Theoretical Phonology: Suprasegmental Phonology

Natural Classes and Distinctive Features

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Outline

1. Phoneme
2. Distribution
3. Allophones
   - Aspiration in English
   - Palatalization in German and in Greek
   - Flapping
   - Glottal Stop
4. Formalising Allophony

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Introduction

Today we will begin our quest to the basic generalisations, questions, and methods in phonology. Phonology aims to identify (3) types of generalisations (see Kenstowicz 1994:57):

1. the language's inventory of phonological elements: vowels, consonants, syllables, tones etc.
2. the distribution of these elements in the language's representations: e.g., initial, medial, or final positions in the word, stressed or unstressed syllables, if an element of type *a* follows/precedes an element of type *b*, etc.
3. the alternations in the shapes of morphemes composed of these elements within the word and variant pronunciations of words within the sentence.

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Contrast

A thing without oppositions
ipso facto does not exist.

Charles Sanders Peirce
Collected Papers, 1.457

Phonemes

Consonants:

bill – pill – vill – fill – mill – dill – till – thill – sill – nill – gill – kill – chill – hill – ill – rill – will

In this list[1], I included the word *ill* as well. We can claim that *ill* begins with a zero phoneme (represented with ∅):

pill – ∅ill

[1] from Jakobson, Fant & Halle (1952: 2)

Phonemes

English Vowels:

bead	/iː/	bid	/ɪ/
bird	/ɜː/	bed	/ɛ/
bard	/ɑː/	bad	/æ/
bawd	/ɔː/	bod(y)	/ɒ/
booed	/uː/	budd(hist)	/ʊ/
bud	/ʌ/		

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Phonemes

Greek Vowels:

πας /e/ – πες /ε/ – πεις /i/ – πως /ɔ/ – πους /u/ –

Phonemes

- The difference between /d/ and [t] in <do> and <two> is *contrastive* (also termed *distinctive*), since this difference (i.e., voicing) forms the sole basis for distinguishing different words (and thus, [t] and [d] contrast).
- We call /t/ and /d. *phonemes*.
- The phonemes are the sounds that comprise the phonemic inventory of English, Greek, Spanish, etc. and when they alternate in the same context they change word meaning.
- Nevertheless, a phoneme (e.g., /t/ and /d/) by itself does not have a meaning.

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Contrastive Distribution

Phonemes are in contrastive distribution that is when they are found in the same environment a change of meaning occurs.

Complementary Distribution

Complementary distribution is the distribution of phones such that one phone cannot occur in the same phonetic environment as the other (see palatalization in German and Greek).
$\rightarrowtail$ When two allophones are in complementary distribution, we can predict their occurrence if we know their environment.

Free Variation

Speakers pronounce sounds differently because of their physiology, sociolinguistic properties, the setting etc. In other, words there are different variations of sounds which occur in the same the same environment–unlike allophones–but without triggering a change in meaning–unlike phonemes–, these sounds are said to be in Free Variation. Nevertheless, free variation is not so free but there are social constraints imposed on variation. The task of sociolinguistics and sociophonetics has been to describe the social constraints of variation.

Distribution

Another important aspect of the phonemes distribution is that they do not occur in the same places within a word. For example, a p sound occurs both at the beginning and the end of a word but an [h] does not occur at the end of a word in English.

Distribution

Positions in phonological strings constraint the distribution of sounds. To put in probability terms, not all sounds have the same probability after certain positions; for example the beginning of a syllable (syllable onset position) or at the end of a syllable (syllable coda position).

1. Cin: pin tin kin, sin bin din gin lin min etc.
2. sCin: spin *stin, *ssin, *sbin, *sgin *slin *smin[2].

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[2] I use here the star symbol to show that the word does not occur in the language

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Aspiration in English

Word	IPA	Word	IPA
pen	[ˈpʰɛn]	spin	[ˈspɪn]
ten	[ˈtʰɛn]	stay	[ˈsteɪ]
ken	[ˈkʰɛn]	skin	[ˈskɪn]
kill	[ˈkʰɪɬ]	skill	[ˈskɪɬ]
kent	[ˈkʰɛnt]	school	[ˈskuːɬ]
text	[ˈtʰɛkst]	stress	[ˈstɹɛs]
coin	[ˈkʰɔɪn]	ski	[ˈskiː]
play	[ˈpʰleɪ]/[pl̥eɪ]	split	[ˈsplɪt]
pray	[ˈpʰɹeɪ]/[pɹ̥eɪ]	spray	[ˈspɹeɪ]
pool	[ˈpʰuːɬ]	spot	[ˈspɒt]
apply	[əˈpʰlʌɪ]/[əpl̥ʌɪ]	respect	[ɹɪˈspɛkt]
account	[əˈkʰʌʊnt]	stay	[ˈsteɪ]

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Aspiration in English

Voiceless / p t k / are aspirated when initial in an accented syllable or at beginning of a word:

- pen [p^hɛn]
- can [k^han]
- tin [t^hɪn]

See however spin [spɪn], spoon [spuːn], stop [stɒp], score [skɔː]. It is clear that in English there is no contrast between a hypothetical [pɛn] and [p^hɛn]. Therefore, aspirated variants are not phonemes in English.

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Compare these with the Cypriot Greek minimal pair (τον) ππαρά [pʰːa'ra] 'money' vs. παρά [pa'ra] 'despite'). The aspirated and non aspirated stops are allophones in English but they are phonemes in Cypriot Greek.

Aspiration in English

$$/p/ = \begin{cases} [p^h] \\ \\ [p] \end{cases}$$

- /p/ is a phoneme whereas [p] and [p^h] are its allophones.
- The phonemes are enclosed in slanted brackets whereas the allophones in square brackets[3]

[3] This notational distinction is no longer systematically enforced (Kenstowicz, 1993:66); we use when we want to highlight the distinction.

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Palatalization in German[4]

[x]	•	[ç]	•
Buch	'book'	mich	'me'
hoch	'high'	Pech	'pitch'
noch	'still'	horch	'hark'
Bach	'stream'	China	'China'

[4] Data from Hyman, 1975: 9.

Palatalization in Greek

Velar			Palatal		
κάπως	['kɐpɔs]	'somehow'	κήπος	['cipɔs]	'garden'
κόπος	['kɔpɔs]	'effort'	Καίτη	['cɛti]	'kate'
κούπα	['kupɐ]	'mug'			
γόνος	['ɣɔnɔs]	'offspring'	γίδα	['ɟiðɐ]	'goat'
γούνα	['ɣuna]	'fur'	γέλα	['ɟɛʎo]	'smile'
γάλα	['ɣɐlɐ]	'milk'			
χαρά	[xɐ'ɾɐ]	'pleasure'	χέρι	['çɛɾi]	'hand'
χορός	[xɔ'ɾɔs]	'dance'	χήρα	['çiɾɑ]	'widow'
χουρμάς	[xur'mɑs]	'date'			

Palatalisation in German and in Greek

Palatalisation takes place both in German and Greek:

$$/x/ = \begin{cases} [x] \\ \\ [ç] \end{cases}$$

/x/ is a phoneme which has two allophones a velar [x] and palatal [ç] occurring in complementary distribution (see *Slide* **10**).
Nevertheless, the application of palatalisation differs in the two languages: In German, it is the preceding vowel that triggers palatalisation whereas in Greek it is the following vowel that triggers palatalisation. Therefore, the environment is of utmost importance for the application of palatalisation.

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Flapping

The standard pronunciations of the word *water* is [wɔːtə], yet in most North American Dialects [t] and [d] are pronounced as [ɾ], namely as ['waɾɻ̩].

1.
   - water ['waɾɻ̩] (Received Pronunciation (RP) [wɔːtə])
   - atom ['aɾm̩] (Received Pronunciation (RP) ['atəm])
2.
   - sit ['sɪt] – sitting ['hɪɾɪŋ]
   - set ['sɛt] – setting ['sɛɾɪŋ]

Flapping

$$\text{alveolar stop} \longrightarrow \text{flap} \;/\; \text{vocoid} \_\_ \text{unstressed syllabic}$$

when an alveolar stop is followed by an unstressed syllabic and it is preceded by a vocoid (vowel or glide), it becomes a flap (see Odden 2013:23).

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Glottal Stop

When /t/ is preceded by a vowel and followed by a syllabic [n̩], they /t/ is pronounced as a *glottal stop*.

Example

button ['bʌʔn̩]
bit ['bɪt] $\longrightarrow$ *bitten* [bɪʔn̩]

Allophones

An American English /t/ has at least 8 allophones[5]:

[t]	*plain*	s**t**em
[t^{h}]	aspirated	**t**en
[ʈ]	retroflexed	s**t**rip
[ɾ]	flapped	a**t**om
[ɾ̃]	nasal flapp	pan**t**y
[t^{ʔ}]	glottalized	h**t**it
[ʔ]	glottal stop	bo**tt**le
[ ]	zero	pan**t**s

[5] from Kenstowicz, 1994:66 (modified).

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Allophones in Greek

In Greek, nasal /n/[6] has the following variants:[7]

[n]	*plain*	Άννα	['ana]	Anna
[n̪]	dental	άνθος	[an̪'θos]	flower
[n̲]	retracted alveolar	πένσα	['pen̲sa]	pliers
[ɲ]	palatal	εννιά	[e'ɲa]	nine
[ŋ]	velar	πάγκος	['paŋgos]	bench

[6] see also the discussion on 'Greek Prenasalisation' in your textbook.

[7] see Arvaniti, 2007:13.

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Introduction

Phonology has to explain

- How do abstract linguistic constituents map to acoustic representation? What processes (e.g., assimilation, elision, deletion, insertion, etc.) take place.
- What is the optimal way to explain the phonological procedures?

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Formalising the Rules: A First Attempt

$$\begin{bmatrix} k \\ ɣ \\ x \\ n \\ l \end{bmatrix} \rightarrow \begin{bmatrix} c \\ ɟ \\ ç \\ ɲ \\ ʎ \end{bmatrix} / \_\_ \begin{bmatrix} i \\ ɛ \end{bmatrix}$$

Figure: Palatalization in Standard Modern Greek

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Reading rule formulations

The rule portrayed on slide 31 is interpreted as follows:

- The left side of the arrow constitutes the *focus*, which is essentially the input of the rule.
- The right side of the arrow constitutes the *structural change* (SC) introduced by the rule.
- The part after the constituent slash constitutes the environment, where the rule takes place.
- The dash *environment dash* ___ specifies the focus relative to the *conditioning context* (CC), (which in slide 31 coincides with the vowel matrix).

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Summary

- The Phonemes comprise a language's phonemic inventory.
- The Phonemes change word meaning when they contrast in the same environment.
- Allophones are different realisations of a phoneme.
- Allophonic realisations depend on the segmental environment; hence allophones cannot contrast in the same environment.
- We have seen our first rules in phonology.

- In the following week,
  - We will see that phones can be further analysed into smaller constituents or features.
  - We will see better ways to formalise rules.

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For Further Reading I

- Ashby, M. and Maidment, J. (2005).
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- Hyman, L. (1975).
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For Further Reading II

Odden, D. (2013).
Introducing Phonology.
Cambdridge University Press, Cambridge, second edition edition.

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