Phonological and Semantic False Memories across Memory Systems

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Introduction

False Memory

- False memories (FM) are remembering things that never happened (Radvansky, 2017)
- False memories can be studied using the Deese/Roediger-McDermott paradigm (DRM: Deese, 1959; Roediger & McDermott, 1995)
  - Lists of related words are studied, participants reliably recall a non-presented word (critical item, or CI)
- False memories are due to increased activation and monitoring errors (Roediger, Balota, & Watson, 2001)

Short-Term vs Long-Term False Memory

- Most false memory research using the DRM has examined long-term memory (LTM) but the DRM can be modified with shorter lists and immediate tests to assess short-term memory (STM)
- Existence of STM false memories suggest the processes involved in false memory production can occur rapidly
- Semantic false memories in both STM and LTM suggest an overlap between working/STM and LTM mechanisms (Atkins & Reuter-Lorenz, 2008; Flegal et al., 2010)
- Phonological codes are important to STM accuracy (McBride et al., 2019)
- STM reliance on phonological coding should reduce meaning-based influences (e.g., Norris, 2017) and increase errors for phonological associates than semantic associates (Xu et al., 2017)

Phonological vs Semantic Lists

- Phonological lists contain words that sound alike
- Semantic lists contain words that share a common theme or meaning
- False memories occur for semantic lists and phonological lists (Finley et al., 2017)
- Semantic errors suggest meaning-based influence (cf. Coane et al., 2016)
- Phonological errors suggest lexical-level influence (e.g., Hutchison & Balota, 2005)
- Most research has examined semantic and phonological lists in long-term memory (LTM)
- Similar error rates for semantic and phonological lists across STM and LTM suggests similar underlying processes, different error rates would suggest distinct underlying processes

Experiment 1: 6 – Item Lists

Purpose: Compare false memories in short-term and long-term across semantic and phonological lists

- Reversal of false memory rates suggests different memory stores are differentially sensitive to semantic and phonological coding

Materials: Semantic and phonological lists for 36 CIs (Watson, Balota, & Roediger, 2003)

Procedure: The same procedure was used for Exp 1 and Exp 1

Experiment 2: 4 – Item Lists

Purpose: Replicate Experiment 1 with 4-item lists and compare false memories in short-term and long-term across semantic and phonological lists

- Reversal in false alarm rates across tests with only 4-item lists would allow the assessment of short-term memory by not exceeding working memory capacity

Method: Same materials and procedure from Exp 1 were used except list length was changed from 6-items to 4-items

Method

Procedure: Exp 1 showed 6-item lists, Exp 2 showed 4-item lists

Short Term Memory Task

Critical Lure: DOG

Study Phase

Phonological List: bog, dot, dodge, frog

Semantic List: paw, bark, bite, flea

750 ms each

36 lists

Test Phase

dot/flea (Studied)

dock/puppy (Non-studied)

dog (CI)

Correct

YES

NO

NO

Long Term Memory Task

Study Phase

Phonological List: bog, dot, dodge, frog

Semantic List: paw, bark, bite, flea

36 lists

Test Phase

dot/flea (Studied)

dock/puppy (Non-studied)

[Odd/Even task] (CI not tested)

1-min break after all lists

Recognition Phase

108 words

Studied, Probed x12

Studied, Non-probed x 24

Non-studied, Non-probed x 36

CI x 36

Same encoding parameters as the STM task

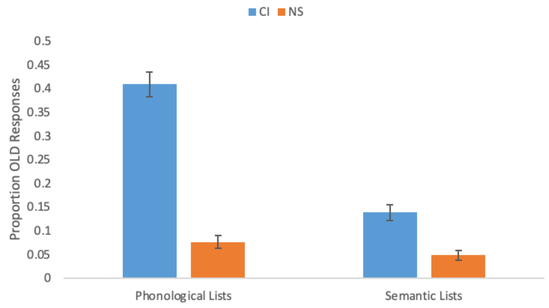
LTM or STM between participants (LTM participants were not warned about the final test)

Results

Short-term Memory Performance

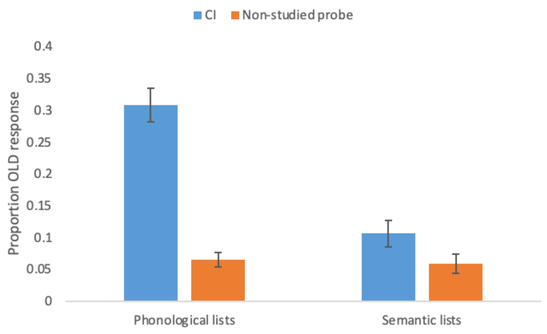
Experiment 1: (6-item lists)

- More errors in phonological than semantic lists



Experiment 2: (4-item lists)

- Replicated results of Exp 1
- More errors in phonological than semantic lists

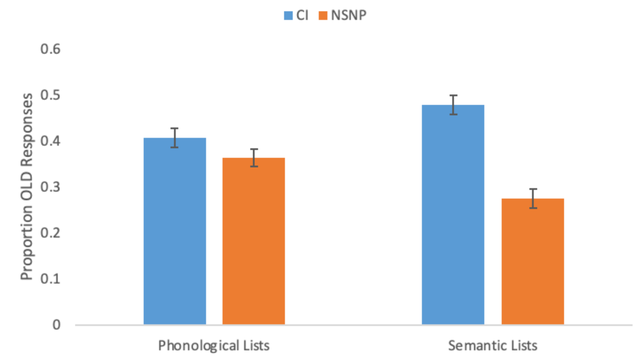


Results

Long-term Memory Performance

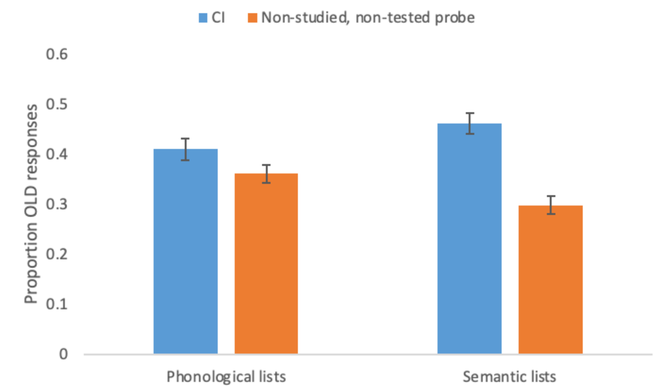
Experiment 1: (6-item lists)

- False memory reversal: More false alarms to semantic CIs than phonological CIs



Experiment 2: (4-item lists)

- Replicated results of Exp 1
- False memory reversal still exists with 4-item lists
  - More false alarms to semantic CIs than phonological CIs



STM vs LTM

- False alarms increased from STM to LTM for semantic CIs
- False alarms did not significantly differ from STM to LTM for phonological CIs
- False alarms to non-studied probes increased from STM to LTM, for both list types, with phonological lists increasing more

Discussion

- Successful replication of Exp 1 with 4-item supports our initial conclusions
  - Working memory capacity is not exceeded with 4-item lists, results show effect in STM
- In STM, more errors for phonological lists than semantic lists suggests phonological coding drives errors and processes
- In LTM, the effect reverses resulting in increase in semantically-driven errors
- In LTM, false alarms to non-studied probes increased, especially for phonological lists, suggesting reduced discriminability or increased reliance on surface similarity
- Overall results suggest there are distinct processes involved in the production of false memories in STM compared to LTM
  - Phonological and semantic information contributes differently to false memory production at short and long-term delays