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Temporal–spatial memory: retrieval of spatial information does not reduce recency

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Abstract

Factors influencing the shape of serial position curves in non-verbal serial short-term memory were examined, using a task testing memory for the position of dots. Similar recency slopes were found when both position and order were recalled (Experiment 1A) and when order only was required (Experiment 1B). This observation was confirmed and tested further in conditions requiring the same encoding but different amounts of spatial information at retrieval (Experiment 2). However, Experiment 2 also revealed an effect of spatial information retrieval on the overall level of memory for recency items. Overall, the results indicate that spatial items produce bow-shaped serial positions curves in tasks requiring the maintenance of order information and that recency is affected by the demand on spatial information retrieval in terms of the overall level of performance but not in terms of the recency slope. These findings are contrary to what is found in the literature on serial verbal recall when both item and order information are required. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

Curves depicting the pattern of error in a test of memory for serial order tend to be bowed, exhibiting performance that is markedly better over the first few items (the primacy effect), and modestly better over the last few items (the recency effect), than for the intervening items (for an overview see, Crowder, 1976; Greene, 1992). Classically, this pattern of results was established using relatively short lists of verbal items. Recently, emerging evidence has suggested that this pattern extends beyond verbal tasks to spatial tasks also (Avons, 1998; Jones, Farrand, Stuart, & Morris, 1995; Parmentier & Jones, 2000). However, by comparison with verbal tasks, our understanding of spatial short-term memory is impoverished. The current paper is concerned with exploring the role that memory for item information, as opposed to memory for order, plays in shaping serial position effects in visuo-spatial short-term memory. We exclude from our analysis changes in the visual identity of the to-be-remembered material in contrast to other studies (e.g. Avons, 1998).

Diverging evidence has been reported with regard to the shape of serial position curves for verbal and non-verbal stimuli. Generally, bow-shaped serial position curves have been observed in verbal studies (e.g. Bjork & Healy, 1974; Caplan, Rochon, & Waters, 1992; Conrad, 1965; Healy, 1974; Henson, Norris, Page, & Baddley, 1996), but recency without primacy was found for non-verbal stimuli. This led some authors to propose a functional distinction between verbal and visuo-spatial mental representations (e.g. Broadbent & Broadbent, 1981). As Jones et al. (1995) pointed out however, studies showing only recency are tests of recognition memory and do not require participants to maintain any order information, only item information (Broadbent & Broadbent, 1981; Korsnes, 1995; Neath, 1993; Phillips & Christie, 1977; Walker, Hitch, & Duroe, 1993; Wright, Santiago, Sands, Kendrick, & Cook, 1985). Tests of recall of order, without recognition, using the position of visual items in space, showed marked bowing of the serial position curve (Jones et al., 1995; Smyth & Scholey, 1996). This conclusion was recently reinforced in tests of recall of novel visual patterns (Avons, 1998; Avons & Mason, 1999). When verbal and non-verbal tasks are equated in terms of task demand characteristics, verbal and non-verbal serial curves were of similar shape. Moreover, interference in serial memory occurs irrespective of the type of stimuli used in the primary and secondary tasks (verbal or non-verbal, see Jones et al., 1995). These results certainly call into question the assumption of separate memory representations for verbal and non-verbal stimuli based on the shape of serial position curves, and further, the validity of such a distinction in models of memory (Jones, 1993; Jones et al., 1995; Avons & Mason, 1999).

Studies involving memory for sequences of verbal material suggest that the balance of emphasis on order as against item information has important consequences for serial recall performance. Re-presenting test items simultaneously at recall so that only order information has to be retrieved (e.g. Battacchi, Pelamatti, & Umiltà, 1990), results in verbal serial position curves which exhibit both marked primacy and recency. However, requiring participants to recall both item and order information results in a serial position curve lacking serial position effects compared to when order only has to be recalled (Bjork & Healy, 1974; Fuchs, 1969; Healy, 1974). These differences in

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