Source Memory in Older Adults: An Encoding or Retrieval Problem?

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presented by

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Source Memory:
- The “where” and “when” of episodic memory
- Can include any contextual feature (not content)

Source memory is affected by aging more than fact or item memory (Brown, Jones, & Davis, 1995; Trott, Friedman, Ritter, Fabiani, & Snodgrass, 1999; 6 more studies)

Hypothesis: source memory relies on the integrity of the frontal lobes (Coffey et al, 1992; Raz, 2000)
- Patients with focal frontal lesions make more source memory errors than control (Janowsky, Shimamura & Squire, 1989)
- Amensics with FL lesions do poorly on source memory; those without perform normally (Simamura & Squire, 1987)
- Supported with ERPs and fMRIs
Relation between FL and Source Memory?

Contrary findings:
- Amnesic Korsakoff patients showed relation between FL atrophy and item, not source, memory (Kopelman, 1989)
- FL atrophy predicts fact recall, not source memory (Spencer & Raz, 1994)
- Source memory correlated with MTL functioning (Henkel et al, 1998)

Boundary between contextual and content features ill-defined; much crossover

Trade-off between item and source memory? (Naveh-Benjamin & Craik, 1996)

Perhaps FL activation in source memory tasks product of the greater difficulty of the tasks – i.e. search strategies, decisions (Shallice, 1982; Moscovitch, 1994)
Experiment 1: Methods

Questions for this study:
- Processes in source memory, and FL involvement
- Experiment 1: older adults with high/low FL impairment, high/low MTL impairment

- 32 older adults from Glisky et al 1995, 8 from each group; 24 young adult undergrads
- No differences in age, education, scores on MMSE
- Two tests:
  - listened to 12-item list of voices, 3X, random order, then voices again with either same or other sentence; recognition memory test for voices (2AFC)
  - Same setup; recognition memory test for sentence that each voice spoke (also 2AFC)
Experiment 1: Results

2x2 ANOVA: main effects of age and type of memory; no interaction
Voices that spoke same sentence more likely to be recognized than different

- Greater effect in younger than older (“same” condition)
- No effect of neuropsychological group (item and source)

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- No connection between difficulty and FL function
- Low FL group had difficulty with source recognition
  - Retrieval problem? Decision problem?
- Older adults showed smaller benefit of repeated context (9% compared with 20%)
Experiment 2: Method

- 24 older adults, 6 from each neuropsychological group; 24 undergrads

- Chairs:
  - 32 chairs in two different locations: 16 used during study phase, 16 as distracters
  - 12 more chairs from the two locations
  - An additional 2 chairs at the beginning of each set for primacy/practice issues

- Two tests:
  - Item memory test
    - Shown chairs; judgment; 2AFC item recognition
  - Source memory test
    - The 12 chairs; judgment; 2AFC source recognition
Experiment 2: Results

- 2X2 ANOVA showed main effects of age and type of memory, no interaction
- No same-different effects
- Near-effect of FL functioning on source memory; only group to perform significantly over chance
  - Low level of performance on source tasks may have caused floor effect
- No memory advantage for same condition, so not retrieval issue
  - Weak connection between object and location information?

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Experiment 3

Same as Experiment 2, but new subjects, and in test 2, subjects asked to judge how well each chair fit the room.

2x2 ANOVA showed main effects of age and memory type, and an interaction.

- Older adults not impaired on source recognition
- Marginal same-difference effect (p=.10)
- Low FL group better than high FL at source memory
  - Encoding activated normally with high FL functioning, but in low FL only with instruction
  - Does not fit with retrieval hypothesis

Tradeoff between encoding and retrieval?

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Experiment 4

- 32 older adults, 8 from each neuropsychological group; 24 undergraduates
- Same as experiment 1 (sentences with different voices), but with an orienting question (like experiment 3)
- 2X2 ANOVA: marginal effect of type of memory only significance
  - Older adults not impaired on source recognition
- Same-different effect for young and old
  - Enhanced for high FL group in item memory
- Replicates experiment 3: selective benefit of orienting for low FL group
- High FL group greater advantage for repetition of stimuli than low FL

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Discussion

- Evidence for importance of FLs in encoding
  - Attentional issue? Integrative issue? (Schacter et al, 1994)
- Little support for importance of FLs in retrieval, but tentative
- No effects of MTL: 2AFC method instead of recall
- Performance on item and source memory tasks correlated for young, not old
  - Different method of attacking tasks?
- Experiment 2: why 12 chairs and not 16?
- Differences in education (experiment 3, 4), in MMSE (experiment 2); always lower vocab in young adults
- Still very broad issues, and general brain regions
- High FL group not impaired on source memory
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