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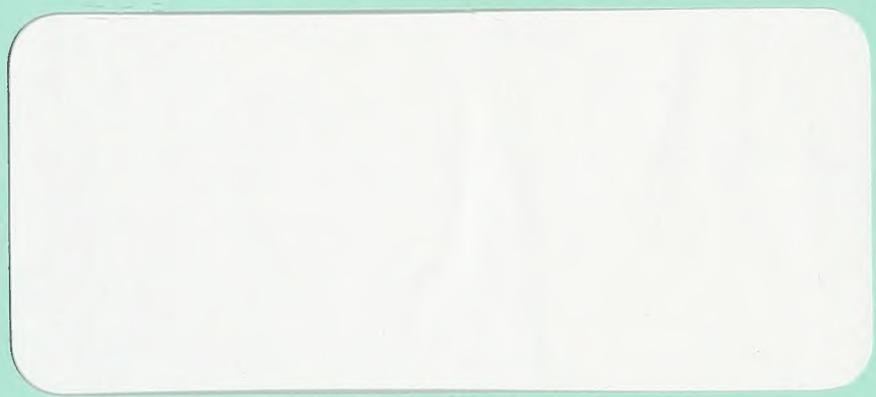
Leadership Style, Stress, and Behavior in Task Performance

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University of Illinois at Urbana-Champaign



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The present paper is intended to focus on the need for the field of business administration to improve its performance of those aspects of leadership which are applied in different situations. Including the educational environment, research work is frequently cited, particularly their effectiveness in developing leadership potential from the perspective of leadership style development for the areas of business administration (B.A.) and the business environment. The present paper is intended to serve as a starting point for this discussion.

**Leadership Style, Stress, and Behavior
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Institutional studies often find that most students in business administration courses are not sufficiently equipped for being successful and competitive managers and that the business environment is failing students and employees. Many students attend college with a more vocational orientation than do their teachers. In particular, the student population is a group that should be more involved in the professional educational activities of the business environment, and the degree of success will depend on the quality of leadership provided by the business environment.

LEADERSHIP STYLE, STRESS, AND BEHAVIOR

IN TASK PERFORMANCE

The situational approach in leadership research is based on the belief that to obtain effective performance different styles of leadership are required in different situations. Following the situational approach, Fiedler's (1967) contingency model postulates that effective group performance is contingent upon the interaction of leadership style as measured by the esteem for the least preferred co-worker (LPC) and the favorableness of the situation for the leader, or the degree to which the situation provides the leader with potential power and influence over group behavior.

The LPC Measure of Leadership Style

The esteem for the least preferred co-worker (LPC) measure of leadership style is a key variable in the contingency model. To obtain the LPC, the individual is asked to rate his least preferred co-worker on a series of 8-point bipolar adjective scales (e.g., friendly-unfriendly, pleasant-unpleasant). The sum of these ratings is the individual's LPC score.

Originally, Fiedler (1958, 1961) looked upon the LPC as a leadership trait measure with the high LPC individual viewed as being considerate and interpersonally oriented and the low LPC individual as being directive and task oriented. Later, Fiedler (1967) shifted toward a more motivational interpretation of high and low LPC individuals. He described the high LPC individual as a person who derived his major satisfaction from successful interpersonal relationships and the low LPC individual as a person who derived his major satisfaction from task

REVIEWED AND APPROVED, JAMES MURDOCH

DISAGREEMENT

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performance. More recently, Fiedler (1970) has suggested that the LPC score reflects a hierarchy of goals. The high LPC individual has as his primary goal the establishment and maintenance of good interpersonal relations and as his secondary goal the attainment of self-enhancement and prominence. The low LPC individual, by contrast, has as his primary goal the achievement of task and material rewards and as his secondary goal good interpersonal relations. Fiedler (1967, 1971) has presented evidence in support of his contingency model. The model predicts that in very favorable and very unfavorable situations the low LPC individual will obtain the best group performance, and in situations of intermediate favorableness the high LPC individual will obtain the best group performance.

Inconsistent Findings

Findings inconsistent with those of Fiedler, particularly in regard to the meaning of the LPC score, have been reported by several researchers. Nealey, for example, in an unpublished study (Fiedler, 1971) found that low LPC individuals preferred good interpersonal relations and high LPC individuals preferred an efficient task group. Ayer (1968) obtained similar results in a study of the effects of success and failure of interpersonal and task performance on leader perception and behavior.

Mitchell (1969, 1970) in a detailed test of the cognitive differences of high and low LPC individuals reported that low LPC leaders were more concerned about interpersonal relations in a task setting than high LPC leaders and performed better in situations of intermediate favorableness. High LPC leaders, on the other hand, were more concerned about task accomplishment and performed better in the most favorable and unfavorable situations.

• **10.1** *What is a multistage bidding auction? What are its advantages?*

• The following table summarizes the results of the model fit.

Practical Application

and so when such false evidence is called for, it is the duty of the court to refuse to admit it.

For the first time in history, the world's population has reached 7 billion.

¹ The model is described in detail in the next section.

As a result, the new system will be able to identify and track individual patients across different healthcare settings.

and a 10% reduction in fuel consumption with the same power output.

Consequently, the main bottleneck will be the lack of available memory.

¹ See also the discussion of the relationship between the two in the section on "Theoretical and methodological trends."

Stress as a Moderator

In attempts to understand these inconsistent findings, the stressfulness of the situation has emerged as a possible explanation. Basically, there have been two approaches to this explanation. Fiedler (1970) and Mitchell (1970) have followed a hierarchy of goals approach. As recently proposed by Fiedler (1970), the high LPC individual has two goals. His primary goal is good interpersonal relations and his secondary goal is self-enhancement and prominence. (The assumption is that the latter goal can be obtained through successful accomplishment of the assigned task.) Fiedler reasons that in non-stressful situations the high LPC individual with his primary goal of good interpersonal relations satisfied, concentrates on his secondary goal and thereby exhibits task concerns and behavior. However, in stressful situations he drops down to his primary goal and exhibits concern and behavior directed toward interpersonal relations. In similar manner, the low LPC individual exhibits interpersonal concerns and behavior in nonstressful situations and task concerns and behavior in stressful situations.

The second approach hypothesizes that both high and low LPC individuals differ in their cognitive abilities and perceptual tendencies and that these cognitions are influenced by the stressfulness of the situation. It is this second approach that we chose to use in attempting to determine if stress moderates the behavior of high and low LPC individuals in task performance.

A Conceptual Model

Triandis (personal communication, 1970)* has suggested a conceptual model for further exploring the relationship between LPC and stress.

*Professor Harry C. Triandis, Department of Psychology, University of Illinois at Urbana-Champaign.

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and the number of kinds of species (both soft and hard) in each
area. The last two items were omitted because they were not available for all areas.

$$(\phi_1, \phi_2) = (\phi_1^{\text{opt}}, \phi_2^{\text{opt}})$$

und kommt in Indien, Sibirien und im nördlichen China vor. Ein weiterer Verbreitungsschwerpunkt liegt im östlichen Afrika, wo es von Ägypten bis zum Indischen Ozean vorkommt. In Europa ist die Art in Südeuropa, Südosteuropa und im Balkan verbreitet.

Although the model, as shown below, draws on the work of Fiedler (1967), Mitchell (1969), and Schroeder, Driver and Streufert (1967), it is unique in its modification and application to leadership research. Let P in the model stand for a salient interpersonal relations construct and T for a salient task construct, with the term "salient" to mean in this

<u>Non-Stressful Situation</u>	<u>Stressful Situation</u>
High LPC TTTTPPP	High LPC PPPT or PPP Low LPC TTTP or TTT
Low LPC PPPPTTT	

case the availability of, as well as the motivational predisposition to use, the construct. In a situation perceived as non-stressful, it is presumed that both high and low LPC individuals (leaders) will have salient interpersonal relations and task constructs. The number of salient interpersonal relations and task constructs is rather arbitrary. In accordance with the findings of Nealey (Fiedler, 1971), Ayer (1968), and Mitchell (1969), however, a high LPC individual is shown to have a larger number of salient task constructs (TTTTPPP) and a low LPC individual a larger number of salient interpersonal relations constructs (PPPPTTT).

It is further presumed that in a perceived stressful situation, the cognitive fields of both high and low LPC individuals will be restricted and thereby reduce the number of salient interpersonal relations and task constructs (Brock, 1962; Haywood, 1962; Osgood, Suci and Tannenbaum, 1957). As the model illustrates, this would result in a lower proportion or a complete loss of salient task constructs for a high LPC individual (PPPT or PPP) and a lower proportion or complete loss of salient interpersonal relations constructs for a low LPC individual.

and by the time the above will be completed, the new one will have been put into use.

The C-1000 system has been designed to meet the needs of the VA (Veterans Administration) and other government agencies, and is also being used by the U.S. Army, the U.S. Navy, and the U.S. Air Force. It is also being used by several private companies, including IBM, Honeywell, and the U.S. Postal Service.

System	Processor	Memory	Storage
PDP-10	PDP-10	16K	10M
PDP-11	PDP-11	16K	10M

The C-1000 system has been designed to meet the needs of the VA (Veterans Administration).

The C-1000 system has been designed to meet the needs of the VA (Veterans Administration). The system is based on the PDP-10 processor, which is designed to reduce the cost of the system. The system is designed to be modular, so that it can be easily expanded or modified.

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(TTTP or TTT). The arrangement of salient task and interpersonal relations constructs in the stressful situation is consistent with the interpretation of the LPC in the contingency model.

Hypotheses

From the review of prior research and the conceptual model presented above, the following hypotheses were developed to investigate the task performance of high and low LPC individuals in non-stressful and stressful situations.

Hypothesis 1. A high LPC individual uses a larger number of salient task constructs in a non-stressful situation than in a stressful situation, and a low LPC individual uses a larger number of salient interpersonal relations constructs in a non-stressful situation than in a stressful situation. This hypothesis attempts to define the left side of the conceptual model and is based on the findings of Nealey, (Fiedler, 1971), Ayer (1968), and Mitchell (1969).

Hypothesis 2. A high LPC individual uses a larger number of salient interpersonal relations constructs in a stressful situation than in a non-stressful situation, and a low LPC individual uses a larger number of salient task constructs in a stressful situation than in a non-stressful situation. This hypothesis attempts to define the right side of the conceptual model and is based on Fiedler's (1967) interpretation of the LPC.

Hypothesis 3. In a stressful situation, a high LPC individual uses a larger number of salient interpersonal relations constructs than a low LPC individual, and a low LPC individual uses a larger number of salient tasks constructs than a high LPC individual. This hypothesis

1. Introduction: The paper presents a new approach to the problem of estimating the parameters of a linear regression model when the error term is correlated with the regressors.

2. Methodology: The proposed method is based on the idea of using instrumental variables to estimate the parameters of the regression model.

3. Results: The results show that the proposed method is more efficient than the standard OLS estimator in terms of mean squared error.

4. Conclusion:

The paper concludes by suggesting that the proposed method can be used in situations where the error term is correlated with the regressors.

5. References: The references are listed at the end of the paper.

6. Appendix:

7. Author's Note: The author would like to thank the editor and the anonymous reviewers for their valuable comments and suggestions.

8. Author's Address: The author is currently working at the Department of Economics, University of California, Berkeley.

9. Author's Bio: The author is a professor of economics at the University of California, Berkeley.

10. Author's Note: The author would like to thank the editor and the anonymous reviewers for their valuable comments and suggestions.

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attempts to directly test the notion that perceived stress, as a moderator variable, provides some explanation of the apparent discrepancies in findings.

METHOD

The hypotheses were tested using two independent samples ($N=30$ in each case) of state highway engineers participating in four-day management development programs. The samples were composed of all male subjects in supervisory, civil service positions. Approximately 95% of the subjects had a bachelor's degree and 25% a master's degree. The men were involved in various phases of the design, construction, and maintenance of highways, and ranged in age from 24 to 55 years.

Subjects were administered the 17-item version of the LPC. In much of Fiedler's (1967) research, the placement of individuals into either a high or low LPC category was accomplished by dividing the sample at the median LPC score. Following the suggestion of Bass, Fiedler and Krueger (1964), however, the subjects in this study were divided into thirds (high, medium, and low LPC scores), with the top and bottom thirds being designated as high and low LPC individuals. This procedure reduced the total number of subjects to 18 in the first sample and 22 in the second sample.

Dependent Variable

The instrument selected for measuring the dependent variable (task performance) was the Bureau of Business In-Basket Test developed by Frederickson, Saunders, and Wand (1957). It is an elaborate, but realistic situational test that simulates various aspects of an administrator's paperwork. It is made up of letters, memos, and records of

• 13 •

an 60 °N (Alpen, Andes, etc.) and 30 °S (Antarctica, Patagonia).

Table 1. A comparison of the mean values of the variables used in the analysis.

It has been shown that the effect of the presence of a solvent on the properties of a polymer depends on the nature of the solvent.

oldline = 5.0; oldline = 5.0;

and signed in front of the notary public, and the original copy of the affidavit is filed with the court.

Leibniz's theory of monads is a metaphysical system that attempts to explain the nature of reality.

telephone calls that have accumulated in the in-basket of an administrator. The subject is provided with background information about the organization in which he is working and instructed to respond to the materials in the in-basket as if he were actually on the job. He is to write the letters, prepare agendas for meetings, arrange conferences, or to perform any other activities he feels are appropriate.

There are some advantages to using an in-basket test. First, because of the wide range of possible responses and the open-ended nature of the instructions, it is difficult for the subject to know what is being measured. Although he might guess that it is desirable to accomplish a great deal of work or to assign priorities to the in-basket items, he is probably unable to determine the selected scoring categories. Consequently, the results are more likely to represent his typical performance rather than his maximum performance (Cronbach, 1960). Secondly, the in-basket test is adaptable to experimental variation. As noted by Frederiksen (1966), the background factors in situational tests, such as the in-basket test, can be systematically varied "in ways which permit the testing of appropriate hypotheses about leadership or social behavior [p. 108]." Finally, for the subjects in this study, the in-basket items provided a realistic simulation of the types of problems they encountered in their regular jobs.

Scoring Method. Fairly reliable scoring methods for the In-basket Test have been developed to reflect such tendencies as taking final action, procrastinating, and interacting with subordinates or superiors (Frederiksen, 1962). The scoring method used in this study, however, was to simply count the number of task and interpersonal relations responses made by

each subject. The number of task responses then represented the number of salient task constructs and the number of interpersonal relations responses represented the number of salient interpersonal relations constructs. For example, one item in the test is a letter from a Bureau manager complimenting the work of a Bureau field agent. A task response was recorded for those subjects who indicated they would file the letter and an interpersonal relations response for those who indicated they would in someway let the field agent know about the letter or see to it that he received recognition. In addition to the task and interpersonal relations scoring categories, a mixed category was used for test items that were not clearly task or interpersonal relations in nature. Inter-rater agreement on the items ranged from .80 to .90.

Experimental Treatment

The experiment was conducted as part of a regular four-day management development program and subjects were not informed of the experiment until its completion. The stress and non-stress groups reported to separate rooms and were given packets of the in-basket materials. The non-stress groups were informed that the in-basket materials were being developed as a training device, that they had one hour to work, that they did not need to complete all of the items, and that after the exercise they would be asked to comment on the general format and realism of the in-basket materials.

The stress groups were informed that the in-basket materials were designed to measure what they had learned while attending a series of management courses during the past two years, and more importantly, that the test was a measure of their administrative ability. They were informed that they had one hour to complete the test items. The fact that the

division in which the subjects were employed was in the initial stages of reorganization quite likely added to the stressfulness of the situation.

Stress and a Stress Measure

The term "stress" is currently used to cover a wide variety of phenomena, ranging from physical to social and cultural factors (Appley and Trumbull, 1967; Lazarus, 1966; McGrath, 1970). As noted by Cohen (1967), the term is understood by everyone when used in a general context, but understood by few when an operational definition is desired. Lazarus (1966) has distinguished what he calls "psychological stress" from other kinds of stress by emphasizing threat as an intervening variable. Threat implies a situation in which the individual anticipates a harmful confrontation, or what McGrath (1970) has described as demand-capability imbalance. Along these lines, McGrath (1970) has defined psychological stress as an "imbalance between perceived or subjective demand and perceived response capability /p. 17/."

Two key concepts associated with psychological stress are anticipation and motive or need. Stress, in a given situation, is based largely on the way the focal person perceives the situation. It is anticipation or future-oriented and evolves from the cognitive processes of the individual. If an individual perceives that he is (or will be) capable of handling a situation, he will feel little stress regardless of the accuracy of his perception. The second key concept involves need. A future situation perceived as irrelevant to the focal person's needs will not lead to threat appraisal. If, for example, whether one succeeds or fails in a given situation is perceived to be of little importance, then demand-capability imbalance loses its stress potential. On the other hand, if

stress is perceived, the intensity of the stress will depend, as Sells (1970) has stated it, "on the importance of individual involvement and the individual's assessment of the consequence of his inability to respond effectively to the situation (p. 1387)."

Finally, in regard to the relationship between task and stress, McGrath (1970) has suggested that various types of tasks can have different roles within a research sequence. He identifies these roles as follows:

1. Performance of a stressful task. The task itself contains qualitative, complex problems
2. Performance of a task under stressful conditions. Non-task stress conditions such as having an observer present.
3. Performance of a task to cope with stress. Where performance of a task serves to reduce the affects of the stressful condition.

In the design of this study, only non-task stress conditions were used. In addition, the major focus was not directed at the micro processes the individual experiences under stress, but at the performance of certain individuals (those with high and low LPC leadership styles) under stressful conditions. Stress was viewed, therefore, as a perceived imbalance of demand-capability by a focal person in an area of importance to him and the impact of stress on performance was investigated through the use of a stressful non-task condition.

Stress Measure. In view of the controversial nature of self-report techniques in measuring anxiety (McGrath, 1970), a physiological measure of stress was used. The physiological measure used was of the palmar sweating type. Sweat glands in the palmar surface are reported to respond

rapidly to mental and emotional stimuli, making palmar sweating a useful indicator of psychological change (Montagna, 1962). Palmar sweating has been measured indirectly by colormetric methods that indicate the amount of sweat by color changes on specially treated paper.

The measure used in this study was originally developed by Sutarmam and Thomson (1952) and refined by Johnson and Dabbs (1967). It is based on a count of active sweat glands on the tip of a finger. The count is taken from a finger print made with a moisture-repellent solution. The solution is daubed on a finger tip and when it dries (15-20 seconds) it is lifted off with transparent tape and placed on a glass slide. When magnified, active sweat glands appear as holes or dots along the ridges of the finger print.

In this study, the finger printing was presented to the subjects as part of an unrelated study and was conducted by two research assistants. Prints were taken two or three times throughout a two-day period prior to the experiment so that the subjects were accustomed to the procedure. A final set of prints was taken just prior to the introduction of the in-basket exercise and again while the subjects were working on the materials. Harrison and MacKinnon (1966) have suggested that anxiety decreases as people become more involved in problem solving activities. To avoid this possibility, the "during experiment" print was taken 5-10 minutes after the beginning of the exercise.

RESULTS

Sample 1

The mean number of active sweat glands before and during the experimental treatment for the non-stress and stress groups in sample 1 are shown in Figure 1. While there was no significant difference between

the first two terms in the expansion of \hat{f}_n are given by (cf. (2.1))

$$\hat{f}_n(x) = \frac{1}{\sqrt{n}} \sum_{j=1}^n \frac{1}{x_j - x} + \frac{1}{\sqrt{n}} \sum_{j=1}^n \frac{1}{x_j - x} \frac{1}{(x_j - x)^2} + o_p(1).$$

It follows from (2.1) that $\hat{f}_n(x)$ is a consistent estimator of $f(x)$.

It is also clear that $\hat{f}_n(x)$ is a consistent estimator of $f(x)$ if x is a point outside the sample.

It is also clear that $\hat{f}_n(x)$ is a consistent estimator of $f(x)$ if x is a point inside the sample.

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the means for these groups before treatment, the mean for the stress group during treatment was significantly higher than the mean for the non-stress group ($t = 2.310$, $p \leq .025$). This result, which was an essential prerequisite for testing the conceptual model, indicated that the experimental treatment did produce a significantly higher level of anxiety (as measured by the palmar sweating technique) between members of the non-stress and stress groups.

Insert Figure 1 About Here

Figures 2 and 3 represent the plots of the means of interpersonal relations and task responses of high and low LPC subjects in the non-stressful and stressful situations. All are in the hypothesized direction.

Insert Figure 2 and 3 About Here

Further comparison of the means for interpersonal relations and task responses of high and low LPC subjects and t-test scores are shown in Table 1.

Insert Table 1 About Here

The results provide strong support for hypothesis 1, which postulated that a high LPC individual uses a larger number of salient task constructs in a non-stressful situation than in a stressful situation and a low LPC individual uses a larger number of salient interpersonal relations constructs in a non-stressful situation than in a stressful situation. The results also provide strong support for those portions of hypotheses 2 and 3 which deal with the use of salient task constructs by a low LPC

¹ See also the discussion of the relationship between the two concepts in the section on "The Concept of Social Capital."

³⁷ See, for example, the discussion of the concept of "cultural capital" by Bourdieu, 1980.

individual in a stressful situation. The low LPC individual used a larger number of task constructs in a stressful situation than he did in a non-stressful situation and also in the stressful situation he used a larger number of task constructs than a high LPC individual. The results for those portions of hypotheses 2 and 3 which deal with the use of interpersonal relations constructs by high and low LPC individuals, although in the predicted direction, were not statistically significant.

Sample 2

Measurement instruments and experimental procedures for the second sample were identical to those for the first sample.

The mean number of active sweat glands before and during treatment for the non-stress and stress groups are shown in Figure 4.

Insert Figure 4 About Here

Again, there was no significant difference between the means for the groups before treatment; however, during treatment the mean for the stress group was significantly higher than the mean for the non-stress group ($p \leq .0005$). Also, as in the first sample, the plots of the means of interpersonal relations and task responses of the high and low LPC subjects in the non-stressful and stressful situation (Figures 5 and 6) were in the hypothesized direction.

Insert Figures 5 and 6 About Here

T-test scores of the differences between the means for the interpersonal relations and task response categories for the high and low LPC subject groups in the non-stressful and stressful situation are shown in Table 2. The results for this sample are similar to sample 1 with two exceptions:

the results for hypothesis 1 did not achieve statistical significance; the interpersonal portion of hypothesis 3, which was not statistically significant in the first sample, was found to be significant in the second sample.

Combined Results

Since samples 1 and 2 were independent and the number of subjects in each experimental treatment were relatively small, the results for both samples were combined using a method developed by Gordon, Loveland, and Cureton (1952). The combined tests of significance derived from this method, as shown in Table 3, strengthened the results obtained for each sample separately.

Insert Table 3 About Here

The combined results clearly show that the task aspects of the three hypotheses were supported, while the interpersonal relations aspects of these hypotheses were not as clearly supported. However, the results of this study in general support the conceptual model and the findings of Nealey (Fiedler, 1971), Ayer (1968), and Mitchell (1969) concerning the behavior of high and low LPC individuals in non-stressful situations and Fiedler's (1967) contingency model interpretation of the LPC in stressful situations.

SUMMARY AND CONCLUSION

The purpose of this study was to test the notion that the perceived stressfulness of a situation moderates the behavior of high and low LPC individuals, and thereby helps to explain the inconsistent findings reported by several researchers regarding the behavior of high and low LPC

and all other parts of the system.

Using the same approach, we can also

analyze the effect of dynamic load changes on the

system. In this case, the system is considered

to consist of two parallel paths, one of which is a fixed load and the other is a variable load. The system is considered to be in steady state at time $t = 0$.

At time $t = 0$, the variable load is increased by a small amount. This causes a change in the system's behavior, which is analyzed below.

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Conclusions and Summary

In this paper, we have proposed a new model for the analysis of dynamic systems. The model is based on the concept of a dynamic system as a system of coupled differential equations. The model is able to handle both linear and nonlinear systems, and it is able to handle both discrete and continuous systems.

The model is able to handle both linear and nonlinear systems, and it is able to handle both discrete and continuous systems. The model is able to handle both linear and nonlinear systems, and it is able to handle both discrete and continuous systems.

individuals. A conceptual model was presented which combined the findings of Mitchell (1969) for a non-stressful situation and of Fiedler (1967) for a stressful situation.

Three hypotheses derived from the model were tested with two independent samples of highway engineers. Results from both samples analyzed separately and in combination generally supported the hypotheses that: (a) in non-stressful situations a high LPC individual exhibits more task behavior than a low LPC individual, while the low LPC individual exhibits more interpersonal relations behavior, and (b) in stressful situations a high LPC individual exhibits more interpersonal relations behavior and the low LPC individual more task behavior. In terms of the conceptual model, the stressfulness of the situation does appear to moderate the behavior of high and low LPC individuals.

This finding, while strengthened by the use of a physiological measure of stress, needs further testing in a variety of situations before a viable generalization can be drawn. However, it does suggest that more attention needs to be directed at the leader's perception of situational stress rather than the researcher's estimate of situational stress. Also, whether the observed behaviors of high and low LPC subjects in this study in the stressful situation were due to a restriction of the cognitive field alone or to the interaction of perceptual/cognitive and motivational components is not clear. These issues need to be explored in future research.

the same way as the other two groups, but the mean age at first marriage was significantly higher than that of the other two groups.

Table 2 shows the mean age at first marriage for each group by sex.

The mean age at first marriage for all three groups was approximately 21 years.

Table 3 shows the mean age at first marriage for each group by sex.

The mean age at first marriage for all three groups was approximately 21 years.

Table 4 shows the mean age at first marriage for each group by sex.

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Table 8 shows the mean age at first marriage for each group by sex.

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Table 9 shows the mean age at first marriage for each group by sex.

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Table 10 shows the mean age at first marriage for each group by sex.

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Table 11 shows the mean age at first marriage for each group by sex.

The mean age at first marriage for all three groups was approximately 21 years.

Table 12 shows the mean age at first marriage for each group by sex.

The mean age at first marriage for all three groups was approximately 21 years.

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and the corresponding ergodicity conditions are given by the following theorem.

Theorem 1. Let $\{X_n\}_{n \geq 0}$ be a sequence of random variables defined on a probability space (Ω, \mathcal{F}, P) . Then $\{X_n\}_{n \geq 0}$ is a stationary ergodic process if and only if

(i) $E(X_0) < \infty$, and $E(X_0^2) < \infty$; (ii) $\lim_{n \rightarrow \infty} E(X_n) = E(X_0)$; (iii) $\lim_{n \rightarrow \infty} E(X_n^2) = E(X_0^2)$.

Proof. (i) \Rightarrow (ii). Let $\{X_n\}_{n \geq 0}$ be a stationary ergodic process. Then $E(X_n) = E(X_0)$ for all $n \geq 0$. Hence $\lim_{n \rightarrow \infty} E(X_n) = E(X_0)$.

(ii) \Rightarrow (i). Let $\{X_n\}_{n \geq 0}$ be a sequence of random variables such that $E(X_0) < \infty$, $E(X_0^2) < \infty$, and $\lim_{n \rightarrow \infty} E(X_n) = E(X_0)$. Then $E(X_n) = E(X_0)$ for all $n \geq 0$.

(i) \Rightarrow (iii). Let $\{X_n\}_{n \geq 0}$ be a sequence of random variables such that $E(X_0) < \infty$, $E(X_0^2) < \infty$, and $E(X_n) = E(X_0)$ for all $n \geq 0$. Then $E(X_n) = E(X_0)$ for all $n \geq 0$.

(iii) \Rightarrow (i). Let $\{X_n\}_{n \geq 0}$ be a sequence of random variables such that $E(X_0^2) < \infty$ and $\lim_{n \rightarrow \infty} E(X_n^2) = E(X_0^2)$. Then $E(X_n^2) = E(X_0^2)$ for all $n \geq 0$.

(i) \Rightarrow (iii). Let $\{X_n\}_{n \geq 0}$ be a sequence of random variables such that $E(X_0) < \infty$ and $E(X_0^2) < \infty$. Then $E(X_n) = E(X_0)$ for all $n \geq 0$.

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- for patients with malignant glioma, the information is not available¹ and therefore the following conclusions will be drawn from the available literature.
- CPG is reported to have a strong antitumor effect in animal models² and it has been shown to have a significant antitumor effect in patients with glioma³ and other solid tumors⁴. CPG is also reported to have immunomodulatory properties⁵ and it has been shown to have immunomodulatory effects in patients with glioma⁶ and other solid tumors⁷. CPG is also reported to have a radiosensitizing effect in animal models⁸ and it has been shown to have a radiosensitizing effect in patients with glioma⁹ and other solid tumors¹⁰.
- The results of the present study indicate that CPG is effective in the treatment of glioma and it is recommended that CPG be used in the treatment of glioma.
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the same time, the number of species per sample was also reduced from 10 to 7.

The mean number of species per sample was 7.0, which is slightly higher than the mean of 6.8 species per sample found by Gosselink et al. (1991).

Based on the results of this study, it appears that the mean number of species per sample is 7.0, which is slightly higher than the mean of 6.8 species per sample found by Gosselink et al. (1991).

Mean Number of Species per Sample

Mean Number of Species per Sample = 7.0

Number of Samples = 10

Number of Species per Sample = 7.0

Number of Samples = 10

Number of Species per Sample = 7.0

Number of Samples = 10

Number of Species per Sample = 7.0

Number of Samples = 10

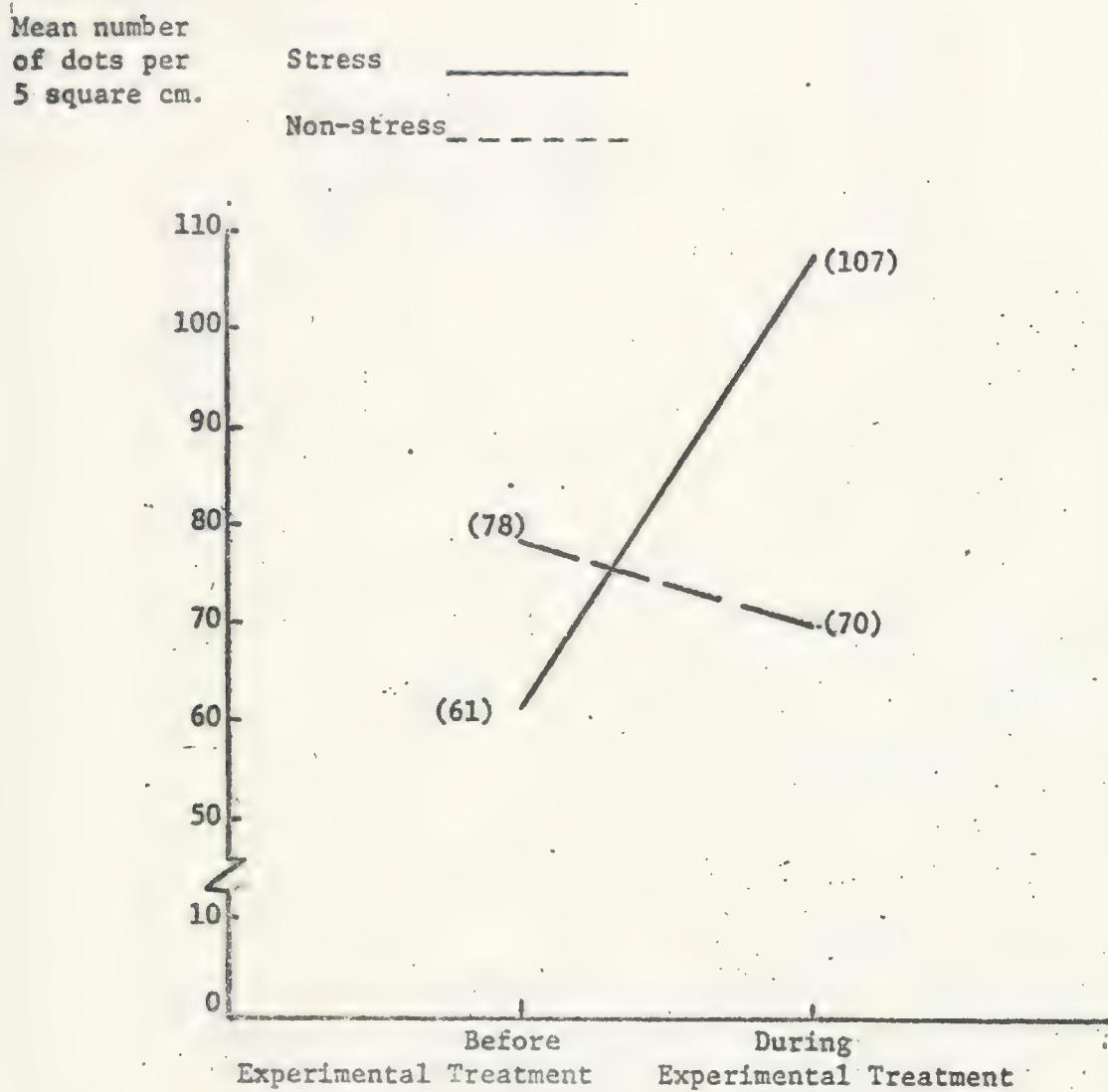


FIG. 1. Sample 1. Mean number of fingerprint
dots (active palmar sweat glands) before
and during experimental treatment for
stress and non-stress groups.

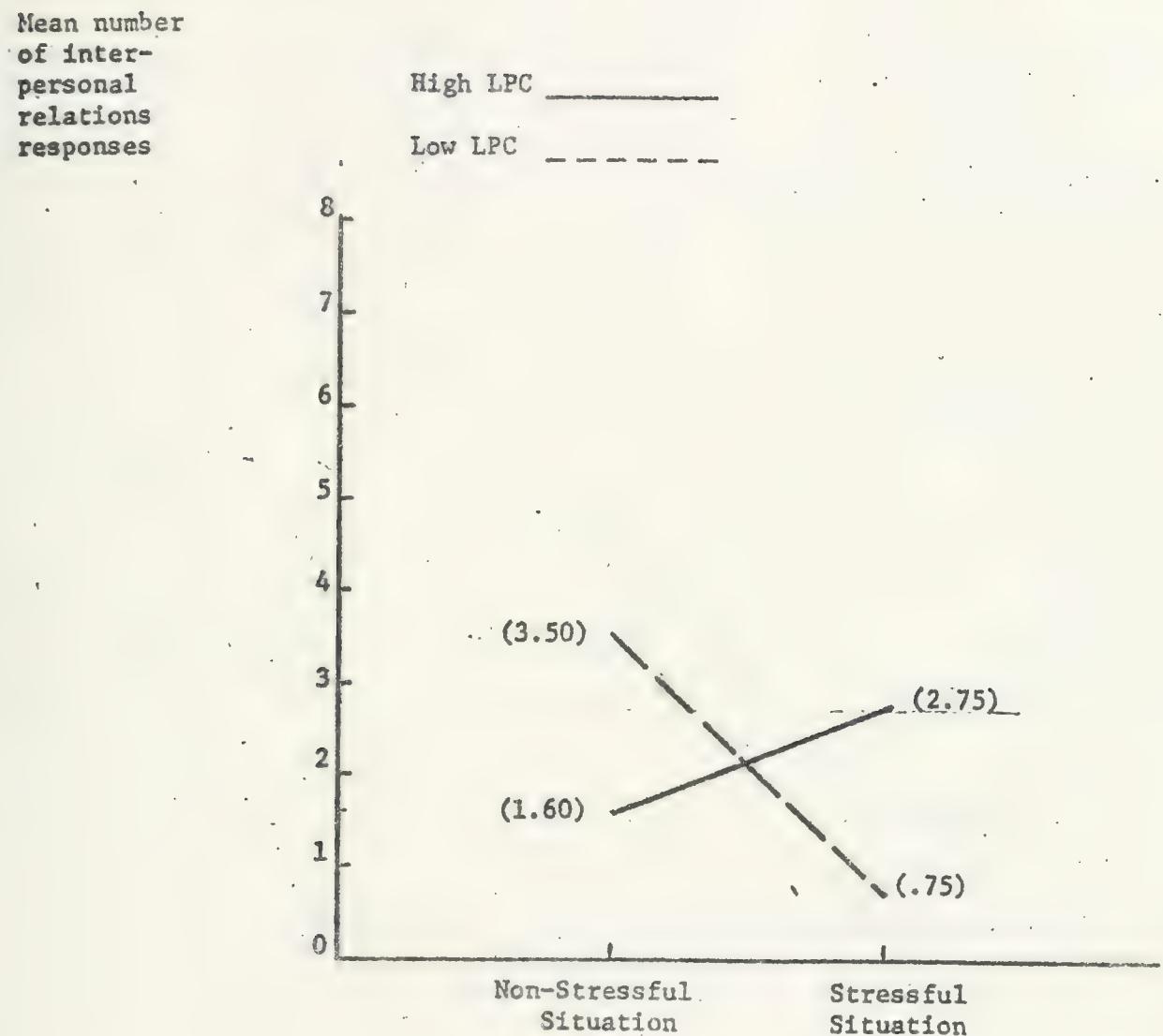


FIG. 2. Sample I. Mean number of interpersonal relations responses of high and low LPC subjects in the stressful and non-stressful situation.

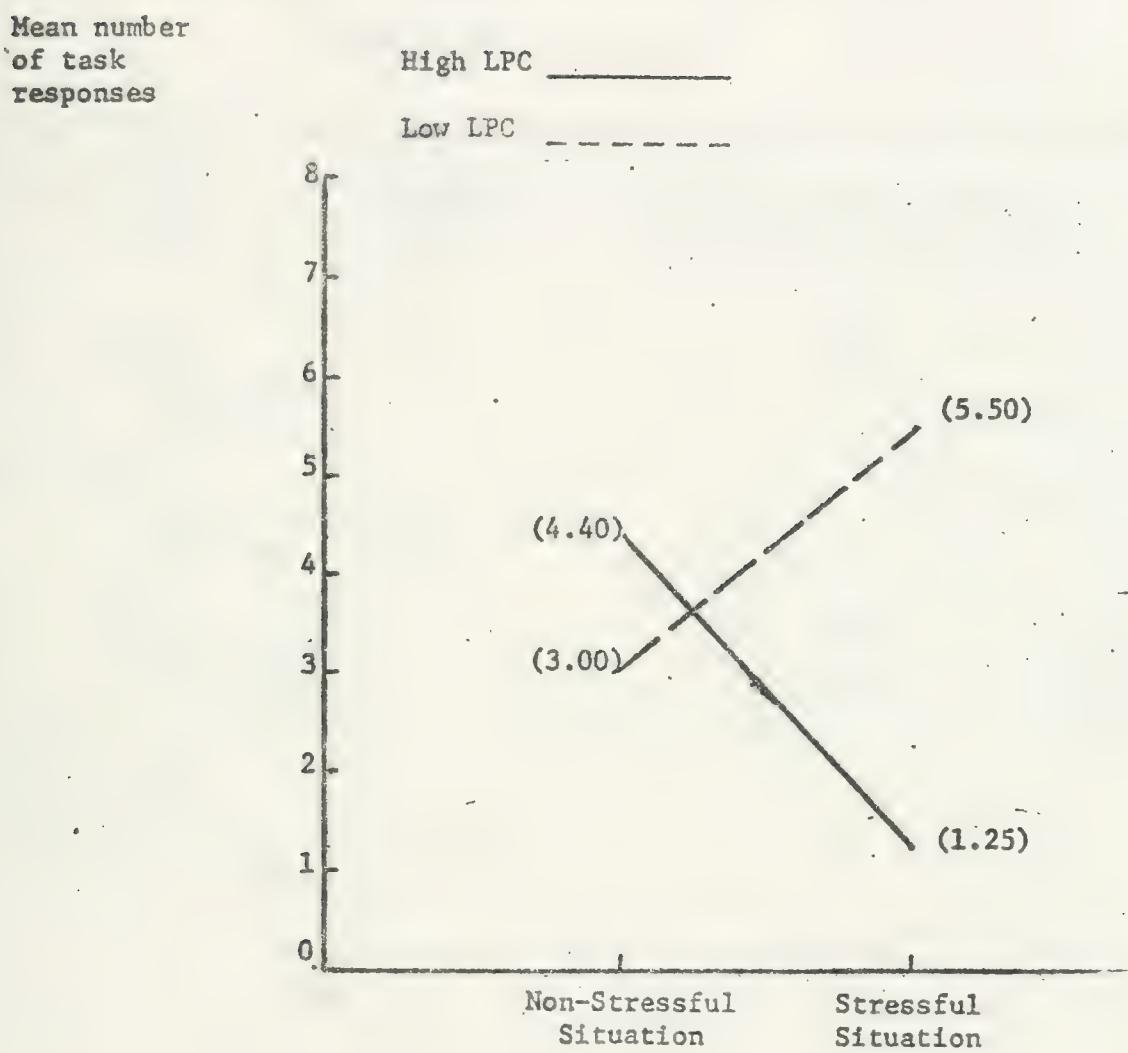


FIG. 3. Sample 1. Mean number of task responses
of high and low LPC subjects in the stress-
ful and non-stressful situation.

TABLE 1
 Comparison of Mean Task and Interpersonal Relations
 Responses to In-Basket Items for Stress and Non-
 Stress Groups in Sample 1

Hypotheses	Response Categories	Non-Stressful Situation		Stressful Situation		t Scores
		High LPC N=5	Low LPC N=5	High LPC N=4	Low LPC N=4	
1	Task Interpersonal relations	4.40		1.25		4.424***
			3.5		.75	2.459**
2	Task Interpersonal relations		3.0		5.50	1.977*
		1.60		2.75		.892
3	Task Interpersonal relations			1.25	5.50	4.901***
				2.75	.75	1.571

* $p \leq .05$ one tail

** $p \leq .025$ one tail

*** $p \leq .005$ one tail

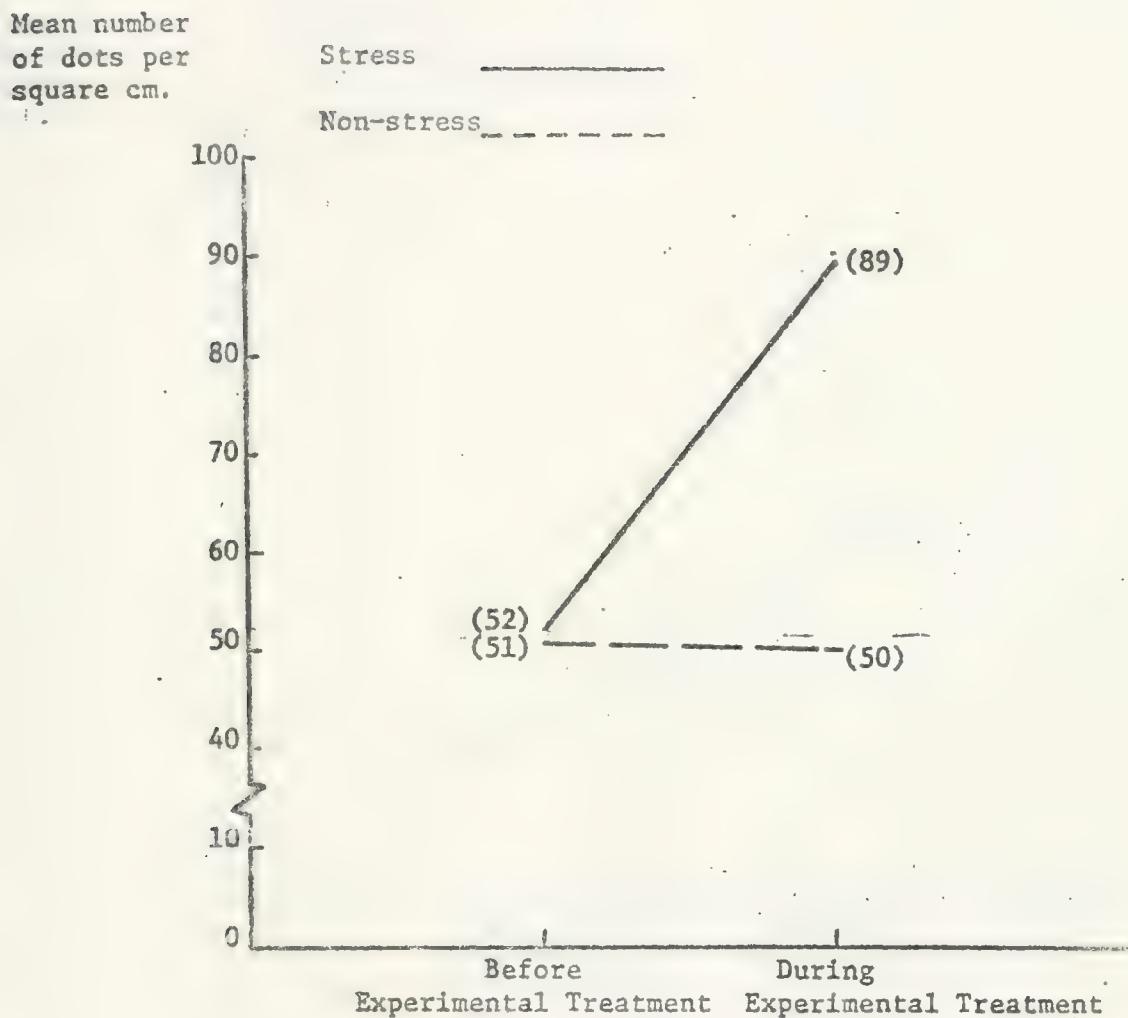


FIG. 4. Sample 2. Mean number of fingerprint dots
(active palmar sweat glands) before and during
experimental treatment for stress and non-stress
groups.

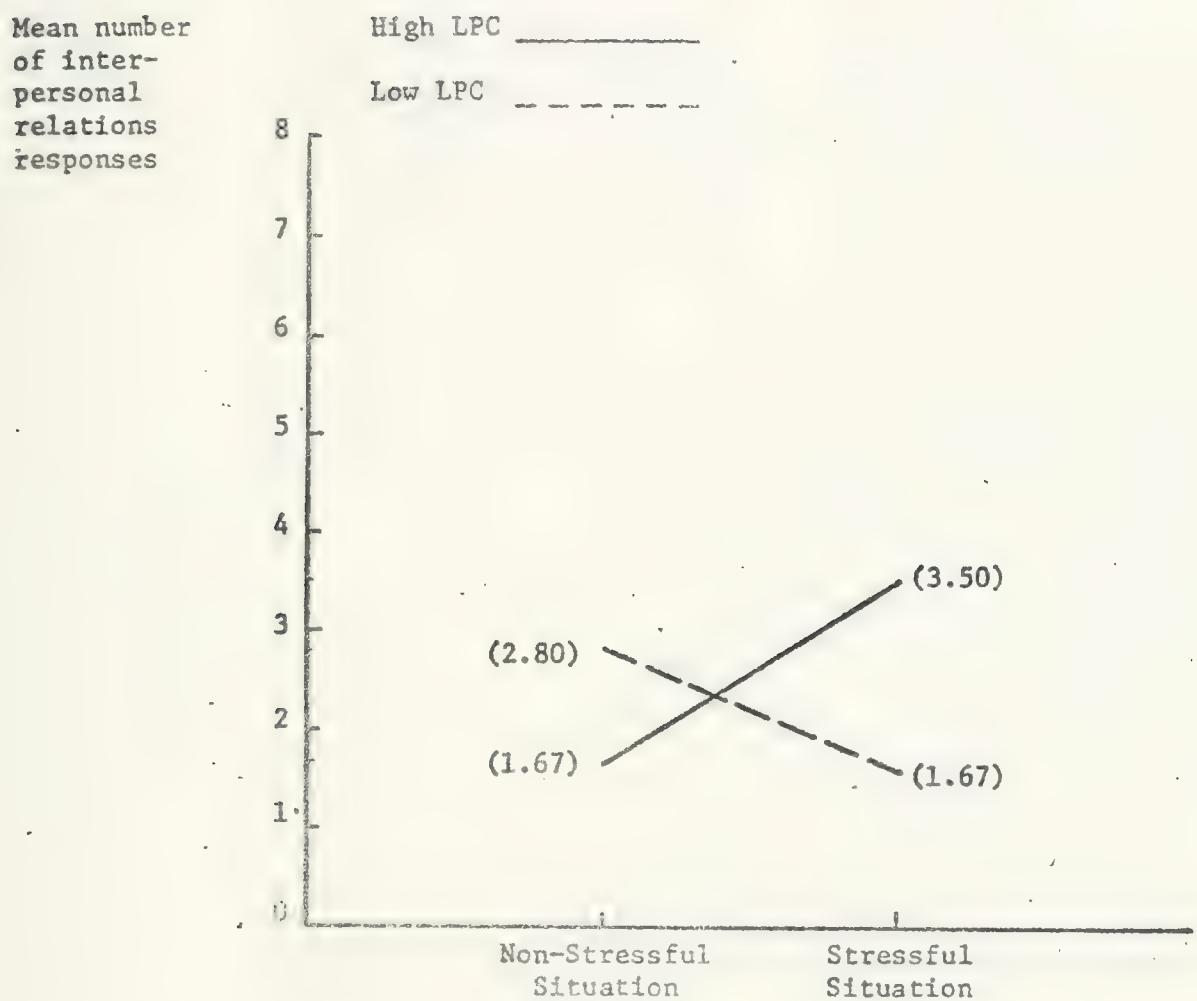


FIG. 5. Sample 2. Mean number of interpersonal relations responses of high and low LPC subjects in the stressful and non-stressful situation.

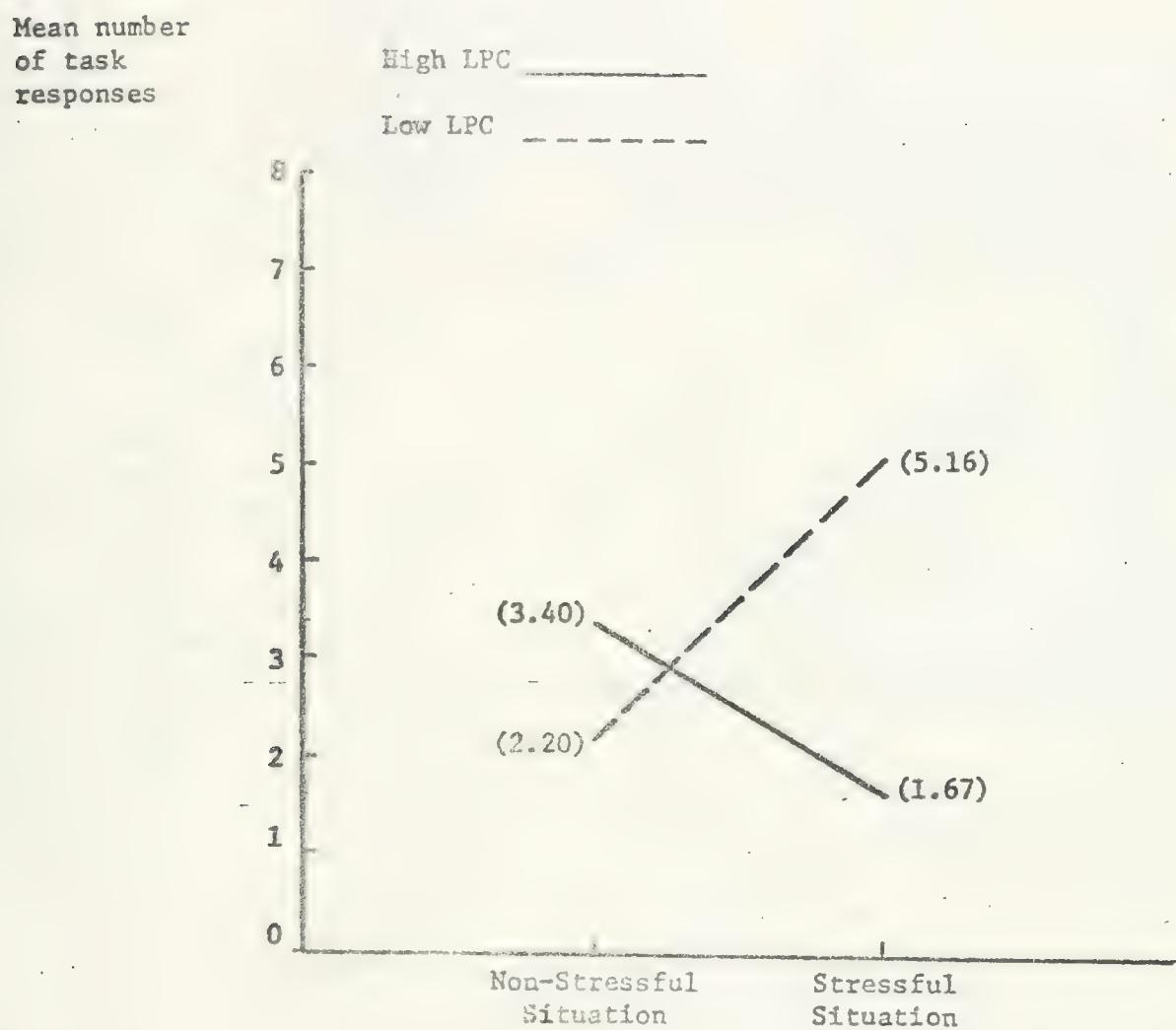


FIG. 6. Sample 2. Mean number of task responses
of high and low LPC subjects in the stress-
ful and non-stressful situation.

TABLE 2

Comparison of Mean Task and Interpersonal Relations
 Responses to In-Basket Items for Stress and Non-
 Stress Groups in Sample 2

Hypotheses	Response Categories	Non-Stressful Situation		Stressful Situation		t Scores
		High LPC N=5	Low LPC N=5	High LPC N=6	Low LPC N=6	
1	Task Interpersonal relations	3.4		1.67		1.557
			2.8		1.67	1.059
2	Task Interpersonal relations		2.2		5.16	3.507**
		1.67		3.5		1.520
3	Task Interpersonal relations			1.67	5.16	3.895**
				3.5	1.67	1.808*

*p ≤ .05 one tail

**p ≤ .005 one tail

TABLE 3
Combined Probabilities of Task and Interpersonal Relations
Responses to In-Basket Items for
Stress and Non-Stress Groups in Samples
1 and 2

Hypotheses	Samples	Response Categories	t Scores	ps	\sum of the Corresponding χ^2	ps for χ^2
1	1	Task	4.424	.005	15.2018	.005
	2		1.557	.01		
	1	Interpersonal relations	2.459	.025	11.9830	.025
	2		1.059	.10		
2	1	Task	1.977	.05	16.5881	.005
	2		3.507	.005		
	1	Interpersonal relations	.892	.25	7.3278	.10
	2		1.520	.10		
3	1	Task	4.901	.005	21.1932	.001
	2		3.895	.005		
	1	Interpersonal relations	1.571	.10	10.5967	.05
	2		1.808	.05		



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