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EFFECT OF THE PRESENCE OF OTHERS ON THE PLACEBO RESPONSE

by

Robert A. Worcester

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ABSTRACT

A comparison of the effects of the presence of others on responses to a placebo pill was made between 4 treatment conditions. The placebo was described to Ss as a "mild stimulant" producing feelings of elation and mild euphoria. In Condition I, Ss waited for the pill to take effect while the experimenter was not present. In Condition II, Ss waited with the experimenter present. In Condition III, Ss waited together in groups of 5 but were separated by partitions to prevent communication. In Condition IV, Ss waited together in groups of 5 and were allowed to freely interact. No significant difference was found between groups in evaluations of moods produced by the placebo in an analysis of variance of semantic differential questionnaire responses. A significant difference between Condition I and Condition IV was found, however, in the degree to which moods were attributed to the placebo administration. An extension of Zajonc's social facilitation theory is suggested to account for the finding that the presence of others in Condition IV increased the degree to which Ss attributed their mood to the action of the placebo on a postexperimental questionnaire.

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INTRODUCTION

Descriptions of drug effects abound in contemporary literature. The use of drugs to alter moods, influence mental states, and change behavior has become one of the hallmarks of our times. Drug use, therapeutic and otherwise, is an ancient practice. Modern technology, however, has produced such a vast array of psychoactive drugs that, in many cases, their effects on mental processes are only dimly understood.

One result of pharmacological research is the realization that often what is observed in drug effects cannot be attributed to the specific action of the chemical agents involved. Dramatic effects are often observed in subjects who have received nothing more than saline solutions or milk sugar tablets commonly used as placebo controls in drug research. Doctors have long been aware of the therapeutic value of placebo treatments (Shapiro, 1960) and have come to refer to the "placebo effect" as any effect of medical intervention that cannot be attributed to the specific action of drugs or treatment. Because of its frequent and sometimes dramatic occurrence in medical research the placebo effect has generated considerable interest.

In addition to the drug effects observed in medical research as a result of placebo treatment, the popular and "underground" press have reported bizarre experiences attrib-

uted to such agents as dried banana peels and powdered insects. These effects too are sometimes difficult to understand in terms of the chemical properties of the specific substances and are conceivably examples of placebo-like effects outside of a medical setting.

A sociologist, Howard Becker (1966), has suggested that some drug effects may be as much a social phenomenon as a chemical one. Extensive interviews with marihuana smokers revealed that the novice must first be initiated by being made aware of the physical sensations produced by the drug. He must learn to interpret the sensations as desirable and pleasant. Becker suggests "vague impulses and desires, probably most frequently a curiosity about the kind of experience the drug will produce, are transformed into definite patterns of action through the social interpretation of a physical experience which is itself ambiguous." Such a process requires the support, information, and example of other individuals. It is Becker's contention that marihuana provides only ambiguous physical sensations that are perceived as pleasurable only because of the individual's social learning.

Whether or not one agrees with the contention that marihuana provides only ambiguous physical sensations, the model Becker advances could conceivably explain a significant portion of the "highs" experienced in the drug culture. The purpose of the research reported in this study is to investigate the influence of very basic social factors on drug experiences where the drug is known to be pharmacologically inactive.

Psychological Research on Placebo Effects

Beecher (1955) was one of the first drug researchers to suggest that placebo effects were important enough to be studied in their own right. In a series of studies on postoperative pain he found that placebo treatments relieved pain in almost half the number of cases that were relieved by morphine treatments. Beecher (1959) used the term "placebo reactor" to refer to patients who consistently responded to inert medication. He suggested that placebo effects were important components of any drug response and that they posed serious methodological difficulties for the evaluation of specific drug action. He warned also that a wide variety of unpleasant side effects had been encountered among the placebo controls used in his studies. He attempted to isolate characteristics of the "placebo reactor" in terms of personality traits and attitudes. He found "placebo reactors" to be generally more anxious, outgoing, cooperative, and optimistic about treatment. He suggested also that placebo response is related to the degree of stress the patient experiences. He found that "placebo reactors" were more likely to respond to active drug treatments.

Lasagna, Mosteller, VonFelsinger, and Beecher (1954), Steinbook, Jones, and Ainslie (1965), and Duke (1963) are among those who have also attempted to relate placebo response to measures of suggestibility. Each found measures of attitude and personality that correlated with measures of

placebo response. Results of these studies were not consistent and suggest that situational variables are quite important as well.

Shapiro, Wilensky, and Struening (1968) point out that one difficulty with attempts to relate placebo responses to suggestibility is that measures of suggestibility do not correlate well with one another and represent a rather loosely defined theoretical concept. They went on to devise a "placebo test" as a measure of responsiveness to placebo treatment. The authors found it was necessary to distinguish between patients who responded positively to treatment and those that reacted negatively. Both are considered "placebo reactors" in placebo research but were found, in this study, to have quite different characteristics.

Liberman (1964) and Wolf, Doering, Clark, and Hagans (1957) found no evidence for characterizing "placebo reactors" and observed that the number of individuals who responded consistently to placebo treatments was no greater than what one would expect from chance given the initial proportion of response to no response. Liberman concluded that, in his subjects, placebo reactivity should be viewed as a potential tendency that can become manifest in anyone under the right circumstances and is not an attribute possessed by some but not by others.

Reviewing situational factors that influence treatment, Honigfeld (1964) found evidence for a medical equivalent of the "Hawthorne effect". Patients responded to changes

in observational routine, treatment, and personal attention that accompany a drug research project. He concludes that often enthusiasm for a new treatment can be transmitted to a patient with beneficial results regardless of whether the patient has received the actual treatment or a placebo. Feldman (1956) found that investigators themselves influence the results of studies. He found that evaluations of patients' progress with drug treatment in a psychiatric setting was significantly related to the evaluator's own attitude toward chemotherapy.

Some research has suggested that social influences on drug effects may be considerable. Nowlis and Nowlis (1956) reported that the effects of drugs showed less variation in group administration conditions than they did under conditions of individual administration. They suggested that group norms were established for drug effects in their study. Slater, Morimoto, and Hyde (1957) reported significantly different reactions to LSD under conditions of individual and group administration. Subjects taking the drug in groups showed more elation and activity, whereas subjects who took the drug alone showed more anxiety and inappropriate behavior. Unfortunately, no placebo controls were used in the study.

Knowles and Lucas (1960) conducted an investigation of the effects of individual and group administration conditions on responses to placebo treatment. Subjects indicated from a checklist any side effects they felt during a thirty minute waiting period following administration of a

lactose tablet. Although no significant differences between individual and group administration conditions were found in the number of pleasant or unpleasant side effects reported, evidence of an interaction between conditions of administration and personality traits measured by the Maudsley Personality Inventory was found. There was a significant correlation between "neuroticism" and placebo response in group conditions but not in individual administration conditions. There was a significant correlation between "extroversion" and placebo response in individual administration conditions but not in group conditions. A replication of the individual administration conditions using less medically sophisticated subjects found a negative correlation between "extroversion" and indicated placebo effects.

Knowles & Lucas, (1960) used a small sample (N = 22) of medically sophisticated volunteers. They do not report if subjects in the individual condition waited alone or in the presence of the experimenter, nor do they report if the checklist was given alone or in the presence of the experimenter. Results of the correlations were inconsistent and did not confirm the experimental hypothesis that placebo effects are related to suggestibility defined in terms of the Maudsley Personality Inventory traits. Their study, as well as other investigating social influences on placebo responses, did not present a theoretical basis for predicting social interaction effects.

Some Theoretical Suggestions

Research attributing placebo effects to individual "reactivity" has been inconclusive and it has been readily accepted that social and situational influences on placebo effects are important factors to be considered. No theoretical positions have been advanced, however, to guide research in this area. This is perhaps due to the medical orientation of many of these researchers which explains effects in terms of individual traits or constitutional predispositions. On the other hand, social psychologists have also not specifically directed their attention to the problem of predicting social influences on placebo responses.

There are many ways in which social factors could produce drug effects, of course, but the simplest form of social influence could come from the mere presence of others during the period the drug is supposed to be taking effect. Much of the research on such "social facilitation" effects has recently been integrated by Zajonc (1965), and his theoretical formulations, along with those of another social psychologist, Stanley Schachter, may provide a model for understanding some of the basic social influences which shape placebo reactions.

Zajonc (1965) proposed that the presence of others, whether as coactors or mere observers, can systematically influence a wide range of task performance. Although he does not extend his theory to predict the effect of the presence

of others on reactions to drug or placebo administration, the process he proposes might well apply to such responses as they occur in an individual or group situation. The presence of others, he suggests, serves to increase an individual's level of arousal which facilitates the performance of well-learned responses but impairs the performance of poorly learned responses. Thus an individual who is performing a task requiring well-learned responses, such as reciting a frequently practiced word list, should do better in a group situation than if others were not present. If, however, an individual were performing a task that required poorly learned responses, such as reciting an infrequently practiced word list, he should perform better alone than in the presence of others. A preponderance of research (Schachter, 1964) indicates that accurate discrimination of patterns of internal stimulation associated with moods and emotions is generally a poorly learned response. Placebo effects may exist because it is difficult to distinguish the effect of an active drug from that of an inert substance on the basis of internal sensations. The subject's task in placebo research is one in which the correct response is to observe that no changes in the way the subject "feels" resulted directly from the placebo administration. The correct response is probably not well-learned. Therefore, according to Zajonc, it would be less likely to occur in the presence of others than it would when the subject is alone. Likewise, incorrect responses should occur more frequently in the presence of

others taking the form of a response to a placebo administration.

Schachter (1964) proposed a theory which suggests that individuals interpret and label their moods and emotions on the basis of social or situational cues rather than on the basis of specific patterns of internal sensations. Where sensations cannot be readily attributed to an external stimulus, the reactions of others to a situation provide important cues used to determine the appropriate emotional label for the sensations. Schachter induced physical sensations in subjects and found that the drug produced sensations were labelled "joy" as readily as "anger" depending on his manipulation of the social cues. In his study subjects who received placebo treatments also responded to the manipulation of social cues by reporting that they experienced the appropriate mood. According to Schachter placebo responses resulted from the interpretation of normal physical sensations in terms of the social cues provided by the experiment. He concludes that moods result from an interaction of cognitive and physiological factors rather than from specific physiological reaction patterns associated with specific moods. In the present study subjects were given instructions which indicate how others have supposedly responded to the treatment and were asked to report their own reactions in terms of the appropriate mood labels.

Neither theorist intended to apply his proposals directly to the problem of predicting the effect of the pres-

ence of others on placebo effects. Taken together, however, they suggest a model that might explain differences in the degree of placebo response observed under conditions of individual or group administration of inert substances. The model is based on Zajonc's proposition that the presence of others influences task performance by increasing arousal, thereby making well-learned responses more likely and poorly learned responses less likely. The performance of tasks requiring well-learned responses is facilitated by the presence of others while the performance of tasks requiring poorly learned responses is impaired by the presence of others. On the basis of Schachter's demonstrations, one can conclude that accurate discrimination of patterns of internal sensations associated with moods is not well-learned and that errors should conform to the pattern suggested by the social cues. The experimental task of reporting accurately the effects of a placebo requires performance of a poorly learned response and should, therefore, be impaired by the presence of others. Conversely, errors in the form of the suggested placebo "effect" should occur more frequently in group situations than in situations where the individual subject is alone.

Hypothesis

The hypothesis investigated in this experiment is that the presence of others will increase the degree of placebo response suggested by the treatment conditions. By combining and extending the theoretical positions of Zajonc

(concerning the effect of others on task performance) and Schachter (regarding the labelling of emotional states) a model to account for differences observed in a comparison of individual and group administration of placebo treatments is set forth. Observed differences in strength, frequency, or content of reported changes in mood attributed to the placebo treatment constitute the dependent variable in this study. The independent variable consists of the degree of exposure of individual subjects to the presence of an experimenter and other subjects during the period that the placebo supposedly takes effect. If exposure to others increases the degree of placebo response, then the null hypothesis can be rejected and the increase attributed to social facilitation.

METHOD

Subjects

Subjects were 120 introductory psychology students drawn from the University of Manitoba psychology subject pool. Subjects were taken from classes meeting at Saint John's College and Saint Paul's College. All other introductory psychology classes had received a lecture covering the use of placebo controls in psychological research and were therefore excluded from this study. Altogether 48 males and 72 females were distributed evenly among the experimental groups described below.

Design

Four treatment combinations representing two conditions of individual placebo administration and two conditions of group administration were used. In Condition I subjects received the placebo and were asked to wait alone for 15 minutes while the "drug" took effect. At the end of the waiting period they evaluated their mood on a semantic differential form before the experimenter returned to the room. In Condition II subjects waited alone with the experimenter while the "drug" took effect and then completed the semantic differential in the presence of the experimenter. In Condition III subjects were given the placebo in groups of five and waited together in the presence of the experimenter during the 15 minute waiting period. Subjects were separated from each other by partitions and were not allowed to observe or communicate with one another during the experiment. In Condition IV subjects sat together at a table during the waiting period and were allowed to freely interact. The experimenter was present during the experiment in Condition IV.

Procedure

Subjects were first contacted during class time by the experimenter (RW). They were asked to sign a sheet indicating a time they could come to an interview room for an explanation of the experiment and a scheduling of an appoint-

ment time. Subjects who showed up at the interview room were told the experiment involved the use of a mild stimulant drug that was completely safe for human use. Individuals who expressed an interest in the experiment were asked to sign a statement that they understood that it involved no danger to themselves. They also agreed to abide by experimental precautions commonly used in drug research (documents in the appendix).

Subjects were directed to an experimental room in the psychology department building by appointment slips and were greeted by the experimenter wearing a white laboratory coat. In group conditions subjects were asked to wait quietly together until all the subjects arrived. The following instructions were then given to all subjects:

> I am (name) and I will be giving you the instructions for this experiment. As you probably know, it is important for each subject to receive exactly the same instructions. Rather than trust my memory I will use this tape recording of the instructions. If there are any questions following the tape, I will be glad to answer them.
>
> (tape recording) This is a research project that is developing new methods for the evaluation of drug effects. In this experiment we are testing and gauging the psychological measuring instruments used to study drug effects rather than actually studying the drug itself. It is important in this kind of research to develop accurate, sensitive, and reliable measures of drug effects and to be able to compare them to the effects of well-known pharmacological compounds so that meaningful comparisons can be made between new experimental drug preparations and those that are already well-researched.
>
> The drug used in this study is perfectly safe for human use and has well-known pharmacological properties. It has a stimulating effect on the central nervous system. Its effects are brief

> and mild. You will probably notice a slight increase in your rate of breathing as the drug takes effect. This is normal and should not alarm you. Often people report very pleasant changes in mood due to the action of this drug. You may feel elated, amused, and mildly euphoric. These are side effects and will probably last only about 15 or 20 minutes. If you feel any side effects we would be very interested in your observations.

A short series of tests were given prior to the administration of the placebo. These included: a measure of the subject's breath rate, a reaction time test, a time estimation test in which the subject estimated a 30 second time period, and a dynamometer trial. The purpose of these measures was to suggest a pretest -- post-test design and to obtain a base rate of breathing for each subject. The placebo was a small, buff colored, null effect pill flavored with tincture of gentian to provide a bitter taste. Subjects were instructed to dissolve the pill on their tongue for a moment before swallowing it so that the flavor would be apparent to them. The following tape-recorded instructions were given each subject with the administration of the pill:

> Now it is time to administer the drug preparation. This drug is a stimulant acting on the central nervous system; its effects are well-known to be safe and mild. There are no harmful side effects. Your reaction to this drug will enable us to scale our test measures for the future evaluation of new drug substances. It will take from 10 to 15 minutes for it to be absorbed into your system and you may experience slight changes in mood such as the mild euphoria I mentioned. It will help us very much in gauging the effects of this drug if you would record these changes by writing a brief description of them and the time you first noticed the change. Any other written thoughts or comments on the experiment or the procedure will be appreciated. Please make at least one comment every five minutes during the

following 15 minute period while we wait for the drug to enter your system.

Subjects in the first condition (where the experimenter left before the pill was taken) were also given instructions for the use of the semantic differential form at this time and were told to complete the form when a timer signalled the end of the waiting period. Also a post-experimental questionnaire was left face down and subjects were told to complete it after they had filled out the semantic differential. These subjects were told that the experimenter would return when they had completed the questionnaires.

In the second condition, where subjects waited alone but in the presence of the experimenter, subjects were given the same instructions on the use of the semantic differential and post-experimental questionnaire. However the experimenter remained with the subject and answered any question asked by the subject during the waiting period. The experimenter did not otherwise communicate with the subject.

In condition three subjects were seated between 4 by 6 foot partitions when they arrived for the experiment. The experimenter remained with the subjects throughout the experiment but the subjects could not communicate directly with each other.

In the fourth condition subjects were seated around a table in the same large room used for condition three and were allowed to communicate directly with each other throughout the experiment.

After the questionnaires were completed, all subjects

repeated the series of tasks given as a "pretest". Post-treatment breath rate was obtained and subjects were told that results of the experiment would be sent to the address indicated on their interview verification form.

Six groups of five subjects were run in each of the two group administration conditions. Each group was composed of three females and two males. A similar proportion of males and females was run in the individual administration conditions. The group administration conditions were alternated with the individual administration conditions. Group conditions were run at times when five subjects could make appointments for the same hour and were interspersed irregularly between the individual administration appointment times. Subjects were not told that appointment times were for individual or group administration treatments.

The major dependent variable in the study, the subject's mood, was assessed through a 26-item semantic differential rating scale. This scale was largely derived from an earlier mood scale constructed at the University of Manitoba to measure affective changes resulting from exposure to pleasant and unpleasant stimuli (Adamson, Romano, Corman, and Burdick, 1970). Items were selected on the basis of their high evaluative component as determined by Adamson's factor analysis and by their appropriateness to the mood intended to be induced by the experimental instructions.

RESULTS

Extent of Placebo Effect

Table 1 presents, by treatment condition, values for each of the 26 semantic differential items used to assess subjects' moods. A value of "4" represents the neutral position on the scale; higher values indicate displacement toward the positive ("mildly euphoric") end of the scale. Although no control group was used to establish what moods were experienced by subjects prior to the placebo administration, displacement of the scores toward the positive end of the scale means that subjects did report the mood suggested by the placebo instructions. The magnitude of the displacement, in turn, indicates the reported placebo effect was "moderate" in intensity, according to the definition of the scale points given in the instructions.

Differences Between Conditions

Since items from the Adamson, et al, (1970) semantic differential were used in a new context in this study, and since some new items were added, a factor analysis (principal components, verimax rotation) was performed on the responses to our 26 item mood inventory. Five factors accounting for 57.4 percent of the total variance were retained from the analysis of the scales over all 120 subjects.

Table 1

Mean Scores of Each Semantic Differential Adjective Pair, by Condition

Adjective Pair		Condition			
		I	II	III	IV
1.	Friendly-unfriendly	5.60	5.90	5.47	5.77
2.	Angry-peaceful	5.83	5.83	5.60	5.83
3.	Shaky-steady	5.27	4.30	4.77	4.23
4.	Successful-unsuccessful	5.03	4.87	4.77	4.67
5.	Withdrawn-outgoing	4.80	4.67	4.37	4.87
6.	Relaxed-aroused	5.10	5.30	5.53	5.00
7.	Disgusted-pleased	5.20	4.93	4.83	4.97
8.	Weak-strong	4.73	4.27	4.13	3.97
9.	Secure-insecure	5.17	5.13	5.00	4.94
10.	Embarrassed-assured	5.40	4.73	4.90	5.23
11.	Healthy-sickly	5.63	5.70	5.90	5.90
12.	Cool-warm	4.53	4.56	4.56	4.57
13.	Energetic-tired	4.20	4.43	4.17	4.43
14.	Tense-relaxed	5.40	4.93	5.40	4.83
15.	Critical-tolerant	5.03	4.53	4.97	4.77
16.	Pessimistic-optimistic	4.67	4.93	4.83	4.93
17.	Sensitive-insensitive	5.03	4.58	4.53	4.93
18.	Proud-ashamed	4.93	4.44	4.53	4.70
19.	Sociable-unsociable	5.47	5.30	5.27	5.43
20.	Open-closed	5.13	5.20	4.67	5.07
21.	Afraid-confident	5.20	5.13	5.10	5.33
22.	Hard-soft	4.20	4.36	4.36	4.93
23.	Suspicious-trusting	4.47	4.46	4.47	4.73
24.	Happy-sad	4.43	5.50	5.37	5.44
25.	Nervous-relaxed	5.57	5.03	5.37	4.80
26.	Excited-calm	5.43	4.80	5.13	4.67

Table 2

Factor Loadings of Responses to the Semantic Differential Mood Questionnaire[1]

Adjective Pair		Factor				
		1	2	3	4	5
1.	Friendly-unfriendly	.620				-.406
2.	Angry-peaceful	-.706				
3.	Shaky-steady	-.499		.591		
4.	Successful-unsuccessful	.571				
5.	Withdrawn-outgoing	-.376	-.471			-.382
6.	Relaxed-aroused	.367	-.724			
7.	Disgusted-pleased	-.676				
8.	Weak-strong	-.375		.534		
9.	Secure-insecure	.682				
10.	Embarrassed-assured	-.672				
11.	Healthy-sickly	.408		-.376		-.446
12.	Cool-warm					
13.	Energetic-tired		.372	-.414		
14.	Tense-relaxed	-.579	.658			
15.	Critical-tolerant	-.543				
16.	Pessimistic-optimistic					
17.	Sensitive-insensitive				.611	
18.	Proud-ashames	.527	.347			
19.	Sociable-unsociable	.754				
20.	Open-closed	.593				
21.	Afraid-confident	-.696				
22.	Hard-soft	-.427		-.564		
23.	Suspicious-trusting	-.425		-.349		-.409
24.	Happy-sad	.627				
25.	Nervous-relaxed	-.673	.512			
26.	Excited-calm	-.428	.645			

[1]Only factor loadings significant at the .01 level or beyond are listed.

The first factor accounted for 29 percent of the total variance and had a strong evaluative component as expected. All but four of the adjective pairs had significant loadings on this factor at the .01 level or better. The following adjectives received the highest loadings: sociable, peaceful, confident, secure, pleased, relaxed, assured, happy, friendly, and open. This factor suggests a pleasant, sociable mood consistent with the "mild euphoria" suggested by the instructions given to the subjects. This factor will be referred to as the "elation" factor.

The second factor accounted for 11 percent of the total variance and loaded highly on the following adjectives: aroused, tense, excited, nervous, outgoing, and energetic. This factor suggests a state of arousal consistent with the description of the placebo pill as a "mild stimulant". This factor will be referred to as the "arousal" factor. The third factor accounted for 7 percent of the total variance and gave significant loadings to the following adjectives: shaky, soft, weak, tired, sickly, and trusting. This factor suggests unpleasant arousal and will be referred to as the "bad trip" factor. The remaining two factors accounted for 6 and 4 percent of the total variance respectively. Neither of the last two factors provided easily interpretable adjective clusters. Table 2 gives the significant factor loadings for each of the 26 adjective scales.

Five summary factor scores were obtained for each subject by converting responses to each semantic differential

item scale to a standard score, multiplying by the factor loading of that item, and summing the products of the 26 scales. Standard scores were used rather than raw scores so that differences in means and variation among the 26 scales would not effect the weighting and summing of the individual scale responses in arriving at a total factor score.

Subjects were separated into treatment groups corresponding to the four conditions of placebo administration. A separate fixed effect, one-way analysis of variance was made for each factor across the four treatment groups.

Table 3

Analyses of Variance of Summary Factor Scores

Factor 1, "Elation"	Condition	Mean	
	I	1.80	
	II	-.68	
	III	-.82	F = .73; n.s.
	IV	-.32	
Factor 2, "Arousal"	**Condition**	**Mean**	
	I	.02	
	II	-.17	
	III	.76	F = 1.13; n.s.
	IV	-.61	
Factor 3, "Bad Trip"	**Condition**	**Mean**	
	I	-.56	
	II	.20	
	III	-.30	F = 2.50; n.s.
	IV	.65	

Table 3 (continued)

Factor 4, "Sensitivity"	Condition	Mean	
	I	.60	
	II	-.43	
	III	-.23	F = 3.18; p = .05
	IV	.07	

Factor 5, "Trust"	Condition	Mean	
	I	-.11	
	II	.16	
	III	-.03	F = .28; n.s.
	IV	-.02	

Statistical significance at the .05 level required an F value of about 2.69 (3 and 116 degrees of freedom). Of the five analyses only one yielded an F value equal to or greater than that value. Factor four (sensitivity) was significant at the .05 level but mean values do not suggest a systematic influence of the treatment. Thus there appear to have been no significant systematic differences in mood among the four conditions as measured by the semantic differential mood questionnaire.

Other Measures

In the postexperimental questionnaire (PEQ), subjects indicated, among other things, the extent to which they felt the drug had influenced the mood evaluated on the semantic differential. Responses were recorded on a 160 millimeter scale with the adjective labels: "no effect at all" (0 mm), "very weak effect" (32 mm), "a mild effect" (64 mm), "a considerable effect" (96 mm), "a strong effect" (128 mm), and

"a very strong effect" (160 mm). An analysis of variance (one-way, fixed effect) for responses to this scale showed no significant overall effect across the four treatment groups. Mean values, however, did lie in a pattern predicted by the hypothesis. Duncan's multiple range test determined that the means of the individual-administration-without-experimenter condition (Condition I) and the group-together-condition (Condition IV) differ significantly at the .05 level (two-tailed test).

Table 4

Analysis of Variance of the Postexperimental Questionnaire Item Dealing with the Influence of the Drug on Moods

Conditions		Mean	Standard Deviation
I	Alone (without experimenter)	21.40	27.14
II	Alone (with experimenter)	26.27	20.99
III	Group (with partitions)	31.83	33.11
IV	Group (freely interacting)	38.53	31.31
	Df: 3, 116	F = 2.01; n.s.	

Deflection scores were computed from responses to the semantic differential questionnaire for each subject as a measure of his use of non-neutral positions in responding to the 26 item scales. This score was determined by assigning the following values to the positions on the semantic differential: both extreme positions were given the value "3", the neutral position was weighted "0", and the intermediate

positions were weighted "1" and "2" respectively. The deflection scores were the sums of the values corresponding to the checks marked on each of the 26 scales. No significant differences in the use of extreme positions were found among the four treatments. Table 5 shows the distribution of the means.

Table 5

Deflection Scores on the Semantic Differential Questionnaire

Condition		Mean	
I	Alone (without experimenter)	40.13	
II	Alone (with experimenter)	34.00	F = 1.84; n.s.
III	Group (with partitions)	31.77	
IV	Group (freely interacting)	35.67	

Pretest and post-test measures of breath rate, reaction time, time estimation, and dynamometer strength also showed no significant differences across conditions. Responses to PEQ items dealing with the degree of apprehension experienced prior to and during the experiment appeared unrelated to sex, birth order, and PEQ placebo response.

DISCUSSION

There is little to suggest that the conditions of placebo administration in this study influenced perception of mood change as measured by the semantic differential mood

questionnaire. A fixed effect, one-way analysis of variance was used to analyze factor scores and no linear relation between treatment conditions was assumed. In terms of the independent variable, however, one can group the four treatments into a pattern where each condition represents a progressively greater exposure to the presence of others. One would expect that any treatment effect would be cumulatively distributed across the four treatment conditions. Only one of the five analyses of factor scores met the criterion of statistical significance and in no case did the means appear in the anticipated pattern.

There is evidence to suggest that the conditions of placebo administration influenced responses to the post-experimental questionnaire item, "How strongly did you feel was the maximum influence of the pill administered on the moods you experienced during the period the drug took effect?" Subjects who waited alone indicated, on the average, that the pill had the least effect. Subjects who waited with the experimenter indicated a slightly stronger influence. Subjects in groups who were separated from each other by plywood partitions indicated a stronger influence. Subjects in groups who were allowed to freely interact throughout the experiment indicated the strongest influence. The main effect was not significant but a multiple range test of the mean differences shows the means of the individual alone and the group together conditions to be significantly different at the criterion level. The two intermediate treatments do not

differ significantly from each other or the extreme conditions. These results suggest that exposing an individual to the presence of other subjects and an experimenter increases the tendency to attribute mood changes to the action of the placebo pill. It does not suggest that the experienced mood conforms to the "effect" suggested by the experimental instructions.

Why should the presence of others influence the attribution of moods to placebo action without apparently influencing the evaluation of the moods themselves? One explanation is that the PEQ item measured responses to the general expectancy that "something" ought to happen as a result of the administration of the pill. The semantic differential questionnaire, on the other hand, was intended to measure conformity to the "pleasant, stimulating, euphoric" mood suggested by the instructions to the subject. Considerable variation is possible in responsing to the specific mood intended to be induced by the instructions. Regardless of the extent to which positive mood changes were actually induced by the placebo administration, subjects could anticipate some sort of effect to result from the procedure.

Deflection scores were considered to be a possible indication of nonspecific placebo effects. No significant differences between the treatment conditions were found, however, though the mean distribution suggests the possibility that subjects alone (without experimenter) felt more free to use extreme scale positions than subjects in the other con-

ditions. Such a tendency would work directly against the hypothesized distribution of scores for "Elation" by augmenting the scores in the individual conditions and limiting scores in the group conditions. It is possible that the combined effect of the social facilitation of "Elation" scores and the inhibition of deflection scores could result in each cancelling out the other.

A third explanation of the results is that the single PEQ item was more sensitive to the effects of demand characteristics and experimenter bias than the multi-item semantic differential. It was not possible to utilize blind procedures used in conventional drug research since placebos were given to all subjects. The precaution of using tape-recorded instructions in all conditions was followed and subjects were run as quickly as possible to minimize the opportunity to pass information about the experiment to other subjects outside the experimental setting. Perhaps the best evidence that experimenter bias was not responsible for the results was the finding that the individual administration condition in which the experimenter was not present during the waiting period produced lower scores than the individual administration condition where the experimenter was present on the PEQ item dealing with the effect of the pill. Both individual administration conditions produced lower scores on the PEQ item than the group administration conditions. The specific effect of the presence of the experimenter could not be fully assessed, however, since no group administration

condition was run without the presence of the experimenter. This was done to prevent an entire group from becoming suspicious that the pill was inert due to an individual comment.

The results of the analysis of the PEQ scores are consistent with Zajonc's theoretical position. If the PEQ item measures conformity to the expectation that the pill has some effect on the subject, then disconfirmation of the expectancy must come from the accurate discrimination on the basis of internal cues that the pill, in fact, had no effect. Such discrimination is poorly learned and the presence of others should make disconfirmation of the expectancy less likely. Although not significant statistically, the distribution of "no effect" responses on the PEQ is consistent with the hypothesis in that the greatest number occurred in the individual alone condition and the fewest occurred in the group together condition. Intermediate conditions did not follow the pattern except that they both fell between the extremes.

Breath rate, reaction time, time estimation, and dynamometer strength were not intended to be tests of the social facilitation hypothesis since all tests were conducted in the presence of the experimenter. No nonplacebo control groups were employed to compare the degree of change on the post-test measures. The main purpose of the tests was to lend an air of authenticity to the placebo administration procedures. Written comments about the experiment generally

indicated that the pill's effects were mild. There were few indications of suspicion or dissatisfaction with the experiment.

Suggestions for Further Research

The presence of others seemed to influence the tendency to attribute moods to the action of a pill according to the PEQ results in which only the extreme treatment groups differed significantly. The presence of others is not a prerequisite or even a very strong influence, apparently, and is possibly the simplest of many social influences on placebo or drug effects. The first requirement for further research of this nature would seem to be the validation of the semantic differential technique as a measure of induced mood change. This could be done simply by employing four additional treatment groups. In one condition, subjects would complete the semantic differential (SD) before and after a positive mood induction. In another condition they would complete the SD before and after a negative mood induction. In the third condition the SD would be completed only after a positive mood induction and, in the fourth, only after a negative mood induction. In this way the pretest -- post-test design could be compared to the post-test only design and differences between the positive and negative mood inductions would validate the semantic differential technique as a measure of mood change.

A second important step in research of this nature

would be to determine the degree of suspicion among subjects that they have received a placebo treatment. In the present study all subjects were told they had received a "mild stimulant". Even so, subjects occasionally asked if placebo controls were used in the study. In further research subjects could be told that placebo controls were employed and the dependent variable would be the number of subjects in each condition that felt they had received the placebo pill. Another variation would be to give all subjects a mild stimulant and determine how many believed they had been given a placebo.

According to Zajonc (1965), the mechanism of social facilitation is the arousal stimulus of a group situation. Schachter (1957) and others have suggested that group situations have arousal reducing properties in anxiety provoking situations. This apparent conflict of theories might be investigated using positive and negative mood induction via placebo treatment under conditions of individual and group administration. It might be found, for example, that a positive mood can be induced as easily in individual placebo administration procedures as in group administration procedures. A negative mood induction, however, might be more easily induced by individual administration than by group administration of the placebo treatment.

Dinnerstein and Halm (1970) have suggested that certain drugs may act only to potentiate placebo effects. Such a suggestion runs counter to conventional thinking about drug

effects but is not inconsistent with Schachter's (1964) theory of the physiological determinants of emotional labelling. Certain drugs, such as niacin, have specific visceral effects (flushing); the role of such "cue" effects in potentiating placebo effects could easily be studied.

Becker's (1966) theory of the normative influences on drug effects has not been subjected to experimental verification. The results of the present study suggest that something more than the mere presence of others is necessary to induce strong placebo effects. The effect of a model on placebo responses has not been investigated. Including a confederate of the experimenter in the group administration conditions who acts out the appropriate placebo effect would provide a test of the hypothesis that placebo effects are determined to a large extent by social cues. Characteristics of the confederate could be varied in a number of ways to interact with the intended effect.

SUMMARY

A placebo pill described by the experimenter as a mild stimulant often causing subjects to feel "elated", "amused", and "mildly euphoric" was administered to subjects in four treatment conditions. In Condition I subjects received the placebo, waited for the pill to take effect, and completed questionnaires before the experimenter returned to conclude the experiment. In Condition II subjects waited for the

pill to take effect and completed the questionnaires in the presence of the experimenter. In Condition III subjects were run together in groups of five. Subjects in this condition, however, were separated from each other by plywood partitions to minimize communication between the subjects. In Condition IV subjects were run together in groups of five and were allowed to freely interact throughout the experiment.

Five factors were derived from a factor analysis of the semantic differential mood questionnaires and factor scores were obtained for each subject. Analyses of variance revealed no significant treatment effects with a systematic pattern of mean scores distributed across the four conditions. A postexperimental questionnaire item asking subjects to indicate the degree to which they felt the pill influenced the moods they experienced during the waiting period did provide an interpretable distribution of means across the four treatment conditions. A significant difference between the means of condition one and condition four was obtained.

Results suggest that the presence of others does not facilitate conformity to specific mood cues provided by the experimental instructions but does increase the tendency to attribute moods to the action of the placebo.

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Appendix A.

INTERVIEW VERIFICATION

I have been informed and understand that the drug used in this experiment is a safe, non-prescription drug that is approved for use in research programs such as this. The drug has absolutely no long term effects; in fact, all effects are completely gone within thirty minutes.

As a standard precaution I agree to abide by the following experimental safeguards:

1) I agree to report any prescribed medication taken the day of the experiment to the experimenter prior to the session.

2) I agree not to consume any alcoholic beverage for one hour prior to the experiment.

3) I will report any illness experienced prior to the experiment to the experimenter in charge.

Signed:_____ Date:_____

Mailing Address: _____ (Street)

_____ (City, Zone)

_____

Phone:_____

Appendix B.

MOOD EVALUATION
QUESTIONAIRE

Friendly	____: ____: ____: ____: ____: ____: ____:	Unfriendly
Angry	____: ____: ____: ____: ____: ____: ____:	Peaceful
Shaky	____: ____: ____: ____: ____: ____: ____:	Steady
Successful	____: ____: ____: ____: ____: ____: ____:	Unsuccessful
Withdrawn	____: ____: ____: ____: ____: ____: ____:	Outgoing
Relaxed	____: ____: ____: ____: ____: ____: ____:	Aroused
Disgusted	____: ____: ____: ____: ____: ____: ____:	Pleased
Weak	____: ____: ____: ____: ____: ____: ____:	Strong
Secure	____: ____: ____: ____: ____: ____: ____:	Insecure
Embarrassed	____: ____: ____: ____: ____: ____: ____:	Assured
Healthy	____: ____: ____: ____: ____: ____: ____:	Sickly
Cool	____: ____: ____: ____: ____: ____: ____:	Warm
Energetic	____: ____: ____: ____: ____: ____: ____:	Tired
Tense	____: ____: ____: ____: ____: ____: ____:	Relaxed
Critical	____: ____: ____: ____: ____: ____: ____:	Tolerant
Pessimistic	____: ____: ____: ____: ____: ____: ____:	Optimistic
Sensitive	____: ____: ____: ____: ____: ____: ____:	Insensitive
Proud	____: ____: ____: ____: ____: ____: ____:	Ashamed
Sociable	____: ____: ____: ____: ____: ____: ____:;	Unsociable
Open	____: ____: ____: ____: ____: ____: ____:	Closed
Afraid	____: ____: ____: ____: ____: ____: ____:	Confident
Hard	____: ____: ____: ____: ____: ____: ____:	Soft
Suspicious	____: ____: ____: ____: ____: ____: ____:	Trusting
Happy	____: ____: ____: ____: ____: ____: ____:	Sad
Nervous	____: ____: ____: ____: ____: ____: ____:	Relaxed
Excited	____: ____: ____: ____: ____: ____: ____:	Calm

Appendix C.

Postexperimental Questionnaire

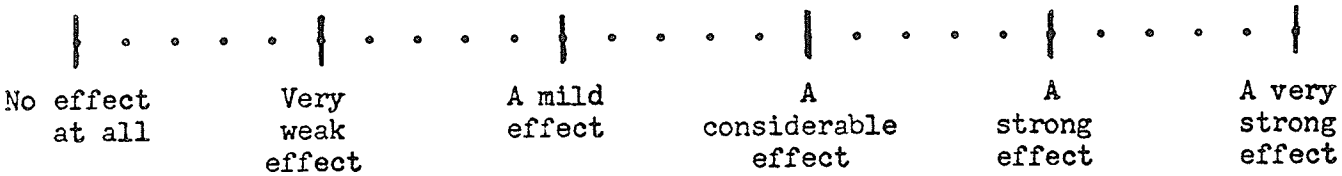
The following information will be useful in evaluating the results of this research project:

Your age ____, Your sex ____, Year in school ____, Major area _____.

Order of your birth in family (circle): Only child, first, middle, last.

Please indicate your answers to the following questions by placing a mark at the appropriate point on each scale.

1) How strongly did you feel was the <u>maximum</u> effect of the drug on the moods you experienced during the period the drug took effect?



2) How confident are you in the accuracy of your mood evaluations?

Very Uncertain ____: ____: ____: ____: ____: ____: ____: Very certain

3) How apprehensive about participating in the experiment did you feel <u>before coming to the experiment</u>?

Very Apprehensive ____: ____: ____: ____: ____: ____: ____: Not at all Apprehensive

4) How apprehensive about participating in the experiment did you feel <u>during the period the drug was taking effect</u>?

Very Apprehensive ____: ____: ____: ____: ____: ____: ____: Not at all Apprehensive

5) How useful did you find the adjective scales for describing the moods you experienced? (Check appropriate comment)

____ Too ambiguous

____ Many adjectives seemed irrelevant

____ Instructions were not very clear

____ Scale was too long

____ Scale was generally useful

____ Other (comment) _____