The Relationship Between the Component Measures of the Operation Span Task

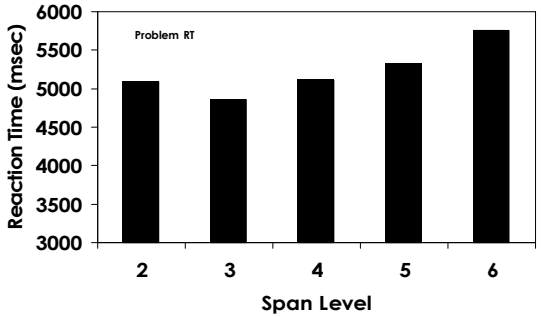
Lisa Barnes, Paul J. Schroeder, Judy Bordeaux, Mallory Crow ◈ University of Nevada Las Vegas

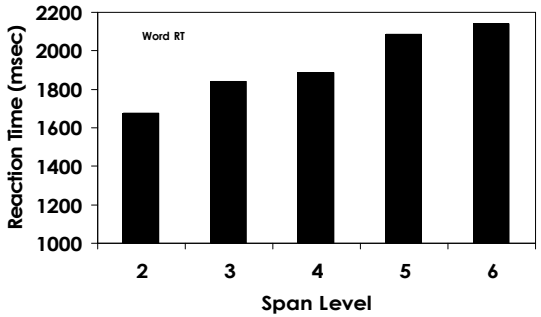
Introduction

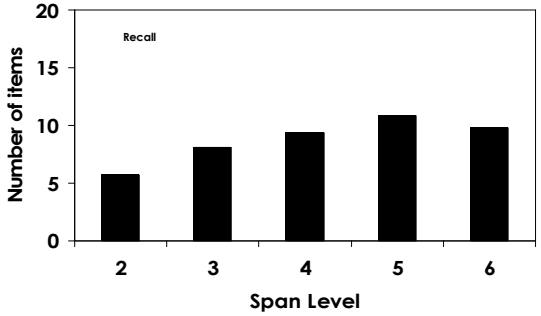
- Working memory is a temporary, limited-capacity storage space in which data is maintained and manipulated for recall or permanent storage (Baddeley, 1986).
- Working memory span tasks measure a persons ability to store and manipulate information in memory.
- The Turner & Engle (1989) operation span task requires participants to retain lists of words in memory for subsequent recall while concurrently reading and solving math problems.
- Conway, et al (2005) suggest that traditional span presentation (incremental) may promote interference and learning effects.
- **Emphasis of Study:** Examine impact of randomized span presentation on task performance.
- Investigate the contribution of problem-word reaction times (RTs) to span task performance.
- Examine potential relationships between the component measures (recall, reaction time, & accuracy).

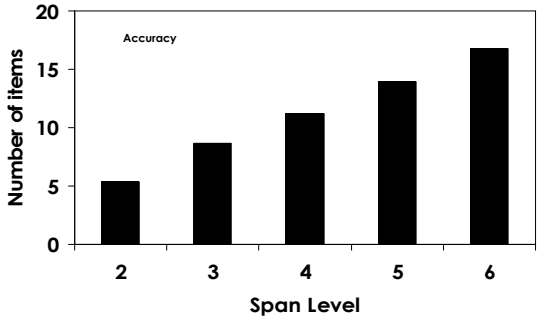
Methods

- **Operation span task**
  - 66 word-problem pairs organized in 6 randomly presented spans
  - 3 problem-word sets per span
  - Task stimuli were presented in 36-point white Ariel font against a black background.
  - The participant controlled the rate of presentation.
- **Instructions**
  - Participants were presented with a math equation (i.e. (4/2)+2=4), which they were instructed to read out-loud.
  - After reading the equation, the participant would enter a yes/no decision about the equation.
  - A word appears on the screen, the participant reads the word out-loud.
  - After completing some problem-word sets, the participant would recall as many words as they could remember, in the order the words appeared.
  - One point was awarded for each correctly recalled word.









Participants

Age	Education	WAIS vocabulary	Bkwrds digit span
19.16 (1.2)	13.6 (.9)	40.2 (7.7)	7.9 (1.1)

N=38	Span	Recall	Accuracy
Problem RT	-.05	-.17	.07
Word RT	**.46****	**.46****	**.43****

*$p < .05$ **$p < .01$

Summary

- **General Conclusions**
  - There was an overall statistically significant difference among the span levels with regard to problem/word RT's, as well as recall & accuracy performance (all *ps* < .000).
  - Mean differences with between recall (*M* = 49.87, *SD* = 8.38) & accuracy (*M*= 61.39, *SD* = 5.24), in addition to significant correlations between word RTs, recall, & accuracy, suggests participants may have relied on processing & storage trade-offs during the task
  - Randomized span presentation may have contributed to the absence of a linear increase in recall scores & problem (but not word) RT's.
  - Examining separate problem and word RT's offers a useful window into the cognitive processes underlying operation span task performance.

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