Paired-associate learning as influenced by birth order and the presence of others

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Social facilitation research has shown that the presence of coactors affects performance in a way similar to the effects of general drive level. Learning of competition material is inhibited while the learning of noncompetition material is facilitated. Research on affiliation need suggests, however, that drive level will be reduced in the presence of others, particularly for first-born individuals. The present experiment was designed to test these hypotheses. First- and later-born Ss were tested either individually or in groups on a paired-associate task known to be competition. The results suggest that the later-born Ss show a social facilitation effect while the first-born Ss an affiliation effect. The results are significant, however, only for male Ss. The results for females tend to support a social facilitation position for both birth-order positions.

Zajonc (1965) has recently presented an hypothesis to account for many of the conflicting results which have emerged from studies of individuals who perform in the presence of others. Using Hill-Spence theory he has suggested that the presence of others acts to increase the S's drive level and that this facilitates the performance of an overlearned task or the learning of a simple task but interferes with the learning of a complex task where the S's dominant response is incorrect.

Recent studies have shown that the presence of an audience increases the probability of emission of dominant responses (Zajonc & Sales, 1966; Cottrell, Wack, Sekerak, & Rittle, 1968) and interferes with the learning of a competition list of paired associates (Cottrell, Rittle, & Wack, 1967) in a manner similar to studies which varied drive by selection of groups from scores on the Taylor Manifest Anxiety Scale (e.g., Spence, Farber, & McFann, 1956).

Other studies in social psychology, however, predict that the effect of the presence of others may be to reduce any anxiety that may be present in the S and that this effect is greater for first-born Ss as against second- or later-born Ss. Schachter (1959) found that in an anxiety-arousing situation first-born female Ss were more

willing to affiliate with others in the same situation than were second-born females. Wrightman (1960) found reductions in the amount of reported anxiety for first-born female Ss who waited with others. This reduction in anxiety was not found for second-born Ss. Although Schachter did not study the effects of affiliation on task performance, Kiesler (1966) found that in a stress situation working in the presence of others impaired performance on a simple task, presumably the effect of coactors being to reduce drive.

The present study is an attempt to compare the formulations of Zajonc and Schachter in accounting for the learning behavior of Ss in a coacting situation.

SUBJECTS

Thirty-two students, equal numbers of males and females, served as Ss. Within each sex division, half the Ss were only or first-born children, while the remainder were second or later born.

Half of the Ss were tested individually with equal representation of ordinal position and sex. The remaining Ss were tested in four groups of four Ss containing two males and two females. Each group of four was composed of Ss of the same ordinal position. Two groups were tested for each ordinal position.

TASK AND APPARATUS

The task was the learning of a list of paired associates and was taken from an earlier study by Spence et al (1956). Ss learned two lists, a practice list of 15 paired nouns which were entirely unrelated, and a competition list, consisting of 12 paired nouns designed to yield a greater number of competing incorrect responses relative to the number of correct responses.

Four of the pairs in the competition list had strong associations between stimulus and response terms. For each of these associated pairs, two further nonassociated pairs were derived which had strong associations between the stimulus member and the stimulus terms of the associated pair. Thus, for example, an associated pair was Barren-Fruitless, and the nonassociated pairs related to this were Arid-Grouchy and Desert-Leading.

The material was presented on slides, one pair to a slide, by a Kodak Carousel S-AV projector. Slides were presented for approximately 2.4 sec and the interitem interval was approximately 1.8 sec.

PROCEDURE

Subjects were given five trials on the practice list. At the end of each trial, Ss were given 1 min to fill in a page of a booklet containing random orders of the stimulus words to which Ss had to provide the response term. This method differs from the anticipation method used in previous studies and, although some evidence suggests that this method leads to greater ease of learning (Battig & Brackett, 1961), other studies find no difference (Reynolds, 1965).

Subjects were instructed to try as hard as possible as the study was being conducted to compare the learning rates of students in different faculties of the university, and the Es were interested in finding the highest scores. This was added to induce involvement in the learning task.

Subjects were not discarded from the experiment in the manner used by Spence et al (1956), where Ss making more than 50 or less than 1 correct response were rejected. All Ss proceeded to the test list.

The test list was presented by a slightly different procedure from the practice list. Results from a pilot study suggested that the above method was easy because all the stimulus words were presented simultaneously, allowing Ss both choice and elimination of wrong guesses.

On the test list Ss saw the pairs presented at the same rate as on the practice list, but the recall trials required the Ss to give the response term while the stimulus term was presented alone on the screen. Pairs of words and stimulus words were presented in different orders on each practice and recall trial. The interval between a practice and a recall trial was 4 sec.

Subjects were instructed that this was the proper list, the one that their actual scores were to be calculated from, so they were to try even harder than before.

Subjects were given 10 trials on the competition list.

RESULTS

Practice List

An analysis of variance was performed on the number of errors on the practice list. The only significant term was the Birth Order by Sex interaction [$F(1,24) = 5.13, p < .05$]. The means for this interaction are presented in Table 1. Sixteen Ss gave more than 50 correct responses on this list but they were not rejected as in previous studies.

Competition List

Analysis of variance was performed on the competition list errors and in this case there were two significant effects. Sex was significant [$F(1,24) = 10.10, p < .005$] as was the Birth Order by Sex by Coaction interaction term [$F(1,24) = 4.28, p < .05$]. Because of the apparent correlation between performance on the practice list and on the competition list an analysis of covariance

Table 1
Mean Number of Errors in Learning
of Practice List

Sex	Birth Order	
	First Born	Later Born
Male	37.98	24.13
Female	21.50	35.50

Table 2
Adjusted Mean Number of Errors in Learning
of Competitional List

Sex	Birth Order			
	First Born		Later Born	
	Alone	Co-action	Alone	Co-action
Male	47.00	42.80	37.10	65.67
Female	21.93	40.18	21.18	30.28

was performed on the number of errors on the competition list, with the number of errors on the practice list as the covariate. The within-cell correlation was 0.52. Sex was again a significant main effect [$F(1,23) = 11.41, p < .01$], females learning with fewer errors. There was also a significant Birth Order by Sex by Coaction interaction [$F(1,23) = 5.02, p < .05$]. This interaction is shown in Table 2, with adjusted means.

The data indicate that male Ss who were later born did less well on learning the competition list when in a coaction situation than when learning alone. These means were significantly different at the .05 level of significance. First-born males, however, tended to do better in a coaction situation, although the differences here are not significant. For female Ss, second-borns tended to learn more quickly in a coaction setting than did first-borns ($p < .05$), but for both ordinal positions the alone condition was better.

DISCUSSION

For males, the data show that on a competition task, where there is the likelihood that the Ss will learn associations interfering with the correct response, the presence of others in a coacting situation produces a decrement in learning, at least for second-born Ss. This seems to support Zajonc's (1965) hypothesis relating presence of others to increased drive. For first-born Ss, however, the presence of others seems to have the effect of reducing

drive, so reducing the difference between the coaction and the individual conditions. This result seems to give support to Schachter's (1959) hypothesis relating birth order to affiliation.

For females, the data are less clear. Female Ss are best alone (or at least with only the E present), supporting Zajonc. When in a coaction situation, however, first borns performed less well than second borns, again supporting Zajonc's suggestions.

The results of this study are in no way final answers to the question of whether presence of others facilitates or inhibits learning. The Ss learned much more rapidly than those of the studies previously cited. In the Spence study, the mean number of correct responses on the practice list ranged from 13.3 to 17.2, while for Cottrell et al (1967) the range of scores was from 18.5 to 19.2. In the present study the mean scores per group were between 40.4 and 50.1 correct responses. This may be due to the differences in the methods of presentation, but if a coaction, rather than an audience, situation is to be used there is no alternative to a study-test method. The differences in speed of learning between males and females may explain the discrepancies between the Birth Order by Coaction interactions for each sex. If the Ss are very effective learners then the competition nature of the lists may be destroyed, as shown by Katahn (1966). Nevertheless, the material still seems to have retained its competition nature for the male Ss, even when individual differences in learning on a practice list had been removed by analysis of covariance.

All Ss were tested in the presence of a female E and this may have reduced any difference between the individual and the coaction conditions. The presence of a female E may have had a differential effect, perhaps acting to reduce whatever drive state was induced by the situation and the instructions in the female Ss. Certainly on the practice list the second-born male Ss do better than second-born females, while on the competition list the order is reversed. If a female E reduced anxiety for female Ss then this effect might be expected as reduced drive should act to hinder competition and facilitate noncompetition learning.

Another factor possibly reducing the generalizability of these results is the fact

that Ss in coaction conditions were tested in mixed sex groups. It may be that male and female Ss react differently to the presence of the other sex in competitive, or implicitly competitive, conditions.

The present data, however, are suggestive of differences between Ss differing in ordinal position and of possible differences in the applicability of Zajonc's and Schachter's theories of the behavior of individuals performing in a coactive situation. Certainly the differences between first- and second-born children would indicate that the mere presence of others is not a sufficient condition for a social facilitation effect to emerge but that an effect may be mediated by some learned drive, as suggested by the results of Cottrell, Wack, Sekerak, & Rittle (1968).

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