**Linguistics**

1. Human Language and Animal Communication Systems

Human communication differs from animals. We analyse these differences in 3 dimensions:

* 1. Discrete Infinity :

With limited number of items (such as alphabets and words), humans are able to construct an infinite number of sentences.

Language is infinite.

If it were finite, there would be a longest sentence for that language. However we can extend any sentence by adding conjunctions and other devices.

Animals on the other hand, have a limited number of sentences.

* 1. Displacement

Humans can talk about space, time, here and now, abstract concepts like homesickness, past, future etc.

Animals, however, can only talk about here and now. Discussions about other topics might happen in some creatures but it would be extremely limited in scope.

* 1. Joint Attention

Humans work together and often have shared goals. Human language thus, can express a shared goal. We can read and understand each other’s perspective and build on it.

Human language is cooperative.

Not true for animals. Some apes might have join attention but it is very limited.

1. Phonetics and Phonology

Two subdisciplines of linguistics which study sounds:

1. Phonetics: studies physical and physiological aspects of sounds in the way they vibrate in the air and the way beings produce them using articulatory organs.
2. Phonology: studies sounds as part of a language.

As a matter of fact, if I say the same word twice, man, man, I do something slightly different in each case that may be interesting for a phonetician but not for phonologist, because it's the same word.

 Every language is produced by sounds except sign languages.

These sounds always have the shape of a finite set, i.e. there's a finite inventory of sounds, which a language uses, roughly something between 20 and 200 different vowels and consonants, differs from one language to the next.

Certain sounds are never used in language, even though they are easily produced such as a clap.

All languages use small sets of building blocks of sound to combine them and make them into words.

That's actually a property of human language, which is not necessary. All human languages happen to be like that, but they don't have to be because there are so many different sounds we could make

It's a way to write down all different sounds: all different consonants and vowels of every individual human language. The IPA only uses symbols for sounds which are used in at least some language. International Phonetic Alphabet is.

3 Ways in which consonants can differ from each other:

1. Place of articulation: where in the mouth the sound is produced.
   1. Labial (pa, ba, ma) : Lips
   2. Alveolar (nuh, lah) : Tip of tongue
   3. Velar (gah) : Back of tongue
   4. Glottal

These are only for English and possibly not exhaustive, other languages may have more.

1. Manner of articulation : manipulation of the air stream coming out of lungs while making sounds
   1. Stop/ Plosive (/p/, /t/, /k/): One thing I can do is just stop it, stop it temporarily and then release it, you will hear a small explosion. Sounds like puh and tuh and cuh.
   2. Fricative (/s/, /f/): The second manner is by closing your mouth but not completely, so that some air can slip through.
   3. Nasal (/m/, /n/): you can close the air stream in your mouth but open your nose so that the air can go out there.
   4. Sonorant (/l/, /g/): one where you let the air go out more or less unimpeded in your mouth.

These are only for English and possibly not exhaustive, other languages may have more.

1. Voicing

Whether or not the vocal cords vibrate to produce the sound. While producing /b/ sound, vocal cords vibrate but not for /p/

Are there consonants that occur in all languages? There at least two good candidates for such consonants. This is the M sound, and the T sound. Controversial. They are good candidates because they are easy to make. Very easy to see M sound.

What is the set of consonants? Very vast set; more than hundreds.

Which language has the most consonants? Very difficult to count and depends on the criteria for counting but some languages in southern Africa have over 100-150 consonants.

Do we have fewer vowels than consonants? Yes, it is likely. The set of symbols used for vowels in the phonetic alphabet is smaller. We use more consonants than vowels within a language. This is because the vowels are slightly more difficult to distinguish. In order to produce consonants, you need some obstruction somewhere in your mouth. In order to produce a vowel, there's no obstruction, you just transform the sound when it's going out in some way. And there's just many more different ways of making an obstruction in your mouth than transforming a sound like that.

Also consonants serve the function of meaning in a language while vowels have grammatical functions. It expresses grammatical structure. And any language has more word meanings than grammatical structures. In Semitic languages, like Hebrew and Arabic, people write only the consonants and not the vowels. They apparently don't need them to understand it.  Also there are messages on the internet where they just took out all the vowels from an English text.  Mm-hm. And you can still understand those messages.

Are there also vowels that can be found in all languages in the world? Very likely that A, I, U are vowels found in almost all languages because they are easier to make and highly distinguishable from each other.

Sound Systems

Distinctions like place of articulation, manner of articulation, voicing are called features. Sounds are constituted of such features. Implications of this assumption are:

1. Evidence Type 1: Phonological activity

In languages, sometimes one sound changes into another sound. It can be described as one feature changing into another.

Feature A 🡪 Feaure B

For instance, in Kalip or Kalib-a, or in Kanat or Kanad-a.

There's a p versus a b and a t versus a d,

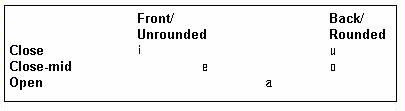
the difference between T and D Is one of voicing, of whether or not my vocal cords vibrate. And that's exactly the difference we find all the time.

At the end of a word in Turkish, every consonant is always voiceless. You never vibrate your vocal cords. Within a word, you might. So there is a phonological activity change from being voiceless to being voiced.

1. Symmetry of Consonants: Phonological symmetry is the even distribution of phonemes throughout the articulatory possibilities of a given language. The inventory of sounds in a given language tends to be symmetrical. Sounds tend to be spread out evenly throughout the articulatory possibilities of a language.

(Spanish): Symmetrical vowel system

Here is an example of a symmetrical vowel system:



Spanish is an example of a symmetrical five vowel system. The five vowel system is the most common among languages of the world.

1. Path of acquisition
   1. /p/, /t/: voiceless, plosive, labial and coronal
   2. Nasal: /m/, /n/
   3. Fricative: /s/, /p/

Young children don't learn sounds one at a time, they learn places of articulation and manners of articulation one at a time.

Speech Errors: In many speech errors, the sounds of language get interchanged.

Sometimes this is kind of uninteresting because it just involves whole sounds. Somebody's trying to say brake fluid and says blake fruid instead. What happens is the r and the l get interchanged here.

But sometimes it also involves features rather than complete sounds. Somebody's trying to say Cedars of Lebanon, but says Cedars of Lemadon instead. We have a non-nasal b and then a nasal n, but it changes into a nasal m and then a non-nasal d.

So it's as if the feature nasal moves from the n to the b.

Another example is skabetti instead of spaghetti. In spaghetti, the p is voiceless and the g is voiced, but in skabetti, as she said it, the k is voiceless and the b is voiced.

So it's, in this case, as if the feature voice has moved from one sound to the next.

Sound and Language Change

A set of consonants can typically be organized in a nice rectangular table. The rows and columns corresponding to our place and manner of articulation.

Since all languages change and possibly we spoke something very different 10,000 years ago. So if we spoke differently 10,000 years ago, did we also use different sounds in a certain language?

Yes

The particular way in which consonants are produced or which consonants a language has definitely changes over time. What evidence do we have for this?

1. Language Comparison: If you have other languages which are related to our language, we can see what consonants they have.

e.g. English is related to German and Dutch, English has a word night, which has two consonants, an N and a T.But German and Dutch have a third consonant, they say nacht, both of them say nacht. So there is this consonant chuh, there. Because it's two other languages, which have that sound, that is an indication that maybe English had that sound as well, at some point in its inventory. And fortunately in English we have another kind of dimension for that, other kind of evidence for that I should say, and it's spelling. The beautiful thing about English is that it has this very conservative spelling.

Spelling didn't change or at least didn't change all that much in the course of the past few centuries. But the sounds probably did. So how do we spell the English word, night? Well, we spell it with G-H. There's G-H in the middle. A G-H in the middle exactly at the point where these other languages have a chuh sound. And it's not very strange to think that maybe G-H was a way to write a chuh kind of sound in English as well. So by looking at the spelling, and by comparing to other languages, we can discover that probably English had at least one more consonant a few hundred years ago.

Why does language change though?

1. Internal factor: Language changes over time because of language acquisition. When children learn a language from their parents, they don’t make a perfect copy. They change it a little bit.
2. External factor:  Languages sometimes borrow words from other languages.

Sometimes English speakers want to speak German or at least they want to say certain German words or German names, like the famous German composer Johann Sebastian Bach. A German would say Bach. But English doesn't have this chuh sound anymore. So an English person would then use the consonant from the consonant table that is closest to this sound? So this, that would be K.

People have to say a sound and they take the one which is closest. It's the sound where you have to change the fewest of these parameters, in this particular case, you have to say chuh, but you don't have it in your system. You take something which is really close. Well, a chuh you'll make at the velar place of articulation, you'll make it in the back of your mouth. Just like the kuh, the only difference between a chuh and a kuh is the manner of articulation, the particular way which the airstream is modified so kuh is an explosion chuh is like frication. You make a little bit of noise by making some obstruction in the same place of your mouth. So what people do is they, they somehow calculate what is the closest what is the most similar sound, and they do so according to our phonetically-defined features.

An interesting example is Hawaiian. It has a small set of consonants. So when they borrow words, they have to be adjusted as well. But due to a small set of consonants, their closest sounds may be far from the actual sounds.

Hawaii is a part of the United States. So they borrow a lot from English. They don't have a T. Their T is actually pronounced like a K. Actually, also their S is sometimes pronounced like a K. So, it's quite well known that Hawaiian word for Christmas is Kalikimaka. Kaliki is Chri- right? So, the K is there, the R of Christmas is changed into an L, Kali. And then ki, so this ki, that's the st of Chri-st-mas, right? So st all together is turned into a k. So these changes might be actually quite big in an individual language if they don't have a lot of choice. But still, you can calculate that this is still the closest sound in their particular system

Language acquisition errors in children could be for many reasons. Some errors are systematic, related to grammar. Some are variable.

Why is it that humans, that humans use sounds rather than gestures like in sign languages, to produce human language?

Sign languages are fully fledged languages.

Why doesn't everybody use them? Why do people still seem to prefer spoken languages?

We only find sign languages if there is a significant proportion of the community who is deaf. Why is that?

We don't really know. Maybe it's because we prefer to use languages also when we cannot really see each other

**1. Introduction**

This chapter and the next few chapters will look at various aspects of the complexity of the sound resources used in the world’s languages and examine how this complexity is distributed geographically. The first aspect to be examined is the size of the set of consonants used in the language, usually referred to as the **consonant inventory**. This is one element of what is called the **phonology** of the language.

| **Values of Map 1A.** Consonant Inventories | | |
| --- | --- | --- |
|  | | |
|  | **Value** | **Representation** |
|  | Small | 89 |
|  | Moderately small | 122 |
|  | Average | 201 |
|  | Moderately large | 94 |
|  | Large | 57 |
| **Total:** | | 563 |

It is usually possible to agree for any given language on a set of elements which are considered to be the **speech sounds** used in that language. The most important consideration in deciding on this set is to find groups of words which sound different from each other by the smallest degree sufficient to make them distinct words of the language. For example, the [English](https://wals.info/languoid/lect/wals_code_eng) one-syllable words *pin, tin, kin, fin, thin, sin, shin* are part of a set which differ by beginning in different ways, *dim, din, ding, did, dig, dish* are part of a set which differ by ending in different ways and *pin, pen, pan, pun, pain, pine, pawn* are part of a set which differ in the middle of the syllable. From a series of such comparisons a list of candidate speech sounds for the language will emerge. Generally the set of those which can appear at the beginnings and ends of syllables will be unlike those which can occur in the middle, hence a distinction is made between **consonants** (sounds typically occurring at the syllable margins) and **vowels** (sounds typically occurring in the syllable centers). In this chapter only consonants will be discussed.

Several further decisions must be made, such as which consonants in different positions should be considered to be the same as each other. For example, speakers of [English](https://wals.info/languoid/lect/wals_code_eng) generally consider that words such as *pip, tit, kick, bib, did, gig* begin and end with the same consonant even though there are some easily recognizable differences between the sounds at the beginning and those at the end. It is also necessary to resolve questions about whether certain beginnings or endings of syllables should be considered to be one sound or a sequence of two or more sounds when analyzed from the point of view of the structure of the particular language. For example, the [English](https://wals.info/languoid/lect/wals_code_eng) word *chip* begins in a way that is similar to the beginning of *tip* followed by the beginning of *ship* (compare saying *grey chip* and *great ship*), and the [English](https://wals.info/languoid/lect/wals_code_eng) word *quick* begins in a way that is similar to the beginning of *kick* followed by the beginning of *wick* (compare saying *lie quick* and *like wick*). These syllable beginnings would both be noted in a phonetic transcription with two symbols, as /tʃ/ and /kw/ respectively. However, when we consider the possibilities of finding related sequences in [English](https://wals.info/languoid/lect/wals_code_eng), a difference between the two becomes apparent. Nothing except /t/ can precede /ʃ/ at the beginning of an [English](https://wals.info/languoid/lect/wals_code_eng) syllable, whereas other sounds can precede /w/, as in *twin, swim, dwell, thwart*. Also several other sounds can follow /k/, as in *click, crick*, suggesting that /k/ and /w/ in the /kw/ sequence are independent elements. Although words like *trip, twin* might suggest independence of the parts /t/ and /ʃ/ in *chip*, the sequences /tw, tr/ are not similar to /tʃ/ in an important way. This is because no [English](https://wals.info/languoid/lect/wals_code_eng) syllable can end with /tw, tr/ (or with /kw, kl, kr/), whereas syllables can end with /tʃ/, as in *rich, pitch, kitsch*. These considerations suggest that /tʃ/ is behaving like a single consonant in [English](https://wals.info/languoid/lect/wals_code_eng), whereas /kw/ is a sequence of two separate consonants.

When such decisions have been made, a list of the consonants used in the language can be compiled and the total of distinct ones added up. For [English](https://wals.info/languoid/lect/wals_code_eng), there is general agreement that the consonant inventory contains 24 consonants, though some linguists might decide there are one or two more or less than this. In the survey of 566 languages reported here a strong effort has been made to apply consistent criteria in determining the consonant inventory size. This sometimes leads to some difference from the conclusions in published descriptions of the languages concerned. For most languages relatively straightforward decisions can be reached, but others are more problematic. A difficult choice often concerns whether to include consonants found only in words borrowed from other languages; generally those sounds introduced just in the last few generations as the result of the spread of world languages such as [English](https://wals.info/languoid/lect/wals_code_eng), [Spanish](https://wals.info/languoid/lect/wals_code_spa), [Russian](https://wals.info/languoid/lect/wals_code_rus), [Mandarin](https://wals.info/languoid/lect/wals_code_mnd), and [Modern Standard Arabic](https://wals.info/languoid/lect/wals_code_ams) have been excluded.

The range of resulting inventories extends from a low of 6 consonants to a high of 122. [Rotokas](https://wals.info/languoid/lect/wals_code_rtk) ([West Bougainville](https://wals.info/languoid/family/westbougainville); [Papua New Guinea](https://wals.info/country/PG)) has only six consonants. These might be represented in a simplified transcription with the letters /p, t, k, b, d, g/ although the range of pronunciations heard in different word positions covers a considerably wider range of sounds than these letters suggest. [!Xóõ](https://wals.info/languoid/lect/wals_code_xoo) ([Southern Khoisan](https://wals.info/family/khoisan#southernkhoisan); [Botswana](https://wals.info/country/BW)) has 122 consonants, mainly because it has a very large number of different click sounds with which a word may begin. The more typical consonant inventory size is in the low twenties, with the mean for the 562 languages being 22.7, the modal value 22 and the median 21. Consonant inventories close to this size (22 ± 3) have been categorized as **average**, and the remainder divided into the categories **small** (from 6 to 14 consonants), **moderately small** (15-18), **moderately large** (26-33), and **large** (34 or more consonants). As Figure 1 illustrates, the particular cut-off values for the categories were chosen so as to approximate a histogram with a normal distribution, although there are somewhat more languages with inventories smaller than the band defined as “average” than with larger than average inventories.

**Figure 1:**Histogram of languages in the sample according to categories of consonant inventory size

**2. Geographical distribution**

Languages with average size consonant inventories are found in most areas of the world, suggesting that this size truly is a representative of something typical for spoken human languages. The languages with larger or smaller inventories on the other hand display quite marked regional disparities in their distribution.

Those with smaller than average consonant inventories predominate in the Pacific region (including New Guinea), in South America and in the eastern part of North America, with particular concentrations of “small” inventories in New Guinea and the Amazon basin. The degree of typological similarity with respect to consonant inventory size between the languages of New Guinea and Australia is intriguing. The received idea is that the population ancestral to speakers of today’s [Australian](https://wals.info/languoid/family/australian) languages reached the continent when New Guinea and Australia were connected by dry land in the now partly-submerged landmass known to geologists as the Sahul shelf. Since the landbridge linking New Guinea and Australia was severed around 7000 years ago, contact between Australian and New Guinea peoples is believed to have been strictly limited except in the immediate region of the Torres Straits. Could this similarity represent the conservation of a trait common to languages spoken long ago when the lands were joined?

Those with larger than average consonant inventories are particularly strongly represented in Africa, especially south of the equator, as well as in an area in the heart of the Eurasian landmass, but are most spectacularly concentrated in the northwest of North America. The languages in this latter area belong to a number of different language families with no demonstrable genealogical relationship, including [Eskimo-Aleut](https://wals.info/languoid/family/eskimoaleut), [Na-Dene](https://wals.info/languoid/family/nadene), [Salishan](https://wals.info/languoid/family/salishan), [Tsimshianic](https://wals.info/languoid/lect/wals_code_tsi) and [Wakashan](https://wals.info/languoid/family/wakashan), among others. There is no evidence that the predominance of large consonant inventories in this area is a consequence of direct borrowing of words between these languages although cultural contacts between the peoples concerned are in many cases intense and deep-rooted. The situation is clearly different in one part of the African zone where large consonant inventories occur. Several Bantu languages (part of the larger [Niger-Congo](https://wals.info/languoid/family/nigercongo) family) in the southern part of the continent, such as [Zulu](https://wals.info/languoid/lect/wals_code_zul) and [Yeyi](https://wals.info/languoid/lect/wals_code_yey), are known to have enlarged their consonant inventory by borrowing clicks and other sounds which they did not previously use from languages of the Khoisan group, which already had many consonants (see, for example [Louw 1975)](https://wals.info/refdb/record/Louw-1975).

**3. Theoretical issues**

Mapping the size of consonant inventories prepares the way to investigate two connected issues. The first concerns how complexity of different aspects of the sound patterns of languages is related. All human languages are capable of expressing the range of human needs; it might therefore be assumed that they would be similar in their level of complexity. We have seen that by one simple measure of their phonological complexity, the size of the consonant inventory, languages cover quite a wide range. But complexity in one aspect might be balanced out by simplicity in another, so that in aggregate all languages are similarly complex. If this is so, mapping different aspects of phonological complexity should tend to show inverse relationships between one aspect and another in level of complexity. If this is not found, it is reasonable to conclude that languages are not constrained to be similar in this particular way, but that languages with quite different levels of complexity function just as well as each other. Several of the maps that follow will contribute to considering this question, by mapping properties of the vowel inventory (chapter [2](https://wals.info/chapter/2)), the syllable structure (chapter [12](https://wals.info/chapter/12)) and the presence and complexity of tone systems (chapter [13](https://wals.info/chapter/13)).

The second issue concerns the hypothesis that there is an overall relationship between the size of a consonant inventory and the kind of consonants it includes. According to the “size principle” [(Lindblom and Maddieson 1988)](https://wals.info/refdb/record/Lindblom-and-Maddieson-1988) smaller consonant inventories will tend to contain only those consonants which are in various ways inherently simpler (perhaps because they involve smaller movements to pronounce them, or are easier for a listener to distinguish from other sounds). Consonants which are inherently more complex will be found in larger inventories. If this hypothesis is correct then the geographical distribution of inherently complex consonants should mirror the distribution of larger consonant inventories. In three of the following chapters, [6](https://wals.info/chapter/6), [7](https://wals.info/chapter/7) and [19](https://wals.info/chapter/19), the occurrence of some selected classes of complex consonants will be mapped as a test of this hypothesis as well as for the inherent interest of seeing the distribution concerned.

**Chapter Vowel Quality Inventories**

by [Ian Maddieson](https://wals.info/author/maddiesoni)

**1. Introduction**

This chapter discusses the number of vowel contrasts in the inventory of sounds in languages. It complements Chapter [1](https://wals.info/chapter/1) on consonant inventories, although in this chapter the number of elements concerned is counted in a slightly different way. **Vowels** are the kinds of sounds that typically occur as the essential centers of syllables; in many languages the shortest possible word consists of just one vowel, as in the [French](https://wals.info/languoid/lect/wals_code_fre) word *eau* ‘water’, pronounced as the single vowel sound /o/. As this example shows, an established spelling system often involves a very indirect connection between the letters used and the vowel sounds of the language. The set of vowels used must therefore be established in the same kind of way as was discussed for consonants, in this case by comparing sets of words in which only the vowel sound differs. The [English](https://wals.info/languoid/lect/wals_code_eng) words *seat, sit, sate, set, sat, sot, soot, suit* show that [English](https://wals.info/languoid/lect/wals_code_eng) has at least 8 different vowel sounds. By considering further sets of words with other consonants, the full set of [English](https://wals.info/languoid/lect/wals_code_eng) vowels can be established (which will vary depending on the variety of [English](https://wals.info/languoid/lect/wals_code_eng) being considered).

As with consonants, for many languages it is quite straightforward to decide how many vowels there are, but in other cases there are some difficult questions to resolve, particularly where there is a question of whether a given syllable center should be recognized as consisting of one or of two (or even more) parts. There are a number of types of cases which pose this problem, of which only three principal ones will be discussed rather briefly here. These concern **vowel length**, **vowel nasalization**, and **diphthongs**.

In many languages a vowel which is held for a longer time contrasts with a shorter version of the same vowel (or one similar enough to be considered basically equivalent). For example, in [Tlingit](https://wals.info/languoid/lect/wals_code_tli) ([Na-Dene](https://wals.info/languoid/family/nadene); Alaska), the word written *t’a* /t'a/ means ‘king salmon’, whereas *t’aa* /t'aː/ means ‘board, plank’. Such a long vowel might be considered to be two copies of the same vowel in succession, as the spelling suggests, or be thought of as a single unit. The considerations which would lead to making one choice or the other are often finely balanced and lead different scholars to different conclusions.

A nasalized vowel is one in which air is flowing out through the nose as well as through the mouth. In many languages pronunciations of the same word may vary in different contexts between saying a nasalized vowel and saying a vowel and a nasal consonant, as in the different pronunciations of [French](https://wals.info/languoid/lect/wals_code_fre) *bon* in *bon café* ‘good coffee’ and *bon ami* ‘good friend’, /bɔ̃ kafe/ versus /bɔn ami/. Again different considerations might lead to different choices, either interpreting such a case as containing a unit which is a nasalized vowel or as consisting of two parts, namely a vowel accompanied by a nasal element.

Diphthongs, such as the kinds of sounds heard between the consonants in the [English](https://wals.info/languoid/lect/wals_code_eng) words *lied* /laid/ and *loud* /laud/, involve movement of vowels from a starting position to a different finishing position. Again it is possible to consider such cases as single sounds with an inherent movement or to view them as the result of saying two different vowels in succession.

According to the decisions which are made on issues such as these the number of vowels said to occur in a given language could vary considerably. A more consistent way to compare vowel inventories is to make the comparison at a somewhat more abstract level. Phoneticians recognize three properties which contribute to the most basic quality or “timbre” of a vowel sound. These are its **height** (roughly, how open the jaw needs to be to make the vowel), its **position in a front-to-back dimension** (roughly, whether the tongue needs to be pushed forward, remain more or less in the position in which it rests during normal breathing, or be pulled toward the back of the mouth for that vowel), and the **lip position** (whether the lips are pushed forward and narrowed or not). There is much more agreement on how many vowel types differing along one or more of these basic dimensions occur in any given language. Long and short variants of the same vowel are always counted once, nasalized vowels do not add to the inventory as long as a non-nasalized counterpart occurs, and so on. For that reason, the number of basic vowel qualities in each language is what is examined in this chapter. [Spanish](https://wals.info/languoid/lect/wals_code_spa) is thus counted as having five vowels, which generally are represented quite straightforwardly by the letters *i, e, a, o, u* in [Spanish](https://wals.info/languoid/lect/wals_code_spa) orthography. The diphthongs which occur in words such as *puerta* ‘door’ or *siempre* ‘always’ can be resolved as combinations of two of these basic vowels occurring within a single syllable. For the five recognized vowel qualities in [Spanish](https://wals.info/languoid/lect/wals_code_spa) a simple phonetic categorization can be given in terms of the basic properties as follows: the two vowels represented by /i, u/ are high vowels, /e, o/ are mid vowels and /a/ is a low vowel. The vowels /i, e/ are front, /a/ is central, and /o, u/ are back; /o/ and /u/ are also rounded while the other three [Spanish](https://wals.info/languoid/lect/wals_code_spa) vowels are unrounded.

**2. Establishing the values**

When vowel qualities are counted in this way in the sample of languages surveyed for this chapter, the average number of vowels in a language is just fractionally below 6. The smallest vowel quality inventory recorded is 2 and the largest 14. There are 4 languages in the sample with only two contrasting vowel qualities; these are languages in which only the height of the vowel has any distinctive function according to at least one possible interpretation of their phonetic patterns. An example of this extreme is [Yimas](https://wals.info/languoid/lect/wals_code_yim) ([Lower Sepik-Ramu](https://wals.info/languoid/family/lowersepikramu); [Papua New Guinea](https://wals.info/country/PG)). Only one language in the sample, [German](https://wals.info/languoid/lect/wals_code_ger), uses 14 vowel qualities and only 2 make use of 13, namely the variety of British [English](https://wals.info/languoid/lect/wals_code_eng) included here and [Bété](https://wals.info/languoid/lect/wals_code_bet) ([Kru](https://wals.info/family/nigercongo#kru), [Niger-Congo](https://wals.info/languoid/family/nigercongo); [Côte d'Ivoire](https://wals.info/country/CI)). Considerably more languages have an inventory of five vowels than any other number — 188 or just over one-third. The next most frequent inventory size is six vowel qualities, with 100 languages (or 17.8% of the sample). In plotting the data on [Map 2A](https://wals.info/feature/2A), vowel quality inventories with 5 or 6 members have therefore been grouped together in the category of “average” while those with 4 or fewer are classified as “small” and those with 7 or more are classified as “large”. Languages with “average” vowel quality inventory size account for more than half the total sample (51.2%), about a third (32.5%) have “large” vowel quality inventories, and only 16.3% have “small” vowel quality inventories.

| **Values of Map 2A.** Vowel Quality Inventories | | |
| --- | --- | --- |
| [**Go to map**](https://wals.info/feature/2A) | | |
|  | **Value** | **Representation** |
|  | Small vowel inventory (2-4) | 93 |
|  | Average vowel inventory (5-6) | 287 |
|  | Large vowel inventory (7-14) | 184 |
| **Total:** | | 564 |

**3. Geographical distribution**

There are strong areal patterns in the distribution of vowel quality inventories. Not surprisingly, languages with average inventory sizes are the most widely scattered. In just a few areas, southern Africa being one, they occur almost to the exclusion of the other two types. Small and large inventories on the other hand are markedly skewed in their geographical distributions. Languages with small inventories are frequent in the Americas. The indigenous languages of the Americas quite often have four vowels in a set similar to that of [Spanish](https://wals.info/languoid/lect/wals_code_spa) except for missing an /u/-like vowel. Examples of languages having this kind of system are [Eastern Ojibwa](https://wals.info/languoid/lect/wals_code_oji) ([Algonquian](https://wals.info/languoid/lect/wals_code_alg); Ontario), [Navajo](https://wals.info/languoid/lect/wals_code_nav) ([Athapaskan](https://wals.info/family/nadene#athapaskan); southwestern [United States](https://wals.info/country/US)), [North Puebla Nahuatl](https://wals.info/languoid/lect/wals_code_nhn) ([Uto-Aztecan](https://wals.info/languoid/family/utoaztecan); [Mexico](https://wals.info/country/MX)), and [Tacana](https://wals.info/languoid/lect/wals_code_tac) ([Tacanan](https://wals.info/languoid/family/tacanan); [Bolivia](https://wals.info/country/BO)). Others of these languages, such as [Aymara](https://wals.info/languoid/lect/wals_code_aym), [Cherokee](https://wals.info/languoid/lect/wals_code_che), and [Haida](https://wals.info/languoid/lect/wals_code_hai), have three-vowel systems, usually reported as having two high vowels /i, u/ and a low central vowel /a/. In Australia small vowel inventories dominate, this feature being just one of a number of properties which tend to give the languages native to this part of the world a special character from the point of view of their sound patterns. Small vowel inventories occur rarely in the remaining parts of the world, that is, in Africa, the entire Eurasian mainland and New Guinea and the Pacific Islands, although there are some specific small language groups, such as the [Berber](https://wals.info/family/afroasiatic#berber) languages of North Africa and the [Northwest Caucasian](https://wals.info/languoid/family/northwestcaucasian) languages spoken near the border of Russia and Georgia, which may have this feature.

Africa is strikingly marked by a zone right across the "middle belt", roughly between the Equator and the Sahara, in which large vowel inventories predominate. This belt encompasses languages belonging to three major families, [Niger-Congo](https://wals.info/languoid/family/nigercongo), [Nilo-Saharan](https://wals.info/languoid/family/nilosaharan) and [Afro-Asiatic](https://wals.info/languoid/family/afroasiatic). The relatively large number of vowels in these languages seems to be associated with the prevalence of patterns of **vowel harmony** in the same area. When a language is said to have vowel harmony this generally means that within a word, including any affixes, it is only possible to combine the members of certain subsets of the vowels together. Such restrictions are very common in both [Niger-Congo](https://wals.info/languoid/family/nigercongo) and [Nilo-Saharan](https://wals.info/languoid/family/nilosaharan) languages within this area. Since its effect is to reduce the number of legitimate words that can be constructed from the set of sounds available, the presence of vowel harmony may make it easier to tolerate a larger than average number of different vowels in a language as it reduces the risk of mishearing and misidentifying a word. This is because in a language with vowel harmony a given vowel in a word does not have to be discriminated from among the set of all possible vowels, but only among those of a subset.

There are also concentrations of larger than average vowel inventories in interior Southeast Asia and southern China, in much of Europe and, on a smaller scale, in interior New Guinea. The European area also includes a number of languages with vowel harmony restrictions on the distribution of their vowels, such as [Finnish](https://wals.info/languoid/lect/wals_code_fin) and [Hungarian](https://wals.info/languoid/lect/wals_code_hun), as well as [Turkish](https://wals.info/languoid/lect/wals_code_tur) and its relatives (which extend well into Central Asia and to western China). However, large vowel inventories in some of the other languages in this area came about (in part, at least) as a result of earlier distinctions between sets of long and short vowels being transmuted into contrasts of vowel quality. This occurred (subject to other influences as well) in [English](https://wals.info/languoid/lect/wals_code_eng), [German](https://wals.info/languoid/lect/wals_code_ger) and [Italian](https://wals.info/languoid/lect/wals_code_ita), amongst others.

**4. Discussion**

In the Asian area concerned a number of the languages are well-known for having undergone historical sound changes which shortened their words so that many of them became just one syllable long, and often at the same time reduced the number of distinctions between different consonants, especially at the ends of words. In some cases at least, these changes also resulted in increasing the number of distinct vowels. Such patterns of inter-related changes have sometimes been taken to suggest that languages maintain an overall balance in the complexity of their phonological systems. It is therefore interesting to examine whether a tendency to balance a small number of consonants with a larger number of vowels and conversely to balance a larger number of consonants with fewer vowel contrasts can be detected in the data of this survey. In a set of 559 languages for which the consonant inventory size and the vowel quality inventory size are both available, absolutely no correlation was found between the number of vowels and the number of consonants (for the statistically minded, the correlation coefficient between the two series of numbers is -.004). The lack of any significant relationship between these properties is also evident when the broad size categories discussed in this chapter and Chapter [1](https://wals.info/chapter/1) are considered. For example, of the 167 languages with “moderately large” and “large” consonant inventories as defined in Chapter [1](https://wals.info/chapter/1), 33 have “small” vowel quality inventories and 50 have “large” vowel quality inventories, or 19.8% and 29.9% respectively. These proportions are very similar to the overall frequencies found in the entire sample. As a general principle it cannot therefore be said that the numbers of vowels and consonants in an inventory, as counted here, bear a relation to each other. There are many different possible balances between these two aspects of a language’s sound system which all serve to create a satisfactory tool for human use.

Words and Sentences

Morphology is the study of the internal structure of words, how words are composed of smaller, meaningful units in languages of the world.

Syntax is the study of sentences. How sentences are formed out of words in turn.