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SOCIAL FACILITATION OF DOMINANT RESPONSES BY THE PRESENCE OF AN AUDIENCE AND THE MERE PRESENCE OF OTHERS[1]

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Experiments have shown that the presence of an audience affects individual performance by enhancing the emission of dominant responses. An experiment was conducted to evaluate the proposal of Zajonc that the mere presence of other persons is responsible for audience effects. A total of 45 university students performed a pseudorecognition task; 15 performed the task alone, 15 performed the task before an audience of 2 passive spectators, and 15 performed the task in the presence of 2 persons who were not spectators. The task placed previously established verbal habits in competition with each other. The presence of an audience enhanced the emission of dominant responses, but the mere presence of others did not.

In a recent review, Zajonc (1965) used Hull-Spence theory to integrate the contradictory results from social facilitation studies. He proposed that the mere presence of other persons enhances the emission of dominant responses by increasing the individual's general drive (D) level. Since dominant task responses may be either correct or incorrect, depending on the task and stage of practice, this proposal can accommodate both the social increments and the social decrements that have been found in performance. Viewed in this way, the effects of audience and coaction conditions upon individual performance are merely instances of a process which occurs whenever other persons are present.

Recent studies of audience effects, using previously validated behavioral indicators of general drive, have obtained results which are consistent with the Zajonc proposal (Cottrell, Rittle, & Wack, 1967; Zajonc & Sales, 1966). These studies, however, do not show that the mere presence of others is responsible for audience effects upon performance.

The aim of the present study was to determine whether the presence of persons who are not spectators or coactors also produces drive effects upon individual performance. The present study compared the effects of three conditions—alone, mere presence, and audience—upon performance on a pseudorecognition task. Other persons were present when the subject performed in both the audience condition and the mere presence condition, but only in the audience condition did they have the status of spectators. In contrast to the spectators in the present study and in studies of audience effects (for instance, Cottrell et al., 1967; Zajonc & Sales, 1966), the stimulus persons in the mere presence condition did not express interest in watching the subject perform, and they were unable to see the task stimuli to which the subject responded.

The task used in this study places verbal habits of different strengths in competition with each other. Zajonc and Sales (1966) used this task and found that the presence of an audience enhanced the emission of responses governed by strong habits at the expense of responses governed by weaker habits. The proposal of Zajonc that the mere presence of other persons increases drive level implies that

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in the present study both the mere presence condition and the audience condition should enhance the emission of dominant responses.

METHOD

Subjects

The subjects were 45 male introductory psychology students at Kent State University, participating to fulfill a course requirement. They were assigned randomly to the three conditions of the experiment with the restriction that 15 participate in each condition.[2]

Apparatus and Materials

The stimuli were 10 nonsense words—AFWORBU, BIWONJI, CIVADRA, FEVKANI, LOKANTA, MECBURI, NANSOMA, PARITAF, SARIDIK, and ZABULON—similar to those used by Zajonc and Sales (1966). The *training stimuli* were 4 × 6-inch photos of each word. The *test stimuli* were 2 × 2-inch slides of each word.

The slides were presented on a Lafayette KT-800 tachistoscope. A Meylan Electric Stopclock, 2022 NF, was used to time the stages of the experiment.

Procedure

Training. Verbal habits of varying strengths were established by manipulating the number of times the subject vocalized each of the nonsense words. There were five training frequencies: 1, 2, 5, 10, and 25. The 10 words were divided into five pairs. For each subject one of the word pairs was assigned to each of the training frequencies. For each subject a deck of 86 photos was prepared consisting of 50 photos for the two 25-frequency words, 20 photos for the two 10-frequency words, 10 photos for the two 5-frequency words, 4 photos for the two 2-frequency words, and 2 photos for the two 1-frequency words. The cards were arranged in sequence by shuffling the deck. The word pairs were rotated through the training frequencies in a 5 × 5 Latin-square which was completed three times in each experimental condition.

The experimenter described training as a study of how people learn a foreign language. He presented the photos by displaying a word, and then reading it aloud. Then the subject read the word aloud once. His pronunciation was neither reinforced nor corrected. The presentation rate was one photo every 4 seconds.

Testing. During testing the verbal habits were placed in competition with each other and the effects of the experimental conditions upon the frequency of emission of the verbal responses were observed. The subject received recognition instructions. He was also told that the speed of presentation would vary, that sometimes the word would be difficult to identify, and on these trials he should guess. To prevent rehearsal, the subject then read a passage from a history book.

The slides were tachistoscopically projected through a small window in the control room upon a screen in the adjacent experimental room which was 7 feet from the subject. The two rooms were connected by an intercom. To familiarize himself with the procedure, the subject first saw and named four English words—CLEVELAND, STUDENT, UNIVERSITY, and PROFESSOR—twice each at varying speeds and diaphragm settings. Then the test stimuli were presented in four blocks of 40 trials each. If a subject failed to respond within 10 seconds, the experimenter urged him to guess, and did not show the next slide until he did.

Each block consisted of 10 recognition trials and 30 pseudorecognition trials. In each block the *recognition trials* consisted of single presentations of each of the 10 training words. They were exposed with a medium diaphragm setting and a shutter speed of .2 second. In pretests, these conditions produced correct recognition on 85% of trials. The position of the recognition trials in the trial block and the training frequency of the word shown were determined randomly. A different schedule was prepared for each trial block and they were administered to all subjects.

On the *pseudorecognition trials* a stimulus was presented which was an equally adequate stimulus for all of the 10 verbal responses. One of the training words was exposed in reverse position with a small diaphragm opening for .01 second. In pretests, subjects reported seeing something wordlike under these conditions, but were unable to identify words and could not distinguish forward presentations from backwards presentations. The subject's response was accepted if two of its syllables matched a training word. On the few occasions when the experimenter could not classify a response, he told the subject that his response was not one of the foreign words he had learned and asked him to make another guess.

The experimenter remained silent during the test trials unless the subject was tardy in responding or made an unclassifiable response.

Dependent variable. The dependent variable was the number of times words of each training frequency were emitted on the pseudorecognition trials. The pseudorecognition trials served to place the verbal habits established during training in competition with one another. The subject was instructed to call out 1 of the 10 training words on each trial and to guess when he was unsure. Since stimulation on the pseudorecognition trials was equally adequate for all of the 10 verbal responses, the guessing responses on these trials showed the effective strength

[2] Fourteen other students reported to the lab, but were not used. One was blind, one was a member of a racial minority, and one was excluded from the audience condition because he discovered that the response words were not being presented on the pseudorecognition trials. Eleven students were excluded—audience (4), mere presence (3), and alone (4)—because their responses on the first block of pseudorecognition trials indicated they had not learned more than three of the response words.

of the verbal habits when in competition with one another.

Experimental Conditions

In the *alone condition* the subject was alone in the experimental room during testing.

In the *audience condition* two interested spectators observed the subject and the test stimuli to which he was responding. Two confederates entered the experimental room immediatcly after the subject finished reading the history passage. They posed as fellow introductory psychology students who were coming to participate in a color-perception experiment. The experimenter informed them that their experiment would begin when the subject was finished. The confederates obtained the experimenter's permission to watch the present experiment while they waited. The experimenter instructed the subject and the confederates not to talk to each other, and left the room. The confederates sat 6 feet from the subject and were positioned so they could observe both the subject and the screen on which the words were projected. The confederates watched quietly and attentively throughout the 160 test trials.

The *mere presence condition* differed from the audience condition in that the two confederates did not express interest in watching the subject, and they wore blindfolds which prevented them from observing the stimuli to which the subject responded. After the subject had finished reading, the two confederates entered, posing as subjects for a color-perception experiment. The experimenter noted that their experiment would begin when the subject was finished, and asked them to put on blindfolds to adapt to the dark in preparation for their experiment. After he instructed the subject and confederates not to talk, the experimenter returned to the control room. The blindfolded confederates were seated in the same proximity to the subject as in the *audience condition* and waited silently through the 160 test trials.

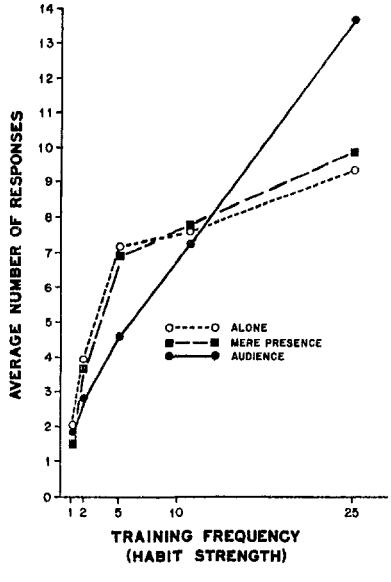

FIG. 1. Number of responses of different training-frequency classes emitted on the pseudorecognition trials, averaged over subjects and over trial blocks.

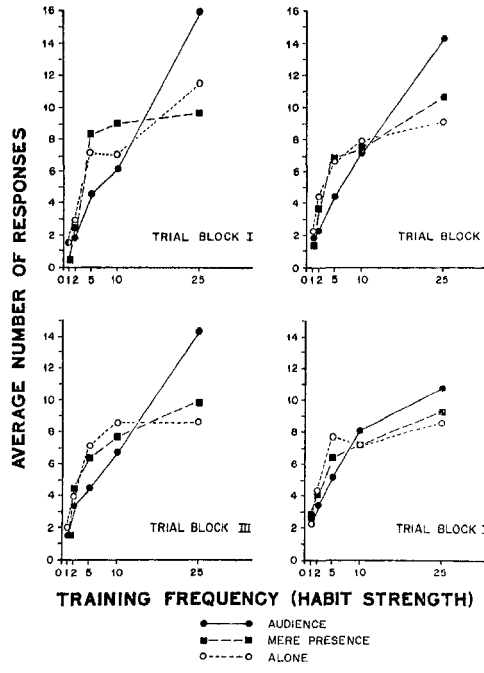

FIG. 2. Number of responses of different training frequency classes emitted in separate blocks of pseudorecognition trials, averaged over subjects.

The confederates were male undergraduates. They were assigned to the conditions with the restriction that each confederate participate in both conditions an approximately equal number of times.

To equalize the interval between training and testing, subjects in the alone condition read more lines of the history passage than did subjects in the audience and mere presence conditions.

RESULTS

Response Emission on Pseudorecognition Trials

Figure 1 presents for the three conditions the mean number of responses of each training-frequency class emitted on the pseudorecognition trials. There were 15 subjects in each condition and each contributed 120 responses (4 blocks of 30 pseudorecognition trials). The response frequencies were averaged over trial blocks and subjects.

TABLE 1

SLOPE OF FUNCTION RELATING RESPONSE EMISSION TO TRAINING FREQUENCY FOR THREE CONDITIONS SEPARATELY AND COMBINED ON SEPARATE AND COMBINED TRIAL BLOCKS

Trials	3 conditions combined	Alone	Mere presence	Audience
Block I	.428	.363	.321	.600
Block II	.359	.235	.328	.515
Block III	.336	.226	.283	.500
Block IV	.257	.202	.235	.334
Responses averaged over all blocks	.346	.257	.292	.488

Note.—There were 15 subjects in each condition. Response frequencies were averaged over subjects.

Figure 2 presents the mean number of responses of each training-frequency class emitted on each block of pseudorecognition trials. The data summarized in Figure 2 were submitted to a three-factor (testing condition, training frequency, and trial block) analysis of variance. Three effects were significant. The main effect of training frequency is significant ($p < .001$, $F = 44.30$, $df = 4/168$). Analysis of the trend components [3] revealed that the linear component of the training frequency effect is significant ($p < .001$, $F = 90.50$, $df = 1/42$), and accounts for 88% of the variation between training frequency classes. Response emission on the pseudorecognition trials is an increasing linear function of training frequency. The slope of this function is .346.

The purpose of the present study was to evaluate the drive-producing (D) effects of the presence of an audience and the mere presence of others. Hull-Spence theory (Spence, 1956; Spence & Spence, 1966) assumes that in a competitional situation the probability of a response's emission is a direct function of the magnitude of its excitatory potential (E) relative to those of other responses. The E variable is assumed to be a multiplicative function of the habit (H) and drive (D) variables. Since in the present experiment the values on the habit factor—the training frequencies—were the same for all testing conditions, variation in the drive factor would produce an interaction between conditions and training frequency by changing the slope of the response-emission function. The analysis of variance showed that the interaction between conditions and training frequency is significant ($p < .025$, $F = 2.38$, $df = 8/168$). This interaction is primarily due to differences between conditions in linear trend. The significant ($p < .05$, $F = 3.90$, $df = 2/42$) linear component of the interaction accounted for 71% of the interaction sums of squares. Comparison of the slopes of the response-emission functions shown in Figure 1 by analysis of the linear trend showed that the response-emission function for the audience condition is significantly steeper than it is for both the alone condition ($F = 7.21$, $df = 1/28$, $p < .025$) and the mere presence condition ($F = 4.53$, $df = 1/28$, $p < .05$). The slope of the response-emission function for the mere presence condition was not reliably different ($F < 1$) from the slope for the alone condition.

The effects of the experimental conditions upon response emission were similar over all trial blocks, since the three-factor interaction of testing condition, training frequency, and trial blocks was not significant ($F = 1.21$, $df = 24/504$, *ns*). Figure 2 shows that on every trial block the presence of an audience enhanced the emission of responses governed by strong habits at the expense of responses governed by weaker habits, and that on every trial block response emission in the mere presence condition was similar to response emission in the alone condition. Table 1 shows that on every trial block the slope of the response-emission function in the audience condition was greater than the slope in the other two conditions, and also that on every trial block the slope for the mere presence condition was similar to the slope for the alone condition.

Table 1 also shows that on successive trial blocks the slope of the response-emission function for all conditions combined became less steep. This finding is reflected in the third significant effect of the analysis of variance, a significant ($p < .001$, $F = 3.00$, $df = 12/504$) interaction between training frequency and trial blocks. Significant ($p < .001$, $F = 7.83$,

[3] Gaito's (1965) suggestions were followed in deriving trend coefficients for unequal intervals.

$df = 3/216$) variation between trial blocks in the slope of the response-emission function accounted for 83% of the interaction sums of squares.

Accuracy on Recognition Trials

On 40 trials—10 in each block—the training stimuli were presented supraliminally. The three conditions did not differ ($F < 1$) in the mean percentage of correct recognitions (alone $\bar{X} = 78.2\%$, mere presence $\bar{X} = 79.8\%$, audience $\bar{X} = 80.7\%$) on these trials.

Time Measures

The three conditions did not differ by t test either in the mean number of minutes to complete the training stage of the experiment (alone $\bar{X} = 6.0$, mere presence $\bar{X} = 6.1$, audience $\bar{X} = 6.1$) or in the mean number of minutes to complete the testing stage (alone $\bar{X} = 29.3$, mere presence $\bar{X} = 28.6$, audience $\bar{X} = 28.3$). However, the mean interval between training and testing was significantly shorter by t test ($p < .005$) in the alone condition ($\bar{X} = 6.2$) than in both the mere presence condition ($\bar{X} = 7.0$) and the audience condition ($\bar{X} = 6.9$).[4] Thus it is possible that the shorter training-testing interval was responsible for the testing performance of the alone subjects, rather than their solitude during testing. Analyses of covariance were performed for the comparisons involving the alone condition. The length of the training-testing interval was the covariate. The covariance adjustments were small—in all analyses the pooled within-group regression coefficient was zero to three decimals—and the adjustments did not change the pattern of findings reported above. Therefore, the shorter training-testing interval does not seem to be responsible for the performance of the alone subjects.

DISCUSSION

The results of the present study show that the presence of an audience increases the individual's general drive (D) level. On the pseudorecognition trials the presence of an audience enhanced the emission of dominant responses at the expense of subordinate responses. Previous research (Zajonc & Nieuwenhuyse, 1964) has shown that this is the effect of drive manipulations upon response emission on the pseudorecognition trials.

The findings of the present study correspond quite closely to the findings of Zajonc and Sales (1966). This study also showed that the presence of an audience enhances the emission of dominant responses on the pseudorecognition trials. The slope of the response-emission function for subjects tested alone was .368 [5] in the present study and .308 in the Zajonc and Sales (1966) study. The slope for subjects tested with an audience was .699 in the present study and .669 in the Zajonc and Sales (1966) study.

Another similarity in the findings of the two studies is that in both studies there was a significant interaction between training frequency and trial blocks upon response emission due to a decline in the slope of the response-emission function over successive trial blocks. The decline results from the supraliminal exposure of each of the 10 training stimuli once during every trial block, serving to increase the usage of the low-frequency words as guesses.

The results of the present study do not support the proposal of Zajonc (1965) that the mere presence of other persons is responsible for audience effects upon performance. Although the presence of an audience enhanced the emission of dominant responses, the mere presence of other persons of the same status

[4] Bringing the confederates into the testing room in the audience and mere presence conditions required more time in the experiment than in pretests. Thus, subjects in the alone condition did not spend sufficient time in reading from the history passage to equate the training-testing interval among conditions.

[5] The slopes of the present study shown in Table 1 were multiplied by the factor 43/30 to make them comparable to those obtained by Zajonc and Sales (1966). This procedure was necessary because in the Zajonc and Sales (1966) study the measurement unit on the ordinate was the same width as the measurement unit on the abscissa, but in the present study the ordinate unit was wider than the abscissa unit. In the Zajonc and Sales (1966) study there were 31 pseudorecognition trials per block and the sum of the training frequency values was also 31, but in the present study there were 30 pseudorecognition trials per block and the sum of the training frequency values was 43.

(subjects for a later experiment) and in the same physical proximity as the audience did not enhance the emission of dominant responses. The slope of the response-emission function for the mere presence condition was not reliably different from the slope for the alone condition, and the response-emission slope for the audience condition was significantly steeper than the slope for the mere presence condition.

Further research may show that the Zajonc proposal holds true only for audience and coaction arrangements; drive effects upon individual performance will not occur unless the others present are either spectators or coactors. Since simple physical presence does not seem to be sufficient, further research must also determine the factor which is responsible for audience effects upon individual performance.

REFERENCES

COTTRELL, N. B., RITTLE, R. H., & WACK, D. L. Presence of an audience and list type (competitional or noncompetitional) as joint determinants of performance in paired-associates learning. *Journal of Personality,* 1967, **35**, 425–434.

GAITO, J. Unequal intervals and unequal *n* in trend analysis. *Psychological Bulletin,* 1965, **63**, 125–127.

SPENCE, K. W. *Behavior theory and conditioning.* New Haven: Yale University Press, 1956.

SPENCE, J. T., & SPENCE, K. W. The motivational components of manifest anxiety: Drive and drive stimuli. In C. D. Spielberger (Ed.), *Anxiety and behavior.* New York: Academic Press, 1966.

ZAJONC, R. B. Social facilitation. *Science,* 1965, **149**, 269–274.

ZAJONC, R. B., & NIEUWENHUYSE, B. Relationship between word frequency and recognition: Perceptual process or response bias? *Journal of Experimental Psychology,* 1964, **67**, 276–285.

ZAJONC, R. B., & SALES, S. M. Social facilitation of dominant and subordinate responses. *Journal of Experimental Social Psychology,* 1966, **2**, 160–168.

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