Social facilitation of long-term recall*

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Forty-eight Ss were given a single presentation of a paired-associate list while either alone or with another girl present. The other girl either watched S closely or paid no attention to her. Recall took place either 2 or 45 min after the presentation of the list. Ss who had seen the list in the presence of an unattending girl recalled significantly less of the R terms than did Ss who had seen the list while alone when testing occurred after 2 min. Ss who had seen the list in the presence of an unattending girl also recalled more of the R terms when testing took place after 45 min than when it took place after 2 min. A predicted exacerbation of this effect when the other girl watched S was not found.

Since the appearance of Zajonc's paper on social facilitation in 1965, a substantial body of literature has accumulated, showing the manifold and varied effects which being with others can have upon the behavior of both human and subhuman organisms. By assuming that the presence of other conspecific organisms produces a hypothetical state of arousal, which, in turn, has energizing effects on behavior, Zajonc made possible a wide range of empirical studies in which the dependent variable need not be related to social settings, as such, but only to the arousal construct. Such behaviors as simple verbal acts (e.g., Zajonc & Sales, 1966), verbal learning (Ganzer, 1968; Cottrell, Rittle, & Wack, 1967; Matlin & Zajonc, 1968), motor behavior (e.g., Martens, 1969a), physiological reactivity (Martens, 1969a, b), complex social acts (Zajonc, Wolosin, Wolosin, & Loh, 1970), and attitude change (Weiss, Miller, Langan, & Cecil, 1971) have all been shown to be affected by the presence of others.

The present experiment was designed to test the effects of socially induced arousal upon still another behavior which has been shown in past studies to be influenced by arousal from nonsocial sources, namely, long-term recall. Beginning with a study by Kleinsmith & Kaplan (1963), several investigators have shown that long-term memory is facilitated by increases in arousal during acquisition. This arousal increment has been manipulated either through the use of differentially arousing materials to be learned (Kleinsmith & Kaplan, 1963; 1964) or through the administration

of extraneous white noise (Berlyne, Borsa, Crow, Gelman, & Mandell, 1965; McLean, 1969). The general conclusion of these studies has been that when a S learns materials under relatively high arousal, he later shows poorer short-term recall than does a S who has learned under low arousal, but superior long-term recall. Walker and his colleagues (e.g., Walker & Tarte, 1963) have explained this finding in terms of reverberating neural circuits: the greater the amount of nonspecific arousal, the greater the number of times the trace corresponding to the materials to be learned will reverberate, and hence, the stronger will be the memory for it. This improved memory should become apparent only upon long-range testing, however, since short-range recall, presumably occurring while the perseverative process is going on, should be hindered. During this phase, the neurons involved in memory storage are either actively firing during presentation of the stimuli or are in the absolute refractory period. Which interval produces "short-term" and which "long-term" recall has not yet been determined. Although some investigators (e.g., Berlyne, 1967) propose intervals of as long as 24 h to distinguish learning from more transient performance effects, Kleinsmith & Kaplan (1963) found that for all practical purposes, the superiority in recall associated with high arousal over that associated with low arousal was relatively stable by about 40 min after acquisition.

In the present experiment, female Ss were exposed to a paired-associate list either alone or with another girl in the room. The other girl, an experimental confederate, either observed closely as S was exposed to the list or paid no attention to S. The former group we have called the audience group and the latter, the mere-presence group. This distinction

was made in order to test Cottrell's contention that the presence of others is more arousing when they constitute an audience than when they are present but not observing the S (Cottrell, 1968; Henchy & Glass, 1968).

After a single acquisition trial, the S waited either 2 or 45 min then was tested for recall of (1) the R terms, with the S terms presented, and (2) the S terms, with the R terms presented. The resulting design is a 3 by 2 factorial, with eight Ss in each cell.

The main prediction of the experiment is that Ss who have been exposed to the list while alone will show significantly better recall than Ss in the conditions where another girl is present when testing takes place 2 min after the exposure, but will show poorer recall when testing takes place 45 min after exposure. Following Cottrell's argument, it is also predicted that the hypothesized recall effect due to social facilitation will be greater when the other girl watches S than when she merely sits in the same room as S.

METHOD

Subjects

The Ss were 48 undergraduate females who participated in order to earn points toward the final grade in the introductory psychology class. The confederate (C), who posed as a S, was a 19-year-old undergraduate female.

Procedure

Arriving at the laboratory, S was met by E, who asked S to wait outside the experimental room until called. Shortly thereafter, C arrived, at which time E prevented any interaction between the two girls by stepping outside the experimental room and announcing that the experiment would begin. If S was to be run alone, E asked C to remain seated and to await further instructions. If the audience or mere-presence condition was to be run, both S and C joined E.

In every condition, S was seated at a table facing a blank wall. The table contained a Lafayette memory drum, by means of which the stimuli were presented. S was given a single learning trial consisting of a list of six nonsense syllables of 0% association value as stimulus terms and the digits 2 through 7 as response terms. The syllables, TOV, CEF, QAP, JEX, LAJ, and DAX, were the same as those used by Kleinsmith & Kaplan (1964). The ISI was 2 sec. During this period, E made himself as unobtrusive as possible, standing behind S and as far from her as he could get in the room; it was hoped that, in this way, any possible arousal due to E's presence could be minimized.

In the mere-presence condition, C

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was instructed that she would undertake the learning task after S and was asked in the meantime to fill out a short inventory having some relevance for the experiment. To do this, C sat within S's field of vision at a side table, but with her back turned to S, as she busied herself with answering the inventory questions. In the audience condition, C was also instructed that she would follow S at the memory drum, but was asked to pay close attention to what S was doing as the list was presented. C, therefore, sat next to S, at a distance of about 2 ft, and paid close attention to S.

After S had been given the single presentation of the S and R terms, E asked her to step into the next room and await further instructions as C ostensibly learned the list. After either 2 or 45 min, E called S back to the experimental room, where the recall test took place. Each of the S terms was presented with an ISI of 4 sec, and S was instructed to say aloud the appropriate digit on each trial. The digits were not repeated. The R terms were then presented without the S terms, and S was asked to give the appropriate trigram in each case. C was not present in the room during recall testing in any condition, and E took the same unostentatious position as he had during the acquisition trial.

RESULTS AND DISCUSSION

The dependent measures were the number of paired digits recalled after presentation of the trigrams and the number of trigrams recalled following presentation of the digits. The data representing recall of R terms is presented in Fig. 1. An analysis of variance for these data reveals that neither the social setting nor the length of the recall interval

contributed significantly to the variance, but that the two variables did interact ($F = 4.78$, $df = 2, 42$, $p < .05$). A Duncan multiple-range test performed subsequent to the analysis of variance reveals that this interaction is due mainly to significant differences between Ss in the alone/2-min and mere-presence/2-min groups and between the mere-presence/2-min and mere-presence/45-min groups. Whereas having C present in the room hindered recall 2 min after acquisition, it facilitated recall after 45 min. Obviously, the significant interaction between social setting and recall interval is accounted for by the presence of C in the room in a nonobserving role: Under these conditions, recall after a long period was substantially better than recall after a short period of time.

The results therefore substantiate Zajonc's theory in that effects due to the hypothetical increase of arousal were found with C being merely present. Our expectation, that the same effect would be exacerbated when C acted as an O, was not supported. The reason for this is not obvious, but one possibility is that C's nearness to S in the audience condition may have distracted S's attention to some degree from the items on the memory drum, perhaps by eliciting some implicit social responses toward C. This distraction may have had little effect on short-term recall, since the effects of the proposed reverberation would have been quite powerful over the short interval and would have masked any effects due to poor attention. However, recall at 45 min after acquisition would have been greatly affected by distraction, since over the longer period of time, perseverative effects would have diminished and only effects of insufficient attention to the S-R terms would have persisted. Thus, Ss in the audience condition would have shown poorer recall than Ss in the mere-presence condition when recall took place 45 min later, as was found. It was noted during the interview conducted with each S after the session that several of the Ss commented that C's sitting nearby and observing may have taken their minds off the stimuli. Such distraction would be quite serious in a case such as the present one, where each term is seen only one time.

Recall of S terms with the R terms as cues was not significantly affected by either independent variable, and no interaction was found. In general, fewer correct responses were given on this measure in all treatment groups than were given on the S-R measure.

While the data fail to support Cottrell's hypothesis regarding

audience effects, they do uphold Zajonc's position by showing that the presence of another person in the situation leads to an effect attributable to an increase in arousal and which has been shown, in other studies, to be related to arousal of nonsocial origin.

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Fig. 1. Mean digits recalled.