

Chapter 5

APPLIED PART-SET CUING

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ABSTRACT

This chapter was designed to accomplish three main goals: (a) to review current theoretical explanations of part-set cuing phenomena, (b) to examine research of everyday applications of part-set cuing, and (c) to report the results of two new experiments that explore part-set cuing inhibition and facilitation in everyday memory contexts. In Experiment 1, participants compiled grocery lists as a confederate either physically walked them through a grocery store or showed a video of her recent store trip. At test, some participants were told that they lost the list (free recall—no cues), while others were told that a coffee spill made half the list illegible (free recall—part set cues). In Experiment 2, visiting high school students and their parents completed a campus tour and then were asked to complete a surprise reconstruction of order test. They were shown 12 pictures of campus buildings/names in a new random order. Half the tests comprised consistent part-set cues (6 buildings shown in proper positions) and half consisted of control cues (6 buildings and 6 positions eliminated from consideration). As expected, Experiment 1 (free recall) produced reliable part-set cuing inhibition and Experiment 2 (reconstruction) showed part-set cuing facilitation.

INTRODUCTION

Imagine that you are a student in a history course and you are asked to remember twenty key events that lead to World War I for a subsequent test. Just prior to the test, the instructor gives you a choice: (a) take a test with hints (i.e., a random half of the events are provided;

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recall remaining ten events), or (b) take a test without hints (i.e., recall all twenty events). In both cases, the proportion of correct responses will represent your test score. Which test would you choose? Most people would likely choose the test with hints, assuming that the retrieval cues would facilitate their performance. Contrary to popular belief, however, providing part of set of to-be-remembered (TBR) items at test typically inhibits free recall performance—a phenomenon known as *part-set cuing inhibition* (e.g., Nickerson, 1984; Slamecka, 1968).

Part-set cuing inhibition has proven robust in free recall, having been replicated under a wide variety of laboratory manipulations, including: episodic and semantic memory (e.g., Brown, 1968), categorized and uncategorized lists (e.g., Basden, 1973; Mueller & Watkins, 1977; Rundus, 1973; Watkins, 1975), nonlinguistic stimuli (e.g., Peynircioglu, 1987), intra- and extra-list cuing (e.g., Basden, Basden, & Galloway, 1977; Mueller & Watkins, 1977; Watkins, 1975), and varying numbers of cues (e.g., Roediger, 1973; Slamecka, 1972). Importantly, however, part-set cues do not always inhibit performance. Indeed, participants often show *part-set cuing facilitation* when they are asked to remember events in a temporal sequence using serial recall (Basden, Basden, & Stephens, 2002; Kelley & Bovee, 2007) or reconstruction of order measures (Serra & Nairne, 2000; Kelley & Bovee, 2007). Hence, in the previous example, choosing a test with hints would enhance performance if the twenty key events had to be recalled chronologically.

In the present chapter, we will begin by examining the leading explanations of these phenomena, including the strategy disruption hypothesis (e.g., Basden et al., 1977) and a dual-mechanism approach (Bauml & Aslan, 2006). Then, we will consider a relatively unexplored area of research—applications of part-set cuing. To date, the majority of part-set cuing studies have been employed in the lab with simple word stimuli (Nickerson, 1984). More recently, however, researchers have explored part-set cuing in broader contexts, such as examining these phenomena with social or collaborative memory tasks (e.g., Andersson, Hitch, & Meudell, 2006) and with false memory tasks (e.g., Reysen & Nairne, 2002). Still, applications of part-set cuing to real-world contexts are relatively sparse. We will address this final issue by exploring two new experimental applications of part-set cuing.

EXPLANATIONS OF THE PART-SET CUING PHENOMENA

Researchers have attempted to uncover the underlying causal mechanisms that drive these part-set cuing phenomena, however most theories have focused exclusively on explaining part-set cuing inhibition (e.g., see Nickerson, 1984 for an exhaustive review of part-set cuing theory and research from 1968-1983). Three explanations in particular—the *competition at retrieval hypothesis* (e.g., Rundus, 1973), the *cue overload hypothesis* (Mueller & Watkins, 1977), and the *editing task hypothesis* (Roediger & Tulving, 1974)—have been shown to provide incomplete accounts of how part-set cues influence retention. These hypotheses cannot account for the full range of inhibition effects (e.g., Basden et al., 1977; Peynircioglu, 1989; Nickerson, 1984; Raaijmakers & Shiffrin, 1981; Sloman, Bower, & Rohrer, 1991; Watkins; 1975), nor can they explain the facilitation effects with order retention (e.g., Serra & Nairne, 2000).

Strategy Disruption Hypothesis. In contrast, the *strategy disruption hypothesis* (e.g., Basden et al., 1977; Basden & Basden, 1995) suggests that when participants encode information, they typically employ a specific organizational strategy (e.g., temporal location, spatial location, mnemonic devices, interitem associations, etc.) that they believe will facilitate their subsequent recall. Consistent with the principle of transfer appropriate processing (e.g., Morris, Bransford, & Franks, 1977), retention is influenced by the degree of match between organizational strategies at encoding and the strategies employed at retrieval. Hence, part-set cuing inhibition will arise when the presence of cues at test promotes a retrieval strategy that is inconsistent with the participant's original encoded organization of the TBR events. On the other hand, facilitation will occur when the retrieval strategy is consistent with original encoding.

Over the past three decades, many studies have explored the strategy disruption hypothesis (e.g., Basden et al., 1977; Basden & Basden, 1995; Peynircioglu, 1989). For instance, Brown and Hall (1979) examined the influence of item strength and number of cues on semantic memory and showed that the strategy disruption hypothesis best accounted for their results. The experiment began with a free-association task in which participants generated four responses to 20 separate stimulus words (e.g., *bird* and the responses *canary*, *tree*, *chirp*, and *fly*). In a second session two days later, participants were given a surprise recall test in which they were asked to regenerate their responses, sometimes in the presence of cues and other times without cues. On cued trials, one-third of the participants received a single previous generated word from a set as cue, another third received two of the four previous answers as cues, and the last third received three of the four previous responses as cues. Additionally, strength of the cue item was manipulated by taking cues from varying output positions at the time of initial item generation, assuming that earlier output reflects stronger association.

Brown and Hall (1979) reasoned that, if part-set cuing disrupts participants' recall strategies, then the main effects of number of cues and strength of cues should not be significant. That is, the presence of any cue of any strength should be sufficient to disrupt participants' intended recall strategies. If, however, the results indicated that stronger cue items produced greater inhibition, then Rundus' (1973) competition at retrieval theory would be supported. Alternatively, if performance decreased as the number of cues increased, results would be in favor of the cue-overload hypothesis (Mueller & Watkins, 1977). Consistent solely with the strategy disruption hypothesis, Brown and Hall reported the classic part-set cuing inhibition effect, with no main effects for cue number or item strength.

The strategy disruption hypothesis can also account for facilitation effects with order retention (e.g., Kelley & Bovee, 2007). For instance, Basden et al. (2002) showed that participations regularly used seriation as a strategy for serial recall tests. In their study, participants showed part-set cuing facilitation when they were provided with cues consistent with a serial (or chaining) strategy—that is, when cued items were shown in their original positions, performance was enhanced relative to a control cue condition. Accordingly, they showed part-set cuing inhibition when the cues were inconsistent with a serial strategy (i.e., cued items in incorrect positions).

In general, the strategy disruption hypothesis has enjoyed a great deal of success accounting for a wide range of empirical findings. However, there have been occasional challenges to the hypothesis (e.g., see Peynircioglu, 1989; but see Basden, Basden, Church, & Beaupre, 1991 for a rebuttal). Indeed, recent evidence by Serra and Oswald (2006) has proven

problematic for a strict interpretation of the strategy disruption hypothesis. They noted an important shortcoming in the strategy disruption literature, namely, that past research routinely failed to measure the “strategy” being employed by participants. To gain a better understanding of the underpinnings of strategy disruption, Serra and Oswald measured the degree to which a particular strategy was used, the amount of strategy disruption, and the impact of that disruption on recall in a series of three experiments.

In their first two experiments, Serra and Oswald (2006) used 12-item lists that they developed in such a way as to make the participants adopt a forward-associative seriation recall strategy. List structures were based on the idea that people form interitem associations based on serial position (i.e., chaining) and that people are more likely to form associations between semantically related items. In the developed set of lists, each item was semantically associated with the following list item (e.g., earth-ground-beef-cow-milk, etc.). Although participants were not informed of the nature of the lists, Serra and Oswald clearly expected that many participants would implicitly self-adopt the seriation strategy. Following each list presentation, participants either completed free recall test with either no cues or part-set cues.

To determine whether participants self-adopted the forward-associative seriation strategy and if it was disrupted by the presence of cues, Serra and Oswald examined the output order of the recalled items relative to the original presentation order. For both cued and uncued trials, participants appeared to self-adopt the researchers’ intended recall strategy. However, the output order more closely resembled the original order on uncued trials than on cued trials. This was taken as evidence that cues had disrupted the participants’ recall strategy. Importantly, however, although the cues had disrupted recall strategy, they did not significantly impair recall performance. In both experiments, participants recalled an equal or greater proportion of the TBR items in the cued condition than in the uncued condition.

In their third experiment, Serra and Oswald used the same list items, but presented the words in a random order—that is, the forward semantic relations between items were removed from the list structures. Interestingly, participants’ recall order (or strategy) did not differ significantly across cue conditions—they recalled the list items in a manner consistent with the original presentation order, at a rate slightly above chance. This time, however, recall performance resembled traditional part-set cuing inhibition with higher recall accuracy of TBR items on uncued trials than cued trials. Clearly, the lack of part-set cuing inhibition in the first two experiments was not an artifact of the list items or of the procedure. Instead, the absence of part-set cuing inhibition likely reflects that the semantic associations between items in the first two experiments were stronger recall aids than the forward chaining associations alone.

Serra and Oswald’s findings pose a serious challenge to a strict view of the strategy disruption hypothesis as an explanation of the part set cuing. Under certain conditions, such as when list items are highly semantic related, the strategy can be disrupted by the presence of cues without impairing recall. Additionally, the traditional part-set cuing effect can occur without a large disruption of the recall strategy, as seen in Experiment 3. In an attempt to reconcile these findings with the previous literature, Bauml and Aslan (2006) proposed a dual mechanism account of part-set cuing.

Dual Mechanism Account. According to Bauml and Aslan (2006), the detrimental effect of part-set cuing can be caused by either strategy disruption or retrieval inhibition with encoding as a mediating factor. In situations wherein participants are likely to form a high number of interitem associations between list items (e.g., instructed to encode serially,

multiple study sessions), recall will be based primarily on these associations. The presence of part-set cues, then, might disrupt the participants' rigid recall strategy and decrease the number of TBR items recalled. The associations between items remain intact, however, and may be used again once cues are removed to recall the items in a 'chained' fashion. This transient nature of the PSC has been confirmed in several of the studies mentioned above (e.g., Basden et al, 1977; Mueller & Watkins, 1977; Watkins; 1975). However, when participants form a low number of interitem associations between items or fail to find distinct relations between items, the mechanism responsible for the traditional part set cuing effect is different.

This alternative mechanism, according to Bauml and Aslan (2006), may involve retrieval-induced forgetting (Anderson, 1994), in which retrieving an item from memory inhibits the representations of competing responses. Whereas retrieval-induced forgetting has typically focused on overt item retrieval, Bauml and Aslan extended it to covert retrieval as well. In a part-set cuing paradigm when participants do not form interitem associations (e.g., categorized lists), re-exposure of list items as cues causes covert retrieval of these nontarget items, consequently inhibiting target items' representations in memory and making them less likely to be recalled. Because a person will eventually self-terminate retrieval after a number of retrieval failures, the search of memory will likely stop before all the target items are recalled. Retrieval inhibition differs from Rundus's competition-at-retrieval hypothesis (1973) or Mueller and Watkin's (1978) cue overload hypothesis. In these accounts, the cuing impairment is produced by changes to the association strengths between items. By using a retrieval-induced forgetting approach, Bauml and Aslan emphasized that the part-set cuing effect is due to representational-based changes to the items, which should provide longer-lasting inhibition.

Bauml and Aslan (2006) explored these ideas across a series of three experiments designed to identify the contexts in which strategy disruption was the mediating mechanism (i.e., high associative encoding conditions) and the contexts in which retrieval inhibition was the mediating mechanism (i.e., low associative encoding conditions). Following high associative encoding, strategy disruption should produce part-set inhibition on an initial cued test but not on a later test when part-set cues are removed. In contrast, following low associative encoding, retrieval inhibition should yield part-set inhibition on an initial test and this inhibition should remain even when cues are removed on a later test.

In their first experiment, Bauml and Aslan manipulated interitem associations formed between subjects and retrieval cues at test within subjects. Lists were composed of 16-items each and an equal number of items in a list from two categories. Items were presented individually in a random order. In the low associative condition, participants saw a list once during the study phase. In the high associative condition, participants had successive study-test trials of each list so that they would be more likely to form interitem associations. Items were presented in the same order on each trial. Following the study phase, participants completed a critical recall test with half the trials cued and the other half uncued. On the cued critical recall tests, participants were given half the items from each category and instructed to use them as cues to recall the remaining items. On free recall critical tests, participants were given the category names and instructed to recall all of the list items. After a short distractor task, everyone completed a free recall test in which they were told recall all of the items by category.

As predicted, in the high associative condition, participants showed part-set cuing inhibition—they recalled more target items on uncued trials than cued trials during the critical test. However, performance between cued and uncued groups was equivalent on the final free recall test, reflecting that part-set cuing inhibition was transient and was released once cues removed. In the low associative condition, participants again recalled more target items on uncued than cued trials on the critical test. Although, this part-set cuing inhibition remained for the final free recall test—there still was a decrement in recall performance for those who has received cues during the critical phase of the experiment. This longer-lasting inhibition was consistent with Bauml and Aslan's retrieval inhibition mechanism account for situations with a low number of interitem associations.

Experiment 2 followed-up Experiment 1 by determining if re-exposure to cue items in the critical test created output interference on the final test. If it had, then it is possible that the re-exposure to cue items during the critical test strengthened their representations in memory, rather than suppressing the target item representations, and made them more likely to be recalled first in the final test before the target items. To resolve whether differences in the first experiment were due to long-lasting inhibition by part-set cues or due to output interference, Bauml and Aslan controlled for participants output order. They repeated the low-associative condition from Experiment 1, but controlled for output order by using category-plus-first-letter-recall tests. During the critical tests, participants in the cued condition were given whole nontarget items as cues and letter cues to test their memory for the target items only. Participants in the uncued condition were given letters cues in a random order for the target items only. For the final test, all participants received letter cues for target and nontarget items. Target items were tested before nontarget items to control for output order interference. In all tests, items were blocked by category. During the critical test, performance on cued trials was again less than on uncued trial. This pattern remained the same in the final test. Thus, the detrimental effects in these first two experiments appear not to be due to output order inference, but are due, instead, to retrieval inhibition of target items.

In their final experiment, Bauml and Aslan attempted to replicate their prior findings using different materials and a different procedure. In this three-factor mixed design, participants were tested on their memory for two 24-item non-categorized lists. High and low associative encoding was manipulated between-subjects—the low associative group was not given specific instructions during the study phase, except to the read the words aloud as they were individually presented, whereas the high associative group was instructed to make a meaningful sentence for each list item and to interrelate these sentences to form a story. As in the first two experiments, cuing during the critical test was manipulated within-subjects. On cued trials, participants read the nontarget items aloud and wrote the target items below them. On uncued trials, participants freely recalled as many items as they could. All participants then completed a final free recall test. As expected, part-set cuing inhibition was transient in the high association condition, but long-lasting in the low association condition.

Across their three experiments, Bauml and Aslan (2006) demonstrated that the mediating mechanism behind PSC-inhibition can differ across encoding contexts. When a person is able to create associations between the items and reduce interitem interference, part-set cuing inhibition is released once cues are removed and a person can return to his or her original recall strategy. However, when items are encoded with a relatively few interitem associations, part-set cuing inhibition is not as transient. Presumably, this long-term suppression of target item representations is caused by covert retrieval in nontarget cue items and is very similar to

what occurs in retrieval-induced forgetting. To date, this dual-mechanism hypothesis appears to provide the most complete account of extant data.

Given that the effects of part-set cuing can be sometimes detrimental and sometimes beneficial, one may wonder whether these findings extend beyond traditional laboratory settings and stimuli to more applied settings. Indeed, by understanding the influences of strategy disruption and retrieval inhibition, people potentially may avoid real-world situations that are ripe for inhibition or reconfigure those situations to promote better memory performance. In the next sections, we will consider broader applications of the part-set cuing phenomena.

APPLICATIONS OF PART SET CUING

As implied in the opening of this chapter, part-set cuing appears to have a natural application to the field of education. Teachers should find part-set research particularly relevant as they construct exams, whereas students would do well to keep these phenomena in mind as they study for and complete their exams. Surprisingly, researchers have neglected to explore this application in any systematic way. Moreover, any applications of part-set cuing research are difficult to find, as the literature is dominated by basic research. Indeed, we found only two ‘applications’ of part-set cuing—within the contexts of collaborative inhibition and false memory—and whether these are true applications is a matter of debate. Regardless, the research is interesting and relevant to everyday life, and is reviewed below.

Collaborative Inhibition. Collaborative inhibition refers to a decline in recall performance as a result of cross-cuing, or the information exchange that takes place between two or more individuals during the discussion of a memory event (e.g., Basden, Basden, Bryner, & Thomas, 1997; Weldon & Bellinger, 1997). Items recalled by group members appear to undermine the many benefits to group collaboration, in that such recall acts as part-set cues for others in the group, which disrupts their retrieval strategies. For instance, Andersson, Hitch, and Meudell (2006) found that after studying a word list, participants who were given spoken cues during recall remembered fewer words than participants in the free recall condition. Notably, participants whose spoken cues were distributed throughout the recall period (i.e., cues consistent with participants’ retrieval strategies) remembered more target words as compared to participants who were given spoken cues only at the beginning of the recall period (i.e., cues inconsistent with participants’ retrieval strategies).

Dagnall, Parker, and Munley (2007) provided further evidence of this common strategy-disruption mechanism between cross-cuing and part-set cuing that led to inhibited recall of information. Participants solved anagrams either independently or in pairs, and afterwards were asked (either independently or with a partner) to remember the words presented as anagrams. Beyond the finding that individuals who encoded independently (i.e., solved anagrams individually) and recalled with a partner forgot more items than those who encoded and recalled anagrams individually, results indicated that pairs who encoded collaboratively forgot fewer items than those who encoded individually and then worked collaboratively on the recall task. Dagnall et al. concluded that just as the part-set cuing effect can be reduced through the use of consistent cues, collaborative inhibition can be limited through joint encoding, which leads to similar retrieval strategies and thus, less strategy disruption during

recall. Overall, cross-cuing and part-set cuing appear to operate similarly, as they both disrupt retrieval strategies. Perhaps individuals should attempt to limit their social interactions when they try to remember an event, because two heads aren't always better than one, at least when it comes to the recall of information.

Part-Set Cuing of False Memories. In two experiments, Reysen and Nairne (2002) demonstrated the effects of part-set cuing on false memories. Specifically, Reysen and Nairne assessed the proportion of nonpresented critical items (e.g., list items: bed, rest, nap; critical non-presented item: sleep) recalled during free recall and cued recall tasks. In their first experiment, after studying a word list, participants recalled a higher proportion of critical words on the free recall test than on the cued recall test. Put another way, retrieval cues inhibited the recall of nonpresented words that were falsely remembered during the memory task. As an extension of this finding, their second experiment explored the effects of different memory test conditions upon item recall. In particular, Reysen and Nairne compared the influences of random cues and consistent cues on the recall of nonpresented critical words. In contrast to the finding that participants recalled a greater proportion of studied words (i.e., words that were correctly remembered, that actually appeared on the list) in the consistent cue condition than in the random cue condition, there were no significant differences between the recall of critical words in the consistent and random cue conditions; consistent and random cues equally inhibited participants' false memories.

Taken together, Reysen and Nairne's (2002) experiments highlight the robust part-set cuing effects that apply to false memories, as measured by the recall of nonpresented critical words. Critical items appear to operate similarly to studied items in that the recall of both becomes hampered in the presence of retrieval cues. However, in regards to the finding that the presentation of consistent cues reduced the part-set cuing effect for the studied items but not for the critical items, critical words may function somewhat differently as compared to studied words, at least in terms of their recall.

Given the paucity of applied research on the part-set cuing phenomena, one is left to speculate about the situations in which part set cues might influence memory. Any setting in which a person is working with partial information (e.g., using an old or corrupted computer file; listening to a closing argument or summary) could potentially disrupt a person's recall strategy, actively inhibit retrieval, or in certain circumstance, even facilitate recall of desired information. In the following experiments, we consider two common real-world scenarios which demonstrate the applicability of part-set cuing inhibition and facilitation.

EXPERIMENT 1

Experiment 1 was designed to explore the generality of part-set cuing inhibition to the ability to remember items on a grocery list. Specifically, participants were given a scenario in which their friend's grandmother needed help grocery shopping. The friend then takes the participants on either a real or a virtual trip to the grocery store while the participant views and writes down the grocery items. On a subsequent memory test, participants were either informed that they lost the grocery list (free recall condition) or that there was a coffee spill and only half of the items were legible (part-set cue condition). Participants attempted to recall as many items as possible. In both the applied (real-world) and lab-analog scenarios, we

expected that participants in the part-set condition would recall fewer items than participants in the free recall (no cue) condition

Method

Participants. Forty-eight Lake Forest College psychology students earned extra credit in exchange for participation in experiment. In the applied condition, groups of five or fewer individuals were transported to a local grocery store for experimental sessions lasting about 20 minutes. In the lab analog condition, groups of up to four individuals were tested at a time. Seated in separate cubicles, each participant completed the task on an IBM-compatible computer in sessions lasting approximately 15 minutes.

Materials. One grocery list was created and used for both the applied and lab analog conditions. The list contained 20 items, each consisting of two words (e.g. seedless grapes, kosher franks, curry powder). Three tests were constructed: one version of a free recall test and two counterbalanced versions of a part-set test. The free recall test sheet consisted of 20 rows and two columns of blank lines. On the part-set tests, half of the items (every other item; odd/even counterbalanced) were displayed at the top of the test sheet, in a random order, and 10 blank rows with 2 columns appeared at the bottom of the sheet. For each test, participants were instructed to recall the items in any order. In addition to the test sheets, one blank grocery list (20 rows of 2 columns) was created and employed in the presentation phase.

Separate orders of the grocery list items were constructed for the applied and lab-analog conditions. Both orders, however, were consistent with how a person might encounter the items while shopping at a store (i.e., items in the same aisle would follow each other on the list). For the lab analog condition, a short video was created which displayed each item for 12 seconds—four seconds showing a person's hand taking the grocery item and 8 seconds displaying the item's name (white letters on black background; 36-pt Times New Roman font; centered). A two second inter-stimulus-interval followed presentation of each item.

Procedure. All participants were given the same scenario: they were told that they were going to grocery shop for their friend's grandmother while the friend was out of town. They were instructed that they would visit the grocery store with the friend (in person or virtually) and that they should take careful notes on the list because grandmother has very particular tastes. In the applied condition, participants were transported to a local grocery store where they were given blank grocery lists and pens. Participants were then led around the store, in an efficient and logical route, as the experimenter showed and named 20 grocery items. Participants were asked to write the item names on the blank grocery list as they were shown. Following the last item, the grocery lists were collected and the tests were administered.

In the lab analog condition, participants were given similar instructions as in the applied condition except they were told that they would see a short video depicting the friend shopping for the items instead of visiting the grocery store in person. After viewing each item, participants were instructed to write down the item name on a blank grocery list. Following presentation in both conditions, participants were randomly given either a part-set cued or free recall test. Participants completed the tests at their own pace and were debriefed upon test completion.

Results and Discussion

Figure 1 displays the proportion of correct responses as a function of setting and cue condition. A 2 (Setting: Lab Analog vs. Real World) x 2 (Cue Condition vs. No Cues) between-subjects ANOVA revealed that neither the main effect of setting nor the interaction were statistically significant (both F 's < 1). However, there was a significant main effect of cue condition, $F(1,44) = 10.729$, $p < .001$. Overall, participants remembered more items in the absence of cues (free recall) than with part-set cues, which reflects traditional *part-set cuing inhibition*. Planned comparisons revealed significant part-set cuing inhibition across both settings. Specifically, in the applied condition, participants remembered a significantly greater proportion of grocery items on the free recall test (0.72) than on the cued recall test (0.54). Similar results were found in the lab analog as free recall performance (0.67) exceeded cued recall performance (0.49).

As expected, regardless of setting, participants remembered more items in the free recall condition as compared to participants in the part-set cue condition. Hence, real-world scenarios appear to elicit the same part-set cuing inhibition effect that occurs in laboratory settings. When individuals are given cues to help facilitate their memory performance, those cues tend to hinder recall performance.

EXPERIMENT 2

Experiment 2 was designed to explore the generality of part-set cuing facilitation using an everyday task in which sequential information is particularly important. The motivation for the study came from the following rather common scenario. Imagine that after a busy day of running errands around town, you arrive home and realize that your driver's license (or any card or key) is no longer in your wallet. You cannot recall the last time you remember seeing it because you did not have any use for it during the day, but you did use your wallet quite often. With all the places you stopped, you may have difficulty remembering where you went. In an attempt to retrace your steps, you might use receipts to piece the day's journey back together. However, the receipts would offer an incomplete representation of the day because not every location you visited would yield a receipt. Will looking at these clues help you to remember the order of the day's events? Or, will they interfere with your recall of the remaining locations?

Conducting this exact study in the real world would be particularly challenging, but one can easily imagine how part-set cuing might influence memory in this situation. The present experiment attempted to maintain the spirit of the scenario—by having participants visit several locations and then give them a surprise memory test—while using a more feasible and controlled design. We used prospective students and parents who were visiting Lake Forest College as participants in this study. These first-time visitors completed a standardized tour of 12 campus buildings and were surprised with an incidental reconstruction of order in which they were asked to identify the sequence of buildings that they had just seen. Half the participants were provided with 6 consistent part-set cues (even or odd half of items) while the remaining participants were given 6 control cues (half items/positions eliminated from test).

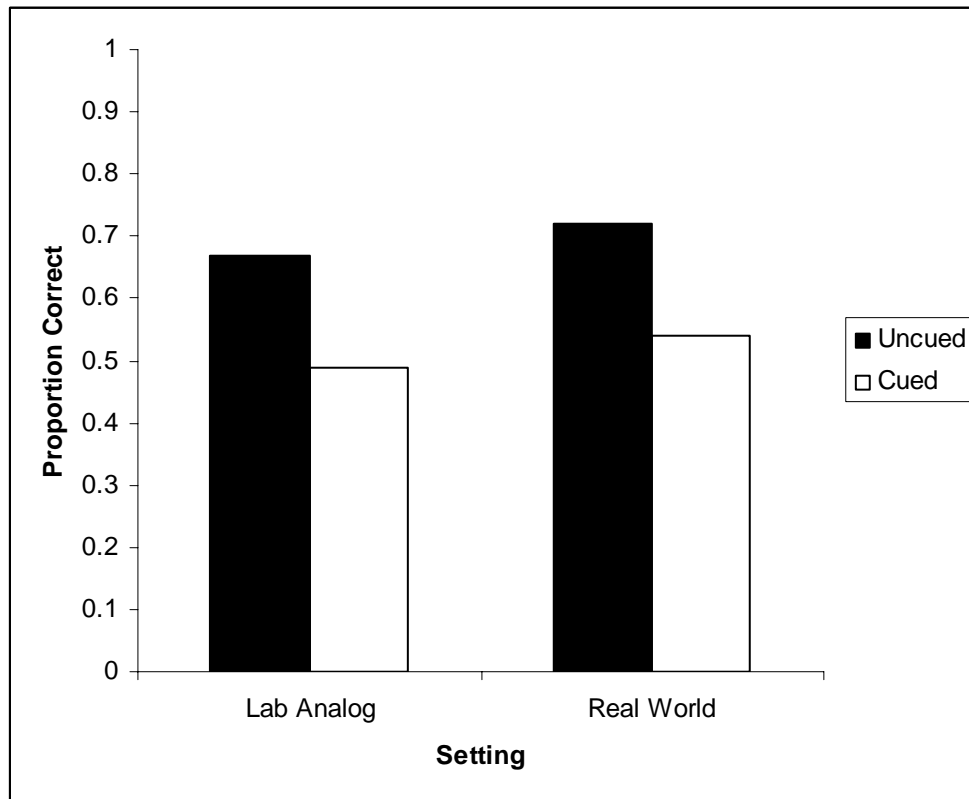


Figure 1. Proportion correct as a function of setting and cue condition.

Consistent with past research (e.g., Serra and Nairne, 2000), we expected part-set cuing facilitation with performance in the consistent condition exceeding that of the control condition.

Method

Participants. Upon completion of a tour of the Lake Forest College campus, 87 campus visitors (prospective students; parents; siblings) were asked whether they would take a brief memory test, about three minutes in length, about the buildings they viewed on the tour. Sixty-eight participants agreed to complete the memory test. In all, 64% of the sample was female. The majority of the participants were in the 15-24 yr (55%) and 45-54 yr (29%) age ranges. The remaining 16% of participants were distributed rather evenly across the 25-34, 35-44, and 55-64 age ranges—a few participants in each category.

Materials. We created a standard tour of twelve campus buildings that was implemented in the same order by a variety student tour guides. Test sheets consisted of the names and thumbnail photographs of each campus, presented in a random order, each with its own corresponding letter (see Appendix). The numbers 1-12, representing the sequential order of the buildings, appears on the bottom the test sheet. Four versions of the test were created—two that provided *consistent part-set cues* where half of the letters of proper buildings were

placed in proper serial positions, and two that provided *control cues* where half of the buildings and serial positions were eliminated from the test (X's appeared in the eliminated positions). In both cases, participants were asked to reconstruct the order of the remaining buildings (highlighted by a box around the name/photograph). Test sheets were printed in color on standard 8" x 11" paper; writing utensils were provided.

Procedure. Upon arriving to the Admissions Office at Lake Forest College, campus visitors were taken on a standard walking tour in which 12 campus buildings were introduced and described in a standard sequential order. Following the tour, visitors were asked if they would be interested in participating in a psychology research project in which their memories for the tour would be tested. Upon reading and signing an informed consent form, participants were given a test sheet and were asked to reconstruct the sequence of buildings they visited on their campus tour by writing the letters associated with the buildings in their appropriate serial positions. Participants were randomly assigned to the consistent cue and control cue conditions and were instructed to use all the letters (reconstruct all six building positions) even if they had to guess. When the test was complete, participants returned the sheets to the tour guide and were thanked for their participation.

Results and Discussion

Figure 2 displays the proportion of correctly reconstructed items at each serial position pair for the consistent and control cue conditions, respectively. A 2 (cue condition: consistent vs. control) x 6 (serial position pair: 1-2, 3-4, 5-6, 7-8, 9-10, 11-12) mixed factor analysis of variance (ANOVA) revealed a significant main effect of cue condition, $F(1,66) = 10.644$; $p < .01$. Overall, participants were able to reconstruct the order of the campus buildings more effectively with consistent part-set cues (0.63) than with control cues (0.46). The main effect of serial position also was reliable, $F(5,330) = 19.244$; $p < .001$, which reflects that the serial position curve was generally bow-shaped, with pronounced primacy and recency effects. Finally, cue condition and serial position did not interact, $F < 1$. As predicted, consistent part-set cues facilitated reconstruction performance in an incidental, everyday memory task.

CONCLUSION

The present chapter was designed to explore the theoretical accounts and everyday applications of part-set cuing inhibition and facilitation. Basic research suggests that two processes—strategy disruption and retrieval inhibition—are particularly important for these phenomena (e.g., Bauml & Aslan, 2006). However, more research is needed to further elucidate these processes and to determine whether other factors might also influence retention in the part-set paradigm. Moreover, additional research is needed to explore how part-set cuing might affect retention in real world settings, especially given that only a few, loosely-defined, applications of part-set cuing have been examined thus far (e.g., Reysen & Nairne, 2002; Weldon & Bellinger, 1997).

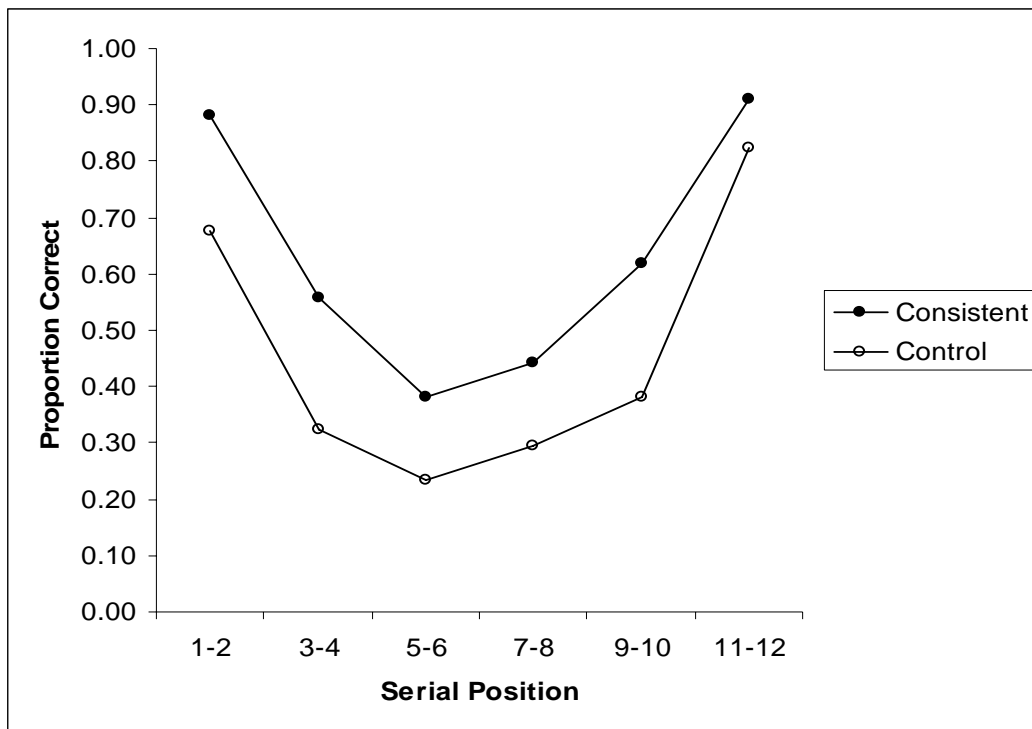


Figure 2. Proportion of correctly reconstructed items as a function of cue condition and serial position.

To this end, Experiments 1 and 2 served as initial forays into applied part-set research and they suggest that part-set cuing influences everyday retention outside the laboratory in very predictable ways. In the first experiment, whether participants learned a grocery list while visiting or viewing a grocery store, part-set cues (in the form of an incomplete grocery list) impaired their recall performance. These findings are consistent with much basic research showing that part-set cuing inhibition is the norm for free recall tasks (e.g., Nickerson, 1984). In the second experiment, first-time campus visitors showed a mnemonic benefit when remembering the sequence of buildings on their campus tour when they were provided with consistent part-set cues as compared to control cues. Such part-set cuing facilitation in the presence of consistent part-set cues is the norm when examining participants order retention (e.g., Serra & Nairne, 2000). Clearly, part-set cuing can influence memory in everyday settings but much more research is needed before we can comment on the ultimate scope and generality of these phenomena.

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