What’s the big deal about Nim Chimpsky?

Language and the brain

PSY 200
Greg Francis
Lecture 31

Broca’s aphasia

- Some stroke patients show agrammatical speech
- Seem to know what they want to say
- But are unable to say it

Broca’s aphasia

- Some stroke patients show agrammatical speech
  - repetition
  - short sentences
  - true for both written and spoken
  - no problem controlling mouth
    - e.g. blowing out candles

Brain damage

- Broca’s area ==> Broca’s aphasia
- Wernicke’s area ==> Wernicke’s aphasia

Broca’s aphasia

- Mr. Ford
  - omitted endings (-ed, -s)
  - omitted function words (or, be, the)
  - skipped function words when reading (or, be, the) but read similar sounding words (oar, bee)
  - named objects and recognized names
  - high (nonverbal) IQ
**Broca’s aphasia**
- Difficulty getting ideas across
- Patient BL was asked to describe this picture

BL: “Wife is dry dishes. Water down! Oh boy! Okay. Alright. Okay... Cookie is down... fall, and girl, okay... boy... um... Who’s is the boy doing?”

**Broca’s aphasia**
- Could understand questions if gist could be deduced from content words
  - Do you use a hammer for cutting?
  - Does a stone float on water?
- Failed to understand anything requiring grammatical analysis
  - The lion was killed by the tiger, which one is dead?

**Wernicke’s aphasia**
- Other stroke patients also show agrammatical speech
- Seem to be able to say things
  - But what they say is almost meaningless

**Wernicke’s aphasia**
- Difficulty getting ideas across

Boy, I’m sweating, I’m awful nervous, you know, once in a while I get caught up, I can’t mention the tampon, a month ago, quite a little, I’ve done a lot well. I impose a lot, while on the other hand, you know what I mean, I have to run around, look it over, trebbin and all that sort of stuff...
**Wernicke’s aphasia**
- Most aphasias involve damage to more than just one specific area

**Anomia**
- Damage around Wernicke’s area produces a deficit in the ability to name things
  - e.g., after a stroke in this area CB cannot retrieve nouns he wants to use

**Anomia**
- Sometimes anomia can be remarkable specific
- Some patients have difficulty with only certain types of nouns
  - concrete vs abstract (chair vs trust)
  - nonliving vs living (table vs dog)
  - animals and vegetables vs food and body parts
  - colors
  - proper names

**Brain and language**
- Recall that the left side of the brain is more involved in language than the right side
  - Broca’s and Wernicke’s areas are on the left hemisphere
- However, the right hemisphere can also work with language
  - left handed people
  - hemispherectomies (age matters!)

**Brain and evolution**
- We’ve argued that language is an evolved instinct
  - differences in brains account for differences in abilities
- One might hope to find proto-language abilities in “close” animals to humans
  - Chimpanzees, apes
- Anatomically, there are many similarities between human brains and apes and chimpanzees

**Brain and evolution**
- Cantalupo & Hopkins (2001)
  - Broadmann’s area 44 (part of Broca’s area in humans)
  - Compare area on left and right hemispheres
    - Larger on left for humans and apes
  - Implies hemisphere asymmetries that underlay language began at least 5 million years ago
Chimpanzee language
- In the 1960s several research groups reported teaching chimpanzees American Sign Language (ASL)
  - after failure to teach spoken language
  - other groups taught chimps to press symbols on a computer keyboard or string magnetized plastic shapes on a board
- Claimed to teach chimps hundreds of words
  - and chimps created new compound words
    - swan -> water bird
    - stale Danish -> cookie rock
    - There’s a movie
    - https://www.youtube.com/watch?v=u4T8ZeZy22M

Problems
- Just like with Eliza (the computer therapist) it is easy to attribute language ability where it does not really exist (9 month old children)
- You can teach an animal a lot using simple conditioning tricks
- Researchers were quick to excuse mistakes as “play”, “jokes”, “puns”, “metaphors”,...

Word counts
- For example, a deaf student on one research team later commented that she saw fewer signs than the non-deaf students
  - seems the researchers counted almost any hand movement as a sign
- Like
  - scratch -> “scratch”
  - pointing -> “you”
  - finger to mouth -> “drink”
  - hugging -> “hug”
  - reaching -> “give”
  - kissing -> “kiss”

Nim Chimpsky
- A relative of other “signing” chimps
  - with more careful judging probably learned approximately 25 words
  - moreover, the “signs” were variations of the natural movements of chimps in the wild
- The chimps did not learn ASL

Grammar
- Chimps failed to learn the rules of ASL grammar
  - unable to understand complex signs
  - Seemingly able to understand complex sentences
    - Would you please carry the cooler to Penny?
  - But really, the chimp need only understand two words: cooler and Penney
  - the rest can be guessed!

Grammar
- Likewise, the chimps never produced complex sentences
  - They tended to “say” things like the following
    - Nim eat Nim eat.
    - Drink eat me Nim.
    - Tickle me Nim play.
    - Me eat me eat.
    - Me banana you banana me you give.
    - Banana me me me eat.
    - Give orange me give eat orange me eat orange give me eat orange give me you.
Evolution

- Note, it would have been interesting if chimps could learn language
  - and not inconsistent with the idea that we have a language instinct
- But the failure of chimps to learn language does not go against the idea that language evolved in humans
  - as some people have proposed

Evolution

- Chimps are the closest living evolutionary relatives of humans
  - so if any non-human living animal could learn language it would probably be chimps
- But in evolutionary history, chimps and humans split from a common ancestor millions of years ago
- Humans evolved a language skill and chimps did not

Conclusions

- Language and the brain
- Broca’s aphasia
- Wemicke’s aphasia
- Anomia
- Chimps

Next time

- Consciousness
- Dualism
- Artificial intelligence
- Qualia

Do you see red like I see green?