Week 2: Language as an instinct

Study Guide

Last week we talked about how language acquisition is amazing and miraculous! Given how fast and based on how little evidence children become competent speakers of their native language, it's unlikely that language acquisition starts from scratch. This week, we'll describe what that means a little more.

Language acquisition is fast, and that is surprising because it's also hard!

- Children go from individual words ("mama"), to two-word utterances ("bye-bye park"), to complex sentences ("then it's gonna be daddy's turn") in the span of a year.
- But their task is quite hard. They have to figure out the basic elements of language (what are the sounds, words, categories, etc) and learn how those elements are permitted to combine (rules)
- Even more challenging: they only get a finite sample of the sentences possible in their language and from that sample, they have to figure out the underlying grammar that would allow them to produce an infinite number of grammatical sentences (and avoid any ungrammatical ones). This is known as an induction problem: many lines are consistent with a set of data and many grammars are consistent with a sample of input. How do we all arrive at the same one?
- As mentioned last week, we can constrain our learning.

Language as an instinct

- Somehow, acquiring language is part of our biological make-up. This isn't as crazy as it sounds, as **lots of behaviors in both humans and animals are biologically determined**.
    - **Instinct**: honeybee language; sucking, chewing, swallowing; mating, walking
    - **Learned/cultural**: reading and writing; cooking; romance; ways of eating ants (chimps)
- **Lots of behaviors are a mixture of both** - the basic program is present in biology, but they also need a rich environment or experience
    - Hunting by cats v. grooming; border collie herding, and human language!

Neurologist Eric **Lenneberg proposed a set of characteristics for biologically determined behaviors**

1. The behavior **emerges before it is necessary**
2. Its appearance is **not the result of a conscious decision**
3. Its emergence is **not triggered by external events** (though the surrounding environment must be sufficiently "rich" for it to develop adequately).
4. **Direct teaching and intensive practice have relatively little effect.**
5. There is a **regular sequence of "milestones"** as the behavior develops, and these can usually be correlated with age and other aspects of development.
6. There is likely to be **a "critical period"** for the acquisition of the behavior.

But, do these characteristics apply to language?

1. Language emerges before it's needed. 5 year olds are basically on par with adults (minus a few vocabulary words), but their needs are still very different.

2. No conscious decision seems to be required. All human communities have language, fairly minimal exposure will suffice, and children need not “decide” or be convinced to learn a language; they just do.
3. No external event triggers language acquisition to begin. Provided the environment is sufficiently “rich” (there is at least some exposure to language), children will acquire language. Contrast this with playing the piano - would a child who grew up exposed to piano music pick up piano playing in the same way they did language?
4. Direct teaching and intensive practice seem to have relatively little effect (more on this next week!).
5. Language follows a sequence of milestones whereby all children appear to master language in the same order: first words, two word speech, etc… (more on this next week!)
6. Instinctive behavior emerges during a specific developmental time window. If a rich environment is required for the behavior to develop normally, those stimuli must occur during this window (e.g. Border Collie’s can’t be raised with sheep if you want them to herd sheep, because they’ll imprint on the sheep between 4-16 months and think they are sheep themselves!)

Let’s spend a little more time on Lenneberg’s final point: the critical period. Specifically, **what is the evidence for a critical period for language**?

- Acquisition appears to be complete before puberty (apart from vocabulary)
- **Second language learners have more success if they learn before puberty**
    - All achieve native fluency if learned when young, but wide range when older.
- **Brain damage effects vary greatly based on timing**
    - In rare cases, when people have seizure disorders that are not responding to other treatment, and the seizures are localized to one hemisphere of the brain, the doctors and patients will elect to undergo a **hemispherectomy** (remove half of the brain!)
    - When the left hemisphere (language) is removed, the outcome is different depending on the age of the patient. Pre-teen patients usually recover language normally, which adult patients never do.
- **‘Wild’ children who grow up without language input**
    - Children who are raised by wild animals or in extreme neglect can have little or no exposure to language during the critical period, and have little or no language ability when they are discovered. They are generally seen as supporting the critical period, but there are some obvious problems: the children are often highly traumatized and have other deficits and there are very few cases.
    - There are many historical cases if you are interested: Romolus & Remus, Victor, Kaspar Hauser, but we will focus on a few modern cases
    - **Genie**: a neglected and abused child discovered at age 13.5 who received little or no language stimulation and was punished for making sounds. Researchers found that, while Genie acquired a large vocabulary and could effectively communicate, she never acquired any real syntax. For example, she might say: “Mike paint” or “Applesauce buy store”.
    - **Chelsea:** was mistaken for being deaf at birth and not exposed to language (unclear why). At age 32, it was discovered that she was only partially hearing impaired and with hearing aids she could hear nearly normally. Like Genie, she developed an extensive vocabulary and could communicate, but wasn’t able to form grammatically correct sentences.

- **Isabelle**: another neglected and abused child, but discovered at age 6.5 had a much better outcome. Just 1.5 years later Isabelle was capable of complex syntax like: “Why does the paste come out if one upsets the jar?” “What did Miss Mason say when you told her I cleaned the classroom?”

Another piece of evidence that language happens to everybody is that **language can often emerge in spite of deficits and independent of general intelligence**

- People with **Williams syndrome** have lower intelligence but high linguistic capacity.
- People with **Specific language impairment (SLI)** have higher intelligence but low linguistic capacity. Their language often emerges later, for example marking tense is usually consistent by age four, but SLI patients can take up to 8 years.
- People with **Down Syndrome** have lower intelligence and strong vocabulary and social language use, but tend to be behind on syntax and morphology (like verb tense, etc)
- Cristopher is an example of a **linguistic savant** who had a remarkable gift for acquiring language in spite of brain damage and general cognitive deficits (unable to pass the false belief task).