Lecture 12:
Communication Disorders, Pt. 2

COGS 153

How can we study the language comprehension impairments in aphasia?

Offline methods:

- Untimed meta-linguistic tasks – e.g. “The boy saw the girl eat the ice cream.” Who ate the ice cream?
  - Sentence-picture matching
  - Grammaticality judgments
  - Paraphrasing

Online methods:

- ERPs
- Eye-tracking & pupillometry
- Cross-modal priming

What are the underlying causes of sentence processing deficits in aphasia?

Broca's aphasia results in complex sentence processing deficits.

- E.g. "The boy was chased by the girl", "Who chased who? -> The boy chased the girl.

Representational vs processing theories

- **Representational**: deficits are caused by an inability to construct particular syntactic representations (like complex sentence structures)
- **Processing**: patients maintain implicit linguistic knowledge of language, but cannot effectively use/access this knowledge

Lexical Processing Theories

Lexical hypothesis: lexical (word-level) retrieval deficits that lead to breakdowns in overall sentence comprehension

Lexical slow rise hypothesis: *slowed* lexical access system that makes syntactic processing too slow, snowballing into breakdowns of structure-building

- ERP component N400 associated with lexical/semantic processing is also delayed in people with aphasia

Bilingualism & Aphasia

What about bilinguals with aphasia?

Two central questions in bilingual aphasia research:

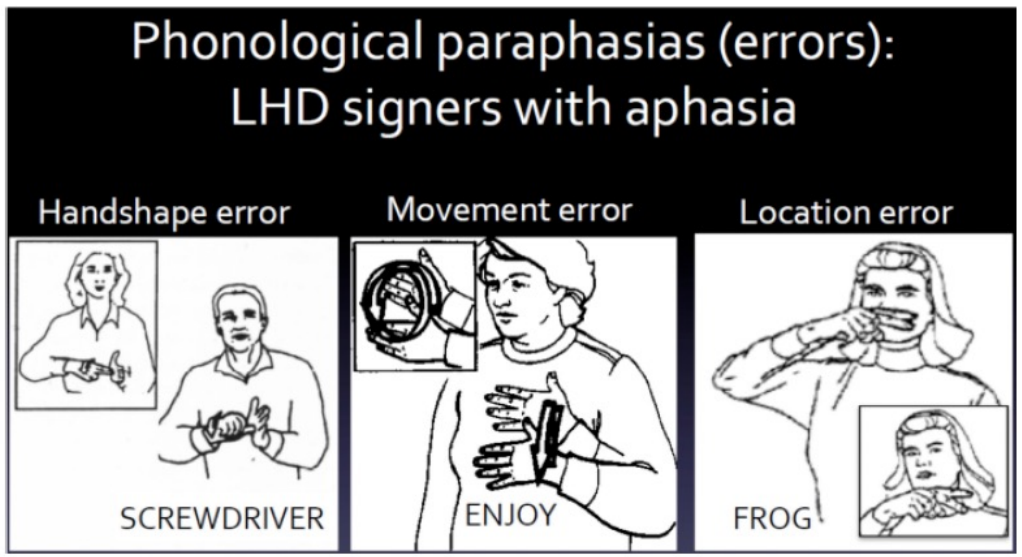
- Are L1 and L2 equally impaired following stroke?
  - Tschirren et al. (2011) – Age of Acquisition of L1/L2 impacts syntactic processing post-stroke, but not other language abilities (i.e., word-finding)
- How does language dominance/proficiency impact language abilities and recovery?
  - Penaloza, Barrett, & Kiran (2020) – Pre-stroke language proficiency predicts language impairments in bilingual people with aphasia

Aphasia and Sign Language

Does left hemisphere damage cause aphasia in sign language users?

- Poizner et al. (1987) – Deaf signers with left hemisphere damage showed symptoms of non-fluent aphasia
  - Sign retrieval difficulties
  - Phonological paraphasias
  - Morphological / syntactic errors

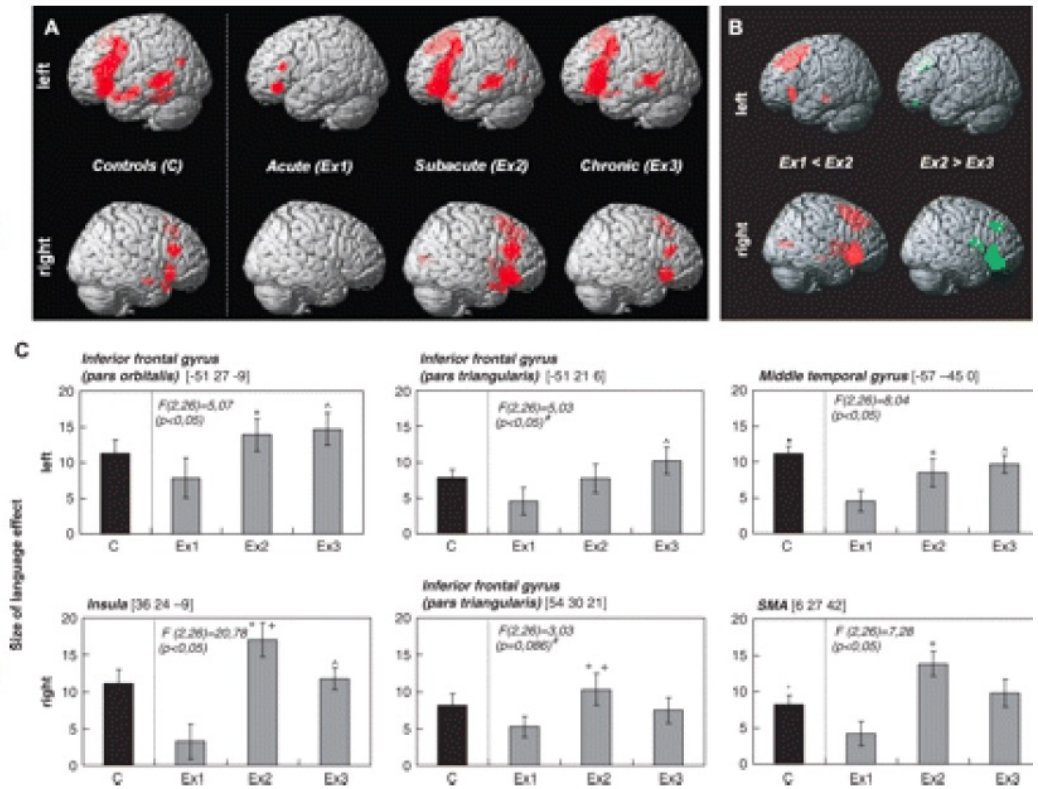
Examiner: What else happened?
Patient GD: CAR . . . DRIVE . . . BROTHER. . . . DRIVE . . .
I . . . S-T-A-D . . . . [Attempts to gesture "stand up"]



Language recovery and neural reorganization

Immediately after stroke, the brain undergoes many changes due to neural plasticity

- Saur et al. (2006) –
  - Acute phase (0-4 days post-stroke) – little activation of the perilesional language networks in left hemisphere
  - Subacute phase (4-14 days post-stroke) – recruitment of the right hemisphere homologue
  - Chronic phase (4-12 months post-stroke) – shifting back to left hemisphere dominance
- Fridriksson et al. (2012) – changes in the activation of the perilesional (area around the lesion) areas were related to better treatment outcomes



Right-hemisphere damage and language

- Patients with right hemisphere damage have largely preserved language skills (including grammar and word meaning)
- Impairments are with pragmatic aspects of language use
  - **Pragmatics:** inter-dependence between meaning and context (including physical context/situation, social context, cultural context/background knowledge, etc.)
    - Pragmatics (meaning in context) vs. semantics (literal meaning)

"Did you fall from heaven? 😳😏"

- Pragmatic (appropriate) interpretation? This person is hitting on me with a cheesy pick-up line / they think I'm attractive, etc.
- Purely semantic (literal) interpretation? "Is it the case that you fell down to earth from above?"

Right-hemisphere damage and language

- Production
  - Patients lack coherence, appropriateness in speech
  - Patients may not always stay on topic
  - Speech may be too vague or too detailed
  - May not establish common ground with conversational partner
  - Reduced sensitivity to the listener, including reduced eye contact and talking more/taking more turns in conversation, conversations may be egocentric

- Comprehension
  - Patients may also have deficits in integrating different kinds of information to arrive at an overall interpretation
  - Impairments are primarily with **non-literal** uses of language:
    - Irony / sarcasm, e.g., *She's a real genius...*
    - Idioms, e.g., *I heard it straight from the horse's mouth*
    - Metaphorical language, e.g., *She's an angel*
    - Indirect requests, e.g., *Can someone get the lights?*
    - Humor interpretation