

# DEEP LINGUISTIC STRUCTURES IN SPEECH

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## [A] FORMAL STRUCTURE OF LANGUAGE:

### [Aa] SPOKEN LANGUAGE:

#### [Aa1] DEEPER LEVEL SUBSYSTEMS:

- **Grammar:**
  - **Morphology** : Formation of Words. Lexical items – uninflected words found in a dictionary + Grammatical forms (e.g., the plural suffix {-s} of English)
  - **Syntax**: Formation of units composed of one or more words – such as Phrases (eg., {the red book, the book that Kumar gave me})
- **Morphophonology**: Mapping of grammatical units to strings of phonological units
- **Phonology**: Formation of Phonemes that are classes of abstract units that contrast with each other. Phonemes, in turn, are represented by **phones** at a lower level (eg., the English phonemes /p/ and /b/ as in {pill}, {bill} and the Hindi phonemes /p/, /p<sup>h</sup>/, /b/, /b<sup>h</sup>/ as in {pal},{bal},{p<sup>h</sup>al} and {b<sup>h</sup>al}

#### [Aa2] SHALLOWER LEVEL SUBSYSTEMS:

- **Phonetics**: Representing a string of phonemes a string of phones which are closer to the actual pronunciation.
- **Semantics**: Assigning meaning to syntactic and morphological inputs.

### [Ab] WRITTEN LANGUAGE:

- **Graphemics**: Formation of Graphemes that are classes of abstract units which are, in turn, represented by Allographs, glyphs etc.

## [B] EXPRESSIVE CONTENT OF AN UTTERANCE:

- Even a short utterance conveys some expression that is not reduced to writing
- Most of the expressive content is spread over several phonemes

## [C] TECHNOLOGY:

### [Ca] PROCESSES:

- Correlating (spoken) utterance with a symbolic representation
- Text is sparse whereas utterance is rich
  - Utterance → Text processing:
    - Condensing the rich information in the signal into a text string
    - Capturing the expressive information and representing it
  - Text → Utterance processing:
    - Converting the text string into the finest phonetic elements (phones, phonetic segments)
    - Supplying expressive content that has to be derived from extra-text sources (parsing, pragmatics, markup etc.)

[Cb] EXPLOITING SIMILARITIES AND DIFFERENCES AMONG LANGUAGES FOR TECHNOLOGY: Detailed study of similarities and differences in the shallow and deep representations of a given set of languages is essential for multi-language synthesis (with special reference to Indian languages and Indian Englishes)

- Even two genetically related languages may have different phonological inventories: Telugu and Tamil stops
- Similar graphemes in two languages may have different phonemic realizations : Hindi and Punjabi {C<sup>h</sup>V} sequences
- Similar phone may be assigned to different phonemes across two languages: British/US English and Hindi aspirates
- Abstract phonemes may camouflage fundamental differences in their phonetic rendering: Telugu and Bengali rhotics.