Jean Lamarck (1744-1829)

Lamarck was wrong about giraffes...

Theory of inheritance of acquired characteristics

...but maybe right about people through language and culture

Components of Language

- **Phonemes** - basic unit of sound
- **Morphemes** - smallest unit of meaningful sound
- **Semantic Development** - learning about expressing meaning
- **Syntactic Development** - learning rules for combining words
- **Phonological Development** - learning about the sound system of a language
- **Syntax** - rules for combining words
- **Pragmatics** - rules of conversation
- **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”?
**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!”

---

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.