Language and the Brain

The case of metaphor
Metaphor ...

- Metaphor seems to play a crucial role in human language and everyday cognition
  - Everyday cognition (Grice, 1975; Searle, 1979; Lakoff & Johnson, 1980; Sweetser, 1990; Gibbs, 1994)
- ... and in making abstraction possible
  - ... even in Mathematics (Lakoff & Núñez, 2000)
- Metaphor: Well studied in Linguistics, Psychology, Philosophy, Anthropology, Education, ...
- Neural basis?
“Labels”

- Language
  - Phonological
  - Syntactic
  - Semantic

- Pragmatic
  - “extra”-linguistic

“Literal”
- “Left hemisphere”
- … from philosophy
- … from lesion studies

“Non-Literal”
- (e.g., metaphorical)
- “Right hemisphere”
- “Extra”-linguistic deficits

“extra”-linguistic deficits from lesion studies... from philosophy
Metaphor? Neural basis?

Word – phrase/sentence
- Familiar - unfamiliar
- Novel - conventional
- Frequent - infrequent
- Simple - complex

Comprehension
Production

Brain lesions
EEG, ERP
rTMS
fMRI, PET
Metaphor comprehension

1. Deficit: Brain injury studies
2. Real-time comprehension: EEG, ERP studies
3. Localizing comprehension: rTMS, Neuroimaging (PET; fMRI)
Metaphor comprehension

1. Deficit: Brain injury studies
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RHD deficit

- Utterance an context
- Joke understanding  (Bihrle et al., 1986; Brownell, et al., 1983)
- Interpretation of sarcasm   (Giora et al., 2002)
- Literal interpretation of metaphorical language   (Winner & Gardner, 1997)
  - “He had a heavy heart”  (sentence-picture matching)
    - Picture with a man crying
    - Picture with a man lifting an oversized heart
Metaphor: RHD deficit?

- Conventional metaphor comprehension negatively correlated with lesion extent in LH (Wernicke’s) (Giora et al., 2002)
Metaphor: RHD deficit?

- Limitations of lesion studies
  - No control
    - High variability in extension of damage
    - Variability in individual’s re-organization plasticity
  - Poor (or no) temporal resolution for tracking the timing of “processing”
  - Few subjects
- Deficit: Abstraction? Familiarity? Complexity?
"The hell with the past—I'd like to put the future behind us."

"The hell with the past—I'd like to put the future behind us." (One man talking to another.)

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