

## Phonological Theories

- Most current phonological theories have arisen out of linguistics.
  - linguists are attempting to understand how language is organized in the brain.
  - They have not yet succeeded.
- No one theory currently is used by all SLPs.

## Phonological Theories

- Up to the 1950s, the focus had been on analysis of what the speaker produced (surface form).
- All current theories are based on the idea of features as abstract things stored in the brain
- It's believed that what is in the brain and what is produced may not be the same.

## Distinctive Feature Theory

- When we describe speech sounds, we use terms like: place, manner, voicing, tongue height, lip rounding, tenseness.
- When we specify one of these descriptions, we are defining the articulatory features of the particular sound.

## Distinctive Feature Theory

- In this theory the basic unit is the feature (not the phoneme)
  - features can't be broken into smaller units.
- Features are binary; all phonemes either have [+] or don't have [-] a particular feature.
  - Several feature systems have been proposed.

## Distinctive Feature Theory

- Features may be based on:
  - Acoustic properties (e.g., strident, voice).
  - Articulatory properties (e.g., high, back, lateral, coronal).
  - Function in a syllable (e.g., consonantal, vocalic).

## Distinctive Feature Theory

- Proponents of this theory believe that phonemes are stored in the brain as "bundles of features".
  - Like phonemes, features are considered to be abstract mental notions.
- Features are called "distinctive" because they allow us to distinguish among phonemes.

## Distinctive Feature Theory

- Two phones are different phonemes if at least one of their features is different.
  - / p / = + consonantal, + anterior, - voice
  - / b / = + consonantal, + anterior, + voice

## Distinctive Feature Theory

- How do we use it clinically? Well...
  - If features are truly the basic unit, children will learn features.
  - Errors may be based on unlearned features rather than unlearned sounds.

## Distinctive Feature Theory

- This theory could potentially help us clinically.
- If we look at features rather than phonemes errors that look unique at the phoneme level may actually have a common basis.
  - What looks like several errors may actually be a common problem of not having learned a single feature.
  - E.g., child's errors may all be on [+] strident sounds or on [+] continuant sounds.

## Distinctive Feature Theory

- Consider the following minimal pairs:
  - pin – bin; pin – sin; pin – gin
  - Are these minimal pairs equivalent?
- Differ on varying numbers of features:
  - pin – bin (1; voicing).
  - pin – sin (2; place, manner).
  - pin – gin (3; place, manner & voicing).

## Distinctive Feature Theory

- Such pairs are equivalent for most current clinical approaches.
- But if children really are learning features perhaps they should NOT be considered equivalent.
- The “maximal oppositions” approach assumes they are not (more later).

## Generative Grammar

- This theory says that when we have an idea to express, we choose the morphemes we need.
- Then we assemble the words into utterances using the rules of the grammar.
- This “plan” then goes to the speech motor system and is expressed physically.

## Generative Grammar

- Each element in the lexicon is stored with details about what features are needed to assemble the necessary phonemes.
  - This is the “underlying representation”.
- The rules specify how phonemes, morphemes, words, and utterances must be combined to express the idea in a grammatically correct way.

## Generative Phonology

- One part of the underlying representation relates to the phonemes.
- The details of how the phonemes are stored in the brain are often specifically referred to as the “phonological representation”.

## Generative Phonology

- What is produced by the speech organs is called the “surface form” or “phonetic representation”.
- A subset of the grammatical rules are the “phonological rules” which *describe* how we get from the phonological representation to the phonetic representation.

## Generative Phonology

- The theory says that phonological rules make use of distinctive features.
- Sounds that share features form “natural sound classes”.
- Natural sound classes are often subject to the same kinds of changes.

## Generative Phonology

- The phonological rules include:
  - Allomorphic rules
  - Morpheme structure rules
  - Sequential constraints
  - Morphophonemic rules

## Generative Phonology

- An example of a phonological rule:
- Final voiced consonants tend to be devoiced at the ends of words (an allomorphic rule)

[+ cons., +voice] → [+cons., -voice] / \_#

## Generative Phonology

- If we want to apply this theory clinically we can examine a child's productions.
  - Look for changes that occur and the contexts in which they occur.
- The child may have their own set of rules.
  - What looks like a series of independent errors may be the result of a common rule.
- If we can discover the child's rules we can try to change them and it should change all the errors affected by the old rules.

## Generative Phonology

- Example of a child's rule:
- Attempts the word "soon" and "kiss" but produces [tun] and [kit] respectively.
  - /t/ substituted for /s/ .
  - /t/ differs from /s/ on the feature continuant.
- The child substitutes the feature [-] continuant for [+] continuant.

## Generative Phonology

- If the child's only error like this is using /t/ in place of /s/ , there is no advantage to talking about a "feature substitution rule".
- If however, the child also says:
  - fæn→pæn, væn→bæn, zu→du.
- A pattern emerges and we can describe the error pattern using a rule.

## Naturalness and Markedness

- Features or sounds that are more common in the world's languages are considered more "natural".
- As languages develop, certain sounds may be selected for use because they are easier to learn.
  - May be because they may be easier to produce and/or easier to hear.

## Naturalness and Markedness

- If sounds truly are more natural, many languages will select them for use.
- Features or sounds that are more natural are said to be "unmarked" because we assume they are the ones children learn first.
- "Marked" features or sounds are those that are less common in the world's languages.
  - they may be harder to learn.

## Generative Markedness

- Generative phonology also says we can predict normal development.
- Marked sounds are less common in the languages of the world which may mean they are more difficult to learn (less natural).
- Children should learn unmarked sounds first.

## Generative Phonology

Markedness says that:

- Voiceless obstruents are more natural than voiced obstruents.
- Obstruents are more natural than sonorants.
- Stops are more natural than fricatives.
- Fricatives are more natural than affricates.

## Generative Phonology

Markedness predictions (cont.)

- Low-front vowels are the most natural vowels.
- Tense vowels are more natural than lax vowels.
- Anterior consonants are more natural than non-anterior consonants.

## Generative Phonology

- How do we use it clinically?
  - It highlights the difference that may exist between a child's underlying representation and surface form
  - We look for phonological rules that account for error patterns
  - We distinguish between natural and unnatural error patterns

## Natural Phonology

- Natural phonology suggests that in their desire to communicate, children simplify what they want to say to make it possible for them to produce it.
- This theory assumes that young children's "underlying representations" are just like an adult's.

## Natural Phonology

- As their abilities improve, they slowly reduce the amount of simplification.
  - Eventually their speech comes to sound like that of an adult.
- Simplifications = "natural processes"
  - Believed to be innate, universal, mental operations.
  - Sometimes just called phonological processes.

## Natural Phonology

- Phonological development = learning to suppress (stop using) the natural processes.
- Phonological disorders = delay or inability to suppress the processes.

## Natural Processes

- Many different lists of processes have been proposed (no one agreed upon).
- Several published tests available.
  - Each test author has chosen a particular set of processes that they feel are either the most common or the most important.

## Natural Processes

- Several broad categories of processes
- Syllable structure processes (change the number or shape of syllables in the word), e.g.
    - Weak syllable deletion
    - Final consonant deletion

## Natural Processes

- Substitution processes (one sound class is replaced by another), e.g.
  - Stopping: substitution of a stop for a continuant sound e.g., /sʌn/ → /tʌn/.
  - Fronting: substitution of a front sound for a back sound e.g., /wit/ for /wik/ .

## Natural Processes

- Assimilatory (harmony) processes (sounds change so they are like another sound in the word), e.g.
  - velar assimilation
  - labial assimilation

## Natural Phonology

- Like Generative Phonology's "rules", the processes presented by Natural Phonology are only *descriptions* of what is being observed.
- We have no way of knowing if these actually represent what is happening in the brain.

## Natural Phonology

- Widely used by SLPs
- Especially helpful with highly unintelligible children who produce many errors.
  - Like generative phonology it allows us to reduce many errors into a more manageable number of "patterns".
  - In principle, if we treat the pattern all affected sounds will improve.

## Natural Phonology

Children with phonological disorders may:

- Retain early 'typical' processes.
- Demonstrate systematic sound preferences.
- Use unusual processes.
- Exhibit variable process use.

## Natural Phonology

- A significant problem with this theory is that errors can sometimes be described with more than one process:
  - E.g., /fɪks/ → /fɪk/ could be "cluster reduction" or "stridency deletion".
- We try to resolve this by determining which process is more frequent

## Nonlinear Phonologies

- A broad group of theories.
- Developed since the 1970s but only recently being considered in SLP research and practice.

## Nonlinear Phonologies

- Generative and Natural Phonology assume that speech is assembled in the brain and produced in a sequential (linear) fashion.
  - Only focused on the individual speech sounds or their features.
  - Assume that all features and sounds are equal.

## Nonlinear Phonology

- Later researchers recognized that features may also be arranged in a hierarchy (a series of levels or "tiers").
- Really just an extension of the idea that phonemes consist of features (from Generative Phonology).

## Nonlinear Phonologies

- The idea of tiers or levels was not new (only its application to phonology).
- It is very similar to the organization often proposed for the syntax of language.