

NOMINAL AND REAL GROUP PERFORMANCE IN RELATION TO MANIFEST ANXIETY AND INDUCED STRESS

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Female college students were selected on the basis of their scores on the Manifest Anxiety Scale. The participants worked either alone or in pairs on a multiple-solution anagrams task. The experiment had a 2 x 2 x 2 design, with group type (nominal versus real), manifest anxiety (low versus high), and induced stress (low versus high) as the three variables. The results indicated that increased anxiety and stress were relatively more detrimental to the performance of real groups as compared with nominal groups.

Keywords: group performance, manifest anxiety, induced stress, normal versus real.

Taylor's (1955) nominal group technique, in which performance of individuals working together as a team (real group) is compared with the pooled performance of the same number of individuals working alone (nominal group), ensures that the superiority or inferiority of groups as compared with individuals can be unambiguously attributed to the fact of people working together irrespective of the distribution of resources among the individual members.

On a difficult multiple-solution anagrams task, real groups have generally produced fewer errors than nominal groups and the two have not differed significantly with respect to correct solutions (Kanekar, 1972a, 1972b). In the present experiment we explored the possibility that different levels of manifest anxiety and induced stress may affect differentially the performance of groups and individuals.

Stress has been operationalized in several different ways for human participants, e.g., threat of shock, threat of failure on a test, frustration, sudden cold showers, time pressures, anxiety resulting from the interpretation of personality tests, humiliating criticism, and badgering. Stress has been shown to depress the number and quality of creative solutions and to foster problem-

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solving rigidity (Cowen, 1952; Gibb, 1951; Patrick, 1934). As regards group functioning under stress, increasing stress sometimes increases group integration (Lanzetta, 1955). There is now available a considerable body of empirical evidence which indicates that individuals in a stressful situation seek the company of other individuals in the same situation and that anxiety reduction is conceivably an important consequence of being together under these circumstances (Kissel, 1965; Miller & Zimbardo, 1966; Schachter, 1959; Wrightsman, 1960; Zimbardo & Formica, 1963). It seems reasonable to assume that under stressful conditions, persons working together cooperatively toward a common goal should be able to withstand the stress efficiently so long as the stress is perceived as coming from a source outside of the group (Kelley & Thibaut, 1969). While not all the evidence conclusively shows that groups can effectively withstand stress, there is at least some evidence to support this assumption (Cohen et al., 1960; Merriam, 1949; Renner & Renner, 1972; Wright, 1943).

In the present experiment we used repeated speed instructions to create the high stress condition as contrasted with the ordinary low stress condition (cf. Brown, 1961, p. 236). Also participants differing on manifest anxiety were used to test the possibility that stress might have different effects depending on the anxiety levels. The hypothesis of the experiment was that an increase in induced stress and manifest anxiety would have a more detrimental effect on the performance of individuals (nominal groups) than on that of (real) groups. On the other hand, one alternative possibility is that group processes may be adversely affected by high anxiety and high stress. This possibility is consistent with the view that another person's presence is a source of arousal (Zajonc, 1965), and this in combination with high anxiety and high stress may result in a level of arousal which is above the optimal level.

METHOD

DESIGN

The experiment had a 2 x 2 x 2 factorial design, with group type (nominal versus real), manifest anxiety (low versus high), and induced stress (low versus high) being the three variables.

PARTICIPANTS

The participants were female undergraduate students of Sophia College, a women's college in Bombay, India, who volunteered to participate in the study and were not given remuneration for participation. More than 400 students participated in the pretesting for manifest anxiety. In the experiment proper, the number of 2-member groups in each of the eight cells was 12, the total number of participants in the experiment thus coming to 192.

PROCEDURE

Taylor's Manifest Anxiety Scale (MAS) was administered to large groups of students in their classrooms. The total number of MAS protocols without errors and omissions was found to be

406. The obtained scores ranged from 0 to 40. The range of 25 to 40 was selected for the high anxiety condition and the range of 0 to 14 was selected for the low anxiety condition.

For the experiment proper, a 40 in. x 12 in. placard was used to present a set of twelve 4 in. high capital letters which were: "A F E L G I Y O M B P T". The placard was kept on display during the forty minutes allotted to the experimental task. A similar placard with the letters "T R E A" on it was used for the practice task on which the participants worked for two minutes before starting on the experimental task.

Participants were seated facing the stand on which the placards were to be displayed and were supplied with pencils and draft paper. Each experimental session had either an individual working alone or a 2-member group working cooperatively on the anagrams task. All participants were instructed to construct as many words of at least five letters as they could out of a set of letters and to avoid making words using a letter more than once, proper names, foreign words, and abbreviations. They were told that each legitimate word would get them 5 points and each error would cost them 10 points. They were advised to make as many correct words as possible and to avoid errors. Participants were to speak out each word and spell out the same so that the experimenter could write it down on her record sheet.

Participants in groups were advised to work cooperatively as a team and to correct, discuss, and consult with one another on any matter such as spelling or admissibility of words. It was emphasized that no word could be given unless it was approved by both members of the group. This veto power, not granted in the previous experiments in this research program, was provided for in order to maximize the corrective processes in the group. To ensure cooperative effort, participants in groups were told that there would be no individual scores and that the score would belong to the group as a whole.

All participants were asked to write down the words they made and, in the case of groups, to write down the words made by the other person also. Corrections or retractions of previously given words were always permitted.

Participants then worked on the practice task for two minutes under the same rules as for the experimental task except that there was no restriction with respect to the minimum number of letters allowed in each word. After the practice task, participants worked on the experimental task for 40 minutes. The experimenter used a stopwatch to keep track of elapsed time and to mark off 5-minute periods on her record sheet. The experimenter recorded all the solutions given by participants and also group interactions and individual verbalizations.

In the low stress condition, participants were told how much time was allotted for their task. Participants in the high stress condition were not told how much time was allotted for the task and were told "Please work very rapidly" at the beginning of every 5-minute period.

TREATMENT OF THE DATA

Group interactions and individual verbalizations were coded into appropriate categories of a scheme of categories of group processes which has been described in detail elsewhere (Kanekar, 1972b).

Nominal groups were formed by pooling the performances of consecutively appearing individuals in the appropriate conditions. Thus the first high anxiety and high stress nominal group was made up by combining the nonduplicate words and errors of the first and second high anxiety and high stress individuals. The errors were those solutions which either violated the prescribed rules of the task or were not English words as determined by reference to an unabridged dictionary. Three-factor analyses of variance were performed for each of the two dependent measures, namely, correct solutions (words) and incorrect solutions (errors).

RESULTS

Mean words and mean errors in the various conditions are presented in Table 1 and the results of the analyses of variance for the two measures are presented in Table 2.

Nominal groups made more words than real groups but the main effect of group type did not reach an acceptable level of significance ($p < .10$). Increase in manifest anxiety appeared to depress the production of words, but this main effect was not even marginally significant ($p <$

TABLE 1
MEAN WORDS AND ERRORS AS A FUNCTION OF GROUP
TYPE, ANXIETY LEVEL, AND STRESS LEVEL

	<i>Low Anxiety</i>		<i>High Anxiety</i>	
	<i>Low Stress</i>	<i>High Stress</i>	<i>Low Stress</i>	<i>High Stress</i>
Nominal Groups:				
Words....	14.25	17.17	16.75	14.83
Errors....	2.08	4.92	4.17	3.17
Real Groups:				
Words....	15.75	15.58	13.17	8.92
Errors....	0.25	0.50	0.42	1.42

TABLE 2
ANALYSES OF VARIANCE FOR WORDS AND ERRORS

Source	<i>df</i>	Words		Errors	
		<i>MS</i>	<i>F</i>	<i>MS</i>	<i>F</i>
A (Group type)	1	137.76	3.04*	207.09	19.38***
B (Anxiety)	1	123.76	2.73	3.01	0.28
C (Stress)....	1	17.51	0.39	14.26	1.34
AB	1	133.01	2.93	0.84	0.08
AC	1	44.01	0.97	0.51	0.05
BC	1	119.26	2.63	14.26	1.34
ABC	1	0.84	0.02	31.51	2.95*
Within cell (error)....	88	45.36		10.69	

Note: * $p < .10$; *** $p < .001$

.20). There was an interaction between group type and anxiety which also did not reach an acceptable level of significance ($p < .10$). Post hoc comparisons among the various conditions indicated that high anxiety nominal groups had significantly more words than high anxiety real groups ($F = 5.97$, $df = 1/88$, $p < .025$) and that this was primarily because of the significant difference between high anxiety high stress nominal groups and high anxiety high stress real groups ($F = 4.63$, $df = 1/88$, $p < .05$) while high anxiety low stress nominal groups did not differ significantly from high anxiety low stress real groups ($p < .20$). Looking at the data from a different point of view, we find that the nominal groups did not differ significantly among themselves on words in the four anxiety-stress conditions while the real groups did. High anxiety real groups had significantly fewer words than low anxiety real groups ($F = 5.66$, $df = 1/88$, $p < .025$) and this was primarily because of the significant difference between high anxiety, high stress real groups and low anxiety high stress real groups ($F = 5.88$, $df = 1/88$, $p < .025$) while high anxiety, low stress real groups did not differ significantly from low anxiety, low stress real groups. There was also an insignificant ($p < .20$) interaction between anxiety and stress which was because significantly more words were produced in the low anxiety high stress condition than in the high anxiety high stress condition ($F = 5.36$, $df = 1/88$, $p < .025$) while the low anxiety, low stress condition produced almost exactly the same number of words as the high anxiety, low stress condition.

On errors, nominal groups had a significantly higher score than real groups ($p < .001$). The triple interaction among group type, anxiety, and stress did not reach an acceptable level of significance ($p < .10$). Post hoc comparisons indicated that nominal groups differed significantly from real groups in the low anxiety high stress condition ($F = 10.95$, $df = 1/88$, $p < .005$) and in the high anxiety, low stress condition ($F = 7.90$, $df = 1/88$, $p < .01$), while nominal groups and real groups did not differ significantly in the low anxiety low stress condition ($p < .20$) and in the high anxiety, high stress condition ($p < .20$). From another point of view, we find that real groups did not differ significantly among themselves in the four anxiety-stress conditions, while nominal groups had a significantly higher error score in the low anxiety high stress condition than in the low anxiety low stress condition ($F = 4.51$, $df = 1/88$, $p < .05$).

When the solutions were considered irrespective of correctness – i.e., when each score is a sum of words and errors – an analysis of variance indicated that nominal groups produced more solutions than real groups ($F = 12.54$, $df = 1/88$, $p < .001$). The interaction between anxiety and stress was almost significant at the .05 level ($F = 3.97$, $df = 1/88$). When the anxiety level was low, high stress generated more solutions than low stress and when the anxiety level was high, high stress generated fewer solutions than low stress. There was also an insignificant interaction between group type and anxiety ($p < .20$) as a result of the fact that real groups tended to be less productive in the high anxiety condition as compared with the low anxiety condition, there being no such effect of anxiety levels on nominal groups.

The most important categories in the record of real group processes were: (1) Positive other-corrections, i.e., retractions of errors resulting from the intervention of a person other than the one who originally made the error, and (2) positive nonproductive consultations, i.e., consultations among group members which wound up rejecting an error. Combining these two categories yields an index of preventions of errors through group interaction. Mean preventions of errors through group interaction came to 3.17 for the low anxiety, low stress condition; 3.50 for the low anxiety, high stress condition; 2.17 for the high anxiety, low stress condition; and 4.92 for the high anxiety, high stress condition. A 2 x 2 analysis of variance showed a weak main effect of stress ($F = 3.11$, $df = 1/44$, $p < .10$) and an insignificant interaction between anxiety and stress ($p < .20$). Thus increase in stress was associated with more preventions of errors and this difference due to stress seemed to be more prominent for the high anxiety level than for the low anxiety level.

DISCUSSION

The hypothesis that increase in induced stress and manifest anxiety should have a more detrimental effect on the performance of nominal groups was not supported in this experiment. In fact, the evidence tended to be in the opposite direction, i.e., increase in induced stress and manifest anxiety appeared to have a relatively more detrimental effect on the performance of real groups as compared with nominal groups.

The one unquestionable finding appears to be the fact that across all conditions nominal groups produce more errors than real groups. This confirms the results of previous studies (Kanekar, 1972a, 1972b). What is interesting is that the difference between nominal groups and real groups is more prominent in the low anxiety, high stress and high anxiety, low stress conditions than in the low anxiety, low stress and high anxiety, high stress conditions. One can assume that increase in anxiety and increase in stress would both contribute toward an increase in arousal. Thus the low anxiety low stress condition may be considered the low arousal condition, the high anxiety high stress condition as the high arousal condition, with the high anxiety low stress and low anxiety high stress conditions representing the moderate arousal conditions. There seems to be a curvilinear relationship between arousal levels and number of solutions (i.e., words plus errors) for nominal groups who tend to produce fewer words and errors in the low and high arousal conditions than in the moderate arousal conditions. A somewhat similar relationship has been found by Renner and Renner (1972) between stress levels and performance of individuals working alone.

Renner and Renner did not find significant differences in group performance as a function of stress. In the present experiment, real groups produced fewest words and most errors in the high anxiety high stress (high arousal) condition. The high arousal condition is the

only condition in which nominal groups were clearly superior to real groups on words. It is also the condition in which the difference on errors between nominal and real groups was relatively small (which was also true of the low arousal condition) as compared with the moderate arousal conditions. While the present findings are not consistent with the results of Renner and Renner, it should be noted that comparison of the two studies becomes difficult because the two studies differed both in the task used and in the way stress was manipulated.

The findings gained in the present study can probably be best interpreted in terms of drive or arousal theory which predicts a curvilinear relationship between arousal and performance. Increase in anxiety and increase in stress combine with another person's presence, which also is a source of arousal, to take the arousal level of real groups beyond the optimal level. It is because of this that the performance of real groups on both words and errors is worst in the high arousal condition. The record of group processes showed maximum preventions of errors through group interaction in the high arousal condition. This suggests that the fact that the pair was working as a cooperative team mitigated the detrimental effect of high arousal. Without the cooperation, the real groups might have done even worse with respect to errors in the high arousal condition. One may infer that the high arousal condition is not detrimental to group processes per se but is responsible for the greater initial production of errors in real groups, many of which appear to be eliminated through group interaction. This inference could be tested by having a non-cooperating "group" of people working on a task in the high arousal condition.

Since the levels of significance for most of the effects were less than satisfactory, the findings of the present experiment can be considered at best suggestive. It is also admitted that the pattern of the data is not totally consistent with drive or arousal theory, but it is submitted that this theory comes closest to making sense out of the present data.

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