

individuals with high inputs can distribute rewards proportionately to their own and others' inputs and still allocate the largest portion to themselves. On the other hand, individuals with low inputs must give themselves the least reward when they allocate rewards proportionately to inputs. Being equitable, therefore, appears to be easier for the high inputs individual. This explanation is congruent with the findings of past research (e.g., Lane & Messé¹), which indicate that persons are most likely to divide rewards equitably when such behavior maximizes their own reward.

Moreover, Ss could have felt that the individuals whose input level was closest to their own should be the fairest to them. This expectation may be the result of Ss' feeling that individuals similar to them on some dimension (in this case, level of inputs) should, because of feelings of empathy, be equitable toward them.

The Ss voting for a reward distributor might have preferred someone possessing the two characteristics discussed above. However, if no one individual possessed both characteristics, Ss might have preferred someone possessing one of them more than they did someone possessing neither.

The results tend to support this interpretation. The Ss who worked for 3 h overwhelmingly selected the individuals who possessed the two desired characteristics (those who worked for 2 h) instead of the ones possessing neither of the desired characteristics (those who worked for 1 h). Moreover, the Ss who worked 1 h, having a choice between two individuals each possessing only one of the desired characteristics, selected each person with equal frequency. Furthermore, the Ss who worked 2 h tended (although not significantly so) to select the individuals possessing the two desired characteristics (those working for 3 h) rather than those who possessed only one of the desired characteristics (those working for 1 h). However, since this last finding was not significant ($p > .30$), the interpretation must be considered somewhat tentative.

The results also indicated that Ss, irrespective of their own or the other individuals' level of inputs, had a very strong tendency to distribute rewards equitably. This finding is consistent with the results of past studies and indicates that the norm of equity is salient in three-person as well as two-person groups. However, the results of the present research point to an interesting paradox: While all Ss tended to allocate rewards equitably, distributors were systematically

selected as a function of their inputs. It is hoped that further research will clarify the basis for these findings.

REFERENCES

- ADAMS, J. S. Inequity in social exchange. In L. Berkowitz (Ed.), *Advances in experimental social psychology*. Vol. 2, New York: Academic Press, 1965.
- EDWARDS, A. L. *Manual for the Edwards Personal Preference Schedule*. New York: Psychological Corporation, 1953.
- HOMANS, G. C. *Social behavior: Its elementary forms*. New York: Harcourt, Brace, & World, 1961.
- LEVENTHAL, G. S., ALLEN, J., & KEMELGOR, B. Reducing inequity by reallocating rewards. *Psychonomic Science*, 1969, 14, 295-296.
- LEVENTHAL, G. S., & ANDERSON, D. Self-interest and the maintenance of equity. *Journal of Personality & Social Psychology*, 1970, 15, 57-62.
- LEVENTHAL, G. S., & MICHAELS, J. W. Extending the equity model: Perception of inputs and allocation of reward as a

function of duration and quantity of performance. *Journal of Personality & Social Psychology*, 1969, 12, 303-310.

LEVENTHAL, G. S., WEISS, T., & LONG, G. Equity, reciprocity, and reallocating rewards in the dyad. *Journal of Personality & Social Psychology*, 1969, 13, 300-305.

NOTES

1. Lane, I. M., & Messé, L. A. Equity and the distribution of rewards. To be published.
2. Lane, I. M., & Messé, L. A. The distribution of insufficient, sufficient, and over-sufficient rewards: A clarification of equity theory. To be published.
3. Lane and Messé² report that undergraduates perceive \$2 per hour as equitable pay for participating in psychological research. Therefore, groups in the present research were given \$12 since they worked a total of 6 h.
4. Only the first ballot votes were analyzed because in 18 of the 20 triads only one ballot was necessary to select a reward distributor.

The physical presence of other individuals as a factor in social facilitation

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The purposes of the present study were (1) to establish whether or not the physical presence of other individuals is a necessary condition for the occurrence of social facilitation in humans and (2) to examine the drive hypothesis of social facilitation using female Ss. Ss learned competitive or noncompetitive lists of paired associates while alone or while observed from behind a one-way screen. Analysis of the competitive list data suggested that dominant responses were enhanced at the expense of subordinate responses when Ss were observed through a one-way screen. No affect attributable to observation was found in the noncompetitive list data.

In an attempt to explain the seemingly contradictory results of studies which have examined the effects of audiences on learning and performance, Zajonc (1965) hypothesized that the presence of other individuals increases one's general drive level, thus enhancing dominant responses at the expense of subordinate responses. Thus, when dominant responses are demanded by a given task, an individual's performance is enhanced by the presence of others. However, when subordinate responses are required, one's performance is impaired, due to competition from the facilitated dominant responses. The above hypothesis was initially examined empirically by Zajonc & Sales (1966). They used a pseudorecognition task, which put strong habits into

competition with weak habits, and found that strong or dominant responses were enhanced at the expense of weak or subordinate responses when male Ss were observed by two students who were present in the experimental room. Cottrell, Rittle, & Wack (1967) also used male Ss and Os who were physically present and obtained corroborating results. The task used was the learning of competitive and noncompetitive paired associates, where dominant responses tended to be incorrect and correct, respectively.

Cottrell, Wack, Sekerak, & Rittle (1968) challenged Zajonc's hypothesis that the mere presence of others is the critical factor involved in social facilitation. In addition to observed and nonobserved conditions, they employed a condition where blindfolded peers were present in the room and found that social facilitation occurred only in the observed condition. Male Ss and a pseudorecognition task were used.

*This study is part of a MA thesis, completed under the direction of Dr. D. S. Butt, by the author, who is presently at Kings County Hospital, Brooklyn, New York 11203.

Thus, the mere physical presence of others does not appear to be a sufficient condition for the occurrence of social facilitation. The question examined in the present study was whether or not the physical presence of others was a necessary condition for the occurrence of social facilitation. Since the above-mentioned studies were conducted with male Ss, a second question examined was whether or not Zajonc's drive hypothesis would hold for female Ss.

It was hypothesized that social facilitation would occur with female Ss with the audience viewing from behind a one-way screen. The task used was the learning of competitive and noncompetitive paired associates, and thus, it was expected that under observed conditions Ss would make fewer errors on the noncompetitive pairs and more errors on the competitive pairs compared to Ss in the nonobserved conditions.

SUBJECTS

The Ss were 60 undergraduate female nursing students from Vancouver General Hospital in Vancouver, Canada, who volunteered to participate.

APPARATUS

Within the experimental room a one-way screen covered most of one wall and was covered by curtains when not in use. Easily operated tape recorders were used in the learning of the paired associates; one recorder presented the pairs and the other recorded Ss' responses. The lists of paired associates were those developed by Spence, Farber, & McFann (1956) and subsequently used by Cottrell et al (1967).

PROCEDURE

Fifteen Ss were assigned to each of two control and two experimental groups in the following sequential order: nonobserved with competitive pairs, nonobserved with noncompetitive pairs, observed with competitive pairs, and observed with noncompetitive pairs.

Upon their arrival at the experimental room, Ss were informed that some graduate students were expected to arrive in a few minutes and were going to observe the study. Next, the operation of the tape recorders was explained, and Ss completed five trials on the practice list of paired associates. Only Ss who made at least one correct response on the practice list were used; one S was eliminated for this reason and replaced. The E then mentioned that the Os should have arrived, and he went out into the hall supposedly to look for them. In nonobserved conditions, the E returned and told the S that the Os had not arrived and that they would continue without

them. In the observed conditions, the E looked back into the room and said that the Os had arrived and that he would get them settled in the next room. The E then moved chairs about in the next room, made noises audible to the S, and turned the light on and off (the light was detectable through and around the curtains over the screen) so that the S waiting in the next room was aware of the activity. The E returned to the experimental room, uncovered the screen, set a microphone on the table in front of the S, and explained that the Os were behind the screen and could hear via an intercommunication system. The S was then left alone with the two recorders and proceeded with the experimental task of completing 15 trials on the list of paired associates.

RESULTS AND DISCUSSION

A two-factor (observation and list type) between-Ss analysis of variance was used to examine group effects. Two analyses were carried out, one on the total number of errors made on the practice task and one on the same data from the experimental task. Neither of the main effects nor the interaction effect were significant in the analysis of the practice list data. These nonsignificant findings suggested that Ss in the different groups did not differ significantly in their ability to learn paired associates.

In the analysis of the data from the experimental task, the main effect of list type was significant ($F = 113.63$, $df = 1$, $p < .001$). Inspection of the list means shown in Table 1 indicated that more errors were made on the competitive list than on the noncompetitive list, as was expected. The main effect of observation was also significant ($F = 9.50$, $df = 1$, $p < .005$), as was the interaction of observation and list type ($F = 4.81$, $df = 1$, $p < .05$). Inspection of the means suggested that the significant effect of observation was mainly a result of the performance of Ss who learned the competitive list. A Duncan multiple-range test indicated that Ss in the observed group made significantly more errors than did Ss in the nonobserved group ($p < .01$) on the competitive list. This difference between observed and nonobserved groups was not significant for Ss who learned the noncompetitive list.

Table 1
Mean Number of Errors on
Experimental Task

Type of List	Observation Condition	
	Not Observed	Observed
Competitive	65.1	95.2
Noncompetitive	16.9	21.9

The results of the Ss who learned the competitive list fit the hypotheses of the study, in that female Ss made significantly more errors when observed by an audience not physically present than did nonobserved Ss. According to the general drive hypothesis, the incorrect dominant responses were facilitated at the expense of the correct subordinate responses, and therefore, learning was impaired. This finding suggests that the drive hypothesis accounting for social facilitation holds for females and that the physical presence of Os is not a necessary condition for the occurrence of social facilitation. The results of the present study, in combination with the results of the Cottrell et al (1968) study, where a blindfolded audience was employed, suggest that the mere physical presence of others is neither a necessary nor a sufficient condition for the occurrence of social facilitation.

On the noncompetitive list, Ss' dominant responses did not appear to be enhanced, since observation had no significant effect on performance. One hypothesis that could account for this unexpected finding is that the sensitivity of college students to observation of their performance is a function of the perceived difficulty of the task and how they perceive their own performance. That is, when a S views himself as performing well on a task that appears rather simple, observation by peers may not result in an elevation of general drive level; there is no threat to one's self-esteem. However, when he perceives that he is performing poorly on a seemingly simple task, he may be relatively more sensitive to observation by peers and may tell himself that he should be doing better, that he appears stupid, and so on; thus, his general drive and/or anxiety level is elevated. This hypothesis is speculation for further research.

REFERENCES

- COTTRELL, N. B., RITTLE, R. H., & WACK, D. L. The presence of an audience and list type (competitive or non-competitive) as joint determinants of performance in paired-associate learning. *Journal of Personality*, 1967, 35, 425-433.
- COTTRELL, N. B., WACK, D. L., SEKERAK, G. J., & RITTLE, R. H. Social facilitation of dominant responses by the presence of an audience and the mere presence of others. *Journal of Personality & Social Psychology*, 1968, 9, 245-250.
- SPENCE, K. W., FABER, I. E., & McFANN, H. H. The relation of anxiety (drive) level to performance in competitive and noncompetitive paired associates learning. *Journal of Experimental Psychology*, 1956, 52, 296-305.
- ZAJONC, R. B. Social facilitation. *Science*, 1965, 149, 296-274.
- ZAJONC, R. B., & SALES, S. M. Social facilitation of dominant and subordinate responses. *Journal of Experimental Social Psychology*, 1966, 2, 160-168.