Playing patty-cake interferes with classifying the names of objects that are interacted with manually

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Background

• Distributed theories of semantic memory: Semantic information about an object is distributed over brain regions invoked when we perceive and interact with it (e.g. Allport, 1985)
  • Evidence: Motor regions are active when naming pictures of tools – objects with which we interact manually (e.g., Chao & Martin, 2000)

• Because of this architecture:
  • Experience with an object should determine its representation
    Evidence: Amount of manual experience with an object influences amount of activity in motor regions when making judgments about it (Choler et al., 2009; Kan et al., 2008, 2010)
  • Motor information should be part of (not just ‘peripheral to’) object concepts
    Evidence: Engaging a brain region that is important to a concept may influence ability to access that concept (e.g., Pulvermüller et al., 2005; Glenberg et al., 2007; Witt et al., 2010)

Methods

Auditory Words:
• 208 concrete nouns: Animals, foods/plants, non-manipulable artifacts, tools
  • Balanced on frequency, tensility, number of syllables
• 70 abstract nouns

Procedure
• Classify words (say “pop” if concrete, “two” if abstract) while either:
  • Performing concurrent mental rotation task or no concurrent task (blocked)
  • Performing concurrent mental rotation task or no concurrent task (blocked)

Results (n = 72)

Interaction between type of interference task and experience:

Amount of experience predicts amount of interference:
• … from patty-cake task
• … but not from mental rotation task

Conclusions

• Engaging brain regions underlying manual interaction (with incompatible manual task) interferes with thinking about objects that are manually experienced
• These regions are part of (not peripheral to) the representation of frequently manipulated objects

References