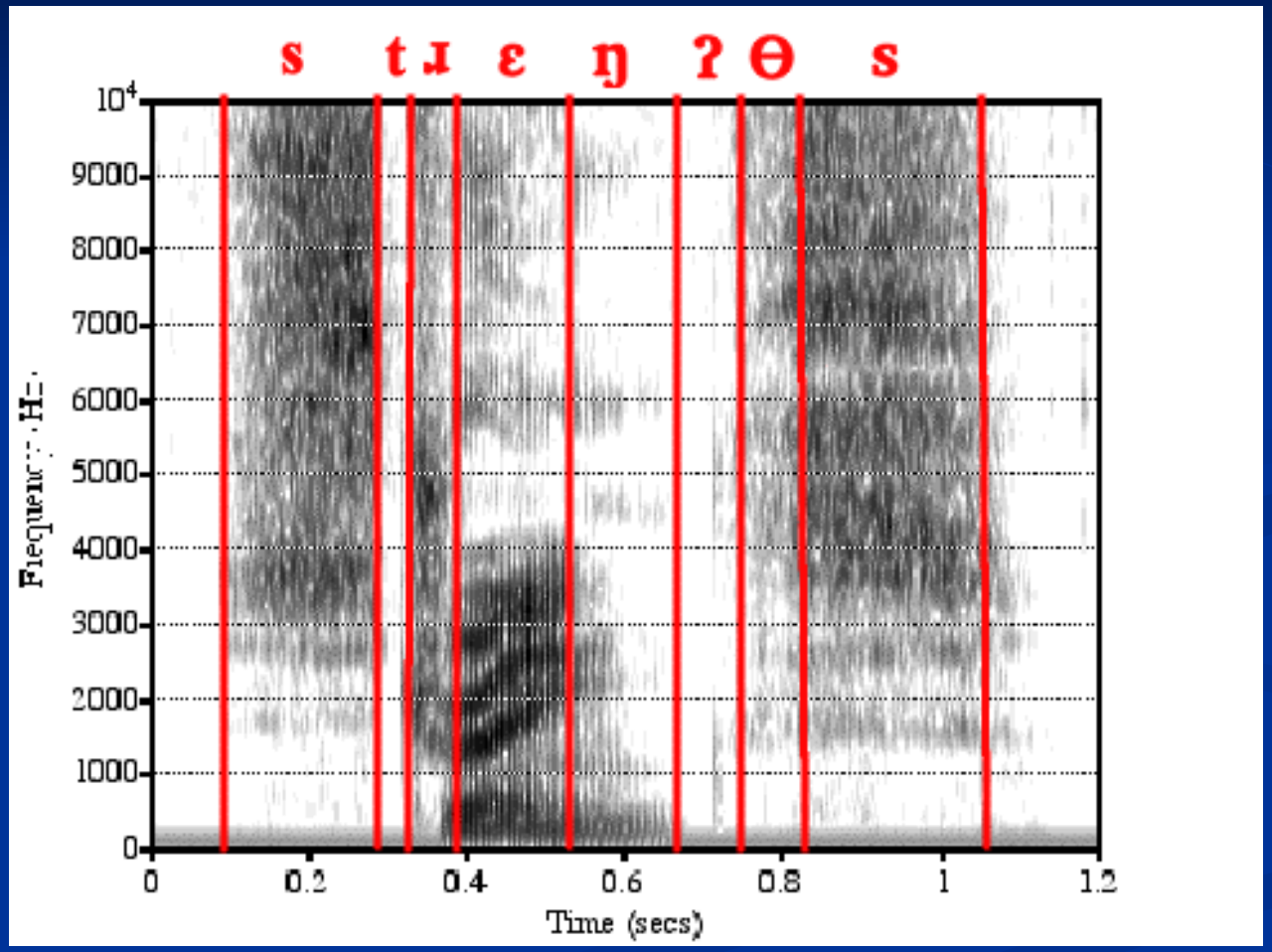
‘streng?ths’


s
t ɹ
ɛ
ŋ
k
10⁴
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

‘strengths’


s
t ɹ
ɛ
ŋ
ʔ θ
10⁴
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

‘strengths’


s
t
ɹ
ɛ
ŋ
ʔ
θ
s
10⁴
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Frequency (Hz)
0
0.2
0.4
0.6
0.8
1
1.2
Time (secs)

Phonology

- study of the mental organization of the sound system

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system
- varies from language to language

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system
- varies from language to language
  - types of mental category

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system
- varies from language to language
  - types of mental category
  - mentally stored representations

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system
- varies from language to language
  - types of mental category
  - mentally stored representations
  - generalisations concerning categories and representations

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system
- varies from language to language
  - types of mental category
  - mentally stored representations
  - generalisations concerning categories and representations
- not concerned with the actual speech sounds: more ***abstract*** level of understanding

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system
- varies from language to language
  - types of mental category
  - mentally stored representations
  - generalisations concerning categories and representations
- not concerned with the actual speech sounds: more ***abstract*** level of understanding
- the interactions between sounds within a system

Phonology

- study of the mental organization of the sound system
- organisation of speech sounds into a system
- varies from language to language
  - types of mental category
  - mentally stored representations
  - generalisations concerning categories and representations
- not concerned with the actual speech sounds: more ***abstract*** level of understanding
- the interactions between sounds within a system
- knowledge of a language: unconscious

Native Speaker Judgments

- ***Syntax***
  - 1. a. Who did you see Graham with?
    (cf. You saw Graham with who(m)?)

Native Speaker Judgments

- ***Syntax***
  - 1. a. Who did you see Graham with?
    (cf. You saw Graham with who(m)?)
  - b. * Who did you see Graham and?
    (cf. You saw Graham and who(m)?)

Native Speaker Judgments

- ***Syntax***
  - 1. a. Who did you see Graham with?
    (cf. You saw Graham with who(m)?)
  - b. * Who did you see Graham and?
    (cf. You saw Graham and who(m)?)
  - 2. a. He told the man who he knew.

Native Speaker Judgments

- ***Syntax***
  - 1. a. Who did you see Graham with?
    (cf. You saw Graham with who(m)?)
  - b. * Who did you see Graham and?
    (cf. You saw Graham and who(m)?)
  - 2. a. He told the man who he knew.
  - b. He told the man how he knew.

Phonology

- Number of syllables
  - a. banana
  - b. steak
  - c. strike
  - d. strengths

Phonology 2

- Possible words
  - a. lug
  - b. blug
  - c. ? tlug
  - d. * ltug

Abstractness

- Abstractness tries to generalize

Abstractness

- Abstractness tries to generalize
- we focus on a few general properties of a class of objects

Abstractness

- Abstractness tries to generalize
- we focus on a few general properties of a class of objects
- we construct a representative of this class

Abstractness

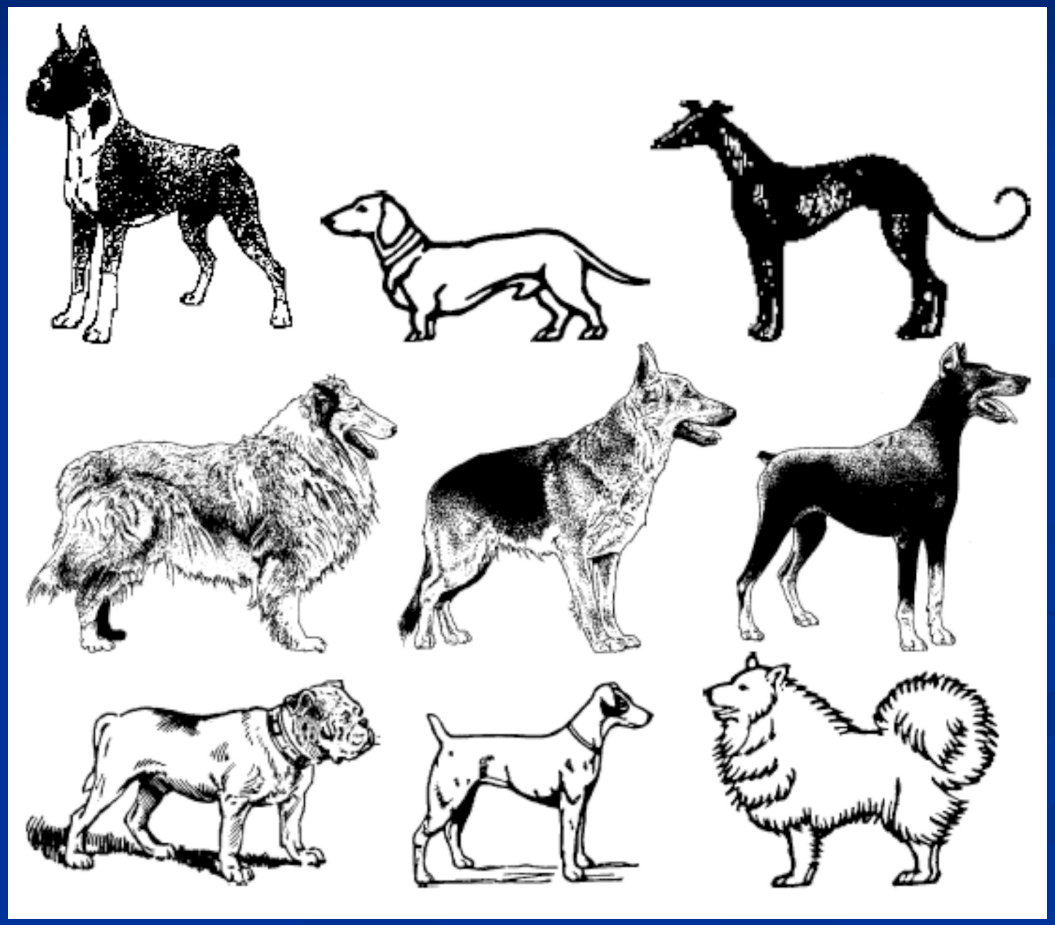
- Abstractness tries to generalize
- we focus on a few general properties of a class of objects
- we construct a representative of this class
- the representative may not be exactly like any specific instance of the set

Abstractness

- Abstractness tries to generalize
- we focus on a few general properties of a class of objects
- we construct a representative of this class
- the representative may not be exactly like any specific instance of the set
- it captures the essence of all members

Abstractness

- The word ‘dog’ is abstract: real dogs vary



Abstractness and Sounds

- It’s the same with contrastive sounds

Abstractness and Sounds

- It's the same with contrastive sounds
- the way we say them may vary

Abstractness and Sounds

- It's the same with contrastive sounds
- the way we say them may vary
- we must choose a representative for the entire class

Contrast vs. Predictability

- Aspirated and unaspirated stops in English

(a) [pʰuːɬ] ‘pool’ (b) [əpʰíːɹ] ‘appear’

Contrast vs. Predictability

- Aspirated and unaspirated stops in English

(a)	[pʰuːɬ]	‘pool’	(b)	[əpʰíːɹ]	‘appear’
(c)	[spəɹt]	‘spurt’	(d)	[dəspáɪt]	‘despite’

Contrast vs. Predictability

- Aspirated and unaspirated stops in English

(a)	[pʰuːɬ]	‘pool’	(b)	[əpʰíːɹ]	‘appear’
(c)	[spəɹt]	‘spurt’	(d)	[dəspáɪt]	‘despite’
(e)	[tʰɔp]	‘top’	(f)	[ətʰǽk]	‘attack’

Contrast vs. Predictability

- Aspirated and unaspirated stops in English

(a)	[pʰuːɬ]	‘pool’	(b)	[əpʰíːɹ]	‘appear’
(c)	[spəɹt]	‘spurt’	(d)	[dəspáɪt]	‘despite’
(e)	[tʰɔp]	‘top’	(f)	[ətʰǽk]	‘attack’
(g)	[stɔp]	‘stop’	(h)	[dəstɹɔ́ɪ]	‘destroy’

Contrast vs. Predictability

- Aspirated and unaspirated stops in English

(a)	[pʰuːɬ]	‘pool’	(b)	[əpʰíːɹ]	‘appear’
(c)	[spəɹt]	‘spurt’	(d)	[dəspáɪt]	‘despite’
(e)	[tʰɔp]	‘top’	(f)	[ətʰǽk]	‘attack’
(g)	[stɔp]	‘stop’	(h)	[dəstɹɔ́ɪ]	‘destroy’
(i)	[kʰiːp]	‘keep’	(j)	[əkʰɹúː]	‘accrue’

Contrast vs. Predictability

- Aspirated and unaspirated stops in English

(a)	[pʰuːɫ]	‘pool’	(b)	[əpʰíːɹ]	‘appear’
(c)	[spəɹt]	‘spurt’	(d)	[dəspáɪt]	‘despite’
(e)	[tʰɔp]	‘top’	(f)	[ətʰǽk]	‘attack’
(g)	[stɔp]	‘stop’	(h)	[dəstɹɔ́ɪ]	‘destroy’
(i)	[kʰiːp]	‘keep’	(j)	[əkʰɹúː]	‘accrue’
(k)	[skoʊɫd]	‘scold’	(l)	[dɪskʌ́vɹ̩]	‘discover’

- Voiceless stops are:

- Voiceless stops are:
  - aspirated at the beginning of a stressed syllable

- Voiceless stops are:
  - aspirated at the beginning of a stressed syllable
  - unaspirated after a voiceless alveolar fricative [s]

Contrast vs. Predictability 2

- Aspirated and unaspirated stops in Korean

(a) [pʰul] ‘grass’ (b) [pul] ‘fire’

Contrast vs. Predictability 2

- Aspirated and unaspirated stops in Korean

(a)	[pʰul]	‘grass’	(b)	[pul]	‘fire’
(c)	[tʰal]	‘mask’	(d)	[tal]	‘moon’

Contrast vs. Predictability 2

- Aspirated and unaspirated stops in Korean

(a)	[pʰul]	‘grass’	(b)	[pul]	‘fire’
(c)	[tʰal]	‘mask’	(d)	[tal]	‘moon’
(e)	[kʰ ɛ d a]	‘dig’	(f)	[kɛda]	‘fold’

- In Korean:

- In Korean:
  - aspirated and unaspirated stops may both occur in the same position

- In Korean:
  - aspirated and unaspirated stops may both occur in the same position
  - at the beginning of the syllable

- In Korean:
  - aspirated and unaspirated stops may both occur in the same position
  - at the beginning of the syllable
- What about at the end of the syllable?

Complementary Distribution

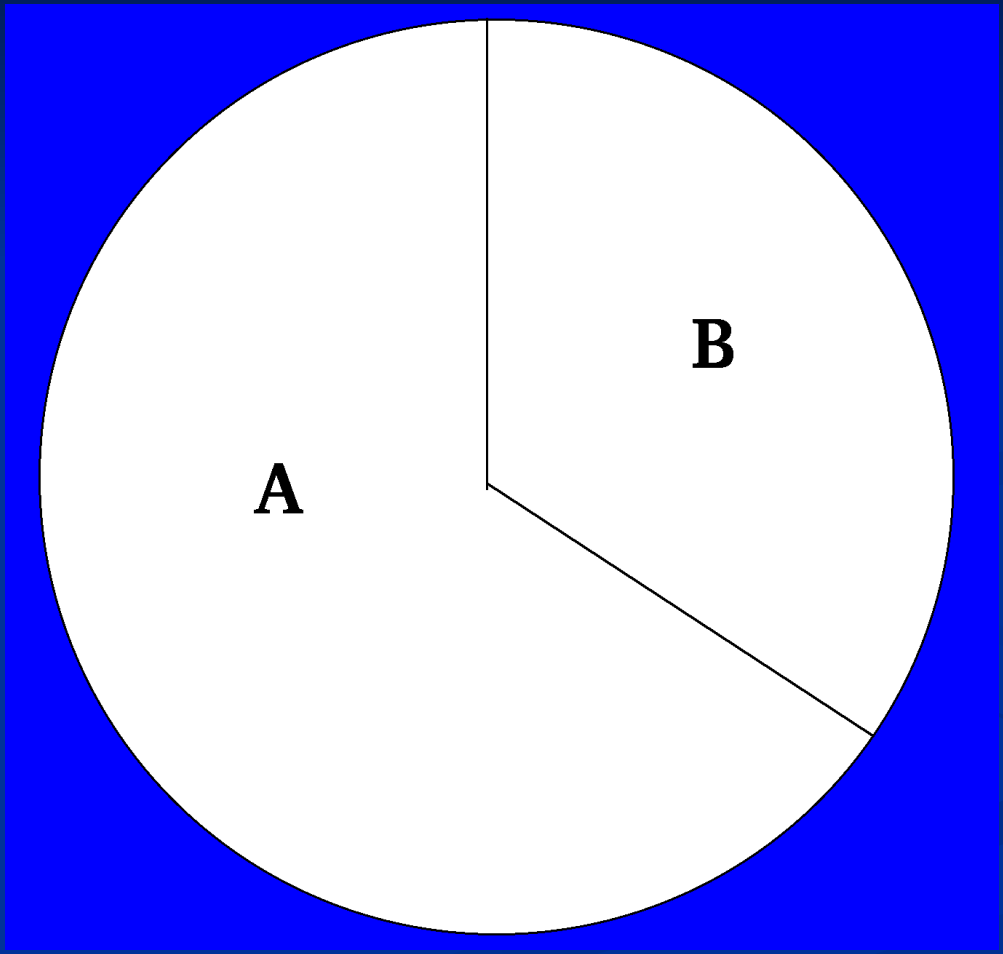
Complementary Distribution

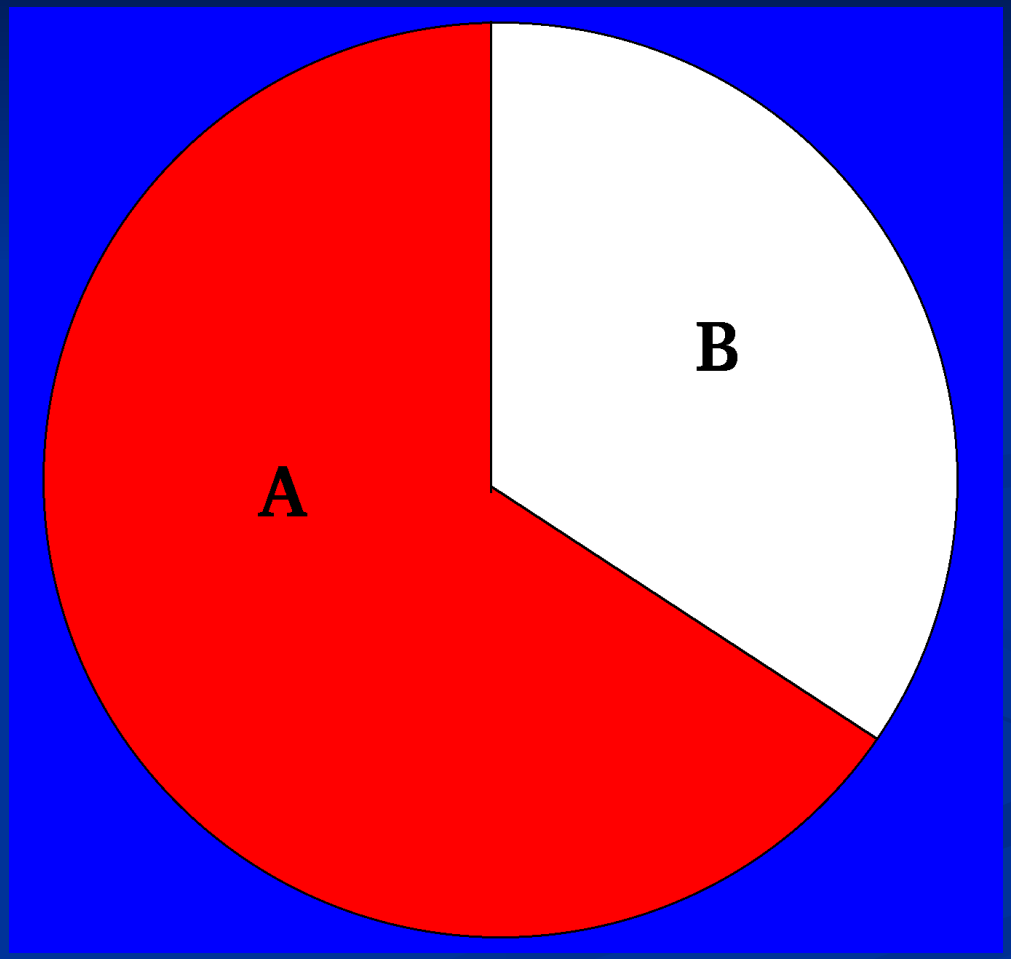
- ***Distribution***: range of positions in which an element can occur

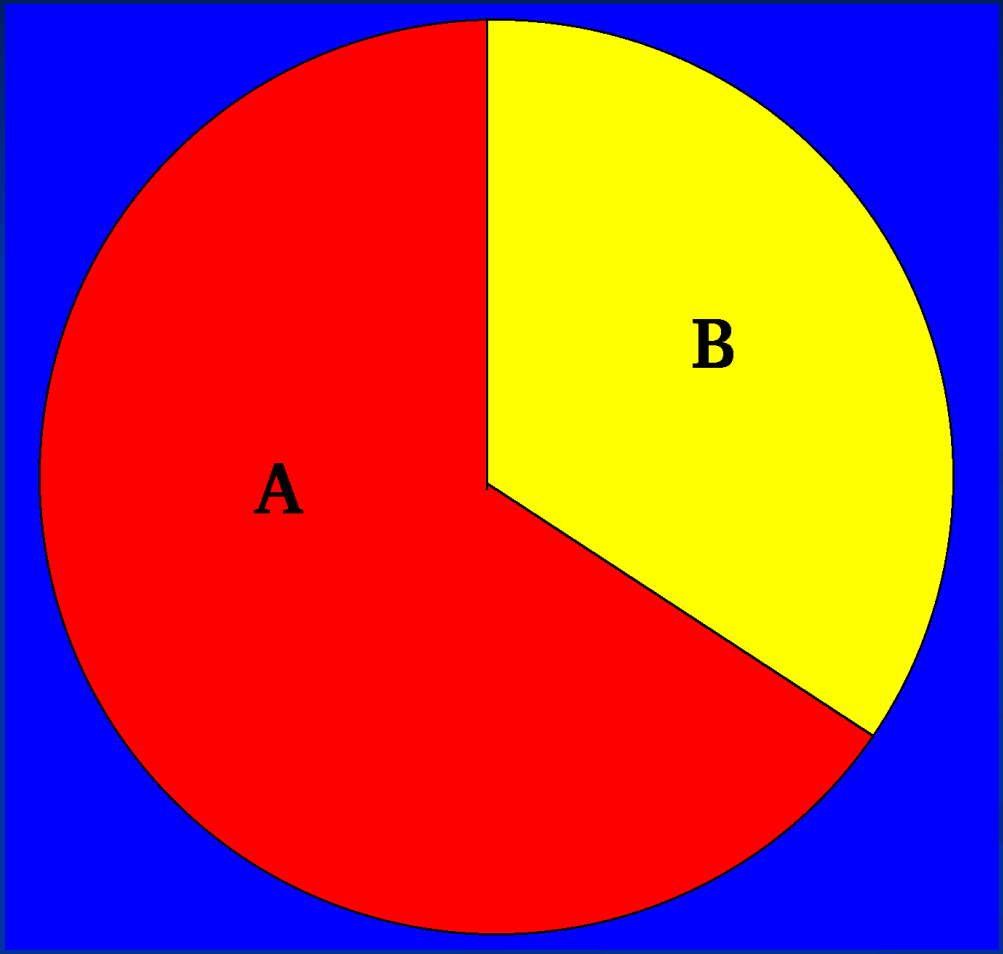
Complementary Distribution

- ***Distribution***: range of positions in which an element can occur

- ***Complementary Distribution***: where 2 *or more* elements occur in mutually *exclusive* distribution (one cannot be found where the other one occurs)


B
A


B
A


B
A

Phonetic Similarity - English

Phonetic Similarity - English

- in both English and Korean, [t] and [t^h] are phonetically similar

Phonetic Similarity - English

- in both English and Korean, [t] and [t^h] are phonetically similar
- in English, speakers will agree that they sound ‘the same’

Phonetic Similarity - English

- in both English and Korean, [t] and [t^h] are phonetically similar
- in English, speakers will agree that they sound 'the same'
- for English, they are ***phonetically distinct***, but ***phonologically equivalent***

Phonetic Similarity - English

- in both English and Korean, [t] and [t^h] are phonetically similar
- in English, speakers will agree that they sound 'the same'
- for English, they are ***phonetically distinct***, but ***phonologically equivalent***
- if you use the wrong one, e.g. [tɔp] 'top' or [st^hɔp] 'stop', it will sound odd, but comprehensible (foreign accent)

Phonetic Similarity

- for English [t] and [t^h] belong to the same mental category, i.e. they are members of a single ***phoneme***

Phonetic Similarity

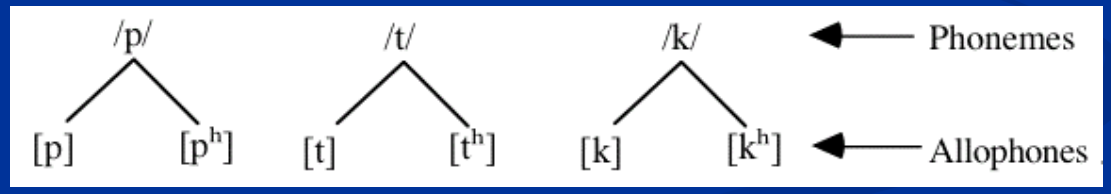
- for English [t] and [t^h] belong to the same mental category, i.e. they are members of a single ***phoneme***
- this applies to all of the stops of English, i.e. [t] and [t^h] constitute a single phoneme /t/, [p] and [p^h] constitute a single phoneme /p/, and [k] and [k^h] constitute a single phoneme /k/

Phonetic Similarity

- for English [t] and [t^h] belong to the same mental category, i.e. they are members of a single ***phoneme***
- this applies to all of the stops of English, i.e. [t] and [t^h] constitute a single phoneme /t/, [p] and [p^h] constitute a single phoneme /p/, and [k] and [k^h] constitute a single phoneme /k/
- English stop phonemes:

Phonetic Similarity

- for English [t] and [t^h] belong to the same mental category, i.e. they are members of a single ***phoneme***
- this applies to all of the stops of English, i.e. [t] and [t^h] constitute a single phoneme /t/, [p] and [p^h] constitute a single phoneme /p/, and [k] and [k^h] constitute a single phoneme /k/
- English stop phonemes:



Phonetic Similarity - Korean

Phonetic Similarity - Korean

- aspirated and unaspirated stops have over-lapping distribution, i.e. they occur in the same place, the beginning of the word.

Phonetic Similarity - Korean

- aspirated and unaspirated stops have over-lapping distribution, i.e. they occur in the same place, the beginning of the word.
- refer to this as ***parallel distribution***, that is there is (at least partial) overlap

Phonetic Similarity - Korean

- aspirated and unaspirated stops have over-lapping distribution, i.e. they occur in the same place, the beginning of the word.
- refer to this as ***parallel distribution***, that is there is (at least partial) overlap
- if you choose the wrong one, you will produce a different word

- Some Korean voiceless stop phonemes:

/p/	/p^h/	/t/	/t^h/	/k/	/k^h/	← Phonemes
|	|	|	|	|	|	
[p]	[p^h]	[t]	[t^h]	[k]	[k^h]	← Allophones

Minimal Pairs

- for Korean [t] and [t^h] belong to different mental categories, i.e. they are members of ***two distinct phonemes***

Minimal Pairs

- for Korean [t] and [t^h] belong to different mental categories, i.e. they are members of ***two distinct phonemes***
- the difference between aspirated and unaspirated stops in Korean is ***contrastive***

Minimal Pairs

- for Korean [t] and [t^h] belong to different mental categories, i.e. they are members of ***two distinct phonemes***
- the difference between aspirated and unaspirated stops in Korean is ***contrastive***
- pairs of words differing in only one element are called ***minimal pairs***

- For Korean, [pul] 'fire' and [p^{h}ul] 'grass' are a minimal pair

- For Korean, [pul] 'fire' and [p^hul] 'grass' are a minimal pair
- Only the first sound is different

- For Korean, [pul] 'fire' and [p^hul] 'grass' are a minimal pair
- only the first sound is different
- minimal pairs are a useful tool in isolating phonemes

- For Korean, [pul] 'fire' and [p^{h}ul] 'grass' are a minimal pair
- only the first sound is different
- minimal pairs are a useful tool in isolating phonemes
- find pairs of words where only one segment differs

- For Korean, [pul] 'fire' and [p^{h}ul] 'grass' are a minimal pair
- only the first sound is different
- minimal pairs are a useful tool in isolating phonemes
- find pairs of words where only one segment differs
- if changing the segment results in different word, then the segment is contrastive and, therefore, phonemic

- For Korean, [pul] 'fire' and [p^{h}ul] 'grass' are a minimal pair
- only the first sound is different
- minimal pairs are a useful tool in isolating phonemes
- find pairs of words where only one segment differs
- if changing the segment results in different word, then the segment is contrastive and, therefore, phonemic
- English *big* and *dig* demonstrate that /b/ and /d/ are contrastive and distinct phonemes

Near-minimal Pairs

- sometimes minimal pairs are difficult to find

Near-minimal Pairs

- sometimes minimal pairs are difficult to find
- English [ʒ] is hard to find at the beginning of the word

Near-minimal Pairs

- sometimes minimal pairs are difficult to find
- English [ʒ] is hard to find at the beginning of the word
- only the word *genre* [ʒɑnɹə]

Near-minimal Pairs

- sometimes minimal pairs are difficult to find
- English [ʒ] is hard to find at the beginning of the word
- Only the word *genre* [ʒɑnɹə]
- may only be able to isolate a contrast in a limited context

Near-minimal Pairs

- sometimes minimal pairs are difficult to find
- English [ʒ] is hard to find at the beginning of the word
- only the word *genre* [ʒɑnɹə]
- may only be able to isolate a contrast in a limited context
- in this case, we choose near-minimal pairs

Near-minimal Pairs

- sometimes minimal pairs are difficult to find
- English [ʒ] is hard to find at the beginning of the word
- Only the word *genre* [ʒɑnɹə]
- may only be able to isolate a contrast in a limited context
- in this case, we choose near-minimal pairs
- English *pleasure* [pʰlɛʒəɹ] and *pressure* [pʰɹɛʃəɹ]

Near-minimal Pairs

- sometimes minimal pairs are difficult to find
- English [ʒ] is hard to find at the beginning of the word
- Only the word *genre* [ʒɑnɹə]
- may only be able to isolate a contrast in a limited context
- in this case, we choose near-minimal pairs
- English *pleasure* [pʰlɛʒəɹ] and *pressure* [pʰɹɛʃəɹ]
- As long as the variation does not affect the segment under examination, this should be acceptable

Minimal Sets

- to speed up the process of phonemic analysis, we may wish to employ minimal sets rather than minimal pairs

Minimal Sets

- to speed up the process of phonemic analysis, we may wish to employ minimal sets rather than minimal pairs
- choose a group of words that only vary in a single segment

Minimal Sets

- to speed up the process of phonemic analysis, we may wish to employ minimal sets rather than minimal pairs
- choose a group of words that only vary in a single segment
- e.g., *pig, big, dig, fig, rig, jig*, etc.

Minimal Sets

- to speed up the process of phonemic analysis, we may wish to employ minimal sets rather than minimal pairs
- choose a group of words that only vary in a single segment
- e.g., *pig, big, dig, fig, rig, jig*, etc.
- this simplifies and speeds up the isolation of phonemes

Phonemic Overlapping

- it is sometimes possible that distinct phonemes may share the same phonetic realization

Phonemic Overlapping

- it is sometimes possible that distinct phonemes may share the same phonetic realization
- This may create a problem for the definition of the phoneme:

Phonemic Overlapping

- it is sometimes possible that distinct phonemes may share the same phonetic realization
- This may create a problem for the definition of the phoneme:
  - A system in which successive occurrences of a given sound X under the same conditions must be assigned to different phonemes necessarily breaks down, because there can be nothing in the facts of pronunciation to tell us which kind of X we are dealing with in any particular utterance. (Bloch 1941)

Phonemic Overlapping

- An example of this potential overlap comes from English negative formation

Phonemic Overlapping

- An example of this potential overlap comes from English negative formation
- the /in-/ prefix has different shapes in different contexts

Phonemic Overlapping

- An example of this potential overlap comes from English negative formation
- the /in-/ prefix has different shapes in different contexts
- bases beginning with a vowel or alveolar consonants are preceded by [n]

Phonemic Overlapping

- An example of this potential overlap comes from English negative formation
- the /in-/ prefix has different shapes in different contexts
- bases beginning with a vowel or alveolar consonants are preceded by [n]
- those beginning with bilabial consonants are preceded by [m]

Phonemic Overlapping

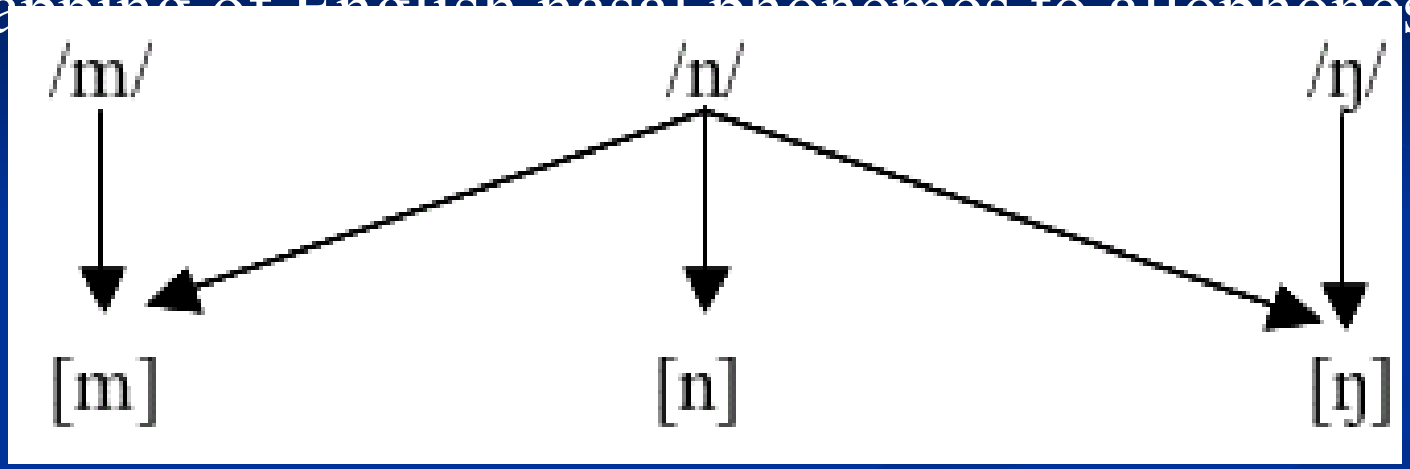
- An example of this potential overlap comes from English negative formation
- the /in-/ prefix has different shapes in different contexts
- bases beginning with a vowel or alveolar consonants are preceded by [n]
- those beginning with bilabial consonants are preceded by [m]
- those beginning with a velar sound are often preceded by [ŋ]

Phonemic Overlapping

- An example of this potential overlap comes from English negative formation
- the /in-/ prefix has different shapes in different contexts
- bases beginning with a vowel or alveolar consonants are preceded by [n]
- those beginning with bilabial consonants are preceded by [m]
- those beginning with a velar sound are often preceded by [ŋ]
- the basic form of the negative prefix must be /ɪn-/

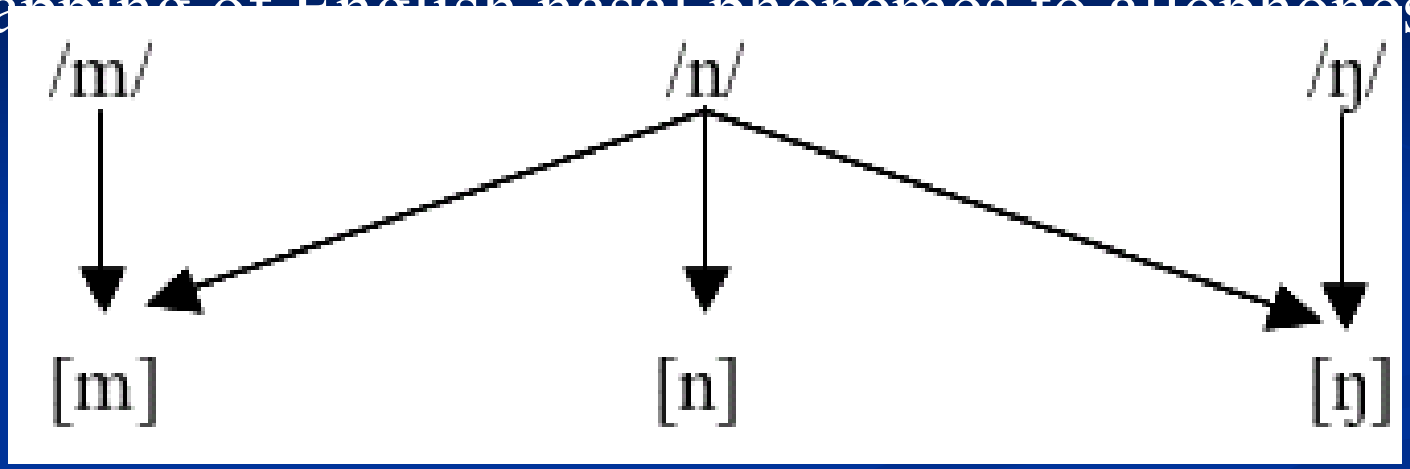
Phonemic Overlapping

- mapping of English nasal phonemes to allophones



Phonemic Overlapping

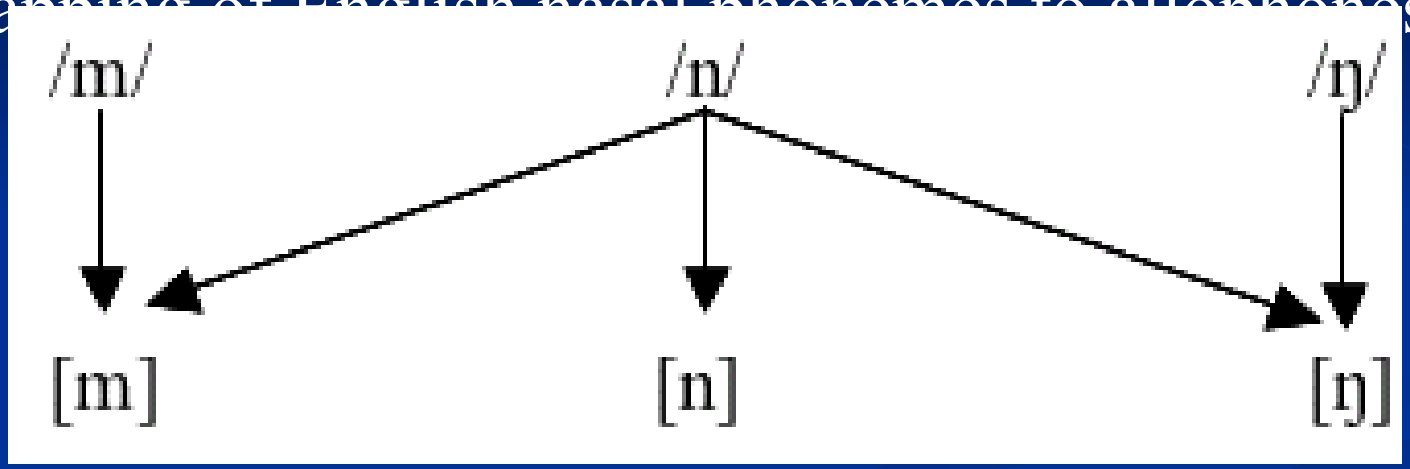
- mapping of English nasal phonemes to allophones



- The phoneme /n/ is realized as [n] sometimes but also sometimes as [m] and also as [ŋ]

Phonemic Overlapping

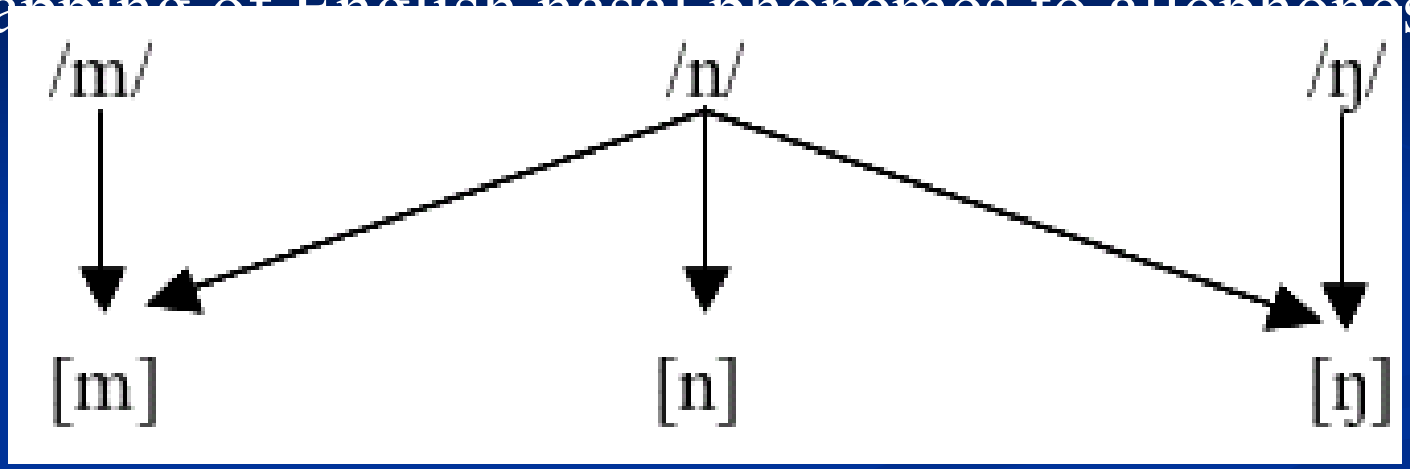
- mapping of English nasal phonemes to allophones



- The phoneme /n/ is realized as [n] sometimes but also sometimes as [m] and also as [ŋ]
- [m] and also as [ŋ] are also phonemes of English

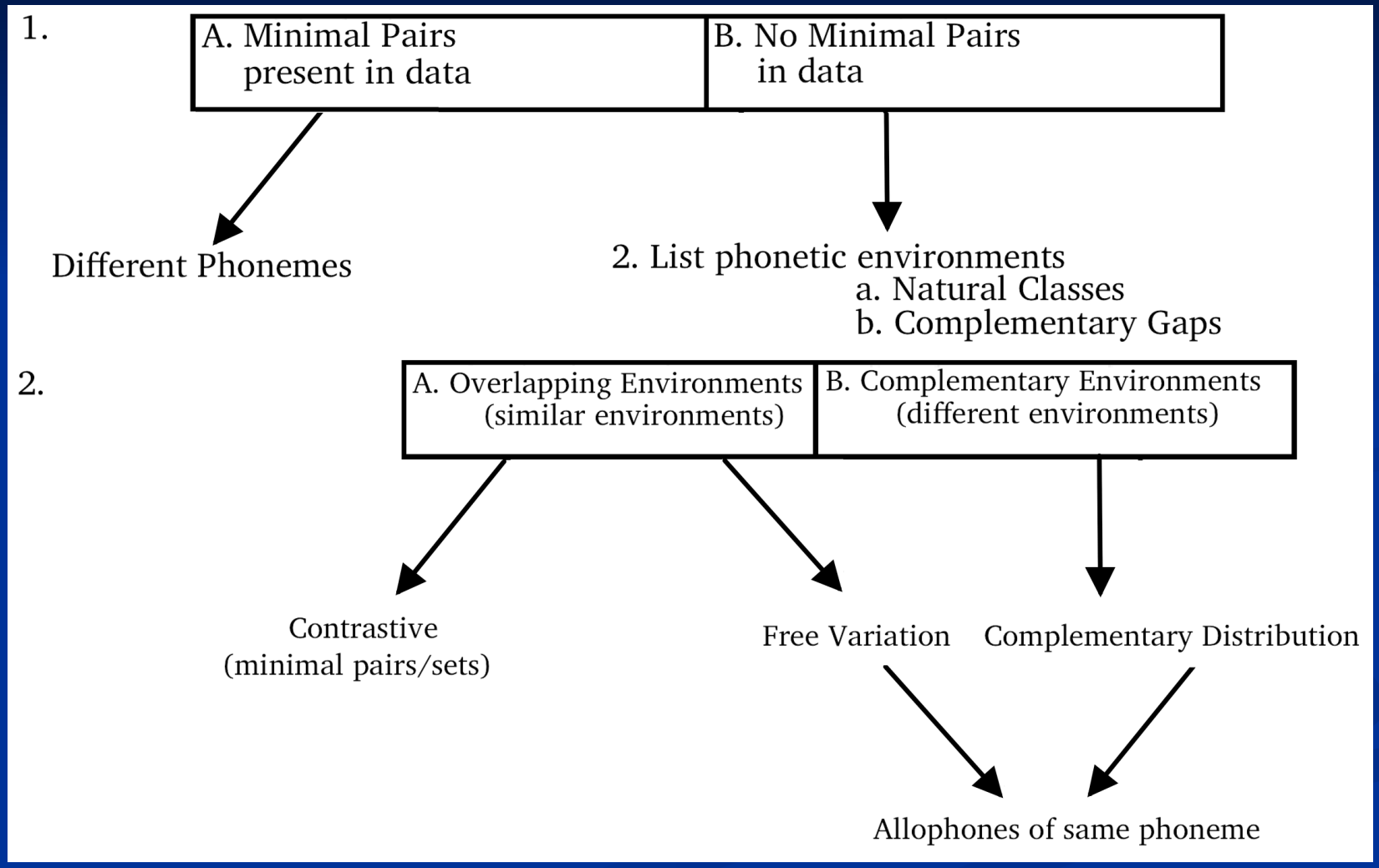
Phonemic Overlapping

- mapping of English nasal phonemes to allophones



- The phoneme /n/ is realized as [n] sometimes but also sometimes as [m] and also as [ŋ]
- [m] and also as [ŋ] are also phonemes of English
- this is a clear case of phonemic overlapping

Doing Phonemic Analysis



Writing Systems

- phonemic transcription can often look a lot like the writing system of a language

Writing Systems

- phonemic transcription can often look a lot like the writing system of a language
- if the language uses the Roman alphabet, many of the symbols will be similar to typical phonemic transcription systems

Writing Systems

- phonemic transcription can often look a lot like the writing system of a language
- if the language uses the Roman alphabet, many of the symbols will be similar to typical phonemic transcription systems
- it is important to remember that writing systems, unless constantly updated, are usually rather poor substitutes for a phonemic system

Writing Systems

- phonemic transcription can often look a lot like the writing system of a language
- if the language uses the Roman alphabet, many of the symbols will be similar to typical phonemic transcription systems
- it is important to remember that writing systems, unless constantly updated, are usually rather poor substitutes for a phonemic system
- in general, writing systems are roughly either :

Writing Systems

- phonemic transcription can often look a lot like the writing system of a language
- if the language uses the Roman alphabet, many of the symbols will be similar to typical phonemic transcription systems
- it is important to remember that writing systems, unless constantly updated, are usually rather poor substitutes for a phonemic system
- in general, writing systems are roughly either :
  - Phonemic

Writing Systems

- phonemic transcription can often look a lot like the writing system of a language
- if the language uses the Roman alphabet, many of the symbols will be similar to typical phonemic transcription systems
- it is important to remember that writing systems, unless constantly updated, are usually rather poor substitutes for a phonemic system
- in general, writing systems are roughly either :
  - Phonemic
  - Morphophonemic

Writing Systems

- a phonetic writing system would be rather impractical

Writing Systems

- a phonetic writing system would be rather impractical
- it would have great difficulty in accommodating different dialects

Writing Systems

- a phonetic writing system would be rather impractical
- it would have great difficulty in accommodating different dialects
- also problems with any form of language change

Writing Systems

- a phonetic writing system would be rather impractical
- it would have great difficulty in accommodating different dialects
- also problems with any form of language change
- if you had to revise your writing system when there is a change in pronunciation, it would not be very practical

Writing Systems

- a phonetic writing system would be rather impractical
- it would have great difficulty in accommodating different dialects
- also problems with any form of language change
- if you had to revise your writing system when there is a change in pronunciation, it would not be very practical
- if you had to print newspapers separately for each dialect in a country, it would not be very cost-effective

Phonemic vs. Morphophonemic

- phonetic writing systems are doomed to failure

Phonemic vs. Morphophonemic

- phonetic writing systems are doomed to failure
- What about phonemic systems versus morpho-phonemic systems?

Phonemic vs. Morphophonemic

- phonetic writing systems are doomed to failure
- What about phonemic systems versus morpho-phonemic systems?
- a phonemic writing system would represent the abstract underlying nature of each contrastive sound of the language

Phonemic vs. Morphophonemic

- phonetic writing systems are doomed to failure
- What about phonemic systems versus morpho-phonemic systems?
- a phonemic writing system would represent the abstract underlying nature of each contrastive sound of the language
- does not take into account any regular changes that take place because of morphemes coming together

Hunmin Jeongeum

- the Korean writing system is a good example of a morphophonemic writing system

Hunmin Jeongeum

- the Korean writing system is a good example of a morphophonemic writing system
- first introduced in the 15th c. document, the Hunmin Jeongeum（훈민정음）

Hunmin Jeongeum

- the Korean writing system is a good example of a morphophonemic writing system
- first introduced in the 15th c. document, the Hunmin Jeongeum（훈민정음）
- in Korean, when the morphemes are brought together, the sounds may change

Hunmin Jeongeum

- the Korean writing system is a good example of a morphophonemic writing system
- first introduced in the 15th c. document, the Hunmin Jeongeum（훈민정음）
- in Korean, when the morphemes are brought together, the sounds may change
- this creates a substantial amount of overlap in the system

Hunmin Jeongeum

- If we tried to represent this phonemically, we would no longer see the underlying form of each morpheme

Hunmin Jeongeum

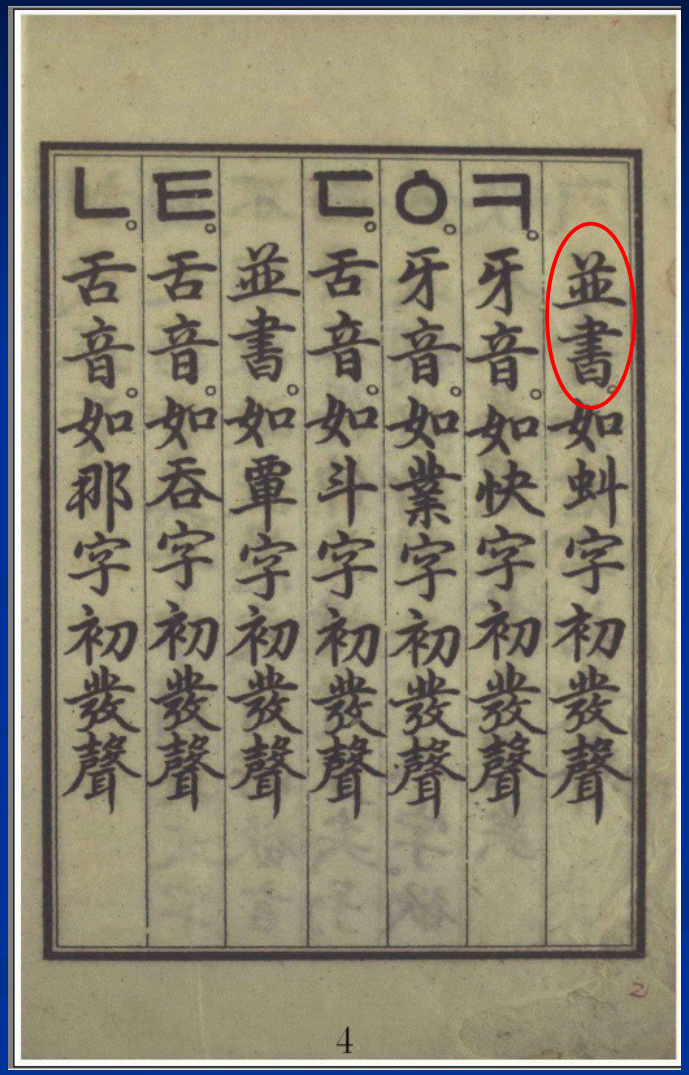
- If we tried to represent this phonemically, we would no longer see the underlying form of each morpheme
- the relationship between forms would be lost

Hunmin Jeongeum

- If we tried to represent this phonemically, we would no longer see the underlying form of each morpheme
- the relationship between forms would be lost
- this would be undesirable

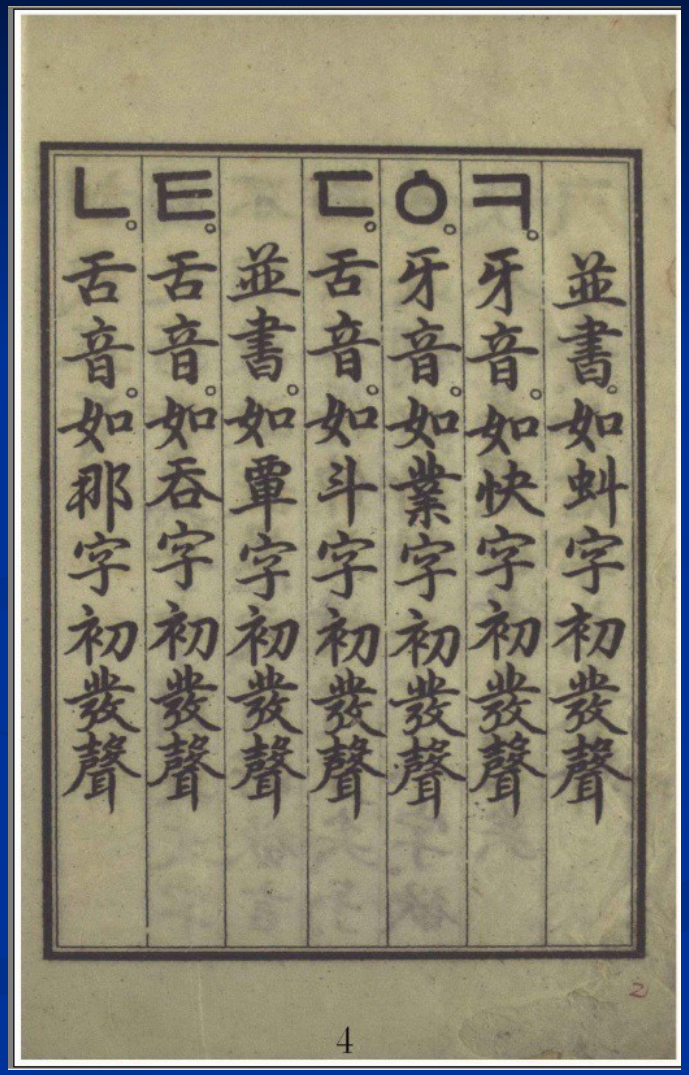
Second Page of HMJ

- ㄲ [k'], a doubled letter, like the first sound of the Hanja 虯 .



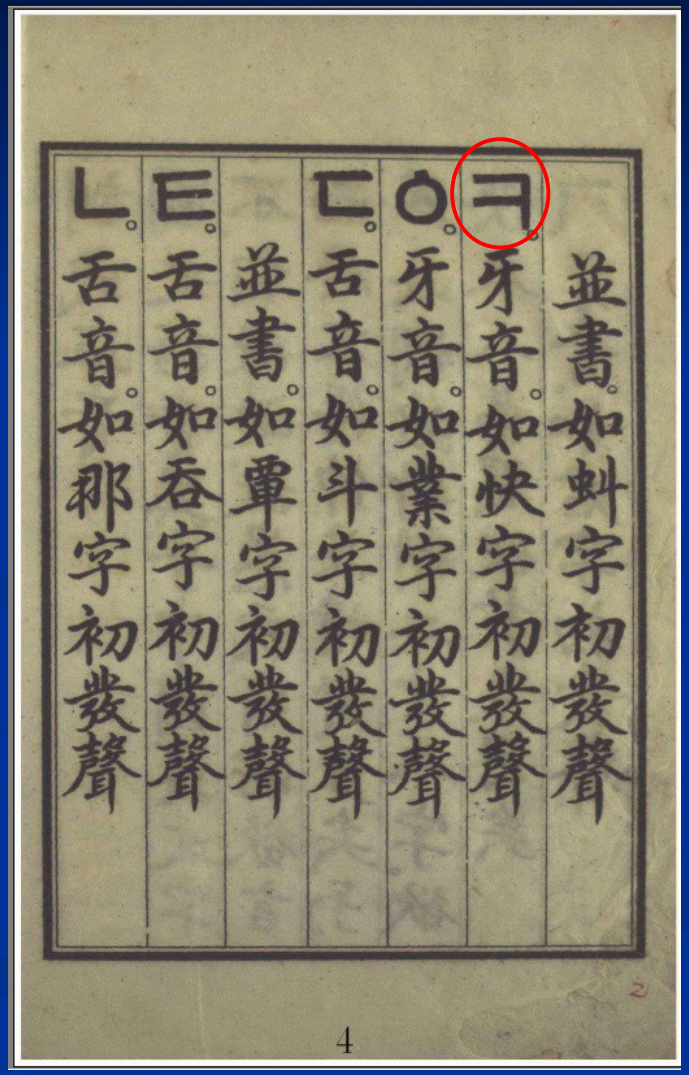
Second Page of HMJ

- ㄲ [k'], a doubled letter, like the first sound of the Hanja 虯 .
  - MC ‹g'i̯ə̯u 'horned dragon; curly'



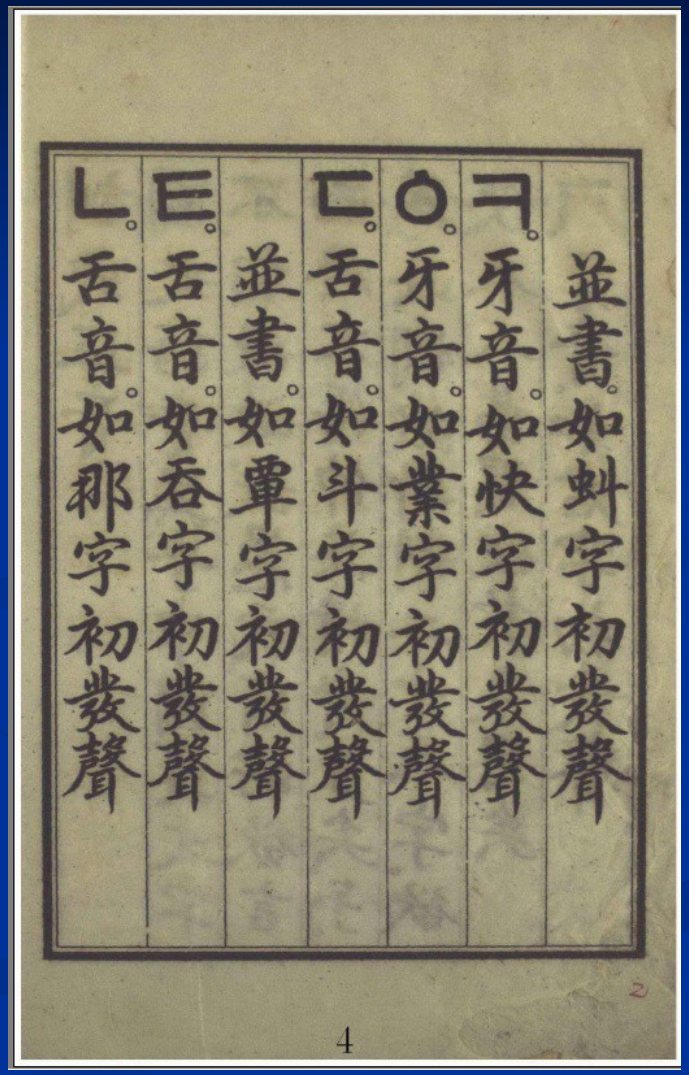
Second Page of HMJ

- ㄲ [k'], a doubled letter, like the first sound of the Hanja 虯 .
  MC ‹g'i̯ə̯u 'horned dragon; curly'
- ㅋ [kʰ], molar sound, like the first sound of the Hanja 快 .



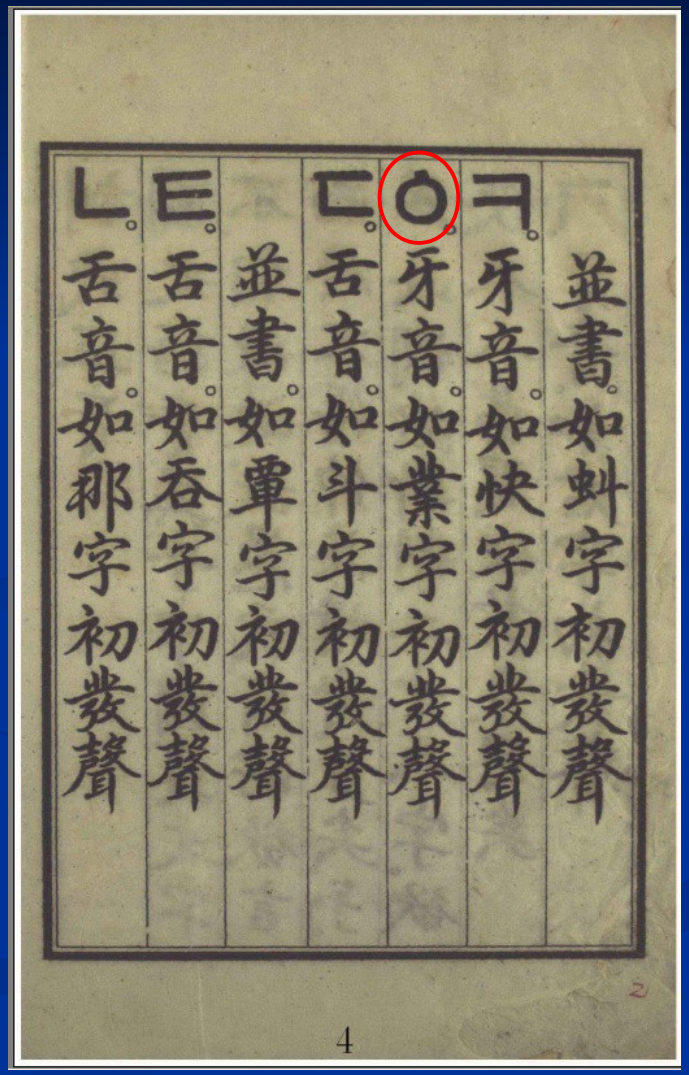
Second Page of HMJ

- ㄲ [k'], a doubled letter, like the first sound of the Hanja 虯 .
  MC ʿg'i̯ə̯u 'horned dragon; curly'
- ㅋ [kʰ], molar sound, like the first sound of the Hanja 快 .
  MC kʿʷāiʾ 'quick, fast'



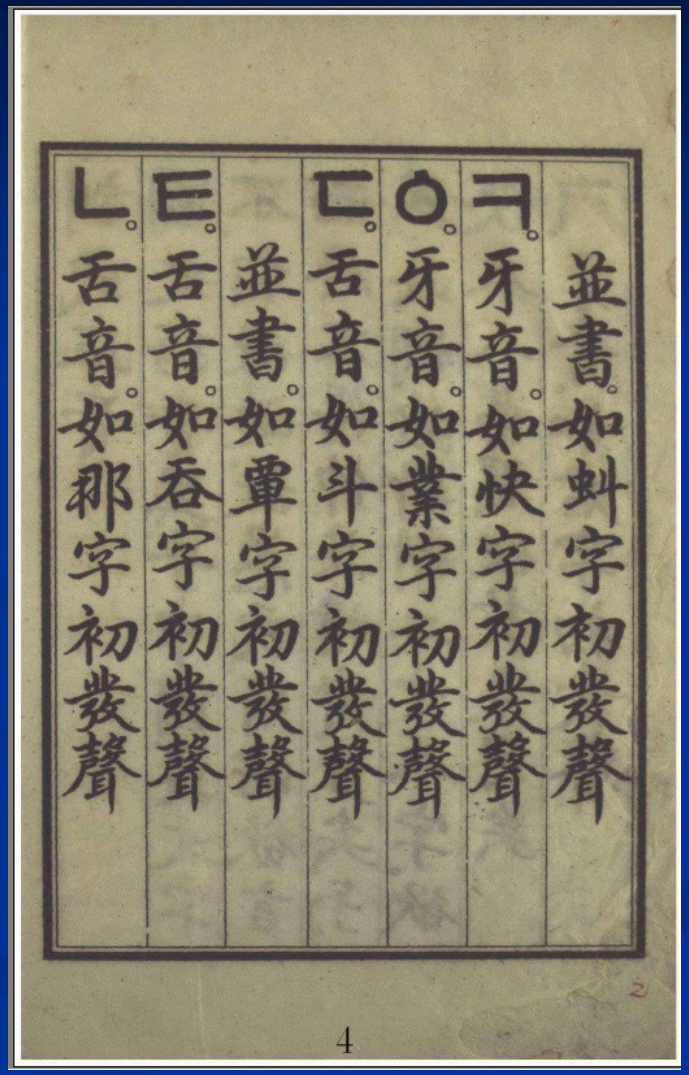
Second Page of HMJ

- ㄲ [k'], a doubled letter, like the first sound of the Hanja 虯 .
  MC ʻg'i̯ə̯u 'horned dragon; curly'
- ㅋ [kʰ], molar sound, like the first sound of the Hanja 快 .
  MC kʻʷāiʾ 'quick, fast'
- ㅇ [ŋ], molar sound, like the first sound of the Hanja 業 .



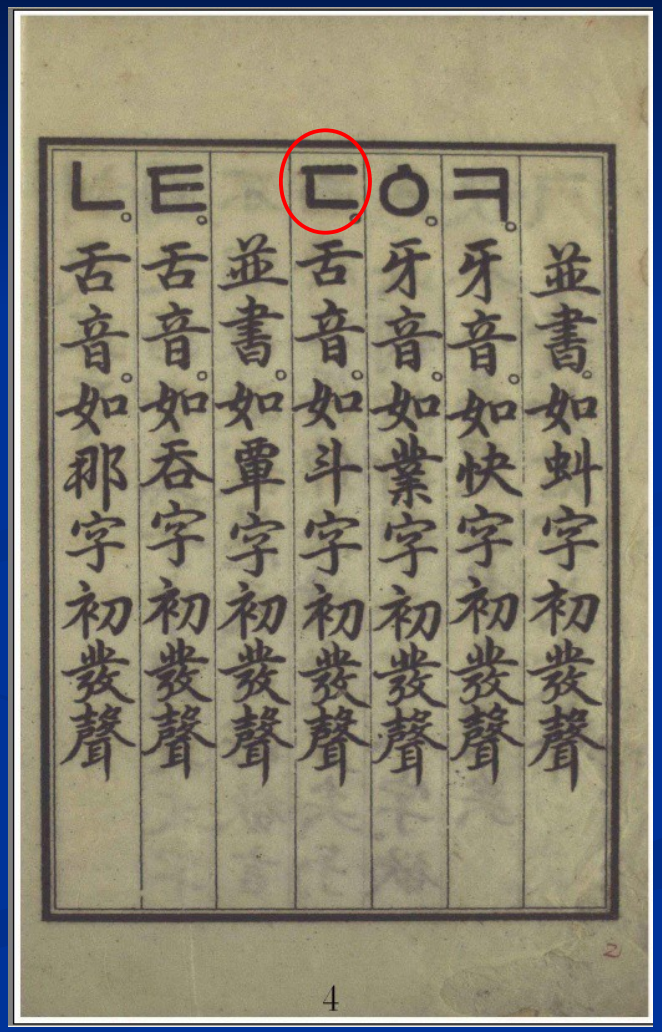
Second Page of HMJ

- ㄲ [k'], a doubled letter, like the first sound of the Hanja 虯 .
  MC ʻg̯ʻi̯ə̯u 'horned dragon; curly'
- ㅋ [kʰ], molar sound, like the first sound of the Hanja 快 .
  MC kʻʷāiʾ 'quick, fast'
- ㅇ [ŋ], molar sound, like the first sound of the Hanja 業 .
  MC ng̯iɒp



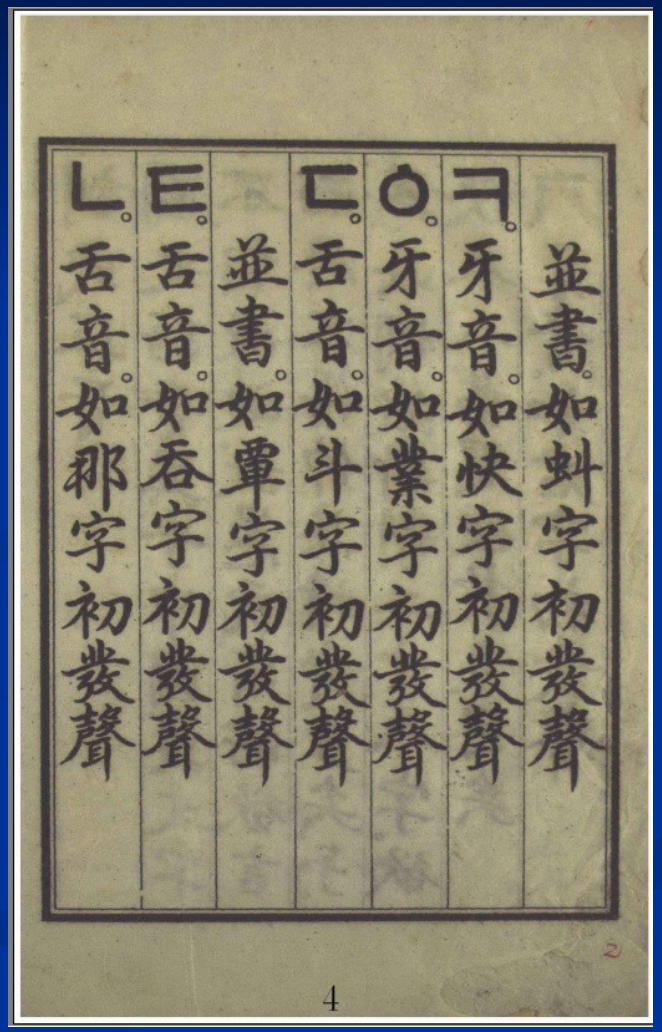
Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .



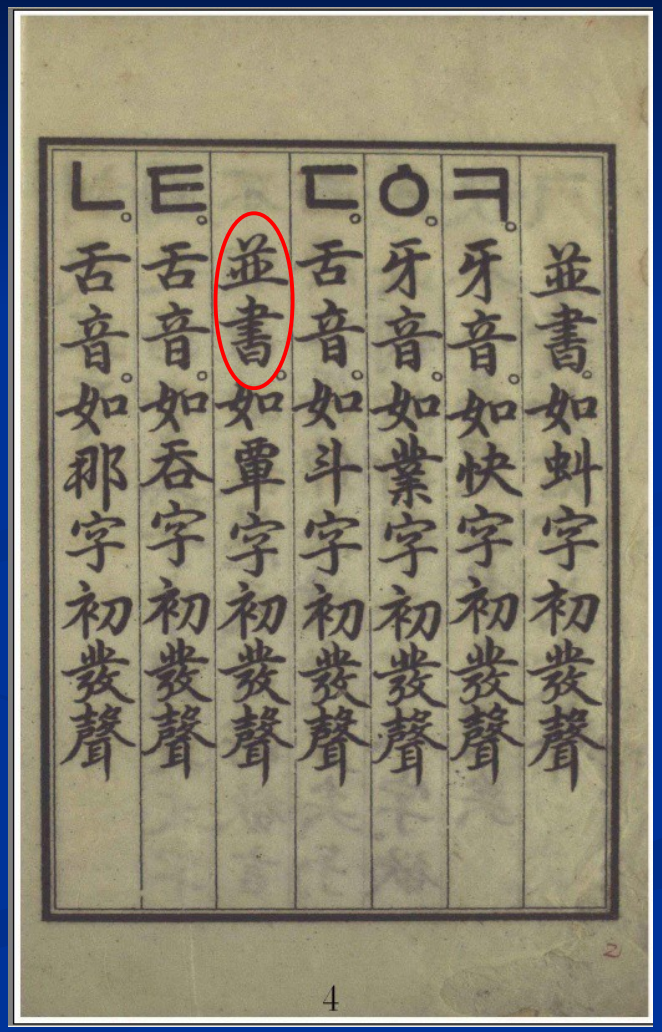
Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .
  MC ʿtə̯u 'dipper'



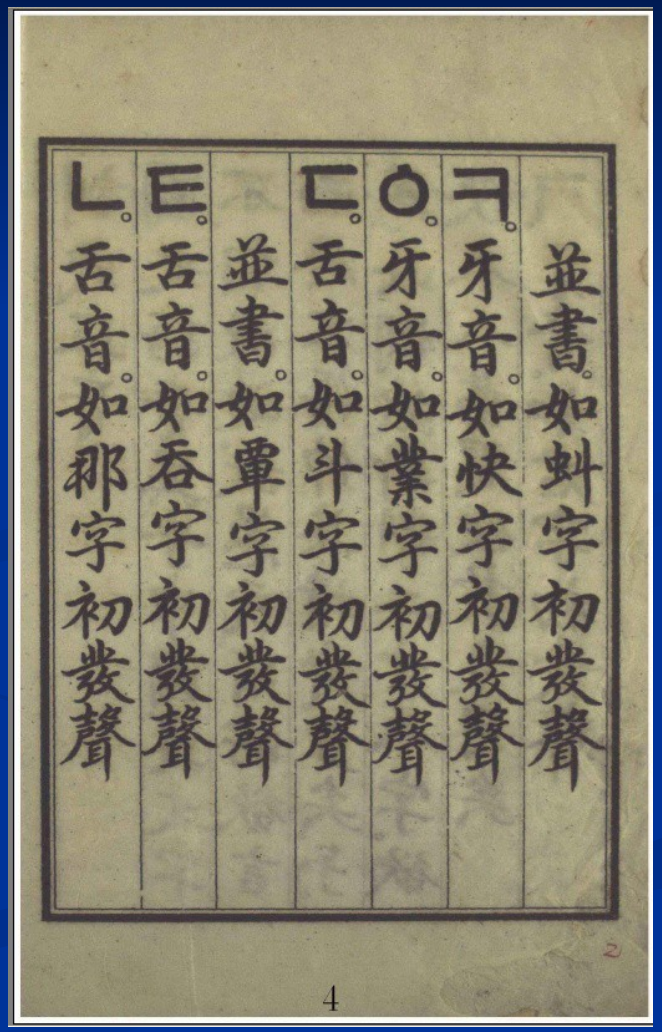
Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .
  MC ʿtə̯u 'dipper'
- ㄸ [t'], as a doubled letter, like the first sound of the Hanja 覃 .



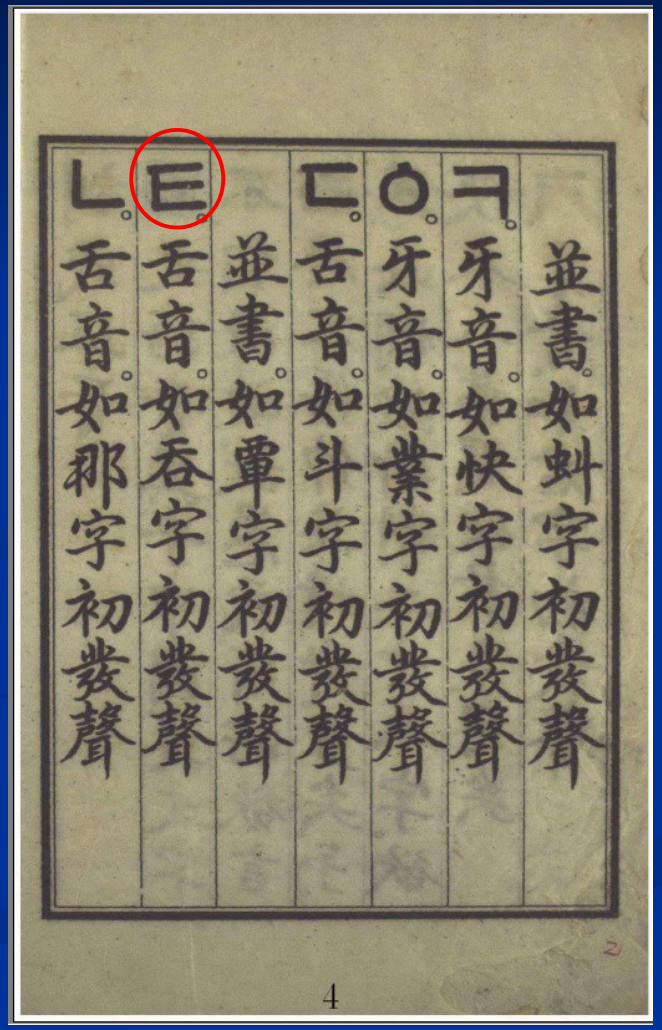
Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .
  - MC ˹tə̯u 'dipper'
- ㄸ [t'], as a doubled letter, like the first sound of the Hanja 覃 .
  - MC ˹dˈâm 'extend, reach'


並書如虯字初發聲
ㄱ 牙音如快字初發聲
ㆁ 牙音如業字初發聲
ㄷ 舌音如斗字初發聲
並書如覃字初發聲
ㅌ 舌音如呑字初發聲
ㄴ 舌音如那字初發聲
4

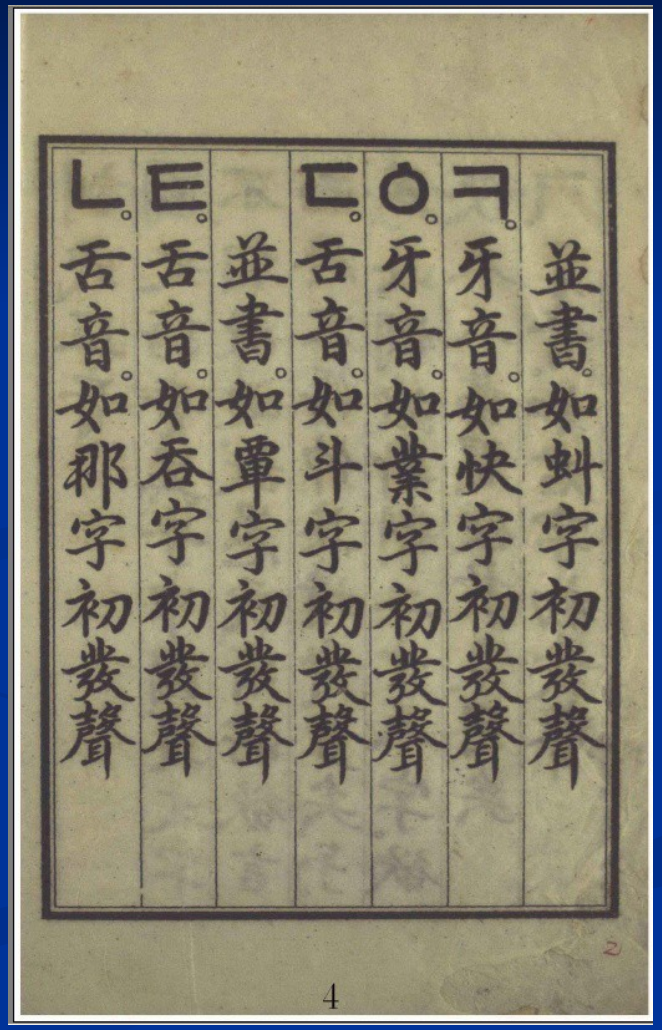
Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .
  - MC ˹tə̯u 'dipper'
- ㄸ [t'], as a doubled letter, like the first sound of the Hanja 覃 .
  - MC ˹dˈâm 'extend, reach'
- ㅌ [tʰ], lingual sound, like the first sound of the Hanja 呑 .



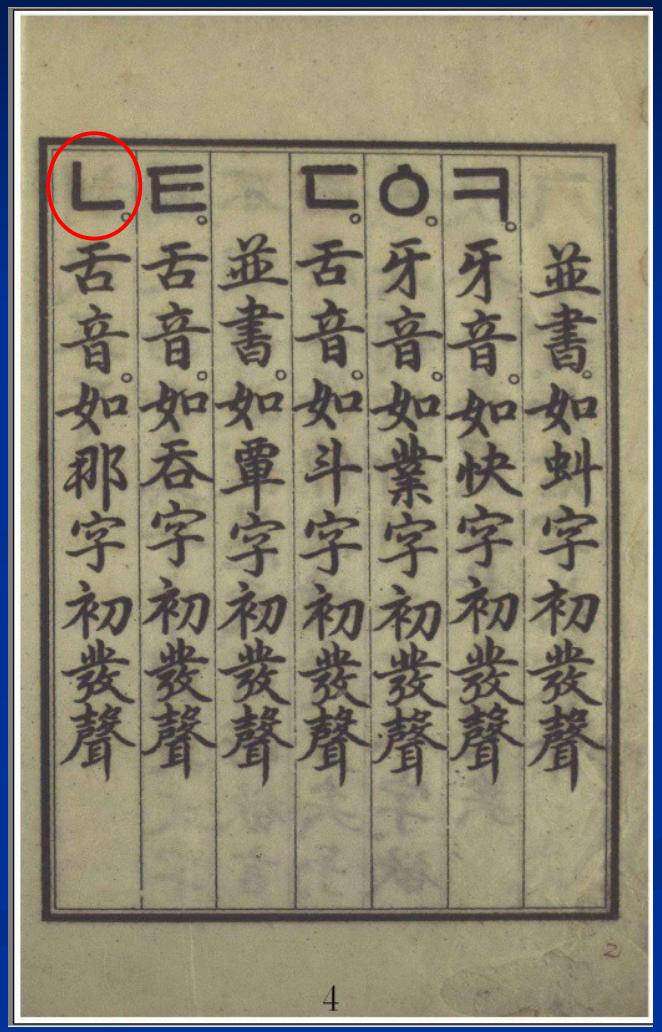
Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .
  - MC ˹tə̯u 'dipper'
- ㄸ [t'], as a doubled letter, like the first sound of the Hanja 覃 .
  - MC ˹dʿâm 'extend, reach'
- ㅌ [t^h], lingual sound, like the first sound of the Hanja 呑 .
  - MC ˹tʿən 'swallow; absorb'



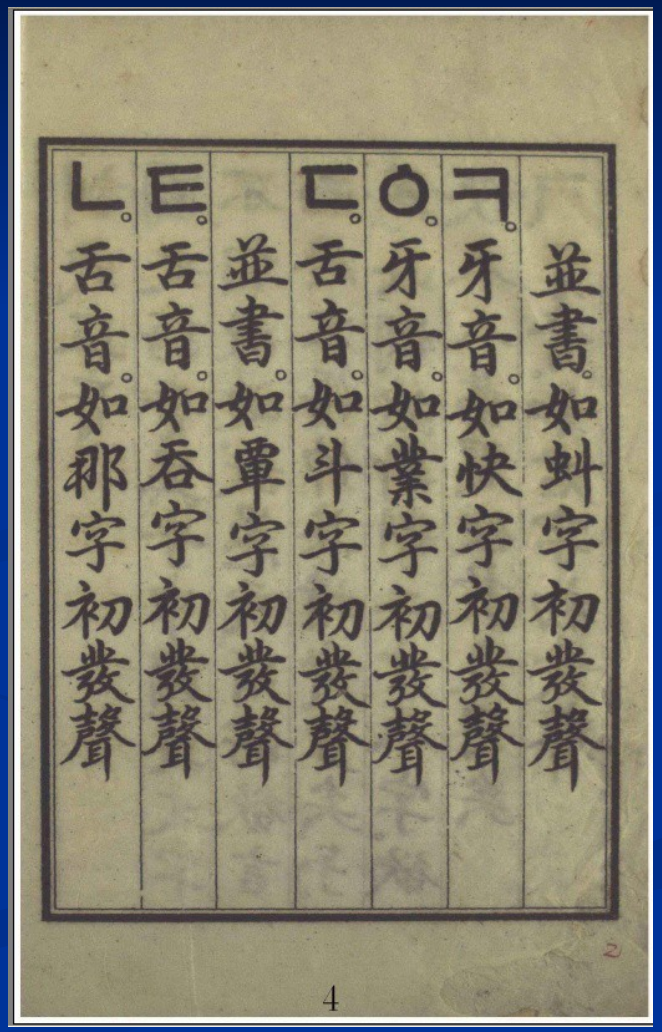
Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .
  - MC ˁtə̯u 'dipper'
- ㄸ [t'], as a doubled letter, like the first sound of the Hanja 覃 .
  - MC ˂dˁâm 'extend, reach'
- ㅌ [tʰ], lingual sound, like the first sound of the Hanja 呑 .
  - MC ˂tˁən 'swallow; absorb'
- ㄴ [n], lingual sound, like the first sound of the Hanja 那 .


並書如虯字初發聲
ㄱ牙音如快字初發聲
ㅇ牙音如業字初發聲
ㄷ舌音如斗字初發聲
ㄸ並書如覃字初發聲
ㅌ舌音如呑字初發聲
ㄴ舌音如那字初發聲
4

Second Page of HMJ

- ㄷ [t], lingual sound, like the first sound of the Hanja 斗 .
  - MC ˹tə̯u 'dipper'
- ㄸ [t'], as a doubled letter, like the first sound of the Hanja 覃 .
  - MC ˹dˈâm 'extend, reach'
- ㅌ [t^h], lingual sound, like the first sound of the Hanja 呑 .
  - MC ˹tˈən 'swallow; absorb'
- ㄴ [n], lingual sound, like the first sound of the Hanja 那 .
  - MC ˹nâˀ 'that; how, much'


並書如虯字初發聲
ㄱ牙音如快字初發聲
ㅇ牙音如業字初發聲
ㄷ舌音如斗字初發聲
並書如覃字初發聲
ㅌ舌音如呑字初發聲
ㄴ舌音如那字初發聲
4

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:
  - [k]-form [s]-form [ʃ]-form
  - a. electric

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:
  - [k]-form [s]-form [ʃ]-form
  - a. electric electricity

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:

	[k]-form	[s]-form	[ʃ]-form
a.	electric	electricity	electrician

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:
  - [k]-form [s]-form [ʃ]-form
  - a. electric electricity electrician
  - b. opaque

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:

[k]-form	[s]-form	[ʃ]-form
a. electric	electricity	electrician
b. opaque	opacity	---

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:

[k]-form	[s]-form	[ʃ]-form
a. electric	electricity	electrician
b. opaque	opacity	---
c. clinic		

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:

	[k]-form	[s]-form	[ʃ]-form
a.	electric	electricity	electrician
b.	opaque	opacity	---
c.	clinic	---	

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:

[k]-form	[s]-form	[ʃ]-form
a. electric	electricity	electrician
b. opaque	opacity	---
c. clinic	---	clinician

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:

[k]-form	[s]-form	[ʃ]-form
a. electric	electricity	electrician
b. opaque	opacity	---
c. clinic	---	clinician

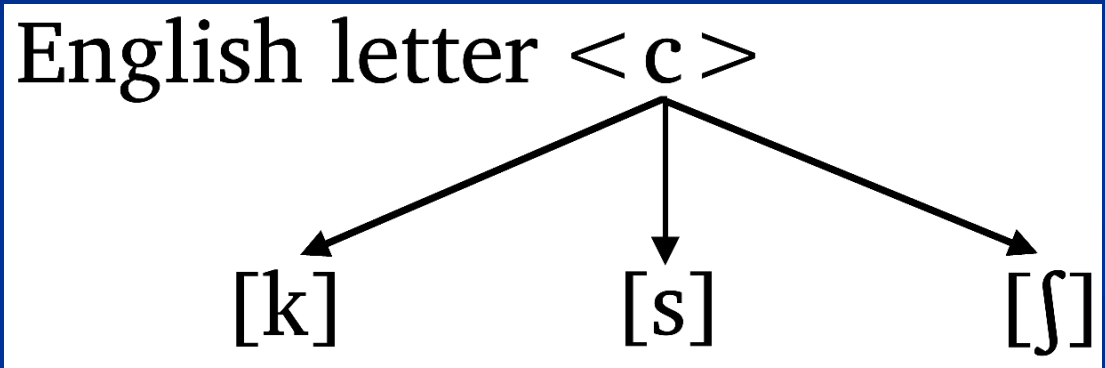
- all the words in each row are related in meaning

English Morphophonemics

- in languages like Korean or English, a morphophonemic system works better
- Look at the words below:

[k]-form	[s]-form	[ʃ]-form
a. electric	electricity	electrician
b. opaque	opacity	---
c. clinic	---	clinician

- all the words in each row are related in meaning
- the pronunciations of <c> are different


English letter <c>
[k]
[s]
[ʃ]

Phonological Symmetry

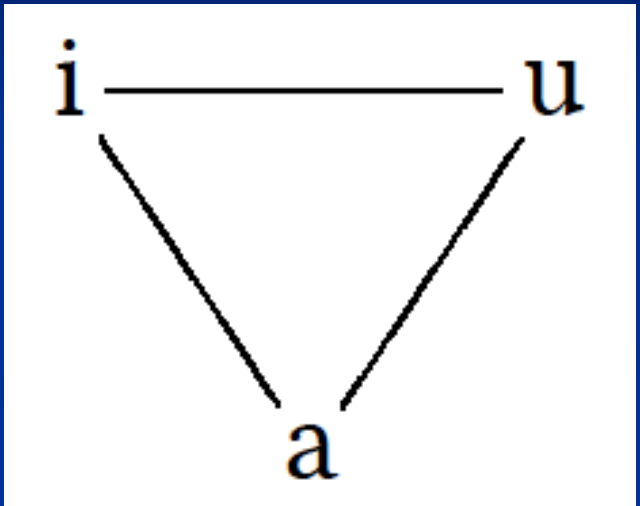
- When we examine phonological systems we notice that there is a certain symmetry

Phonological Symmetry

- When we examine phonological systems we notice that there is a certain symmetry
- vowel systems tend to have evenly-paired members in the front and back

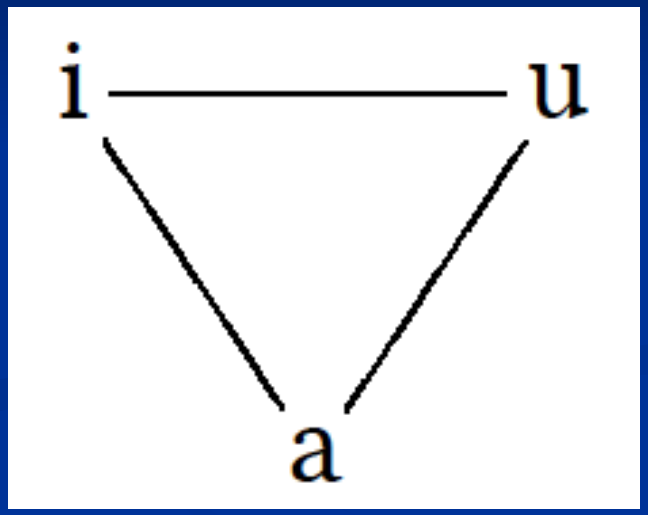
Phonological Symmetry

- When we examine phonological systems we notice that there is a certain symmetry
- vowel systems tend to have evenly-paired members in the front and back
- three-vowel systems are found in Arabic, Nuuchahnulth, and Greenlandic



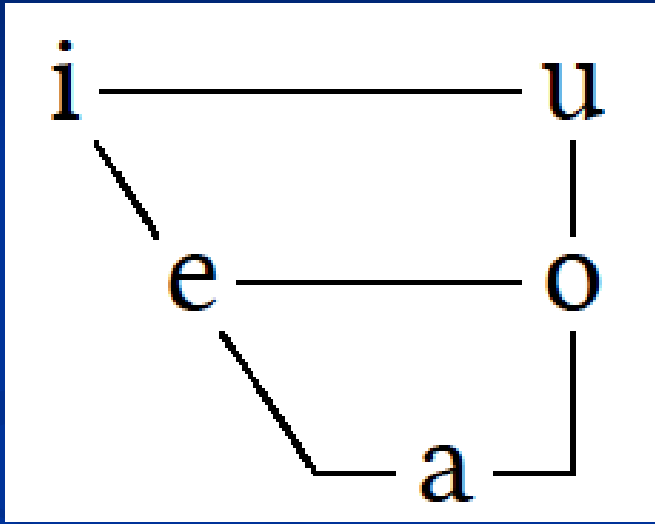
Phonological Symmetry

- When we examine phonological systems we notice that there is a certain symmetry
- vowel systems tend to have evenly-paired members in the front and back
- three-vowel systems are found in Arabic, Nuuchahnulth, and Greenlandic



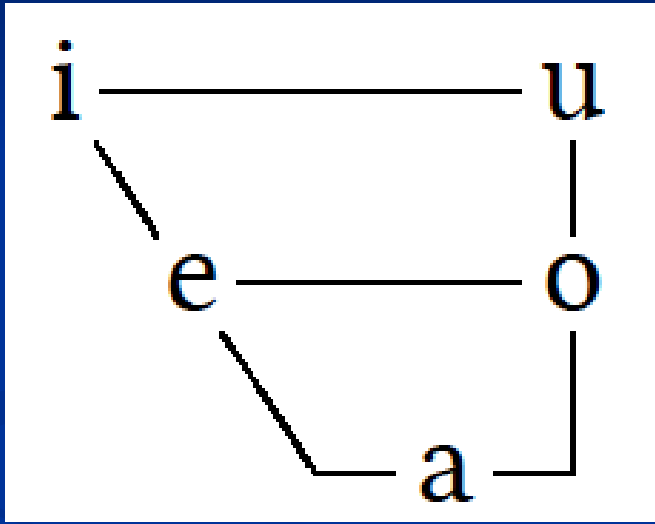
Five-vowel Systems

- Five-vowel systems are the most common



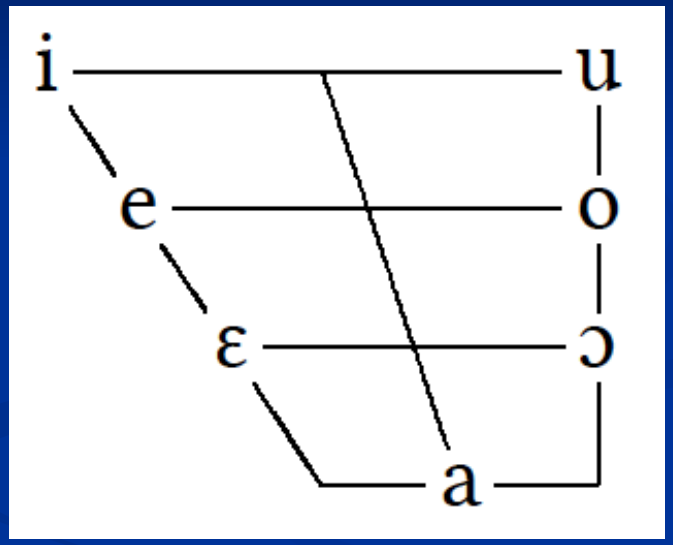
Five-vowel Systems

- Five-vowel systems are the most common
- found in Japanese, Hawaiian, and Spanish



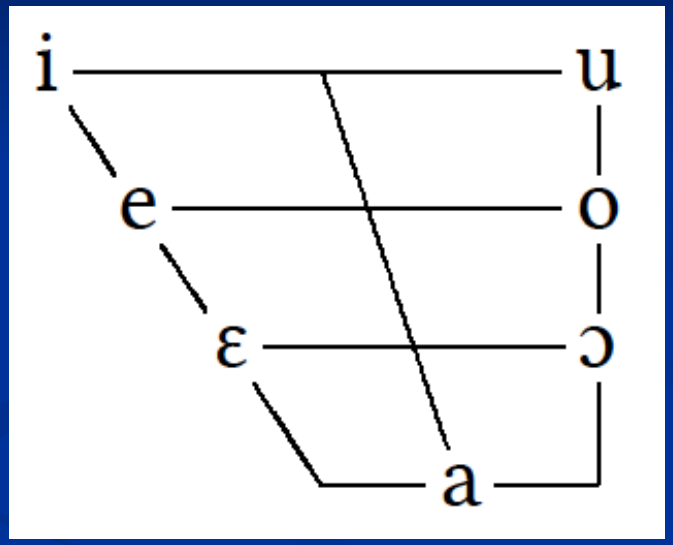
7-Vowel Systems

- Italian and Zulu are examples of languages with a 7-vowel system



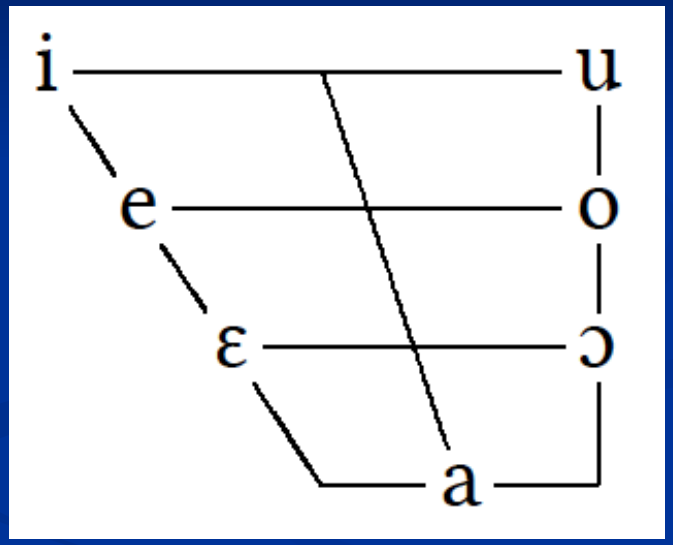
7-Vowel Systems

- Italian and Zulu are examples of languages with a 7-vowel system
- many Bantu languages, like Zulu, have such a system



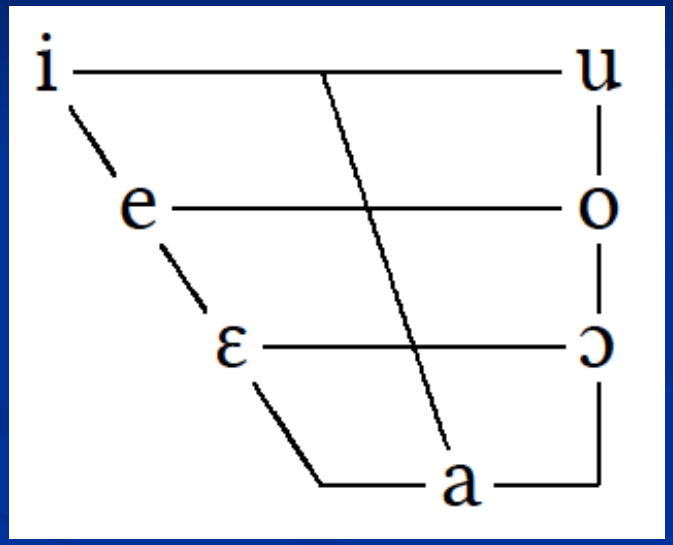
7-Vowel Systems

- Italian and Zulu are examples of languages with a 7-vowel system
- many Bantu languages, like Zulu, have such a system
- some have 9 vowels



7-Vowel Systems

- Italian and Zulu are examples of languages with a 7-vowel system
- many Bantu languages, like Zulu, have such a system
- some have 9 vowels
- Such generalizations can be useful in predicting possible vowels systems

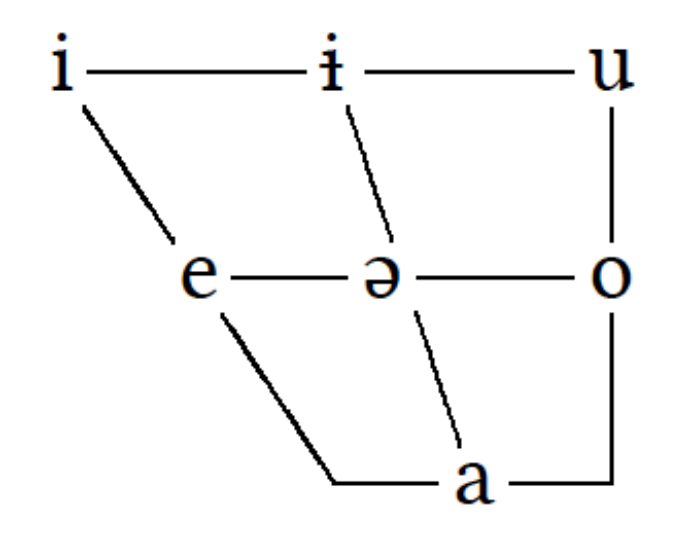


The Korean Vowel System

- not all vowel systems are like this

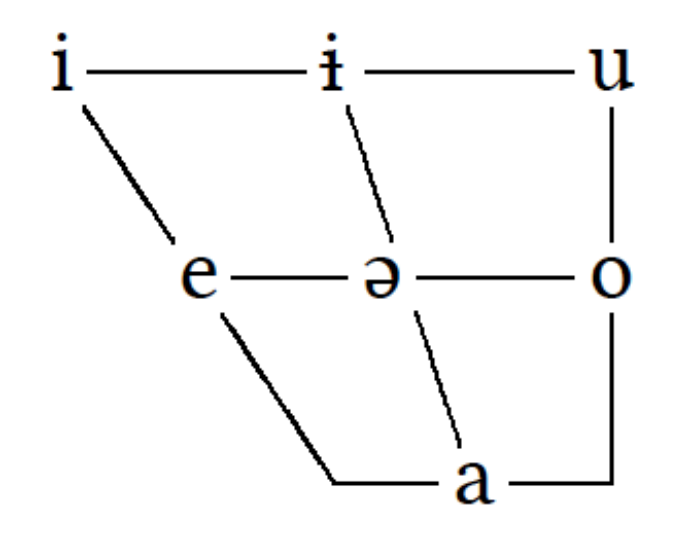
The Korean Vowel System

- not all vowel systems are like this
- we must be open to alternative possibilities



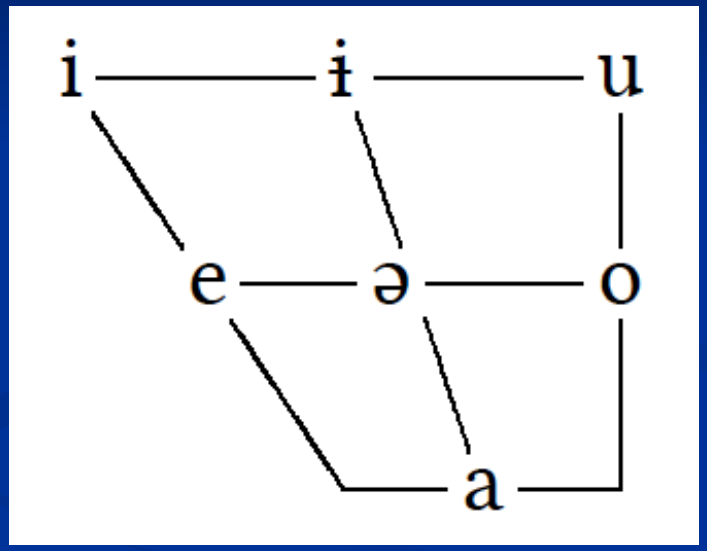
The Korean Vowel System

- not all vowel systems are like this
- we must be open to alternative possibilities
- the Korean system is also symmetrical



The Korean Vowel System

- not all vowel systems are like this
- we must be open to alternative possibilities
- the Korean system is also symmetrical
- three degrees of backness among the non-low vowels



The Cheju Vowel System

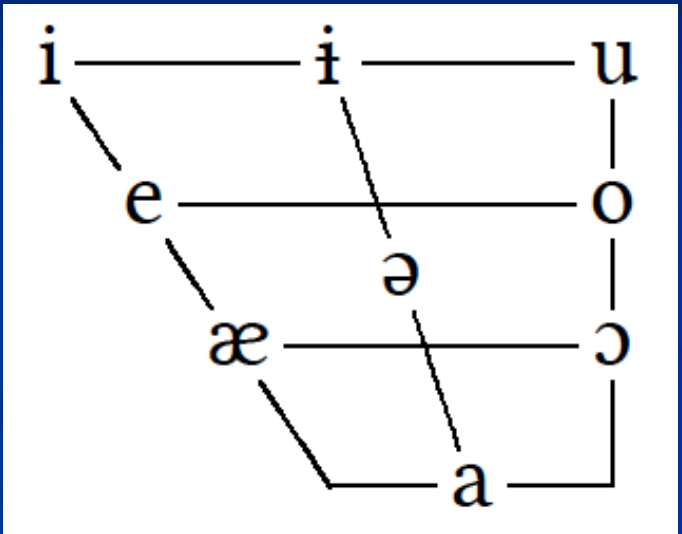
- a more extensive vowel system exists in Cheju Korean

The Cheju Vowel System

- a more extensive vowel system exists in Cheju Korean
- older generation speakers

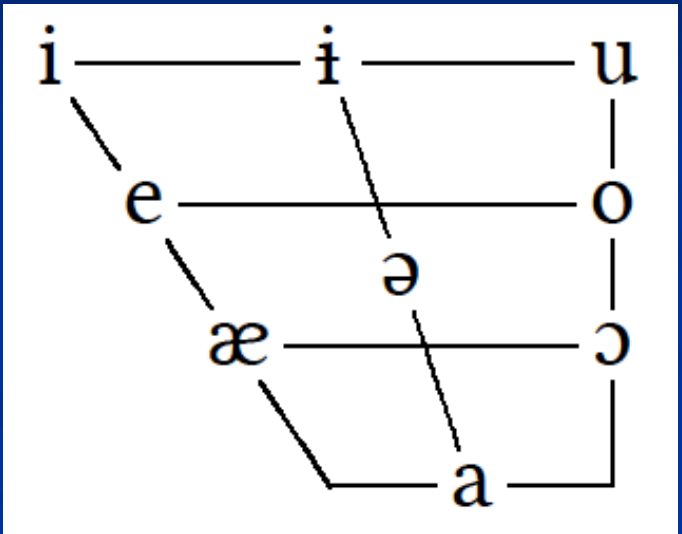
The Cheju Vowel System

- a more extensive vowel system exists in Cheju Korean
- older generation speakers
- 9-vowel system is attested



The Cheju Vowel System

- a more extensive vowel system exists in Cheju Korean
- older generation speakers
- 9-vowel system is attested
- still symmetrical



Free Variation

- The notion of free variation is intended to account for a kind of variability that is non-contrastive

Free Variation

- The notion of free variation is intended to account for a kind of variability that is non-contrastive
- the words have two possible pronunciations, independent of phonological environment, dialect, or speech level

Free Variation

- The notion of free variation is intended to account for a kind of variability that is non-contrastive
- the words have two possible pronunciations, independent of phonological environment, dialect, or speech level
- Free variation in English
  - a. economics [ˈɛkənɑmɪks] [ˈikənɑmɪks]

Free Variation

- The notion of free variation is intended to account for a kind of variability that is non-contrastive
- the words have two possible pronunciations, independent of phonological environment, dialect, or speech level
- Free variation in English
  - a. economics [ˈɛkənɑmɪks] [ˈikənɑmɪks]
  - b. either [ˈiðɹ] [ˈaɪðɹ]

Free Variation

- The notion of free variation is intended to account for a kind of variability that is non-contrastive
- the words have two possible pronunciations, independent of phonological environment, dialect, or speech level
- Free variation in English
  - a. economics [ˈɛkənɑmɪks] [ˈikənɑmɪks]
  - b. either [ˈiðɹ] [ˈaɪðɹ]
  - c. leisure [ˈliʒɹ] [ˈlɛʒɹ]

Free Variation

- The notion of free variation is intended to account for a kind of variability that is non-contrastive
- the words have two possible pronunciations, independent of phonological environment, dialect, or speech level
- Free variation in English
  - a. economics [ˈɛkənɑmɪks] [ˈikənɑmɪks]
  - b. either [ˈiðɹ] [ˈaɪðɹ]
  - c. leisure [ˈliʒɹ] [ˈlɛʒɹ]
- the variation is not based on any obvious conditioning factor

Free Variation

- The notion of free variation is intended to account for a kind of variability that is non-contrastive
- the words have two possible pronunciations, independent of phonological environment, dialect, or speech level
- Free variation in English
  - a. economics [ˈɛkənɑmɪks] [ˈikənɑmɪks]
  - b. either [ˈiðɹ] [ˈaɪðɹ]
  - c. leisure [ˈliʒɹ] [ˈlɛʒɹ]
- the variation is not based on any obvious conditioning factor

The End