

Chapter 7

intro
defn
phnology

is also called functional
↑
phonetics.

PHONOLOGY

According to Bloomfield, phonology is the organization of sounds into patterns. In order to fulfil the communicative functions, languages organize their material, and vocal noises, into recurrent bits and pieces arranged in sound patterns. It is the study of this formal organization of languages which is known as phonology.

What is sound? How and where is it produced from? How is it received by the ears? How and why is one sound different from the other?--questions like these are the subject-matter of Phonology.

S.S DIFFERENCE BETWEEN PHONETICS AND PHONOLOGY

The difference between phonetics and phonology is that of generality and particularity. Whereas phonetics is the science of speech, sounds, their production, transmission and reception and the signs to represent them in general with no particular reference to any one language, phonology is the study of vocal sounds and sound changes, phonemes and their variants in particular

language) If phonetics can be likened to a world, phonology is a country. Phonetics is one and the same for all the languages of the world, but the phonology of one language will differ from the phonology of the other. According to John Lyons, "Phonetics differs from the phonology... in that it considers speech sounds independently of their paradigmatic opposition and syntagmatic combinations in particular languages," and that phonology is the level at which linguist describes the sounds of a particular language (*New Horizons in Linguistics*, 1972).

The subject-matter of phonology is the selected phonetic material from the total resources available to human beings from phonetics. The human vocal system can produce a very large number of different speech sounds. Members of a particular speech community speaking that particular language, however, use only a limited number of these sounds. Every language makes its own selection of sounds and organizes them into characteristic patterns. This selection of sounds and their arrangement into patterns constitute the phonology of the language.

To quote Robins, 'Phonetics and phonology are both concerned with the same subject-matter or aspect of language, speech sounds, as the audible result of articulation, but they are concerned with them from different points of view. Phonetics is general (that is, concerned with speech sounds as such without reference to their function in a particular language), descriptive and classificatory; phonology is particular (having a particular language or languages in view) and functional (concerned with working or functioning of speech sounds or a languages). Phonology has in fact been called functional phonetics. (*General Linguistics*, 1967).

Describe and in reference

SOME MAJOR CONCEPTS OF PHONOLOGY

Phoneme

Most linguists, until recently at least, have regarded phoneme as one of the basic units of language.

But they have not all defined the phonemes in the same way. Some linguists like Bloomfield, and Daniel Jones have described phonemes in purely physical terms. Others like Sapir have preferred psychological definitions. Some regard the phoneme only as abstractional fictitious unity and argue that in a language these are not phonemes but allophones that exist in reality. Furthermore, linguists of the Copenhagen School treat the phonemes as glassemes and regard them as algebraical units.

The term phoneme was first used in the late 1870's notably by Kruszewski. Saussure too worked on the phonemes. But the most notable work in this field was done by Sapir in 1927. Most phoneticians such as Louis Jhelmslev, Bloomfield, Trubetzkoy, Daniel Jones, Roman Jakobson, Pike have thrown light on the phoneme.

(The phoneme, according to Bloomfield, is the minimal unit of distinctive sound-features.) In Webster's *Third New International*, the phoneme is defined as the smallest unit of speech distinguishing one unit from another, in all the variations it displays on the speech of our person or in our dialect as a result of modifying influences, such as neighbouring sounds or stress. In Dorfman's opinion a phoneme is a single-speech sound or group of similar or related speech sounds functioning analogously in a language, and usually represented in writing by the same letter, with or without diacritic marks.

According to most contemporary linguists, however, the phoneme is the minimal bundle of relevant sound features. A phoneme is not a sound; it can be realized only through one of its allophones. It is a class of sounds, actualized or realized in a different way in any given position by its representative the allophone: it is an ideal towards which the speaker strives, while the allophone is the performance he achieves; it occupies an area within which the various allophones move and operate; its outer limits may approach but not overlap those of other phonemes, and it cannot invade the territory of another phoneme without loss of phonemic distinction.

Thus the precise definition of a phoneme has been the subject of much discussion among linguists and there are two major points of view. The first is the 'classification' theory developed by Daniel Jones which considers the phoneme to be a group or family of related sounds, e.g., /p/ in English consisting of [p], [p^h], etc. or /u/ consisting of (u), (ʊ), etc. The second or 'distinctive feature theory' developed by N.S. Trubetzkoy and the Prague School consider a phoneme to be a bundle of distinctive features, e.g. /p/ in English is considered to be made up of a bilabial+stop+voiceless (aspiration is therefore not distinctive and thus the allophones (p^h) and (p) above are allowed for.

Depending on the point of view taken, a phoneme can be defined as "a unit, a ^{style} rubric, a bundle of sound-features", or "the smallest contrastive linguistic unit which may bring about a change of meaning". Hence it is a minimum distinct functional unit. Phonemes of a language may be discovered by forming minimal pairs, i.e. pairs of words are different in respect of only one sound segment. The series of words **pat, bat, cat, hat, sat, that, mat** supplies us with seven words which are distinguished simply by a change in the first (consonantal) element of the sound sequence. These elements of contrastive significance are phonemes and be symbolized as /p, b, k, h, s, t, m/. Similarly, in the series of words **hat, hit, heat, hot, heart**, the elements of contrastive significance are /æ, i, i:, ɔ, a :/.

Phone S.Q

Any objective speech sound, considered as a physical event, and without regard as to how it fits into the structure of any given language is a phone. Hence a phone in phonology is 'the smallest possible segment of sound abstracted from the continuum of speech'.

Allophone S.Q

Some sounds, the native speaker thinks are the same, while others are different. The linguist has to figure out what sounds are grouped together as the same, what it is that they all have in common among themselves and how dissimilar are they to other groups

of sounds in the informant's speech and what criteria the native speaker uses to tell sounds apart. We said earlier that by substituting other segments, the linguist can arrive at a list of these significant, contrastive classes of sounds called 'phonemes'. But we do not always find minimal pairs to help us figure out the list of phonemes. There must be other criteria too, which we will have to incorporate into the definition of a phoneme. The k-sound in **keel**, **calm** and **cool** differs. In **keel** it is at the front in the mouth, in **calm** it is a little in the centre and in **cool** further back in the mouth. The absence of the above mentioned features would not distort the message for the native speaker. He does not differentiate these sounds in every day speech in the sense that he is not aware of the physical differences. He thinks these sounds are members of the k-class or are all **k**. In other words for the phoneme/k, central-k, retracted-k, fronted-k are all allophones.

~~Hence~~ An allophone is a speech sound which is one of a number of variants of a phoneme. Such a variant can be either in complementary variation or in free variation. The occurrence of a particular allophone may be determined by its environment, or it may be in free variation. Allophones determined by environment, for example, are front or clear [ɪ] as in **lamp** or **light** occurring before vowels and the so-called 'back' or 'dark' [ɪ] as in **old** and **table** occurring before consonants and at the end of words. They are in complementary distribution, that is where the dark [ɪ] appears in English, there can occur the clear [ɪ]. An example of allophones occurring in the variation in the Southern British English (R.P.) is the /r/ between vowels, as in **very**, which can occur either as a flap, or as a fricative. Thus (allophones are phonetic variants, they are positional or contextual, or conditional variants (alternants) of phoneme.)

According to Trager and Smith (**An Outline of English Structure**), a linguist identifies these allophones in the following way:

1. The sounds should be phonetically similar.

2. They should be in complementary distribution.
3. They should exhibit pattern congruity with other groups of sounds.

Phonetic Similarity

Phonetic similar sounds are sounds that share a phonetic feature, such as nasality/m, n, ŋ/, or labial quality (/p/and /b/) or front vowel quality (/i/and /e/). But the notion of phonetic similarity is not a reliable guide. In a sense all sounds are phonetically similar, and are produced by the same organs of speech. In another sense they are also dissimilar, which is why we can tell them apart. Hence phonetic similarity is a tricky notion.

Complementary Distribution

Having discovered sets of phonetically similar sounds, for example /p/ and /b/, we must ask whether the variation in each set can be accounted for in terms of the phonetic environments of the members of the set. Mutually exclusive distribution is otherwise known as complementary distribution. For every phoneme there may be positional variants—allophones. Sometimes an allophone occurs in a fixed place in a word. The English phoneme /l/, for example, has one form at the beginning of a word and another form at the end. In a word such as **light**, the first consonant is a 'clear' l, pronounced by placing the tip of the tongue just behind the teeth and keeping the back of the tongue fairly low. In **hill**, the tongue tip is in the same place, but the back of the tongue is 'raised' resulting in a 'dark' l. These variants of /l/ are said to be in complementary distribution: each allophones occurs in its own predictable place in a word.

Another example of complementary distribution is seen in the English phoneme /p/. When p occurs in initial and stressed position, it is pronounced with aspiration (a puff of breath). After 's', this puff of breath disappears. This can be tested by holding a sheet of paper in front of the mouth and saying the words **spot**, **spill**, **pot**, **pill**. In the case of **spot** and **spill**, the paper remains motionless. But when **pot** and **pill** are pronounced, the accompanying puff of breath makes paper billow out.

The notion of complementary distribution in the discovery and assignment of the allophones of a phoneme is useful in a number of cases yet fails in some other cases. For example, in English no word has the segment /ŋ/ in its initial position. Nor does the segment /h/ ever occur in the final position. These two phones are in mutually exclusive distribution, but they are not phonetically very similar to each other. Therefore, the linguist does not regard them as allophones of a single phoneme, but two different phonemes in English, although there is no minimal pair establishing that these two sounds are in contrastive distribution. If two allophones are not in contrast, they are said to be in complementary distribution: that is, neither occurs in any environment in which the other is found.

Symmetrical Patterning

A third principle of discovering allophones, besides those of phonetic similarity and complementary distribution, is that of symmetrical patterning. Languages seem to have symmetrical patterning. Patterning is also known as phonetic patterning or pattern congruity. This pattern differs from language to language. It is to a large extent unconscious and appears to be one of the means by which human memory is able to store a large number of items. In English, for example, many consonant phonemes are unconsciously paired together: /p/ is paired with /b/, /t/ is paired with /d/, /f/ is paired with /v/. In addition, /p/ and /t/ and /k/ behave in a very similar way to one another. They each have an aspirated form which occurs at the beginning of a word, as in **pill, till, kill**, and an unaspirated form after /s/, as in **spill, still, skill**.

By pattern congruity we also mean that relationships are far more important than the phonetic characteristics of the sounds. For example, the allophones of /t/ in English are produced at different points of articulation—in words like *fountain*, the allophone of /t/ is realized at the back of the mouth and in a word like *little* it is at the glottis. For this reason, they ought not to be considered allophones of a dental stop. They are phonetically similar to velar and glottal stops. But the

linguist looks at distribution—and maintains there are paralld positional variants for /p/ and /k/. So, disregarding the physical characteristics and paying attention to the patterning, the assignment of the allophones to a phoneme is done.

Neutralization

Lack of contrast between two phonemes in one particular environment is referred to as neutralization of the contrast in the environment. This so-called neutralization of the distinction between two phonemes is a more common phenomenon than free variation between phonemes in phonology. In languages like German, Russian, Turkish, there is a phonemic distinction between voiced and voiceless consonants in most positions of the word, but in the final positions voiced consonants do not occur. Thus both the German words **Rad** ('wheel', 'bicycle') and **Rat** ('council', 'advice') are pronounced alike namely /ra: t/. The normal orthography maintains the difference but in the phonology this difference is neutralized. In English, examples of this kinds are to be found in the allophones of /m/ and /n/ before /f/ and /v/, in words like **sympathy** and **infancy**. The nasal consonant in each case is likely to [m], that is to say, that /m/ and /n/ are not opposed, so that the sound could be allocated to either the /m/ or the /n/ phoneme.

There are different ways of treating this kind of neutralization. Some scholars say, that it is the phoneme /t/ that occurs in both **Rad** and **Rat** and account for the change of /d/ to /t/ in **morphonemics** which is an intermediate linguistic level between grammar and phonology. Other [e.g. the linguists of the so called Prague-school] would account for this phenomenon by recognizing in addition to the phonemes the **archiphonemes** restricted to the positions of neutralization. They symbolize the archiphonemes by the use of capital letters and would transcribe **Rad** and **Rat** as [rad] and [rat].

Free Variation

Non-significant linguistic variation between two or

more linguistic forms is known as free variation. We have an instance of free variation when two phonetically different units occur, but do not contrast: that is to say, the substitution of one for the other does not produce a different word, but merely a different pronunciation of the same word; e.g. [ai] and [i:] in the pronunciation of the word **either** as /ai ð e/ or /i: ð e/ are not allophones [phonemic alternants] but are in free variation. Similarly /ekənomiks/ and /i: kənomiks/ would produce only one word **economics**. The difference in the pronunciations of **either economics**, etc. is 'accidental'; it is not a part of the regular phonological structure of the language. Other examples of free variation are [w] and [hw] in the pronunciation of the word **wheel** as /wi: l/ or as /whi: l/. Similarly a word like **fortnight** may be pronounced either as /fɔ: tnaɪt/ or fɔ: ? nait/. [?] is the symbol for the 'glottal stop', a sound produced by first bringing the vocal cords together and then releasing them so that there is a sudden escape of air. So [?] is a free variant of /t/ at the end of English syllable as [hw] is of /w/ in the beginning of an English syllable.

THEORIES OF PHONOLOGICAL ANALYSIS

The analysis of an utterance into segmental and suprasegmental features is known as phonemic or phonological analysis. There are several different theories of phonological analysis. Some of these major theories are discussed below:

Structure and System

One approach is in terms of what are called structure and system. The phonological units (Phonemes or sounds) of a language are grouped together to form the various systems and the arrangements of these units in larger units such as syllables, feet, tone-group, sentence that form the structure of that language. The units that form a system can be replaced by other units to produce different utterances, while the relations between the different units present in an utterances constitute a structure. For instance, the English word **sack** /sack/ has structure. For instance, the English word **sack** /sack/ has one syllable, which is made up of a sequence of three

phonemes /s/, /ac/, and /k/. The phoneme /s/ can be replaced by other phonemes /b/, /p/, /t/, /dʒ/, /h/, /ʃ/ to give us different words **back, pack, tack, jack, hack, lack**. All these items that can be replaced by another at a particular place in a structure are in **paradigmatic** relationship and form a system. Similarly, /ae/ forms a system with other phonemes /i/, /i:/, /e/, /ei/ that can be used as substitutes to give us other words **sick, seek, seck, sake**, /k/ also forms a system with the /t/, /d/, /p/, /m/, /n/ that give us the words **sat, sad, sap, sam, sang**.

The units of phonological analysis have a hierarchy, so that a unit of higher rank consists of a sequence of one or more occurrences of the next lower rank. For example, in English one or more phonemes make up a **syllable**; one or more syllables make up a **foot** (which is the unit of rhythm); one or more feet make up a **tone group** (which is the unit of intonation); one or more tone groups make up a sentence. Examples of these phonological units are given below:

- (i) **Phoneme** : /k/, /b/, /t/, /d/, /i/, /e/, etc.
- (ii) **syllable**: **back** /bæk/ **ago** /ə'gəʊ/, **button** bʌ-tʌn/, etc.
- (iii) **foot**: The cur/few tolls/the knell/of part/ing day/. Here we have five feet. (A slanting bar/represents a foot boundary).
- (iv) **tone-group**: // If the 'bride a , grees // the 'marriage is in' January.//
 (// represents tone group boundary; 'represents rising tone; and, 'falling tone, 'accent (strong or stressed syllable).)
- (v) **Sentence**: For example: the sentence given above has two tone groups.

Prosodic Analysis

Prosodic analysis is another aspect of phonology. It is concerned with phonological features 'that extend beyond a phonematic unit in a structure'. Features like aspiration, nasalization, labialization, retroflexion and palatalisation often relate to sequences of more than one

phonematic unit. The study of supra-segmental features like stress, rhythm, intonation, etc. also forms a part of prosodic analysis. Examples of a few prosodic features are given below:

- (i) **aspiration:** The English word **clay** /klei/ has an aspirated /k/ in the form of [K^h], but the aspiration affects the following /l/ also and devoices it to [lo]. It can therefore be described as /h/ prosody.
- (ii) **nasalization:** The English word **sing** /siu/ has incidental nasalization of the vowel /i/ under the influence of the nasal consonants before and after it. Nasalization can therefore be described as a prosody in this kind of syllable.
- (iii) **lip-rounding:** The English word **quiet** /kwait/ has lip-rounding for /k/ also under the influence of the following /w/. We have here an example of /w/—prosody.
- (iv) **palatalization:** The English word **key** /ki:/ has a palatal instead of a velar /k/ under the influence of the following /i/. This can be described as /j/—prosody.
- (v) **accent:** Accent on a particular syllable in a word can be taken as a prosody. For example, the English word **ago** /e' gou/ has the accent on the second syllable.
- (vi) **sentence stress, rhythm and intonation:** are also prosodic features.

Phonemics

Another approach to phonology is based on phonemics, according to which the discovery of the phonemes (the minimal distinctive sound-units) of a language is done by forming minimal pairs (by replacement of one phoneme by another which can bring about a change of meaning). Each phoneme, however, may have slightly different phonetic realizations, called

allophones, in different environments. Most phonological theories are based on phonemics.

Some linguists restrict the use of the term 'phoneme' to segments of human sounds only, and analyse what are called **suprasegmental** or **prosodic** features separately. The most important of the suprasegmental features are: (1) **length** (syllables and feet), **stress**, and **pitch**. (These are discussed in the next **section** of this chapter). Other linguists extend the use of the term 'phoneme' to cover all distinctive sound features including levels of stress, levels of pitch and types of juncture.

Distinctive Features Theory

In the phoneme theory, the phoneme (segment) is the smallest unit of phonology, but in the **Distinct Features Theory** the phonetic feature is the smallest unit of phonology. Segment theory is linguistically inconvenient. There are no rules in any language which apply to all the sounds. There are a fixed number of features or components which form a basic stockpile from which every language selects phonetic features and combines them in different ways. It is these features which keep a segment distinct or separate from others. That is why they are called the **distinct features**.

In distinct features theory (as different from the notation transcription), the phonetic transcription is simplified and systematized by regarding each sound as a set of components, exactly parallel to semantic component. As proposed by Roman Jakobson, Morris Halle, Chomsky, etc., acoustics and/or articulatory variables can be reduced to a small number of parameters or phonetic features (twenty-seven with multi-values). A distinctive features component, for example for the sounds /t/ and /k/ as in the English word **take** according to this theory, may be as follows:

t	k
+ consonant	+ consonant
- vocalic	- vocalic
- voice	- voice

t	k
+ plosive	- aspirate
+ alveolar	+ plosive
+ aspirate	.
+ tense	.
.	.
.	.
.	.

Note: Dots [:] mean that the lists is inexhaustive.
In English, for example, the following phonetic features are distinct.

- (i) **State of Glottis:** voiceless/voiced.
- (ii) **Position of Soft Palate:** oral/nasal.
- (iii) **Place of Articulation:** (a) bilabial/alveolar/velar; (b) labio-dental/dental/alveolar/palato-alveolar.
- (iv) **Manner of Articulation:** (a) plosive/ fricative/ nasal; (b) nasal/ lateral; (c) affricate/ fricative.
- (v) **Part of Tongue raised:** front/ back.
- (vi) **Height of Tongue:** Close/ between half-close and half-open/ between half-open and open/ open.
- (vii) **Lip-position:** unrounded/ rounded.
- (viii) **Stressed/ unstressed.**
- (ix) **Reduced vowel/ unreduced vowel.**
- (x) **Tonic/ non-tonic.**
- (xi) **Tone:** falling/ rising; low fall/ high fall/ low rise/ high rise/ fall rise; or primary/ secondary/ tertiary/ fall-rise.

In more recent work on generative phonology, particularly by Noam Chomsky and Morris Halle, these features have been extensively modified and placed into categories such as

- (i) **Major class feature** as sonorant [making a deep impression] vs. non-sonorant; vocalic vs. non-vocalic.
- (ii) **Cavity features** relating to the shape of the oral cavity and the point of articulation with such features as coronal vs. non-coronal, anterior vs. non-anterior.
- (iii) **Manner of Articulation** features such as continuant vs. non-continuant, tense vs. lax.
- (iv) **Source Features** as voiced vs. voiceless; strident vs. mellow.

s.Q (v) **Prosodic Features** as stress, pitch, etc.

Generative Phonology

Modern science of speech really began with the concept of the 'phoneme' (as developed by Trubetzkoy and others of the Prague School in 1930's. The first significant modification came in 1952 with the distinctive theory, which goes further in rejecting many concepts of the 'traditional' phonology).

'Classical' phonology was concerned with the analysis of the continuum of speech into distinctive segments, whereas the aim of Generative Phonology is to establish a series of universal rules for relating the output of the syntactic component of a generative grammar to its phonetics realization. As mentioned by P. Ladefoged, the aim of generative phonology is to formulate rules to express, "the relationship between the output of a set of syntactic rules and the sounds of actual utterances."

In the application of the generative rules two levels of representation are recognized: a systematic 'phonetic representation' and a 'phonological representation'. An earlier term for the latter was 'systematic phonemic' but this was later rejected because of the meaning of 'phonemic' in structural theories. Generative grammar rejects the notion of a phonemic level and the concept of 'phoneme'. On the phonetic level the phones are bundles

of distinctive features and phonological rules relate these phones directly to 'lexical' level.

THE PHONEMES OF ENGLISH

Trager and Smith set up the following forty-five phonemes for English:

9	simple vowels
3	semi-vowels
2	consonants
4	stresses
4	itches
1	plus juncture
3	terminal juncture

Total 45

Vowels: Trager and Smith purpose nine simple vowels arranged 3×3 :

	Front	Central	Back
High	i	ɪ	u
Mid	e	ə	o
Low	æ	ɑ	ɔ

Semi-Vowels: There are three semi-vowels /y, w, h/.

Complex Vowels: Any one of these can be added to each of the nine vowels giving us $9 \times 3 = 27$ complex vowels—a vowel phoneme followed by a semi-vowel phoneme. Thus in all there are thirty-six (9 simple and 27 complex) vowel phonemes that serve as the vocalic nuclei).

Consonants:

In addition, there are twenty-one consonant phonemes.

^v ^v ^v
 /p t k b d g c j f θ s s v ð z z m n ɹ l r /

Stress

Trager and Smith recognize four levels of stress:

1. Primary / ' /: teacher
2. tertiary / /: Miss Smith; contents
3. weak [zero] / ˘ /: animal
4. Secondary / ˆ /: under; came

Tell me the truth :/teɪmiyð ə truw θ/

Juncture: Trager and Smith recognize four junctures as phonemes: 1. Internal juncture /+ / as in **night+rate** as contrasted to **nitrate**. 2. Single bar Juncture /|/, indicative of incompleteness; 3. Double-bar Juncture /||/, indicative of uncertainty; 4. Double-cross Juncture /#/ , corresponding to the orthographic period of fullstop, indicative of assertion. The first one is known as plus juncture, the other three are called terminal junctures.

Pitch: Trager and Smith accord the phonemic status to pitch and recognize four levels /1 2 3 4/.

Stress, pitch and juncture by Trager and Smith as 'suprasegmental' whereas the vowels and consonants, including the semi-vowels, are segmental phonemes. With segmental phonemes there is very little transition from one segment to the other. But the suprasegmentals are not restricted to one segment but extend over more than one. The segmental phonemes are discrete; the suprasegmental phonemes are super-imposed.

TYPICAL QUESTIONS

1. *Distinguish between phonetics and phonology.*

2. Define and exemplify: (a) phoneme, and (b) allophone.

What is minimal pair ?

3. Distinguish between a phoneme and an allophone.

4. How many phonemes are there in British English (R.P.) ?

5. What is an allophone ?

6. Distinguish between free variation and complementary Distribution ?

7. Do [p] and [p^h] exist in your language ? If they do, give one example of each used in a word. Do they belong to different phonemes or to the same phoneme ? How will you prove it ? Indicate your language.

8. If [p], [t] and [k] exist in your language, indicate whether they belong to three different phonemes or not. How do you prove it ? Indicate your language.

9. Prove that [p], [b], [t] and [d] belong to separate phonemes in English.

10. Show how phonology can be described in terms of structure and system.

11. What are supra-segmental (non-segmental) features in phonology ? Exemplify from English.

12. Distinguish between the clear l and the dark l and the aspirated p, t and unaspirated p and t.

13. What are weak forms ? Give some ten examples of words which have weak forms in R.P.

14. Describe the phonemes of English.