

Human Communication

Lecture 11

Language acquisition

- Different approaches
 - Generativism (nativist position)
 - Behaviourism
 - Cognition

Radical theories

- Generativism (Chomsky) and behaviourism (Skinner) are both extreme
 - Chomsky proposes that we human beings are born with an innate grammar
 - Skinner says that all our behaviour is determined by external influences
- Let's compare the situation with non-humans ...

Human Uniqueness

- Is language unique to humans?
 - Seems obvious to many that it is ...
 - Although: Other animals communicate with a fixed repertoire of symbols
 - But none appears to have the combinatorial rule system of human language, in which symbols are permuted into an unlimited set of combinations, each with a determinate meaning

Language unique to humans?

- Many other claims about human uniqueness, such as that humans were the only animals to use tools or to fabricate them, have turned out to be false
- Some researchers have thought that apes have the capacity for language but never profited from a human-like cultural milieu in which language was taught
- Hence experiments with teaching language-like systems to apes

Consider Koko the gorilla

- <http://www.youtube.com/watch?v=Pmuu8UEi2ko>



Koko using language?

- She uses sign language!(?)
- According to her “teacher” Penny Patterson, an American researcher, Koko is able to understand 1,000 signs based on American sign language and approximately 2,000 words of spoken English
- She is also able to sign back (no protocol of how many signs she can use is available)

Critique

- It is argued that Koko does not understand the meaning behind what she is doing but learns to complete the signs simply because the researchers reward her for doing so (indicating that her actions are the product of operant conditioning)
 - *What more is needed to show understanding?*
- Another concern raised about Koko's ability to express coherent thoughts through the use of signs is that interpretation of the gorilla's conversation is left to the handler: it's subjective and possibly biased
 - *But what about the speech of young children?*

Back to human beings

What do we know?

- All humans talk, while at least it's clear that animals don't acquire human language
 - therefore heredity must be involved in language
- A child growing up in Japan speaks Japanese whereas the same child brought up in California would speak English
 - therefore environment is crucial
- Let's consider the **output** and the **input** that seems to be available to the learning system ...

What do we know about *output*?

- We know that adult language is extremely complex, and we know that children become adults
 - Therefore something in the child's mind must be capable of attaining that complexity
 - Any theory that posits too little innate structure, so that its hypothetical child ends up speaking something less than real language, must be false
 - The same is true for any theory that posits too much innate structure, so that the hypothetical child can acquire English, but not say, Bunto or Vietnamese

What can we observe?

- Vocabulary growth
 - First 500 words at 17 months:
<http://www.TheMcCalpins.com/Kenneth/Development/500words.html>
 - (Quite different from most common 500 words among adults:
<http://www.world-english.org/english500.htm>)
- Syntax moves from simple one word sentences to more complex structure
 - Brown's classic table shows how even 2 or 3-word sentences show syntactic structure ...
(see also e.g. http://members.tripod.com/Caroline_Bowen/BrownsStages.htm)

Brown's classic table

Agent	Action	Recipient	Object	Location
(Mother	gave	John	lunch	in the kitchen.)
Mommy	fix.			
Mommy			pumpkin.	
Baby				table.
Give		doggie.		
	Put		light.	
	Put			floor.
I	ride		horsie.	
Tractor	go			floor.
	Give	doggie	paper.	
	Put		truck	window.
Adam	put		it	box.

Note

Normal children can differ by a year or more in their rate of language development, though the stages they pass through are generally the same regardless of how stretched out or compressed

Learnability Theory

Learnability theory (derived from computer science) has defined learning as a scenario involving four parts ...

The 4 parts

1. A class of languages
2. An environment
3. A learning strategy
4. A success criterion

The class of languages

- In the case of children, the class of languages would consist of the existing and possible human languages.
- One of them is the “target” language, to be attained by the learner, but the learner does not, of course, know which it is.
- The target language is the one spoken in their community.

The environment

- This is the information in the world that the learner has to go on, in trying to acquire the language.
- In the case of children, it might include sentences parents utter, the context in which they utter them, feedback to the child (verbal or non-verbal) in response to the child's own speech, and so on.
- Parental utterances can be a random sample of the language, or they might have some special properties:
 - they might be ordered in certain ways, sentences might be repeated or only uttered once, and so on.

The learning strategy

- The learner, using information in the environment, tries out “hypotheses” about the target language.
- Hypothesis *disconfirmation* is a key operation, leading to hypotheses being rejected (cf. scientific method).
- The learning strategy is the algorithm that creates the hypotheses and determines whether they are consistent with the input information from the environment.
- For children, it is the “grammar-forming” mechanism in their brains; their “**language acquisition device**”.

The success criterion

- If learning occurs, the learners' hypotheses are eventually related in some systematic way to the target language.
- Learners should arrive at a hypothesis at least approximate to the target language.
- But of course this is vague: when is the language *learned*? Does learning *stop*? Exactly *what*, in any case, *is* the “target language” (dialect/idiolect/etc.)?
- Perhaps the real criterion is that the learner is a seamlessly successful participant in the language culture ...; which is hard to express in learnability terms.

What do we know about *input*?

- We don't only know about the output of language acquisition, we know a fair amount about the input to it, namely parent's speech to their children
- So even if language acquisition, like all cognitive processes, is essentially a “black box”, we know enough about its input and output to be able to make precise guesses about its contents

Examples of input

- Positive evidence
- Negative evidence
- Prosody
- Context

Positive evidence

- Children clearly need some kind of linguistic input to acquire language
- Children most definitely do need to hear an existing language to learn that language, of course. Children with Japanese genes do not find Japanese easier than English, or vice-versa; they learn whichever language they are exposed to.
- The term “positive evidence” refers to the information available to the child about which strings of words are grammatical sentences of the target language.

Negative evidence

- Negative evidence refers to information about which strings of words are ***not*** grammatical sentences in the language — such as corrections or other forms of feedback from a parent that tell the child that one of his or her utterances is ungrammatical.

Prosody

- Normal human speech has a pattern of melody, timing and stress called *prosody*.
- And motherese directed to young infants has a characteristic, exaggerated prosody of its own: a rise and fall contour for approving; a set of sharp staccato bursts for prohibiting; a rise pattern for directing attention; and smooth, low legato murmurs for comforting.

Context

- Children do not hear sentences in isolation, but always in a context.
- In interacting with live human speakers, who tend to talk about the here and now in the presence of children, the child can be more of a mind-reader, guessing what the speaker might have meant.
- Many models of language acquisition assume that the input to the child consists of a sentence and a representation of the meaning of that sentence, inferred from context and from the child's knowledge of the meanings of the words.