

# Time relations in the recall of events of the day<sup>1</sup>

DONALD L. KING<sup>2</sup> and ROBERT H. PONTIOUS,<sup>3</sup> *Howard University, Washington, D.C. 20001*

*Subjects were asked to recall events that occurred on previous days and to verbalize what they were thinking as they arrived at the answer. It was found that there was a significant tendency for Ss to recall past events by moving from a prior event to the event to be recalled, i.e., recall was from the past to the present. This result was interpreted as indicating the frequent use of forward chaining in the recall of a day's events.*

Subjects can recall a day's events in at least two ways: by starting from a prior event and moving toward the present or by starting from a more recent event and moving toward the past. The present study attempted to compare the frequencies with which Ss employed these two alternatives. The method that was used was that Ss were asked to describe how they arrived at the recall of a day's event (e.g., what the meat dish was for dinner 3 days ago). The verbalizations of the Ss were then judged as indicating recall in either a forward or a backward time direction.

It was predicted that Ss would more frequently recall events of the day by proceeding from a prior to a subsequent event than vice versa. Moving from a prior to a subsequent event can be viewed as an instance of forward chaining, and starting from a more recent event and moving toward a less recent one can be considered to be an example of reverse chaining. Thus, the known facts about chaining were considered to be relevant to the prediction that recall is more likely to be in the direction of past to present than vice versa.

One relevant finding about chaining is that more mediation can be demonstrated if the meaningfulness of the common or mediating item is high (Peterson, Colavita, Sheahan, & Blattner, 1964; Horton, 1964). Since the events of the day are highly meaningful items, their recall should be influenced by mediation. A second relevant finding is that forward chaining has been demonstrated to occur more frequently than reverse chaining in experiments that used meaningful common items (McGehee & Schulz, 1961; Mink, 1963).

It was thought that the time direction in which a day's events would be recalled might be influenced by the possibility that Ss would first recall the most noticeable (i.e., discriminable) event of the day and then move in the direction of the event to

be recalled. If the most noticeable event occurred somewhere in the middle of the day and the S was asked to recall what he did that night, he might proceed in a forward time direction simply because he was moving from the noticeable event to the event to be recalled. To control for the possible significance of noticeable events on the recall of other events of the day, Ss were asked to recall two events that would normally occur in the morning and two events that would normally occur in the evening.

A second control resulted because Ss were asked to recall events that occurred on successive days. It was thought, for example, that if Ss were asked to recall events that occurred 6 days before, then 5 days before, and then 4 days before, the forward direction of the days might predispose Ss to recall in the direction of moving from a prior to a subsequent event within a given day. To control for this possibility, half the Ss were given questions that referred to days that progressed in the direction of the past to the present and half the Ss were given questions that referred to days that progressed in the direction of the present to the past.

## SUBJECTS

The Ss were 30 undergraduate female students enrolled in the introductory psychology course at Howard University.<sup>4</sup>

## APPARATUS

The responses of the Ss were recorded with a tape recorder.

## QUESTIONS

The six questions used were: (1) "What did you do yesterday, which was . . ." (2) "What was your meat dish for supper 2 days ago, which was . . ." (3) "At what time did you last return home 3 days ago, which was . . ." (4) "Who was the first person you talked to after leaving home 4 days ago, which was . . ." (5) "At what time did you first leave home 5 days ago, which was . . ." (6) "What did you do 6 days ago, which was . . ." Each of these questions ended with the correct day of the week being indicated.

It is evident that Questions 1 and 6 asked about more than one event in a day and that Questions 2, 3, 4, and 5 referred to a single event in a day. Pretesting results indicated that care must be taken in the selection of questions, because many events of the day are either habitual and can be recalled automatically (i.e., without much mediation occurring, it is believed) or occur too infrequently. Thus, the questions that were used referred to events in the lives of the Ss that usually occurred

during a given day but not at the same times or in the same ways from day to day (with the possible exception of Question 5; see the Discussion section).

Each question referred to the same number of days previous for all Ss. Thus, Question 1 referred to events that occurred on the previous day for all Ss, Question 2 referred to events that occurred 2 days previous for all Ss, etc. Half the Ss were tested on a Thursday and half on a Wednesday. Question 1 therefore referred to a Wednesday for half the Ss and to a Tuesday for the other half, and so on.

## PROCEDURES

Testing took place in the same experimental cubicle for all Ss. Each S was given a copy of the instructions to read while the E read them to her. The instructions emphasized that the E was primarily interested in how Ss remembered and that therefore it was important for the S to "tell me the thoughts that go through your mind before you arrive at the answer." The S was also encouraged to "speak out loud at all times" and to "please be sure you actually remember those things that did occur on the day in question and that you are not speaking from habit."

After the Ss read the instructions, they were given practice questions so that they could gain experience in verbalizing their thought processes. The Ss were then given the six test questions. Half the Ss received Questions 6, 5, 4, 3, 2, and 1, in that order, and half the Ss received the same questions in the reverse order. Ss were assigned to the forward and backward progression of question treatments on a random basis.

The Ss frequently verbalized the event to be recalled before saying anything else. If this occurred, Ss were asked various questions so that they would reveal what were assumed to be the associations that led to the recall of the desired event. Questions such as "How did you think of this?" and "What thoughts did you have that led to this?" were used in this connection.

## RESULTS

Ratings of the responses of the Ss were made from a typed transcription of the tape recordings. The responses of the Ss to each of the six test questions received a score of 1, 2, or 3. If the S was judged to move from a later event to one that occurred previous to it in recalling the event or events in question, she received a score of 1 for that question. If the S moved from a prior event to one closer to the present in recalling the event or events in question, she received a score of 3 for that question. When the time direction of the response was not determinable, a score of 2 was assigned.

The two authors independently rated all the responses of the Ss in the sample. A score for each S was obtained by adding up the scores that the S was assigned for each of the six test questions. Since there were 30 Ss, there were two sets of 30 such scores, one set from each rater. The two sets of scores were correlated and a  $r$  of .92 was obtained.

The frequencies with which the Ss used forward, backward, and undetermined time progressions in recall for each question are indicated in Table 1. A 2 by 6 analysis of variance was used to analyze the obtained data. The factor with the two levels was made up of the sequence of days (either forward or backward) in which the questions were asked. The six test questions made up the levels of the second factor, the second factor being a repeated-measures factor.

The analysis of variance indicated that a significant main effect of the order in which the questions were asked was not obtained ( $F = 1.10$ ,  $df = 1/28$ ). Since the assumptions of the analysis of variance were not met, a conservative test, the Greenhouse and Geisser procedure (Winer, 1962, pp. 305-306), was used to test for the significance of the Fs that involved the repeated-measures factor. The Greenhouse and Geisser procedure simply amounts to reducing the dfs for the Fs that involve the repeated-measures factor by a certain quantity. A significant interaction between order and type of question was not obtained ( $F = 0.67$ ,  $df = 1/28$ ). A significant main effect of questions was obtained, however ( $F = 19.48$ ,  $df = 1/28$ ,  $p < .001$ ).

The prediction that was made in the introduction was that Ss would be more likely to remember events by moving in the direction of past to present than vice versa. It was, therefore, expected that each question mean would be significantly different from 2.00, the mean expected on a chance basis. The means for Questions 1, 2, 3, 4, 5, and 6 were 3.00, 2.47, 2.93, 2.73, 2.03, and 2.90, respectively. Since a prediction had been made, an a priori method for comparing the difference between means (Winer, 1962, pp. 65-68)

Table 1  
Frequencies of the Ratings of  
Direction of Recall

Ratings	Questions					
	1	2	3	4	5	6
1	0	2	0	0	8	0
2	0	12	2	8	13	3
3	30	16	28	22	9	27

was used to determine the means of the questions that were significantly different from the expected mean of 2.00. It was found that the means of Questions 1, 3, 4, and 6 were significantly different from 2.00 at the .001 level and that the mean of Question 2 was significantly different from 2.00 at the .01 level.

Since differences among question means were not predicted, the Newman-Keuls method (Winer, 1962, pp. 80-84) was used to determine which question means were significantly different from each other. It was found that the means of Questions 1, 2, 3, 4, and 6 were significantly different from the mean of Question 5 (at the .01 level or better), that the means of Questions 1, 3, and 6 were significantly different from the mean of Question 2 ( $p < .01$ ), and that the mean of Question 4 was significantly different from the mean of Question 2 ( $p < .05$ ).

#### DISCUSSION

It was predicted that Ss would more frequently move from the past to the present than from the present to the past in the recall of a day's event. This prediction was supported at a significant level for five out of the six events to be recalled. For three of the questions, all or almost all of the 30 Ss recalled in the forward direction. It is clear, then, that the obtained results support the prediction that was made. It is also evident that the order of the days that the questions referred to (either forward or backward) did not have a significant effect on the direction of recall.

Question 5, "At what time did you first leave home 5 days ago . . .," did not lead to recall in the direction of the past to the present to a significant extent. Most of the Ss had classes on the days (Friday or Saturday) to which this question referred. A review of the responses to Question 5 appeared to indicate that Ss frequently recalled the time of their first class of the day, then recalled an event or events that occurred prior to leaving home, and then proceeded in a forward direction toward the time that they left home (such instances received a score of 2). The time of the first class of the day is probably a highly discriminable event, since efforts and thoughts directed to arriving at the class on time are most likely repeated occurrences. The reason Question 5 did not support the prediction of more frequent recall from past to present may therefore relate to a point that was made in the introduction; i.e., Ss may use highly discriminable stimuli as starting points in

their search for the recall of the desired event.

A priori predictions concerning differences among the means for the six questions were not made, and an explanation of the mean differences that were obtained will not be attempted because it is felt that the number of variables that could have produced the differences is too great to permit a profitable discussion.

The prediction of more frequent recall in the direction of the past to the present was based on the premise that forward chaining occurs more frequently than does reverse chaining. There are alternative explanations of the obtained results, however. Although Ss were asked to report the thought processes that they were aware of in arriving at the requested recall, their verbal reports may have been affected by ease of exposition, the English language probably being more suited for describing events that occur from past to present than vice versa. Another alternative explanation is that the order of recall was affected by the sequential dependencies that existed among a day's events. If events occurring after the event to be recalled are less strongly associated to each other than the events preceding the item to be recalled, then recall should be in the forward time direction.

#### REFERENCES

- HORTON, D. L. The effects of meaningfulness, awareness, and type of design in verbal mediation. *Journal of Verbal Learning & Verbal Behavior*, 1964, 3, 187-194.
- McGEHEE, N., & SCHULZ, R. W. Mediation in paired-associate learning. *Journal of Experimental Psychology*, 1961, 62, 565-570.
- MINK, W. D. Semantic generalization as related to word association. *Psychological Reports*, 1963, 12, 59-67.
- PETERSON, M. J., COLAVITA, F. B., SHEAHAN III, D. B., & BLATTNER, K. C. Verbal mediating chains and response availability as a function of the acquisition paradigm. *Journal of Verbal Learning & Verbal Behavior*, 1964, 3, 11-18.
- WINER, B. J. *Statistical principles in experimental design*. New York: McGraw-Hill, 1962.

#### NOTES

- This article is based on a Master's thesis submitted to the Graduate School at Howard University by Robert H. Pontious.
- Requests for reprints should be sent to the first author. The address is Psychology Department, Howard University, Washington, D.C. 20001.
- Present address: National Academy of Public Administration, 1225 Connecticut Avenue, N.W., Washington, D.C. 20036.
- Female Ss were used because pretesting suggested that females more frequently verbalized the steps they took to recall the events in question.