The Structure of Language: Morphemes

**Morpheme**
- The smallest unit of sound that contains information.
- May be a word or part of a word.

The Structure of Language: Phonemes

**Phoneme**
- The smallest unit of sound.

The Structure of Language: Syntax

**Syntax/Grammar**
- Rules governing word order, sound combination, sentence formation, etc.

Whorf-Sapir Hypothesis

- Thoughts can take the form of language (as opposed to sights, smells, etc.)
- Therefore, the language that you know and the language that you think in may influence how you perceive, experience, and interact with the world
**Language Development**

**Table 1. Milestones**

<table>
<thead>
<tr>
<th>Age</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 wks</td>
<td>makes cooing sounds</td>
</tr>
<tr>
<td>16 wks</td>
<td>turns head towards</td>
</tr>
<tr>
<td>6 months</td>
<td>refers sounds</td>
</tr>
<tr>
<td>1 yr</td>
<td>babbles</td>
</tr>
<tr>
<td>2 yrs</td>
<td>uses 50-250 words; uses 2 word phrases</td>
</tr>
<tr>
<td>2.3 yrs</td>
<td>vocabulary &gt; 850 words</td>
</tr>
</tbody>
</table>

**Babbling**

- Characterized by drawn-out sounds made up of a variety of combinations of vowels and consonants.
- May sound like a real sentence or question because of the use of inflection and rhythm in the production of the babble.
- Combinations progress to become real words.

**The Segmentation Problem**

**Language comprehension**

- Children must develop language comprehension - parse words and understand their meanings – to be able to produce language.

- Expressive Vocabulary: use of word
- Receptive Vocabulary: understanding of word

**Universal Phoneme Sensitivity**

**Universal Phonetic Sensitivity**

- Very young infants can discriminate between all phonemes.
- Has a biological basis that is influenced by experience in early infancy.

**Social Learning Theory**

- Operant conditioning - praise provides reinforcement.
- Parents as a model - learning through imitation.

**Evidence for:**

- **Case Study: Genie**
  - From birth to age 13, locked in small room without social interaction
  - Did not develop language skills
- Theory: Language skills are learned through exposure to the language

**Evidence Against:**

- Overextensions
- Overregulization
Innate Mechanism Theory

LAD (Language Acquisition Device)
- Chomsky argues that we develop language so rapidly because humans have an innate language mechanism.

Behavioural Support
- **Subjects**: Congenitally deaf children from US & China
- **Background**: No exposure to sign language; no teaching of formal language rules; taught lip reading
- **Observation**: Spontaneously begun to communicate through signing using a grammar not of their parents’ language
- **Suggests**: The presence of an innate, automatic grammar

Neurological Support
- Infants show **physiological response** upon hearing native language = brains pre-wired to adapt to language.
- Infants prefer speech over non-speech sounds = seek language.

Brain Damage

**Aphasia**
- The loss of the ability to speak or understand language due to damage of the left hemisphere of the brain.

**Broca's Area**

**Wernicke's Area**

**Left Hemisphere**

**Patient status**: Damage to Broca's Area
- **Symptoms**:
  - Difficulty in the production of speech
  - Speech grammatically incorrect
  - Sentences formed from nouns and verbs; prepositions and conjunctions omitted; failure to pluralise and put words into the correct tense
  - Ability to comprehend speech remains unaltered
- **Diagnosis**: Expressive Aphasia

**Patient status**: Damage to Wernicke's Area
- **Symptoms**:
  - Difficulty in the comprehension and meaningful production of speech
  - Sentences are long, contain unnecessary and made-up words, have no meaning
  - Ability to produce speech remains unaltered
- **Diagnosis**: Receptive Aphasia
Animal Communication: Washoe

Taught to use signs (from American Sign Language) to communicate with humans

Results:
- Learned to use signs to communicate requests
- Did not use systematic grammar

Conclusion:
- Was not using 'language' to communicate because grammar is a necessary component of language

Animal Communication: Sarah

Taught to use plastic symbols to communicate with humans

Results:
- Learned to use extensive vocabulary of plastic symbols to communicate demands and answer questions
- Unable to generate new sentences

Conclusion:
- Was not using 'language' to communicate because being able to generate various combinations of phonemes to form words and various combinations of words to form sentences is a necessary component of language

Animal Communication: Nim Chimpski

Taught to use signs to communicate with humans

Results:
- Learned to use extensive vocabulary of signs
- Did not use signs spontaneously

Conclusion:
- Was not using 'language' to communicate because using it spontaneously (versus on demand) is a necessary component of language

Intelligence Testing

Francis Galton
Reaction Time as Measure of Intelligence

Stanford-Binet Intelligence Test

- 30 short tasks
- Name parts of the body
- Compare length/width
- Name objects
- Define words
Intelligence Testing
Charles Spearman & ‘G’
= general intelligence/ general cognitive ability

Howard Gardner & Multiple Intelligences
Seven Intelligences
- Verbal
- Mathematical
- Musical
- Spatial
- Kinesthetic
- Interpersonal
- Intrapersonal

Logic
Confirmation bias: seeking evidence that supports your hypothesis – not seeking information that might disconfirm your hypothesis

Reasoning - Heuristic
Availability Heuristic
- Relying on information available to us to make rapid decisions.

Heuristic of Representativeness: We rely on information that we feel is representative of a certain decision

Problem Solving
A problem’s ‘initial state’...
- Includes knowledge and resources you already have.
- Also know the ‘goal state’ of this problem.

Operator
- A tool or action that can change your current state.

Functional Fixedness
- The idea that we have difficulty seeing other uses for the same object.
<table>
<thead>
<tr>
<th>Stages of Development</th>
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</tr>
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<tbody>
<tr>
<td><strong>First Stage / Sensorimotor stage</strong></td>
<td><strong>Second Stage / Pre-operational Stage</strong></td>
</tr>
<tr>
<td>- Lasts until age 2 years.</td>
<td>- Lasts between the age of 2 and 7.</td>
</tr>
<tr>
<td>- Begin to purposefully engage the world.</td>
<td>- Learn to use abstract language to represent concepts and objects.</td>
</tr>
<tr>
<td>- Objects continue to exist even when out of sight.</td>
<td></td>
</tr>
<tr>
<td><strong>Third Stage / Concrete operational stage</strong></td>
<td><strong>Fourth Stage / Formal operational stage</strong></td>
</tr>
<tr>
<td>- Lasts between the ages of 7 and 11.</td>
<td>- After reaching the age of 11.</td>
</tr>
<tr>
<td>- Begin to show ability to reason logically.</td>
<td>- The same logic and reasoning level as adults.</td>
</tr>
<tr>
<td>- Able to classify objects in more complex categories.</td>
<td>- Can test hypotheses, think logical about abstract concepts, can reason about the hypothetical, the abstract, ethics, etc.</td>
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