Sutra 10. Phonology – the Sounds of Language

Sutra 10 concludes our examination of the sub-units (elements) of language. It aims to give you a clearer understanding of:

> *Speech sounds* and *why they sound the way they do*,
> The *natural classes* of sounds: we'll get there through a practical look at the classification of English phonemes, and of
> Why and how speech sounds *interact in connected speech*.

We conclude our study of speech sounds by stressing that language only lives in use by society. We shall take a look at a few natural tendencies in sound change which underlie many of the phonological rules operating in world languages; we will also learn how to write down and interpret phonological rules.

10.1 Phoneme – the Concept; Minimal Pairs & Sets

Phonology studies the characteristic sounds and patterns of sounds in a language. Part of our knowledge of a language is knowledge of its sound system. We must be able to use the sounds of the language, and know the ways in which they combine into patterns. The number of possible sound combinations determines the number of *phonemes* in a language.

There are many definitions of the term *phoneme*; I find these two most useful:

A *phoneme* is:
> **the smallest unit of sound which may distinguish two words, otherwise identical**
> **the *significant contrastive* sound which both the speaker and the hearer perceive to be the same**

N.B.: Phonemes are not sounds as such; they are <u>mental sound images</u> – units, *representing* sounds. These mental images are like footprints of sounds, forming moulds that several similar sounds can fit into - that is why we may perceive several actual *phones* (sounds) to be the same ***phoneme***.

A *minimal pair* is two words with *different meanings* but with *identical phonetic features*, except for a difference in *one phoneme* in exactly *the same position* in the word (*initial, medial*, or *final*).

For example, *p*it & *f*it; f*i*t & f*a*t; pi*ck* & pi*g*, etc. (note that the pairs of words are different only in one sound <u>in the same position</u> (initial, medial, or final).

Minimal sets: several minimal pairs make a minimal set:

> pit, fit, git, shit, bit, sit, lit, wit, or
> fit, fate, fat, foot, fought, feet, fart, or
> pit, pick, pig, pin, piss, pish, etc.

Analysis of *minimal pairs* helps us identify the phonemes or the characteristic sounds of any language.

All people speak in their own peculiar ways: an Australian will speak English differently from an American, a British or an Indian. Remember, sociolinguists claim that 'You are what you say,' because we are all products of our different environments which shape our linguistic behaviour. Our speech reflects our individuality and background. Apart from basic physical differences, factors such as social class, age, sex, and occupation also leave a mark on the way we speak. Some people have high voices, some low, some voices are squeaky, some - melodious. Even the same person's voice and pronunciation vary depending on whether they have a sore throat, a blocked nose, or something else wrong (or right!) with them ☺.

Just imagine what would have happened, if we were unable to *perceive* all these different variations of the basic sounds as the same phonemes! Communication would have become impossible, because there are no two people on this planet that speak in exactly the same way – not even ONE person who ALWAYS pronounces words in exactly the same way! The second definition of the term *phoneme* makes a very important point: a **phoneme** is the **contrastive** **sound segment which both the speaker and the hearer** **perceive to be the same**.

The point I am making here is that speech communication works, because *despite* all the differences in our individual ways of pronouncing the basic sounds, we all still perceive them to be the same sound. It is only when the difference in pronunciation reaches a 'critical mass' that quantity changes the quality, causing miscommunication (remember the cause of that Indian lady's upset at the Aussie doctor telling her '*You are going home today*'? ☺). Here is another example of miscommunication, which reportedly took place in the 'diplomatic circles':

☺ When Charles de Gaulle decided to retire from public life, the American ambassador and his wife threw a gala dinner party in his honour. At the dinner table the Ambassador's wife was talking with Madame de Gaulle.
"Your husband has been such a prominent public figure, such a presence on the French and international scene for so many years! How quiet retirement will seem in comparison. What are you most looking forward to in these retirement years?"
"A penis," replied Madame de Gaulle.
A hush fell over the table. No one knew what to say next.
Finally, Le Grand Charles leaned over to his wife and said, "Ma cherie, I believe zee Americans pronounce zat word: 'appiness.' ☺

10.2 Allophones – Variant forms of Phonemes

Allophones are the actual sounds we hear – they are variations of phonemes resulting from the influence of neighbouring phonemes in connected speech, or from the individual speaker's way of talking. Allophones are still perceived to be the same contrastive sound by both speaker and receiver; they do not cause communication problems, unless they deviate too much from the standard phoneme and begin to sound like another: co*p*y – co*ff*ee, etc.

When working on an unwritten language, we must list not only the phonemes of that language, but also their variant forms (*allophones*). In fact, an essential part of the phoneme identification process consists of finding out which variant sounds belong to which phoneme. Allophones are said to be:

⇒ In *free variation* when they occur randomly. No two sounds can ever be exactly the same, no matter how you try. When sounds vary randomly without changing the meaning of the word, they are in *free variation*.

⇒ In **complementary distribution** when the difference is caused by the neighbouring sounds. If sound varies in a specific phonetic environment, then the allophones are in *complementary distribution*, since one set of environments complements another (like yin & yang):

$$p \longrightarrow p^h \, / \, \# \_\_\_$$

⇒ This means, **p** changes into **p^h** in the following circumstances: after a word boundary (#), i. e., in the initial position, at the beginning of a word.

N.B.: the same pattern holds for the other voiceless stops of English: /t, k/

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⇒ In Korean, however, they are separate *phonemes*:

[pul] 'fire' [pʰul] 'grass'

This is because [p] vs. [pʰ] *does* distinguish meaning in Korean; the same is true for the other voiceless stops in that language.

In Sutra 9, we already talked about the way speech sounds influence each other, caused by the 'imperfection' of our organs of speech. Sound quality, we remember, is determined by the shape of the resonance chambers and the movement of the tongue and other articulators. When we speak, we do not make pauses between words – we produce long strings of sounds, all blending into a stream of sounds.

10.3 Phonological Changes in Connected Speech Revisited

Assimilation [əˌsimiˈleiʃən]
Many factors affect sounds in running speech, most of them resulting from the physical limitations of our organs of speech: our tongues, lips and soft palates are not fast, or flexible enough, to cope with the flow of speech! They cannot move quickly enough to get from one position to another in order to articulate the next sound *precisely*. Many sound changes are due to the influence of one sound upon another, causing the other sound to become more like the 'influencing' sound itself. If a sound change results in more *shared phonetic features between two sounds*, this results in ***assimilation*. There are 3 main types of assimilation:**

1. **Assimilation of Place**: /**t**/ → /**p**/ in *ratbag* [ˈræpˌbæg]*, good boy* [ˈgʊpˌbɔi]*,* or *oatmeal* [ˈəʊpmiːl], etc. This is because the alveolar plosive /t/ is simplified into the /p/ sound, which is closer to the bilabial plosive /b/ and to the bilabial nasal /m/.

2. **Assimilation of Manner**: occurs when two different manners of articulation influence each other to form a different manner of articulation: *Indian* [ˈindʒən] and *soldier* [ˈsəʊldʒə]. This is because the plosive /d/ combines with the approximant /j / to form an affricate.

3. **Assimilation of Voice**: have to [ˈhæftə] (voiced fricative followed by a voiceless consonant)

Assimilation of place will, of course, affect the manner of articulation, so these different types of assimilation usually occur together. ***Assimilation*** can be

> **Partial,** when the changed sound retains at least one of its original features (p*artial regressive assimilation* examples: **in**divisible [ˌindiˈvizəbl], **im**balance [imˈbæləns], **in**credible [iŋˈkredəbl], **in**admissible [ˌinədˈmisəbl], etc.

or
> **Total**, when the two sounds end up identical (a *geminate*, or phonetically double sound; you can see many examples of ***total regressive assimilation*** in Modern English word formation, where the last prefix consonant becomes totally like the following sound:

abbreviate	**ag**gressive	**ap**peal	**at**tend
account	**al**leviate	**ar**rive	
affect	**an**nual	**as**sent	

But: **ad**mire, **ad**just, **ad**jacent, **ad**vance, etc. All the highlighted prefixes are adaptations of prefix '**ad-**' meaning 'to, toward.' The ***d*** in **ad-** always changes to the sound of any following consonant, except m, j, and v.

The *direction* of assimilation can be

> ***Regressive*** – operating backwards, i.e., when the ***preceding*** sound is changed (A < B), or
> ***Progressive*** – operating forwards, when the ***following*** sound becomes more like the preceding one (A > B)

Voicing of intervocalic stops and ***devoicing*** of voiced consonants in word final positions are also a common type of assimilation in many languages:

Russian: [got] 'year' → [goda] 'of the year'; [boχ] 'god' → [boga] 'from god'
German: *Bad* [ba:t] 'bath'; *Tag* [ta:k] 'day'; *Hund* [hunt] 'dog', etc.
Under normal circumstances, apart from our rather clumsy articulators, our breathing also affects the sounds we make – try to say something after doing frog-jump! ☺ In order to combine the two functions (breathing and speaking), every language has developed a rhythm of its own, largely determined by its stress patterns. Absence of stress, we remember, causes weakening and even elision of the ***unstressed*** segments:

Neutralisation [ˌnjuːtrəlaiˈzeiʃən] **of Weak Forms**

Weak forms are those words that are pronounced in an *unstressed* manner. Many of the most common words in English can come in either a strong form or

a weak form. The *weak forms* are nearly all **function words**, such as conjunctions, articles, pronouns, prepositions and some auxiliary and modal verbs.

Generally, the **strong forms** of these words are used when they are being directly quoted, when they are being contrasted, or if they appear at the end of a sentence.
The pronunciation of a weak form can be very different from the strong form of a word: if said in isolation, it could be all but unintelligible. It is usually the context that makes it understandable.

In connected speech, many sounds in unstressed positions get neutralised, blurred between the two distinct sounds. This intermediate sound is known as neutralisation. This occurs in both vowels and consonants.
Neutralisation results in the centering of vowels to the neutral schwa [ə], and sometimes in total omission of sounds and even whole syllables:

[stɒp] [ənd] [ʃɒp]   →   [stɒp ən ʃɒp]
[kʌp]   [ɔv]   [ti:]   →   [kʌpəti:], etc.

__Elision__ [iˈliʒn], (**deletion** [diˈli:ʃn] or **omission** [əʊˈmiʃn]) particularly affects:

➢ Consonant clusters
➢ Weakly stressed syllables that are not especially missed
➢ Words that end in an alveolar consonant and that are immediately
   followed by a word beginning with a consonant (*Stop'n'Shop*, etc. ☺)

The sounds that are elided are those that are so weakly articulated that they become insignificant.

The loss of a weak vowel after the voiceless (fortis) plosives /p/, /t/, /k/:
[pˈteitəʊ] is an example of the schwa being elided after /p/. Other examples:
[ˈsekritri] rather than [sekritəri], [præps] rather than [pəˈhæps], [intrəstiŋ] rather than [intərəstiŋ]. Often [pəˈli:smən] becomes [pli:smən], [medisin] → [medsin], etc.

➢ Another cause of *elision* is when a weak vowel is elided before a
   syllabic consonant (/l/ or /n/: [lesn] – *lesson, lessen*; *session* [seʃn], etc.

➢ Complex consonant clusters are usually elided in running speech:
   George the VIth throne: [dʒɔːdʒ ðə siks θrəʊn], we say [mʌsnt] for
   [mʌstnt], [igzækli] for [igzæktli]; *christening* [krisniŋ], *listening* [lisniŋ], etc.
   /v/ is often elided before a consonant: [ˈləʊdz ə ˈmʌni] '*loads of money*,'
   cup of coffee [kʌpə ˈkɒfiː], etc.

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> ➤ Contracted forms are caused by elision: [aim] instead of [ai əm], [dəʊnt] instead of [du: nɒt], [wəʊnt] instead of [wil nɒt], [kɑːnt] instead of
> ➤ [kæn nɒt], etc.

> ➤ Sometimes we swallow even whole syllables: we say [prɔbli] for [prɔbəbli]; [ləˈbɔrətri] for [ləˈbɔrətəri]; [ˈlaibri] for [ˈlaibrəri], [ˌmɔːfəˈnɒlədʒi] for [ˌmɔːfəfəˈnɒlədʒi], [prəˈpɒstrəs] for [prəˈpɒstərəs], etc.

N.B.:
> ➤ When a vowel sound is elided, it is usually a weak vowel, typically, the schwa. The schwa is a weak sound because we do not need much energy to pronounce it. Many vowels sound like schwa when they are neutralised in unstressed positions.
> ➤ When a consonant is elided, it is usually because it occurs in consonant clusters, or is in an environment with other consonants.

Some elided syllables are represented in standard punctuation (for example, we write *I'm* for *I am*, *don't* for *do not, isn't* for *is not,* etc.). In standard speech, the missing vowel is understood, and so meaning does not suffer from this contraction.

Elision is particularly common in connected speech, when the speech sounds we make are so open to the influence of the neighbouring sounds. It stands to reason, that the faster the speech, the more likely we are to 'swallow' some of the sounds / syllables.

Energy conservation / economy of effort is often the underlying principle of the various forms of assimilation, neutralisation and elision: people always tend to choose the path of least resistance. The same principle applies in the seemingly contrary to it **sound insertion**:

Linking [liŋkiŋ]

If you have ever listened to people speaking a foreign language that was unknown to you, you may have noticed that it was impossible to pick out individual words from the string of sounds that you heard. This is because in real, connected speech, words *are* linked to one another. This is especially significant in RP, where the phoneme **/r/** does not occur in syllable-final

position, unless the word with a final '**r**' is followed by a word beginning with a vowel. Say, in '*fear*' [fiə] / '*fear of God*' [fiər əv gɒd], etc.

So one example of linking is the **re-activation** of an **/r/** sound:

For better or worse: [fə ˈbetər ɔ: w3:s]

Father or aunt: [fa:ðər ɔ:r ˈa:nt]

There are oranges or apples in the cupboard:

[ðeəra:**r** ɔrindʒiz ɔ:**r** æplz in ðə ˈkʌbəd]

Father of three: [fa:ðər əf θri:]

Another example of linking is when two vowels meet over a word boundary: we find it easier to articulate them, if we insert an extra phoneme in order to help the transition. So, another example of linking is to *insert* /r/ between two vowels, for example:
That's the idea of it   →   [ðæts ði aidiə**r** əv it]
The pilot saw an explosion   →   [ðə pailət sɔ:**r** ən eksləʊʒn]
They're withdrawing their troops   →   [ðej r wiðdrɔ:**r**iŋ ðeə tru:ps]
Pretty awful   →   [pritu**r**ɔ:fʊl]

/j/ and /w/ may also link words, for example:

How often?   →   [ˌhaw ˈɔfn] is easier to articulate than [ˌhaʊ ˈɔfn]
They are   →   [ðej ˈa:] is usually said, rather than [ˌðei ˈa:]

Sound insertion can also be in the form of a vowel that 'breaks' a hard-to-pronounce consonant cluster:

Epenthesis [eˈpenθəsis]

The term *epenthesis* is used to describe the change by which a 'vowel is added in the middle of a word to break up two consonants in a cluster. This change is common in languages that don't like consonant clusters and final consonants (such as Japanese, for example). Speakers of some varieties of English often insert an epenthetic schwa [ə] between the final consonants of the word [film] 'film', to produce [filəm]. Epenthesis is also common in Tok Pisin, i.e.,

English		Tok Pisin	
blæk	→	bilak	'black'
blu:	→	bulu	'blue'
nɛkst	→	nekis	'next'
sɪks	→	sikis	'six'
skɪn	→	sikin	'skin'
plɛɪs	→	peles	'village'
fɪlm	→	pilum	'film'

We have seen how the principle of economy (energy conservation) results in most of the phonological conditioning in connected speech. Are there any general tendencies in sound change that are common to all languages?

Despite the mind-boggling diversity of human languages, there are some general **natural tendencies**, based on the fact that certain types of sound change are very common, whereas others are unlikely. A few types of sound change that shaped the development of many languages are:

> ➤ **Final vowels often disappear:** ME [na:mə] → Modern English [ne:m] → [neim]
> ➤ **Voiceless sounds become voiced between vowels:** [ʃʌt] [ʌp] → [ʃʌd ʌp]
> ➤ **Consonants become voiceless at the end of words:** German *Hund*, Russian [got], etc.

Having looked at all these sound changes, we now have to learn how to identify the phonological rules that operate in a language, as well as the rules for writing down those rules:

10.4 Phonological Rules & Rules for Writing Phonological Rules

Phonological Rules are part of native speakers' knowledge of the language. Phonological rules express a *generalization,* or *pattern* of specific sounds in a language.

Steps in Finding Phonological Rules

➢ Look for minimal pairs.
➢ Make lists/tables of the surrounding sounds.
➢ Look for a pattern.
➢ Generalize the pattern you have discovered. Refrain from using mention of actual sounds (i.e, phonetic alphabets). Formulate your rule by using the properties that the sounds have, i.e., stops, nasals, fricatives, etc.

Illustration – English: /t/ is pronounced as [t^h]:

a) at beginning of a word;
b) at beginning of stressed syllable
/t/ is pronounced as [t] *elsewhere.*

*Remember: this is true of all voiceless stops of English: /p, t, k/.

State the *generalization* to cover all the cases = *Phonological Rule*:

$$\text{Voiceless stops} \rightarrow \begin{cases} \text{aspirated / \#\_\_\_\_\_} \\ \text{unaspirated elsewhere} \end{cases}$$

Voiceless stops are pronounced as *aspirated*
a) at the beginning of a word;
b) at the beginning of a stressed syllable.
They are pronounced as *unaspirated* in all other contexts = *elsewher*e.

Phonemes and allophones:

Phonemes : /p, t, k/
Allophones: [p^h, t^h, k^h] – beginning of word; beginning of stressed syllable;
[p, t, k] – elsewhere.

Phonological Rules should be as general as possible:

a) Review the classification of sounds into **Natural Classes** = general categories / groupings of sounds, i.e., stops, voiceless stops, vowels, nasals, fricatives, etc. Also *Sonorants* = sounds made with spontaneous voicing (nasals, liquids, glides, vowels) or *Obstruents* = sounds in which voicing contrasts (stops, fricatives, affricates).

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b) Review the symbols that represent the phonemes of the language (underlying representation = abstract representation of sound in the brain = phoneme)

c) Look for **"simpler" sound** = *unmarked sound*, e.g. [p] is "simpler" than [pʰ] in English

d) Look for most **"general" sound** = *sound in "elsewhere" environment,* e.g. [pʰ] is found at the beginning of a word, or at the beginning of a stressed syllable [p] is found "elsewhere" = more "general"
Formulating & Writing Phonological Rules

a) Using words: In English, the phoneme /p/ is pronounced as the allophone [pʰ] when it is found at the beginning of a word, or at the beginning of a stressed syllable; it is pronounced as the allophone [p] elsewhere.

b) Using the Phonological Rule Formalism: i.e., writing phonological rules. General format of a phonological rule:
A → B / C ___ D

A = underlying representation (phoneme; natural class of phonemes; phonological feature/s), e.g., *voiceless stops*

B = phonetic form – pronunciation (phone, specifically allophone of A; natural class of sounds; phonetic feature(s), e.g. *aspirated*

C and D = context/environment of the rule may be sounds, natural classes of sounds, phonological features or # (= word boundary).

Possibilities: only C present; only D present; both C and D present
→   = "is pronounced as" or "becomes"
/   = "in the context/environment…"
__   = location of target sound
Some of these symbols you already know, but repetition, they say, is the mother of learning ☺:

Phonemes are written between two forward slashes / /, and actual sounds (phones, allophones) – between two square brackets []: [r], [uː], [l], or [ruːlz].

You may also remember that

→   means 'is represented as,' 'is pronounced as,' or 'has the allophones.'

and that a single forward slash / means 'in the following circumstances,' or 'in the environment of,' and it is used in combination with the symbol '___' (the 'bar') to exactly specify the environment, for example:

/**p**/ → [b] / ___vowel

The bar shows where the phoneme occurs: ***immediately before*** a vowel (it is easier to draw the bar than write out the words!)

The reverse order shows that it is the *preceding* sound that conditions the allophone, i.e.:

/**p**/ → [b] / vowel___

This means that /**p**/ has the allophone [b] ***immediately after*** a vowel. Combinations of environments can also be expressed using the same symbols:

/**p**/ → [b] / vowel ___vowel,

which means that /p/ has the allophone [b] ***between*** two vowels.
The terms 'vowel' and consonant' are used so often in phonological analysis and description, that people indicate them simply as **V** and **C**, so the above rule will look like this:

/**p**/ → [b] / **V___V**

You may also remember that the symbol # indicates *word boundary*. Each word has a boundary at each end, so if you take the word *kiss* [kis], the boundaries will be at the beginning and at the end of it: #kis#. This allows us to indicate the phone's position in the word without wasting extra words:

/**p**/ → { [b] / #___
{ [p] / ___#

This rule means that /**p**/ has the allophone [b] word-initially, and [p] – word-finally.

Where an allophone occurs in two different environments, these are normally separated by a comma (if they are not too long and complex), for example:

/**p/** → [b] /___V, [m]

This means that the allophone [b] of the phoneme /p/ occurs before a vowel and also before [m]. If the environments are longer/more complex, it is better to use a bracket:

$$/\textbf{p}/ \rightarrow \begin{cases} [b] / \begin{cases} \#\_\_\_\textbf{V} \\ \textbf{V}\_\_\_\textbf{C} \end{cases} \\ [p] \text{ elsewhere} \end{cases}$$

Here is one more useful symbol:

~   means 'in unrestricted free variation with.'

For example, we know that in Tok Pisin the phoneme /**p**/ may sound as [p], [f] or [ɸ] – these allophones are in free variation, it does not really matter which one you pronounce, you will be understood by Tok Pisin speakers. How can we write this in a short 'formula' way? Look:

/p/ → [p]   ~   [f]   ~   [ɸ]

10.5 Non-Segmental Phonemes

English phonemes are segments of sound, such as /b/, or /t/ or /e/. These are called **segmental** phonemes. Some languages, however, have not only segmental phonemes, but **non-segmental** phonemes also. In North Mandarin Chinese, for example, there are numerous words which are distinguished by the difference in the rise and fall of tone, as in the following minimal set:

Ma   ⎯⎯⎯   (level tone)   mother

Ma   ╱   (rising tone)   hemp

Ma   ∧╱   (dipping tone)   horse

Ma   ╲   (falling tone)   scold

The IPA Chart includes symbols for 'writing' tones and word accents:

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THE INTERNATIONAL PHONETIC ALPHABET (revised to 1993)

CONSONANTS (PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	N		
Trill	B			r					R		
Tap or Flap				ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	L			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.
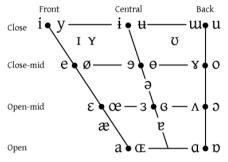
CONSONANTS (NON-PULMONIC)

Clicks		Voiced implosives		Ejectives	
ʘ	Bilabial	ɓ	Bilabial	ʼ	as in:
ǀ	Dental	ɗ	Dental/alveolar	pʼ	Bilabial
ǃ	(Post)alveolar	ʄ	Palatal	tʼ	Dental/alveolar
ǂ	Palatoalveolar	ɠ	Velar	kʼ	Velar
ǁ	Alveolar lateral	ʛ	Uvular	sʼ	Alveolar fricative

SUPRASEGMENTALS

ˈ	Primary stress
ˌ	Secondary stress
ː	Long
ˑ	Half-long
˘	Extra-short
.	Syllable break
ǀ	Minor (foot) group
‖	Major (intonation) group
‿	Linking (absence of a break)

ˌfoʊnəˈtɪʃən

e̞ː   eˑ   ɹi.ækt

TONES & WORD ACCENTS

LEVEL		CONTOUR	
e̋ or ˥	Extra high	ě ˩˥	Rising
é ˦	High	ê ˥˩	Falling
ē ˧	Mid	e᷄	High rising
è ˨	Low	e᷅	Low rising
ȅ ˩	Extra low	e᷈	Rising-falling
↓	Downstep	↗	Global rise
↑	Upstep	↘	Global fall

etc.

VOWELS

Where symbols appear in pairs, the one to the right represents a rounded vowel

OTHER SYMBOLS

ʍ Voiceless labial-velar fricative
w Voiced labial-velar approximant
ɥ Voiced labial-palatal approximant
ʜ Voiceless epiglottal fricative
ʢ Voiced epiglottal fricative
ʡ Epiglottal plosive

ɕ ʑ Alveolo-palatal fricatives
ɺ Alveolar lateral flap
ɧ Simultaneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary

k͡p t͡s

DIACRITICS

Diacritics may be placed above a symbol with a descender, e.g. ŋ̊

̥	Voiceless	n̥ d̥	̤	Breathy voiced	b̤ a̤
̬	Voiced	s̬ t̬	̰	Creaky voiced	b̰ a̰
ʰ	Aspirated	tʰ dʰ	̼	Linguolabial	t̼ d̼
̹	More rounded	ɔ̹	ʷ	Labialized	tʷ dʷ
̜	Less rounded	ɔ̜	ʲ	Palatalized	tʲ dʲ
̟	Advanced	u̟	ˠ	Velarized	tˠ dˠ
̠	Retracted	i̠	ˤ	Pharyngealized	tˤ dˤ
̈	Centralized	ë	̴	Velarized or pharyngealized	ɫ
̽	Mid-centralized	e̽	̝	Raised	e̝ (ɹ̝ = voiced alveolar fricative)
̩	Syllabic	ɹ̩	̞	Lowered	e̞ (β̞ = voiced bilabial approximant)
̯	Non-syllabic	e̯	̘	Advanced Tongue Root	e̘
˞	Rhoticity	ɚ	̙	Retracted Tongue Root	e̙

̪	Dental	t̪ d̪
̺	Apical	t̺ d̺
̻	Laminal	t̻ d̻
̃	Nasalized	ẽ
ⁿ	Nasal release	dⁿ
ˡ	Lateral release	dˡ
̚	No audible release	d̚

Tonal languages have one advantage: the tones and rhythms of speech can be imitated by instruments other than the human voice. This is the basis of the African talking drums (or, more accurately, talking gongs), in which the drumbeats reproduce the tones and rhythms of the language. However, because the drums are unable to reproduce the segmental phonemes, their messages work in a slightly different way: a single message may take much longer to convey. This is because whole phrases are used instead of single words of the ordinary language. For example, among the Lokele people of the Upper Congo, the word for 'dog' is *ngwa*, a single syllable spoken with a low tone. Because there are dozens of other single syllable words spoken with a low tone, the drum equivalent for 'dog' uses a whole phrase, meaning, 'giant dog, little one that barks kpei, kpei' ☺ The 'tune' of this phrase is distinct from any other drum phrase, and serves to distinguish the meaning 'dog' in the message.

This unit has outlined the major steps in analysing the sound structure of a language: collecting linguistic data and sorting out its phonemes and their allophones.

Summary

Part of our knowledge of a language is knowledge of its sound system. We must be able to use the sounds of the language, and know the ways in which they combine into *patterns.* The number of possible sound combinations determines the number of *phonemes* in a language.

A few definitions of *'phoneme'*:

➢ *Phoneme* is what the speaker and the hearer regard as the same *contrastive* sound. It is not any actual sound, but a *mental representation* of it.
➢ *Phoneme* is the smallest phonetic unit in a language that is capable of conveying a distinction in meaning, as the *m* of a *mat* and a *b* of a *bat*.
➢ Also: (linguistic meaning) – one of a small set of speech sounds that are distinguished by the speakers of a particular language.

Each *spoken* phone is perceived as 'belonging' to a particular phoneme, depending on whether it affects meaning (*p*ail vs. *b*ail, *p*ig vs. *b*ig, etc. – these are referred to as *minimal pairs*).

Each language has a set of phonemes that are combined to form all the words of the language. English has 46 phonemes ('Received Pronunciation' – 44). Speech sounds (phones) that are *variants of the <u>same</u> phoneme* are called *allophones.*

Allophones do not affect meaning, although very divergent forms may cause misunderstanding occasionally, like in the case of that poor woman in an Australian hospital, who burst into tears upon hearing her doctor say, [jə ˈgəʊɪŋ ˈhəʊm təˈdai]! ☺

Self-Assessment Q&As & Exercises

Q 1   What triggers phonological change?

A 1   The 'natural tendencies' are caused mostly by the limitations of our anatomy. This accounts for neutralisation/elision of unaccented vowels, assimilation of speech sounds due to anatomical restraints, reduction of consonant clusters, devoicing of word-final consonants, etc.). For example, if you do not like the sound sequence (or it is hard to pronounce) X Y, you do something to pronounce the sequence more easily.

Q 2   When is Assimilation said to be Complete or Total?

A 2   Assimilation is complete/ total, when the two sounds end up identical (a *geminate*, or phonetically double sound; you can see many examples of **total regressive assimilation** in Modern English word formation, where the last prefix consonant becomes totally like the following sound:

abbreviate	**ag**gressive	**ap**peal	**at**tend
account	**al**leviate	**ar**rive	
affect	**an**nual	**as**sent	

The examples above are all of *regressive assimilation* (the change works 'backwards' in the word, from right to left): A ← B

If, on the other hand, the direction of the change is reversed, and the preceding sound influences the sound that follows it, then we have *progressive assimilation*: A → B

Of the two types of assimilation, it is regressive assimilation that is by far the more commonly encountered in the world's languages.
Examples of regressive assimilation:

<div align="center">

Italian: ***octo*** →   ***otto*** 'eight'

septem →   ***sette*** 'seven'

</div>

Q 3   What is Partial Assimilation?

A 3   Assimilation is ***partial*** when the changed sound retains at least one of its original features.
Examples of p*artial regressive assimilation*: **in**divisible [ˌindiˈvizəbl], **im**balance [ˌimˈbæləns], **in**credible [iŋˈkredəbl], **in**admissible [ˌinədˈmisəbl], etc.

Q 4   What is Elision?

A 4   Elision is the deletion of sound segments, which affects particularly
⇒ Consonant clusters
⇒ Weakly stressed syllables that are not especially missed
⇒ Words that end in an alveolar consonant and that are immediately followed by a word beginning with a consonant (*Stop'n'Shop*, etc. ☺)

The sounds that are elided are those that are unstressed and therefore so weakly articulated that they become insignificant. Examples of Segment Deletion:

<div align="center">

XY (Delete Y) →   bomb

XY (Delete X) →   knight

</div>

Q 5   What is Epenthesis?

A 5   Epenthesis is a particular type of sound insertion, when a vowel is used to break a consonant cluster. Examples:

English: bus -- buses
                church - churches
                consume - consumption

Tok Pisin: English [blæk] → Tok Pisin [bilæk], [blu:] → [bulu], [nekst] → [nekis], [siks] → [sikis], [skin] → [sikin], [plɛis] → [peles], [film] → [pilum], [plenti] → [pəlenti], etc.

Dutch: milk → [milək]

Q 6   What is Metathesis (Movement)?

A 6   Metathesis (movement – switching the sequence/order of sounds), i.e.,
Old English   Later English
wæps   wɒsp 'wasp'

Exercises

Exercise 1. A diphthong represents a glide between two different vowel sounds. Tick the box that matches the word with its appropriate diphthong:

	əʊ	ɑʊ	ɔi	ei	ai	ɛə	eə	ʊə
Voice								
Die								
Pray								
How								
No								
Cure								
Share								
Beer								
Bye								
Say								

Exercise 2. Transcribe the following:

Fear; foil; foal; fair; fate; foul; flow; file; mate; might; mare; pear; spear; ouch!

Exercise 3. Golin, Simbu Province, PNG. [n] and [ŋ] are in complementary distribution, conditioned by the <u>following sound</u>. State the conditioning factor, and express the statement of allophones in a formula.

[bansu]   short
[sigwine]   ant
[suŋgwe]   he hit
[guluŋgwe]   he is dead
[pirin]   salt
[noŋgare]   kind of tree
[siŋge]   you hit
[nenin]   your father
[naale]   locust
[nobe]   edible leaf

Rule: _____

Ex. 4 Lenakel, Tana, Vanuatu. [g] and [kʰ] are in complementary distribution, conditioned by the <u>position in the word</u>. State the conditioning factor, and iexpress the statement of allophones as a formula

[gən]	eat	[ɲɨigikʰ]	my heart
[mɛnukʰ]	bird	[gəs]	bite
[agar]	talk	[nɨgbəs]	sandalwood
[tahakʰ]	mine	[arɨkʰ]	stay
[gɛygɛy]	nice	[nɔwanɔwga]	fishing-line

Formula:
_____

Ex. 5 Arosi, San Cristobal, Solomon Islands. Do [t] and [d] belong to the same phoneme or to separate phonemes? Why?

[gede]	pick at food	[arito]	sunshower
[tapuru]	cut hair	[dao]	lie down
[mamareda]	spread out	[udauda]	soft (of food)

[tao]	fine net	[uta]	rain
[huʔitaʔi]	turn over	[tewa]	tall
[ariheda]	kind of rope	[taiduru]	uncombed

Ex. 6 Provide the missing symbols/feature description:

/ / - close, front, unround, long (tense), monophthong
/ / - close, front, unround, short (lax), monophthong
/ / - mid (half open), front, unround, short (lax), monophthong
/ /- open, front, unround, short (lax), monophthong
/ /- open, central, unround, short (lax), monophthong
/ /- mid (half open), central, unround, long (tense), monophthong
/ /- mid (half open), central, unround, short (lax), monophthong
/ɒ/-
/ɔ:/-
/ʊ/-
/u:/-
/a:/-

Ex. 7 What is the difference between the centering and the closing diphthongs? Name them all.

Ex. 8 Supply the missing features:

	Lenis / Fortis	Place of Articulation	Manner of Articulation
/p/			
/b/			
/t/			
/d/			
/t /			
/d/			
/k/			
/g/			
/f/			
/v/			
/θ/			
/ð/			

/s/			
/z/			
/tʃ/			
/dʒ/			
/h/			
/m/			
/n/			
/n/			
/l/			
/w/			
/r/			
/j/			

Ex. 9 Which of the ones below are possible words in English?

[pæg]	[spɔŋk]	[mɔkst]
[pflk]	[vɔʊl]	[ŋalm]

Ex. 10 The 'Wug' Test: one wug → two /????/

a)	[wʌgs]
b)	[wʌgən]
c)	[wʌgz]
d)	[wʌgiz]

Q 11: How do we know that /w/ and /r/ are different phonemes in English?

Q 12: What is the relationship between [p] and [pʰ] in English?

Q 13: What is the missing symbol in each class of English phonemes? What is the class of phonemes?

a) /iː, ɪ, a/
b) /iː, uː, ʊ/
c) /p, t, k, d, g/
d) /f, θ, s, h/

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Q 14: Analyse the following syllables in terms of regular/non-regular and occurring/non-occurring in English. For those that are not regular, explain why.

	Regular?	(Reason)	Occurring?
[beɪʒ]	_____	_____	_____
[skrɪfd]	_____	_____	_____
[pjæŋ]	_____	_____	_____
[krʌŋkt]	_____	_____	_____
[flɪntʃt]	_____	_____	_____