Sarah Creel – How Children Learn to Understand Words

During the first year of development:
- innate auditory abilities govern categorization of speech
- sort out meaningful difference of sounds in language
- begin building Vocab. w/out meaning
- 10-12 mo. First spoken words

Experiments at this time are limited to observing what infants pay attention to. This includes observing what seems new, interesting, or by carefully setting up tests to see if they can determine what a word means or predicts.

1. **Head-turn Preference:**
   a. By playing different sounds from speakers around the baby, researchers record how long the baby faces the speaker in order to measure the interest in a given stimulus

2. **Habituation**
   a. High-amplitude Sucking – a given sound is played as long as babies suck; after hearing same sound, sucking rate declines; sucking rate rises with new stimulus. **Essentially babies like new sounds**
   b. Visual habituation – this technique requires a bit more training and involves hearing a sound every time a baby looks at a visual stimulus, declines as baby becomes habituated to the sound
   c. In order to test whether babies know what certain words refer to, their eyes can be tracked when corresponding pictures are displayed in conjunction with spoken word

**Early Speech development**

The voice onset time (VOT) determines what sound of speech is produced. A different voice onset time can lead the production of a “b” sound versus a “p” sound.
- Infants can tell apart two different sounds in any language.
- There are distinct categories of sounds based on VOT – adults can distinguish difference between categories but not within them (categorical perception)
- Language-specific refinement
  o yet they get worse at discriminating sounds outside their language as they develop

1. **Determining boundaries of words:**
   - word boundaries in speech are unclear
   - parents rarely produce sound in isolation
   - Infants use statistic to recognize sequences of sounds
     o Not specific to language – tone and visual patterns, too
2. Acquisition of Vocabulary
   • Some words may be context bound
   • Categorical organization
     o Proportion of nouns balloons compared to other parts of speech
     o True in almost all languages
   • Problems:
     o phonological encoding: what sounds did you say?
       ▪ Simplify consonant cluster
       ▪ /l/ and /r/ omitted
       ▪ stop consonants often voiced
       ▪ vowels undifferentiated
         ▪ Mispronunciation found do be a problem of production – not in how the children heard sounds
     o present-referent identification: what are you talking about now?
       ▪ Theorized that children form a correlation matrix to match characteristics of what words refer to
       ▪ Linguistic constraints on hypothetical space
         ▪ Whole objects
         ▪ Mutual exclusivity
         ▪ Ability to categorize parts of speech
     o category identification: how can a word be extended?

Howard Poizner – Motor Disorders

   • Provide a window into the workings of the motor system
   • Evolutionarily speaking the brain evolved for motor control

Proprioception
   • Sense of where body is in space
   • Critical in programming up movement

Deaffertation (PNS)
   • Disorder characterized by a complete absence of proprioceptive information
   • Unique in its "knocking-out" of just one sensory modality
   • Loss of dorsal root ganglion cells
   • Thought to be caused by virus
Parkinson’s Disease (CNS)

- Believe to be not getting the right proprioceptive information

Cortical Motor areas

- Parallel and hierarchical
- Basal Ganglia and cerebellum important in modulating effects of cortical motor areas
- Basal ganglia located deep within each hemisphere
  - Receive input from cerebral cortex then send back info to cerebral cortex
  - In Parkinson’s DA-producing neurons die in one nuclei

Parkinson’s therapy and characterization:

First line of therapy: drugs to replenish DA (first 5-15 yrs)

Symptoms:

- Tremor -
- Akinesia -
- Rigidity -
- Loss of postural reflexes -

What evidence regarding the loss of proprioceptive movement was produced by experiments of pointing to objects in space?

Other physiological information

- must lose 60-70% of DA containing neurons to have onset of Parkinson’s
- perhaps genetic predisposition can be triggered by environmental toxin
  - is it in pesticides? Eeek!
- Neurotoxin created in attempt at synthetic heroine created instant Parkinson’s in those who injected it