Phonemes and Allophone

Consider two English words: sip and zip. The only difference between these two words phonetically is in the beginning consonants: [s] is voiceless but [z] is voiced. This is called a minimal pair. The relationship between [s] and [z] in a minimal pair of words like these is called contrast. Specifically, this is called Contrast in Identical Environments or CIE. When we observe contrast in a minimal pair, we say (conclude) that the two segments ([s] and [z]) are distinct phonemes in this language.

Definition: A phoneme is a sound that can consistently be used to make a (minimal) distinction between two different words in the same language.

Now let's consider the relationship between another pair of similar sounds in two different languages:

- oral [a] vs. nasalized [ã].
- In Shipibo (a language spoken in the Amazon jungle of Peru), these two segments also contrast, as in the following minimal pair:
  - [i'sa] 'bird'
  - [i'sã] 'palm oil'

This is also a case of Contrast in Identical Environment, so we conclude that in this language, /a/ and /ã/ are two separate phonemes. This is confirmed by the fact that:

- this type of contrast can also be found in many other words of the language, including in different phonological environments:
  - unstressed syllables as well as stressed syllables, and word-initial and word-medial syllables as well as word-final position. Furthermore, the same type of relationship (contrast) can also be shown to exist for the other pairs of oral vs. nasalized vowels as well: /i/ vs. /ĩ/, /o/ vs. /õ/, etc. All of these facts are an indication that our analysis is on the right track.
- One implication of this conclusion is that in Shipibo, it is probably necessary to write these two phonemes (/a/ and /ã/) in different ways in the practical orthography.

In English, the phone (segment) [a] occurs always and only before an oral consonant or word-finally, while nasalized [ã] occurs always and only before a nasal consonant. This type of relationship is called complementary distribution. It is the opposite of contrast. In English, there can never be any minimal pairs contrasting oral [a] vs. nasal [ã] in the exact same phonological environment at the same time, as there are in Shipibo. In other words, it is not the case that [a] and [ã] are separate phonemes in English. Rather, they are allophones of the same phoneme.

Definition: Allophones are predictable phonetic variants of the same phonemic unit.

The implication of these facts is that in English, there is no need to distinguish oral from nasalized vowels in the practical orthography; native speakers will always choose to pronounce the right allophone correctly when reading, since this is a subconscious, automatic reflex that we do without thinking.

In Shipibo, however, this is not the case: since two words can be minimally distinguished by oral vs. nasal vowels, and since this type of situation is very common in this language, they need to write the two types of vowels differently, or else the native speakers would get confused when they are reading. The way this is done in fact is by:

- writing iso vs. isã. Other possible ways to represent nasalization of vowels in practical orthographies is by:
  - underlining: isä
  - Or putting a tilde on top of the vowel symbol: isã
• phonemes (Shipibo /a/ vs. /ã/)
  • distinctive
  • contrast in identical environment (CIE)
  • minimal pairs can be found
  • overlapping environments
  • mutually inclusive
  • environments
  • contrastive
  • non-redundant
  • non-automatic
  • conscious
  • abstract
  • phonetically unpredictable

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**Difference between Phoneme and Allophone**

• phonemes (Shipibo /a/ vs. /ã/)
  • distinctive
  • contrast in identical environment (CIE)
  • minimal pairs can be found
  • overlapping environments
  • mutually inclusive
  • contrastive
  • non-redundant
  • non-automatic
  • conscious
  • abstract
  • phonetically unpredictable

• allophones (English [a] and [ĩ])
  • non-distinctive
  • complementary distribution
  • (CD)
  • no minimal pairs can be found
  • non-overlapping environments
  • mutually exclusive
  • environments
  • non-contrastive
  • redundant
  • automatic
  • unconscious
  • concrete
  • predictable from the phonetic environment