A comparative analysis of learning in multitrial free and serial recall

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Two of the most widely–used paradigms in memory research examine the ability of participants to study lists of words and subsequently recall them. In the free recall paradigm, participants may recall the studied items from a list in whatever order they choose. In the serial recall paradigm, however, participants are instructed to recall the items from a list in the presented order. In addition to di ering in recall instruction, free and serial recall tasks di er in item presentation order across trials of the same list, which typically varies from trial to trial in free recall and remains constant across trials in serial recall.

Waugh (1961) compared these paradigms to a new condition, free recall with constant presentation order. She concluded on the basis of the average number of items recalled that di erences between free and serial recall were due only to recall instruction and not presentation order. As learning curves provide an incomplete picture of the nature of recall (Addis & Kahana, in press), the present study reevaluated the relationship between serial and free recall using Waugh's three conditions, through the analysis of recall transitions and organization of information retained from trial to trial, in addition to overall recall performance.

Twelve participants learned 21 19-item lists in each of three conditions: free recall with varied presentation order, free recall with constant presentation order, and serial recall. Learning took place over ve study-test trials for each list.

Results indicated that performance in the free recall constant condition shares some commonalities with each of the other conditions. Overall item learning was found to be greater in serial recall and free recall constant than in free recall varied. Order learning was highest in serial recall, but signi cantly higher in free recall constant than in free recall varied. Analysis of item-to-item recall tendencies indicated that in free recall constant, participants make transitions that resemble a loose serial organization: they allow themselves to make backward transitions more frequently than in serial recall, but predominantly recall in the forward direction. and are more likely to make transitions to nearby serial positions than to further positions. Finally, analysis of list organization across trials showed that level of organization holds a consistent relationship with overall recall within each of the three conditions. However, efficiency at retaining items from trial to trial is consistently high during all trials of free recall constant and serial recall, but begins low and gradually increases over trials in free recall varied.

Contrary to Waugh (1961), we conclude that presentation order has an e ect on recall, causing some aspects of performance in free recall constant to diverge from performance in free recalled varied as list trials proceed and to gain resemblance to performance in serial recall. Thus, we suggest that presentation order and recall instructions have separate e ects on learning performance in the recall tasks.

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References

Addis, K. M., & Kahana, M. J. (in press). Decomposing serial learning: what is missing from the learning curve? *Psychonomic Bulletin and Review.*

Waugh, N. C. (1961). Free versus serial recall. *Journal of Experimental Psychology,62*, 496-502.