Distinctive Features Analysis (DFA)

- The distinctive feature analysis is based on the principle that phonemes should not be regarded as independent and indivisible units.
- A phoneme should be seen as bundle or combination of different features.
- The presence or absence of features are represented with + or - respectively.
- If two sounds were represented by exactly the same values + and - then they are not different phonemes.
- A positive value, [+], indicates the presence of a feature, while a negative value, [-], indicates its absence.
The DFA can help us describe sounds adequately and also distinguish one sound from the other.

We frequently refer to distinctive features when describing the consonants of English, and use it very little when describing the vowels.

In DFA, speech sound is called sound segment not phonemes. Each sound can further be divided into matrix of distinctive features.
Distinctive Features Analysis contd.

- Distinctive feature: any set of phonetic properties, as voicing, place of articulation or manner of articulation, serving to characterize and distinguish between the significant sounds or phonemes in a language.

- Example: /p/ has to be defined as a voiceless bilabial plosive to account for all the oppositions found with the other consonants in English.

- Therefore, these three features listed below are the distinctive features of /p/:
  - a. voiceless
  - b. bilabial
  - c. plosive
Examples

- /p/ [-voice, +labial, -nasal, -sonorant]
- /b/ [+voice, +labial, -nasal, -sonorant]
- /m/ [+voice, +labial, +nasal, +sonorant]
Terms used in DFA

- Some terms used in Distinctive Feature Analysis
- **Obstruents**: The vocal tract impedes air flow (plosives, fricatives, affricates)
- **Sonorants**: (vowels, nasals, glide, liquids)
- **Fortis (voiceless)**: produced with more muscular energy.
- **Lenis (voiced)**: produced with relatively weak energy.
- **Laryngeal features**: (the state of the glottis: voiced and voiceless +/- voice)
- **Manner features**: +/- continuant
Redundancy

- Redundancy is an important aspect of phonology which is captured by the use of distinctive features.
- For example, all nasals in English [m], [n], and [ɳ] are voiced. It is therefore, considered to be redundant when we specify [+voice] for them.
- The main distinctive feature in these sounds is the nasality. The voicing is secondary and predictable.
List of proposed distinctive features by Gussenhoven and Jacobs (1998):

- $[\pm \text{consonantal}]$
- Sounds which are $[+\text{consonantal}]$ are those which have some kind of constriction along the center of the vocal tract. This constriction must be at least as narrow as that required for a fricative.

- $[\pm \text{sonorant}]$
- Sounds which are $[+\text{sonorant}]$ are those which are produced with a constriction in the vocal tract that allows the air pressure both behind and in front of the constriction to be relatively equal. This feature generally divides the sound system into sonorants ($[+\text{sonorant}]$ sounds), which are nasals, approximants, glides, and vowels, and obstruents ($[-\text{sonorant}]$ sounds), which are oral stops, fricatives, and affricates.
- [± approximant]
  Sounds which are [+]approximant are those sounds whose constriction allows for a frictionless escape of air.

- [± voice]
  Sounds which are [+]voice are those which are produced with vibration of the vocal folds.

- [± spread glottis]
  Sounds which are [+]spread glottis are those produced with a glottal configuration that produces audible glottal friction. For example, the aspirated stops in English are [+]spread glottis]
- [± constricted glottis]
- Sounds which are [+constricted glottis] are those which are produced with the vocal folds drawn together and tense.

- [±continuant]
- Sounds which are [+continuant] are those which are produced without a central blockage in the vocal tract. For example, fricatives have a central constriction, but there is no complete blockage of the air, and they are therefore, [+continuant].

- [±nasal]
- Sounds which are [+nasal] are produced with nasal airflow.

- [±lateral]
- Sounds which are [+lateral] are produced with airflow passing through one or both sides of the tongue, which is in contact with the central part of the oral cavity.