Jean Lamarck (1744-1829)

Theory of inheritance of acquired characteristics

Lamarck was wrong about giraffes...
…but maybe right about people

through language and culture

Components of Language

- **Phonemes** - basic unit of sound
- **Morphemes** - smallest unit of meaningful sound
- **Syntax** - rules for combining words
- **Pragmatics** - rules of conversation

**Phonological Development**: learning about the sound system of a language

**Semantic Development**: learning about expressing meaning

**Syntactic Development**: learning rules for combining words

**Pragmatic Development**: learning how language is used
The case of word learning…

- Children generally speak their first word before they turn 1.
- 18 months ~ 75 words.
- 2 years ~ 250 words.
- 5 years ~ 10,000 words

The “gavagai” problem (Quine, 1969):
“Gavagai”?
“Gavagai”? Grass? Tail?
Rabbit? Brown?
Ears? Fur?
Soft? “Rabbit essence?”
Mouth eating leaf?

“Flower!”
Or is it
- smell (n.)?
- smell (v.)?
- yellow?
- soft?
  etc., etc.

a.k.a. The “indeterminacy” problem.
How *do* young children learn to name objects?

Different theories have different answers.

Nativist (innate knowledge of language)

**Chomsky, Pinker**

- Universal grammar - unconscious rules common to all languages.
- Modularity hypothesis - the human brain contains an innate, self-contained language module.

Evidence:
- All children exposed to language learn language; other animals do not.
- Specific brain structures linked to specific language abilities.
- Children imposing grammatical structure onto simple language system.

Problems:
- Universal grammar
- Focus is on syntactic development; ignores communicative role of language.
Nativists on learning words

- **Syntactic bootstrapping** - The child comes to the task of learning language with knowledge about syntactic kinds (e.g. noun, verb). These are used to constrain possible meanings.
  
  “This is a daxy one”
  “Big Bird is gorping Cookie Monster”

- **Various Biases and constraints** - The child knows something about how words map to meaning.
  
  – Whole-object constraint (Golinkof et al)
  – Taxonomic constraint (Waxman et al)
  – Mutual exclusivity principle (Markman)
  – Object (shape) and substance (material) biases (Smith et al, Soja et al)

Interactionist (communicative functions of Language)

*Lois Bloom, Tomasello*

- Language is a social skill.
- Children are motivated to interact and communicate.

- **Evidence:**
  
  - Infants mostly use language to communicate with other people.
  - Infants'/children’s sensitivity to pragmatic cues.
  - Non-language-specific phoneme perception.
  - Infants and young children accept nonverbal sounds and gestures as labels for objects.

- **Problem:**
  
  - Nativists believe that sheer focus can not teach complex grammar.
  - Focuses on semantic development.
Interactionists on learning words

• **Pragmatic cues** (Tomasello, Baldwin)
  – Social context
  – *Joint Attention*: both parties engaged in a communicative act, attend to the same thing (mind reading)
  – *Intentionality*: how is the word used?
  – *Linguistic context*: how does it appear in a sentence?
  – *Syntactic bootstrapping*: use the whole sentence to figure out the meaning of the word

  “*oops!*”

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Connectionist

**McClelland, Elman**

• Language develops from strengthening neural connections in response to input.
• Language learning results from general-purpose mechanisms.

• Evidence:
  ▪ Infants can identify structural features of language.
  ▪ General-purpose connectionist models can explain overregularization, overextensions, etc.

• Problems:
  ▪ Most aspects of language have not been modeled yet.
  ▪ Built-in features and assumptions of models.
Connectionists on learning words

- **General purpose mechanisms** - Memory, attention, associative learning.

- **Structured environment** - General purpose mechanisms learning in a structured environment create biased learners, make word learning more efficient.