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Position distinctiveness, item familiarity, and presentation frequency affect reconstruction of order in immediate episodic memory ☆

Alice F. Healy [a,*], Kathleen M. Shea [a], James A. Kole [a], Thomas F. Cunningham [b]

[a] *Department of Psychology, University of Colorado, Muenzinger Building, 345 UCB, Boulder, CO 80309-0345, USA*
[b] *Department of Psychology, St. Lawrence University, Flint Hall, Canton, NY 13617, USA*

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Abstract

Three experiments examined the effects of position distinctiveness, item familiarity, and frequency of presentation on serial position functions in a task involving reconstructing the order of a subset of 12 names in a list of 20 names. Three different serial position conditions were compared in which the subset of names occurred in Positions 1–12, 5–16, or 9–20, with all subsets including Positions 9–12. The serial positions were defined temporally in Experiments 1 and 2 and spatially in Experiment 3. The serial position functions in all three experiments were well predicted by Murdock's [Murdock, B. B., Jr. (1960). The distinctiveness of stimuli. *Psychological Review, 67*, 16–31] account in terms of the distinctiveness of the absolute positions. Experiment 3 also revealed significant effects of item familiarity and frequency of presentation on order reconstruction.

Keywords: Position distinctiveness; Item familiarity; Episodic memory; Order reconstruction; Immediate memory; Serial position function; Absolute and relative positions; Presentation frequency

The aim of this study is to explore factors affecting performance on order reconstruction in immediate episodic memory. One important factor considered is serial position. A bow-shaped serial position function, with advantages for both the initial (primacy) and final (recency) positions, has been found in numerous episodic memory tasks, starting with Nipher's (1878) report. This bowed function has been taken as evidence supporting the dual-storage modal model of memory (e.g., Atkinson & Shiffrin, 1968; Glanzer & Cunitz, 1966; James, 1890; Waugh & Norman, 1965), according to which the primacy effect reflects long-term (secondary) memory and the recency effect reflects short-term (primary) memory. An alternative account, initially provided by Murdock (1960), explains primacy and recency advantages in terms of the fact that the

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* Corresponding author. Fax: +1 303 492 8895.
E-mail address: ahealy@psych.colorado.edu (A.F. Healy).

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initial and final serial positions are more distinctive than are the intermediate positions. This position distinctiveness account applies to tasks irrespective of whether they involve short-term or long-term memory processes. Position distinctiveness should not be confused with item distinctiveness (e.g., Eysenck, 1979), which is a characteristic of the items rather than of their positions and is likely to be based at least in part on their familiarity.

The bowed serial position function was also found for a semantic memory task involving recall of the positions of the U.S. presidents. This task is based purely on long-term memory processes. The presence of a bow-shaped serial position function in this situation was interpreted by Roediger and Crowder (1976; see also Crowder, 1993) as evidence to support the position distinctiveness account. Later, Healy, Havas, and Parker (2000; see also Healy & Parker, 2001) compared a long-term semantic memory task, involving knowledge of the world, with an immediate episodic memory task, involving autobiographical events. These tasks both required participants to reconstruct the order of U.S. presidents. Specifically, participants were given an alphabetical list of the presidents' names and asked to indicate the serial position(s) in which each president occurred. For the semantic memory task the ordering was based on the presidents' terms in office, whereas for the episodic memory task the ordering was based on the presidents' sequence of appearance in a list shown during the experiment. Healy et al. (2000) found different functions for the two free reconstruction of order tasks, even though they both showed primacy and recency advantages (see also Healy & McNamara, 1996). It was found that the serial position function for the long-term semantic memory task had a larger recency advantage than that for the immediate episodic memory task, and there was a penultimate advantage for positions prior to the most recent for the long-term semantic memory task but not for the immediate episodic task (see also Gerrard & Waring, 2006). This finding led Healy, Havas, and Parker (2000) to dispute the position distinctiveness explanation for the serial position function in the long-term semantic memory task in favor of an explanation based on the familiarity of the presidents or the frequency of exposure to relevant order information. Specifically, the participants' familiarity with a president provided them with information relevant to the president's historical position, resulting in better reconstruction of order performance on the positions associated with more familiar than with less familiar presidents.

Subsequently, Maylor (2002) countered the familiarity argument by presenting evidence for a bowed function in a semantic memory task involving reconstructing the order of hymn verses, in which the verses were assumed to be equated in terms of their familiarity. Because Maylor did not directly measure familiarity, in a more recent study Healy, Cunningham, Shea, and Kole (2007) explored various episodic and semantic reconstruction of order tasks, and provided evidence that familiarity, but not distinctiveness of the positions, influenced the serial position function in long-term episodic and semantic memory tasks though not in an immediate episodic memory task. In this study, the distinctiveness of both absolute and relative positions of the items was considered because participants reconstructed the order of only a subset of the full list of items. The lists were 43 items long, but participants reconstructed the order of only an 18-item subset. Three different subsets were compared across participants; the subsets all involved 18 relative positions, but they differed in the absolute positions involved: 13–30, 19–36, or 25–42. The absolute positions all included an overlapping 6-item segment, Positions 25–30, which occurred in either the last six, intermediate six, or first six positions tested. Thus, the overlapping positions allowed for a between-subjects comparison of recency, middle, and primacy portions of the functions based on relative serial positions. This design allowed Healy et al. (2007) to assess the contribution of position distinctiveness with respect to both the relative and the absolute serial positions. Whether codes for position information are absolute or relative is of crucial concern for some models of serial order (see, e.g., Henson, 1998, 1999). Position distinctiveness models, such as Murdock's (1960), can be applied to either absolute or relative positions. For both applications, though, Healy et al. (2007) found no evidence in favor of a position distinctiveness account of the serial position functions from either semantic or episodic memory tasks.

The evaluation of the role of position distinctiveness in the study by Healy et al. (2007) was, however, insufficient for at least three reasons. First, the experiments by Healy et al. involved very long lists of items. There were 43 items in each list. List length is one factor that undoubtedly contributed to the relatively low level of performance that was observed, with performance approaching the floor on the order reconstruction task in some cases. Second, in these experiments, the serial position of an item was confounded with its identity (and, hence, its familiarity). Healy et al. (2007) started with the list of U.S. presidents, so that they could not change the fact, for example, that George Washington was the first president and George W. Bush the most recent. Third, although Healy et al. (2007) tried to compare the effects of absolute and relative serial positions, they never examined performance at the very beginning of the list or even for the most recent item. The first position tested was 13 and the last was 42. If the absolute serial positions of the items are crucial, effects of that variable may only be evident by looking at items at the very ends of the list.