Language Control in the Bilingual Brain


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Introduction

• Whole brain fMRI
• Same parts of brain activated regardless of language
• Previous experiments: language neurons highly overlap and are interconnected
• But, WHERE does language selection take place?

Experiment

• Semantic priming: first word may influence the response to 2nd word
• Neuronal adaptation: brain responds to similar stimuli with decreased activity
• Subjects shown pairs of words
• Either related or unrelated
• In same language or in different language

Procedure

• 3 groups of subjects, bilingual
• 2 German-English and 1 Japanese-English group
• One German group (PET)
• Other 2 (fMRI)
• Shown word pairs
• Measure accuracy and response times

Results

• Semantic priming regardless of language
• Reduced activation of vetral surface of left anterior temporal lobe for semantically related pairs
• Language dependent priming only in head of left caduate
• Reduction of activation only when language is the same
• Priming greater in same language

Hypothesis

• Reduction in left anterior temporal lobe
• 2 different results
  – Semantic activation independent of language
    • Neural adaptation same regardless of language
  – One region in brain responds to both semantic and language
    • Results will depend whether language was the same or different
Discussion

- Damage to left caudate = spontaneously switching languages
- Left Caudate activated when pairs were different languages or semantically unrelated
- All languages use mainly same pathway
- Anterior temporal is language independent

Opinions

- Experiment does not tell how many are female or males
- Thorough experiment, eliminated as many doubts as possible
- Can do experiment with females and males, record brain activity so see where males and females differ in language processing