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**RACIAL ENVIRONMENT, COHESION
CONFORMITY AND STRESS¹**

by

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Abstract

The reactions of subjects to the planned and intrinsic events in a standard conformity experiment were obtained by measuring physiological arousal (plasma free fatty acid level). In a 2 X 2 X 2 design, Negroes and whites were compared under the following conditions: (1) subjects recruited either in groups of friends or strangers; 2) subjects did or did not have a group meeting prior to the experiment. The subjects having previous meetings were the least aroused at all points in the experiment. The Negroes, especially those who had no previous meeting failed to relax during a period of inactivity. High conformity rates among Negroes suggest that group ties protected subjects from the stress of specific events, but not from the stress of being in an experiment.

RACIAL ENVIRONMENT, COHESION, CONFORMITY AND STRESS¹

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Subjects in experiments react not only to conditions consciously introduced by the experimenter, but also to certain facets of the situation which are not planned and are intrinsic to the experimental process. While this set of circumstances might be thought to interfere with the conduct of experiments, its recognition does not constitute a damning criticism of experimental method in social psychology. On the contrary, an experimenter can make this interference work for him if he attempts to understand what meaning the experimental situation itself holds for his subjects. It is the purpose of this study, through the use of physiological and behavioral data, to determine how subjects react to the planned and intrinsic aspects of a typical conformity experiment and how these reactions are modified by selected social-psychological variables.

One practically unavoidable fact is that in an experiment the subject feels he is being evaluated but he is kept in the dark as to the exact criteria used in the evaluative process (Riecken, 1962). This intrinsic ambiguity found in the experimental situation might be "stressful" for at least two reasons. First, the subject might be concerned with gaining a positive evaluation or avoiding a negative evaluation on whatever dimensions he believes he is being observed (Orne, 1962). This concern has been called "evaluation apprehension" by Rosenberg (1965). Secondly, the mere process of being in an experiment usually implies to the subject that he is not being told everything about the experiment. This might engender

anxiety on the part of the subject over what he will confront next - a general fear of the unknown.

Back and Bogdonoff (1967) labeled the stimulus experienced through entering and participating in an experiment as "experimental stress." The study of experimental stress is important for several reasons. First, since reactions to the experimental situation itself can affect the results of an experiment, an understanding of this source of error is a crucial methodological problem in social psychology. Second, because the experimental situation resembles "real life" situations in many respects, we can learn about stress in general from experimental stress.

The use of physiological measures is one way of analyzing experimental stress. Past studies have shown that physiological data can reveal important pieces of information concerning the effects of certain characteristics of the experimental situation itself (Back, Hood and Brehm, 1964; Back, Wilson, Bogdonoff and Troyer, 1967). Physiological responses modified by the autonomic nervous system are not usually under voluntary control. Such processes may provide additional information about the respondents at various points in time throughout the experiment which could not be obtained by direct questioning. The present study was one of a series designed to examine the degree to which selected variables modify physiological and behavioral reactions to experimental stress during a standard experimental session.

In this study we want to test the effects of different conditions of entering the experiment, namely, familiarity, previous acquaintance, previous exposure to an experimental session and relevant personality traits. By modifying these conditions we tested their effect on the initial entrance to the experiment and subsequent behavior and reactions.

Choice of Variables

In order to examine the reactions of subjects to the experimental situation itself (i.e., experimental stress), we wanted a group of subjects for this study which we felt would be especially susceptible to the stresses inherent in this type of situation. For this reason, we decided to use Negro subjects and compare their physiological reactions with white subjects during a conformity experiment. Katz and Greenbaum (1963) suggest that American Negroes have consistently performed poorly in test or research situations because they experience personal threat in a biracial surrounding. If the portrayal of the experimental setting as a stressful one is accurate, it should be all the more stressful to a Negro subject for several reasons. First, the Negro subject would be taken from familiar surroundings and placed in an all white environment, which would tend to make him generally defensive. Secondly, he would be asked to behave while being observed and evaluated, which might be the equivalent of asking him to prove not only his personal adequacy but, given the situation, the adequacy of Negroes in general. We would expect then that the Negroes would be more sensitive to the experimental situation itself than the white subjects, and this would be reflected by different patterns of physiological response.

The choice of the remaining two variables used in this study was determined by the results of several earlier studies which used physiological indices of stress. These studies have suggested that the stronger the group or interpersonal ties among subjects in a small group experiment, the less the physiological arousal of the members. Back and Bogdonoff (1964) showed that subjects recruited in natural groups (four friends) were less aroused throughout the experiment than were those subjects

recruited individually (strangers). In addition, the friends had much higher rates of conformity, indicating the existence of a cohesive group.

In another study (Back, Hood, Bogdonoff and Klein, in preparation), two experiments were performed which were basically the same except that in the second one the subjects were administered some psychological tests the evening before the actual experiment. Although the subjects in this second experiment met only for a brief time and in a room far removed from the experimental laboratory used in the morning, this experience evidently strengthened group identity and group ties for these subjects, who subsequently showed less general arousal than those in the first experiment.

By comparing Negro subjects, for whom we expected the experimental situation to be especially stressful, with white subjects, we intended to examine the effects of the above mentioned variables which we believe tend to modify "experimental stress." We replicated the friends versus strangers conditions for both Negro and white subjects. We also controlled in a more systematic manner whether or not groups of subjects had any previous meeting. Also, because we wanted to know whether what the group actually did in its previous meeting made a difference, the groups meeting in the afternoon were assigned to one of two conditions with different activities, while the remaining groups met only on the morning of the experiment.

In general, we predicted that the subjects recruited as friends and those meeting together prior to the experiment would show the least stress. However, it was not as clear how Negroes in a group would react when placed in an experiment. Although we expected the Negro subject to find the experience stressful, we felt that it was possible that being with members of his own race in a white environment might protect the individual from

the full impact of the stress. It has been shown, for instance, that threat tends to make a group more cohesive (Lanzetta, 1955), so it was feasible that racial-group identity could be heightened in this type of situation, perhaps minimizing physiological reactions as was the case in earlier experiments.

Method

Race, Previous Acquaintance and Previous Experience

This study was originally designed as two almost identical experiments, the first using white subjects ($N = 95$) and the second using Negro subjects ($N = 72$). For both experiments the subjects were recruited by advertising that \$15 would be paid for participation in an experiment. The white subjects were males recruited from the Duke University student body. The Negro subjects were males recruited from North Carolina College, a small college for Negroes in Durham, N. C.

The subjects in both experiments were invited to sign up for the experiment either alone or in groups of four friends - a technique which had shown itself to be effective in previous studies of this type (Back and Bogdonoff, 1964; Bogdonoff, Klein, Back, Nichols, Troyer and Hood, 1964). Half of the subjects in both experiments were recruited as individuals (strangers) and half in groups of four friends.

The third dimension (previous experience) was manipulated by randomly assigning the groups of subjects to one of three conditions. One-third of the subjects in both experiments came to the experimental laboratory in the morning having had no previous meeting with the experimenter. The remainder of the subjects met together the afternoon before the experimental session, in a room different from the one used for the experiment. To determine whether the nature of the activity in the afternoon was important,

two afternoon conditions were used. Half of those meeting in the afternoon filled out questionnaires for thirty minutes. Discussion among the subjects in this condition was neither encouraged nor discouraged. The other half met to engage in a discussion, the content of which was different for whites and Negroes. The white subjects in the afternoon discussion condition met with the experimenter and a medical doctor to discuss past experiences with blood tests and, only in general terms, the experiment. After we had found with the white subjects that the discussions had no different effect from the testing session, we changed the procedure for the Negro subjects. They met (in the afternoon discussion condition) for thirty minutes with the experimenter and were directed to collectively compose stories in response to TAT pictures. Again, there was no difference between the two "afternoon" conditions. As will be seen later, the two afternoon conditions were combined so that the main distinction became whether the groups met the afternoon before or whether they came in the morning only. This procedure enabled us to combine the white and Negro subjects for purposes of analysis. Thus, the primary dimensions in this study were Race (Negro versus White), Previous Experience (Morning-only versus Afternoon) and Previous Acquaintance (Friends versus Strangers).

Task

The task involved the solving of matrix problems of mixed difficulty (Raven, 1956) which were flashed on a screen by a slide projector. It was presented as a test of perceptual problem-solving. Across the bottom of each slide were three possible answers, one of which was to be chosen by the subject as the correct answer. The subjects were instructed to indicate their answers by pressing one of three buttons on an enclosed panel similar to those designed by Crutchfield (1955) and Gerard (1961). The

apparatus allowed the experimenter to control three rows of lights on each of the four subjects' panels, which the subjects were led to believe represented the answers of the other subjects in his group. With this apparatus it was possible to construct a conformity situation by telling each individual that he would be answering last (or fourth). The experimenter could systematically program a given number of wrong answers which the subjects thought were the answers of the others. The answers given by each of the subjects could be recorded in another room and the degree of conformity to the programmed answers computed.

Physiological Measure

The physiological measure used was the level of free fatty acid (FFA) in the circulating plasma. The major virtue of this measure is that since the plasma FFA level is a net indicator of the degree of lipid mobilization, it provides an indirect measure of catecholamine release into the lipid stores. Thus, it is a sensitive measure of autonomic nervous system activation. Changes in FFA level are rapid enough to be measured several times within an experiment.

Additional Measures

Several measures were collected via questionnaires as additional independent variables and for control between experimental conditions. They were: 1) Linton and Graham's (1959) Inner-directed-Other-directed (ID-OD) scale. This scale consists of items which measure the degree of "other-directedness," that is, dependence on peer group, lack of achievement values and strong sensitivity to interpersonal relations. The items typically represent a situation with a multiple-choice answer as to how to deal with this problem. The scale has been shown previously to be related to conformity, especially in the presence of friends (Linton and Graham, 1959; Back and Davis, 1965).

2) A measure of previous interaction. This consisted of a list of activities on which the subjects indicated frequency of participation with other members of the group on a five point scale, from frequently (more than once a week) to never. The frequencies were arbitrarily weighted from 0 to 5 and the sum represented a measure of previous interaction. In addition, the subjects rated each other as "a very close friend," "friend," "a casual acquaintance" and "not a person to whom I am close."

Common Procedure

The subjects fasted for 16 hours before they reported to the laboratory in the morning to insure standardized FFA measures. The subjects were first familiarized with the task and apparatus and given general instructions. An indwelling Courmand needle was placed in the forearm of each subject and the first blood samples were taken immediately. The use of the indwelling needle allowed subsequent samples to be drawn without additional skin puncture. Since previous studies have shown that the initial puncture is stressful (leading to high FFA levels), the subjects sat for the next thirty minutes quietly working on a questionnaire so that the FFA level could reach a resting level. This provided a comparative baseline for assessing the effects of later experiences.

After the resting period the subjects were taken to the experimental apparatus and the second blood sample was taken. Each subject was then given a card which led him to believe that the subjects were to answer in order and that he would be the last of the four to answer the problems to be presented. They were then shown a series of thirty slides. Before the subjects responded to each problem, they were exposed to a display of lights on their panels which were supposed to represent the answers of the other individuals in the group. These answers were programmed by the

experimenter to be unanimous and twenty of the thirty programmed answers were incorrect. The answers actually given by each of the four subjects were recorded and from this an index of conformity for each was derived. Immediately after the group conformity task, the third and final blood sample was drawn. The needles were then removed and the subjects were told of the true nature of the experiment.

Results

Preliminary Analysis and Choice of Technique

Before proceeding with the analysis, initial differences on the measures had to be dealt with. As would be expected, the subjects recruited as friends had much more previous interaction among themselves and more friendship choices than those recruited as strangers. More troublesome was the fact that the recruitment groups also differed on the ID-OD test, the subjects in the friendship groups being more other-directed. This probably occurred because we advertised for friends and strangers at the same time and gave prospective subjects the opportunity to choose whether they would sign up alone or find others to accompany them. This result, of course, validates the ID-OD test, but it also necessitated controlling for ID-OD differences when comparing experimental conditions.

In order to combine the effects of the manipulated conditions with those of the variations within cells due to individual differences, multiple regression was used for the analysis of the data. The manipulated conditions were scored as dummy variables (Negro = 1, White = 0; Morning Only = 1, Afternoon = 0; Friends = 1, Strangers = 0) while the continuous variable (ID-OD) could be used directly in the regression analysis (see Back and Winsborough, 1965, for a discussion of the dummy-variable technique). The results of this analysis allow the assessment of the independent

contribution of any particular variable, controlling for remaining variables (as the significance of the regression coefficient) and the importance of the total set of variables (as the multiple correlation coefficient and its significance level). For each additional variable, only one degree of freedom is lost and thus the danger is avoided of having extremely small cell entries, resulting from splitting subjects into different conditions by dichotomizing the continuous variables.

Trends in FFA Levels

Figures 1, 2, and 3 show the FFA patterns with the three major experimental variables broken down into groups. From Figure 1 it may be seen that the trends for the FFA levels are the same for the subjects meeting only in the morning and those meeting the afternoon before, except that those who met only in the morning are physiologically more aroused at all points. As was true in past studies, there is a decline in arousal during the resting period and a rise during the task. Figure 2 indicates that the strangers are consistently more aroused than are the friends. Again the trend in mean FFA levels is similar for both groups. Figure 3 shows the FFA levels for the white and Negro subjects. The differences between these two groups are not as clear-cut as was the case in the other comparisons. The mean FFA levels for the white subjects are slightly higher at blood samples #1 and #3, and lower at sample #2.

Insert Figures 1, 2, 3 about here

Tables 1 and 2 show the results of the regression analyses based on dummy variables for the main independent variables and the control variable ID-OD. As seen in Table 1, none of the variables used in the study effectively predicted initial reactions to the experiment at sample #1. At

samples #2 and #3, only the difference between the Morning-only versus Afternoon conditions (Previous Experience) was statistically significant. It is also seen that ID-D is an important variable, especially at blood sample #2. The negative regression coefficient on this variable for all samples indicates that the more Other-directed subjects were less aroused physiologically at all points in the experiment.

Insert Tables 1 and 2 about here

Table 2 shows the results of the regression analysis performed on the changes between blood samples (e.g., Sample #2 minus Sample #1, and Sample #3 minus Sample #2). According to these results, the differences between the two racial groups is statistically significant for both FFA changes. It can be seen in Figure 3 why this is so. While there is little difference between the means of the two racial groups, the slopes of the lines indicating FFA changes for the Negroes are not as great as for the white subjects. For the Negroes, there is less of a decline during the resting period and less of an increase during the conformity task and both of these slopes are significantly different from the slopes for the white group.

The two strongest factors determining the patterns of physiological reactions during the experiment, then are Race and Previous Experience. Figure 4 shows the FFA trends when the subjects are broken down into the four groups formed by combining these main variables. The group which is

Insert Figure 4 about here

clearly distinguished from the rest is the Negro - Morning-only group where there is almost no change in FFA from sample #1 to sample #2. To

test for the statistical significance of this difference, a dummy variable was formed by assigning the Negroes in the Morning-only condition a score of 1. This variable was then added to the regression equation which we had used to predict change #1 in Table 2. The addition of this interaction variable (Negro X Morning-only) decreased the amount of variance independently predicted by the race variable in Table 2, and increased the multiple R. The regression coefficient for Race alone was reduced to +0.07. The regression coefficient for the new interaction variable was +0.20 ($F < .10$) while the multiple R became +0.24. The correlation between FFA change #1 and the interaction dummy variable was +.21, which is significant at the .001 level. This indicates that the interaction effect is strong but not entirely independent of race alone.⁴

Conformity

A measure of conformity was derived from the answers given by the subjects after seeing each slide and programmed answers.⁵ A high index score indicates a high proportion of answers conforming to the programmed answers.

The mean rate of conformity was 0.666 and 0.449 for the Negro and white subjects, respectively. For both the Negro and white subjects, conformity was highest among friends and among those who met prior to the experiment. The results of the regression analysis shown in Table 3 show,

4. All other possible interaction effects were tested for in the same manner, but none were of sufficient strength to warrant discussion.

5. The conformity index was computed as the difference between the number of times the subject agreed with the social stimulus (programmed answers) minus the number of times he agreed with the physical stimulus (the correct solution) in the critical trials. To avoid a negative number, a constant of .5 was added, so the index could range from zero to one. An index score of .500 would indicate an equal number of correct answers and agreements with programmed answers.

however, that only the racial difference is statistically significant, and highly significant at that.

Insert Table 3 about here

An examination of the correlations between the two dependent variables provides additional information. For the Negroes, the correlation coefficient between the conformity index and FFA level at sample #3 was +.27, while the correlation coefficient for the white group is +.00 (the difference between correlations is significant at $p < .05$). The correlation coefficient between conformity and FFA change #2 (sample #3 minus #2) was +.27 for the Negroes and +.03 for whites (the difference between correlations is significant at $p < .06$). In general, then, the Negroes conformed to a much higher degree than did the whites and those who conformed the most were those who became the most physiologically aroused during this period.

Discussion

The predicted differences in FFA levels between Friends versus Strangers and Morning-only versus Afternoon were borne out. Both of these variables seemed to work in the same way - the subjects accompanied by sharing stronger group ties showed lower physiological arousal at all three points in the experiment. However, only in the case of Morning-only versus Afternoon were the differences highly significant in a statistical sense, and this was true only for samples #2 and #3. None of the variables used in this study effectively predicted FFA levels upon entrance to the experiment. This is probably due to the fact that reactions to having the needle placed are highly individualistic. It was also discovered that the more Other-directed subjects were less aroused throughout the experiment, significantly so at the resting level. What the ID-OD scale measures is suggested by our find-

ing that the Other-directed subject chose to participate in the experiment with others whom he knew. Linton and Graham (1959) characterized the Other-directed person as one who is dependent upon and is more sensitive to others. Thus, the more Other-directed a person was, regardless of the nature of his relationship with the other subjects, the more he reacted like a friend or a subject who had had a previous group experience.

The results suggest that the Negro subjects also tended to develop strong group ties in this experiment. The extremely high rate of conformity among the Negroes may indicate that in all conditions these subjects were highly group-oriented, since conformity can often be taken as an indicator of cohesiveness in groups. In this stress situation they were willing to let the peer group establish social reality. The positive correlation between FFA change #2 and conformity within the Negro group strengthens the idea that this is true for the Negro groups. The more the Negro subjects were aroused when confronted with conflicting and group-disruptive information, the more they conformed and this may in turn have heightened arousal, while no such relation was found among white, presumably more secure subjects. The formation of cohesive groups in the experimental situation is consistent with Grossack's (1954) contention that there exists among Negroes a norm which strengthens group ties with those of the same race. This would certainly become more salient in the face of threat such as that encountered in this experiment.

If being evaluated in a white setting seemed to increase cohesiveness among the Negro subjects, their physiological reactions to specific events (i.e., the initial puncture, rest period and task) should resemble those observed among friends and the subjects having a previous meeting. The FFA levels for the Negroes were almost identical with those of the white

subjects (lower for samples #1 and #3), yet their failure to relax during the resting period makes it clear that they found the situation itself stressful. It can be concluded that the cohesiveness of the Negro groups protected them from experiencing high arousal during the specific events of the experiment, but they still reacted to the stresses stemming from the situation itself. Evidently the group-orientation based on racial identity tended to buffer the Negro subjects from specific stressful features in the experiment, but not from the stress to which they would be expected to be most susceptible; the stress of merely being in an experiment.

The patterns of arousal observed for the Negroes in this study closely resemble those found in a cross-cultural study of physiological reactions to stress by Lazarus (1966). In this study, Lazarus measured the physiological reactions of American and Japanese students to stress-inducing films. It was found that arousal of the American subjects varied, corresponding in general to intended stressful stimuli, while the Japanese were evenly aroused during all parts of the experiment, including the movies shown for control purposes, with a slight habituation effect. Lazarus attributed this difference to the fact that the Japanese were not used to being in an evaluative situation and therefore had reacted principally to being in an experiment instead of to the specific stressful events.

One further finding should be discussed because of the particular susceptibility to experimental stress observed for the Negroes with no previous experience. It has been shown elsewhere (Back and Bogdonoff, 1967) that for white subjects there is a moderate correlation (+.23) between FFA level after the rest period and the height/weight ratio of the subjects. In other words, the thinner the subject, the less he relaxed during the resting period. Further experimentation designed to control for the fact

that FFA is a by-product of fatty tissues upheld the popular notion that thin people are more excitable than fat people. Bulk evidently acts as a buffer from experimental stress.

In the present study, the correlation between FFA level at sample #2 and height/weight ratio was $+0.14$ for the white subjects and $+0.35$ for the Negroes. However, for the Negroes who met in the morning-only, this correlation was $+0.74$. The comparable correlation for the white subjects was $+0.10$.⁶ So for the group of subjects who found the experimental situation most stressful, body size also became an important factor.

It follows from the results of this study that subjects who for any reason may be especially overwhelmed by the intrinsically stressful features of the experiment will not behave in the same way that other subjects might. In the present study, this was reflected in the physiological data. However, other types of reactions will also be modified which could affect the outcome of the experiment. A preoccupation with the situation as a whole tends to decrease the saliency of specific stimuli which may be consciously introduced by the experimenter while increasing the importance of other unintended factors. For example, subjects experiencing high degrees of experimental stress are more likely to become more sensitive to the behavior of other subjects in the experiment, as did the Negroes who had high rates of conformity in this experiment. The results also suggest that one way of reducing experimental stress and its effects on behavior in the

6. For the Negro - Morning-only group the correlations at samples #1 and #3 and height/weight ratio were $+0.63$ and $+0.69$ respectively. For the White - Morning-only group these correlations were -0.05 and -0.09 . Thus this factor was important in determining arousal at all points in the experiment for the Negroes with no previous experience.

situation is to provide the subjects with some previous experience together. It appears that such an experience need not take place in the actual experimental setting, but only be enough to habituate the individuals to being experimental subjects. One other point should be clear from this study: that physiological measurements can effectively be used by researchers to better understand the subject's point of view in social-psychological and small group experiments.

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Table 1

Results of Multiple Regression Analysis for Blood Samples 1, 2 and 3

Variables	Blood Sample #1		Blood Sample #2		Blood Sample #3	
	Regression Coefficient	F	Regression Coefficient	F	Regression Coefficient	F
Race	-0.07	0.89	0.05	0.41	-0.04	0.25
Previous Experience	0.12	2.45	0.24	10.39 ^a	0.18	5.66 ^b
Previous Acquaintance	0.06	0.53	0.15	3.89	0.13	2.81
ID-OD	-0.14	3.03	-0.20	6.69 ^b	-0.15	3.63
Multiple R	0.22	2.09	0.37	6.27 ^a	0.26	3.81 ^a

^a_p < .01

^b_p < .05

Table 2
Results of Multiple Regression Analysis for Blood Changes

Variables	Change #1 (Blood Sample #2 minus \$1)		Change #2 (Blood Sample #3 minus \$2)	
	Regression Coefficient	F	Regression Coefficient	F
Race	0.16	4.32 ^a	-0.19	5.13 ^a
Previous Experience	0.07	0.90	0.01	0.01
Previous Ac- quaintance	0.07	0.74	0.05	0.34
ID-OD	-0.04	0.25	0.03	0.17
Multiple R	0.20	1.60	0.18	1.36

^a_p < .05

Table 3
Results of Multiple Regression Analysis for Conformity Index

Variable	Regression Coefficient	F
Race	0.43	37.06 ^a
Previous Experience	-0.11	2.66
Previous Acquaintance	-0.01	0.02
ID-OD	-0.04	0.33
Multiple R	0.44	9.94 ^a

^a_p < .001

FIGURE 1

FFA Levels for Morning Only
Versus Afternoon Conditions

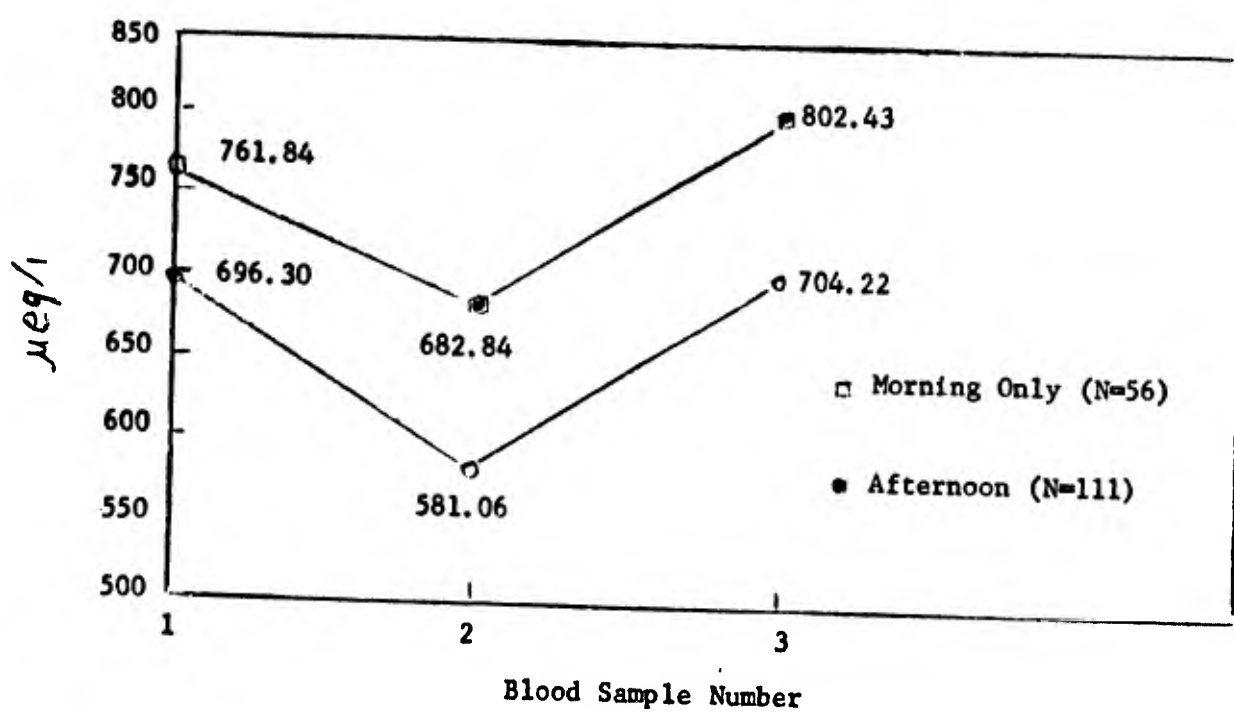


FIGURE 2

FFA Levels for Friends Versus Strangers Conditions

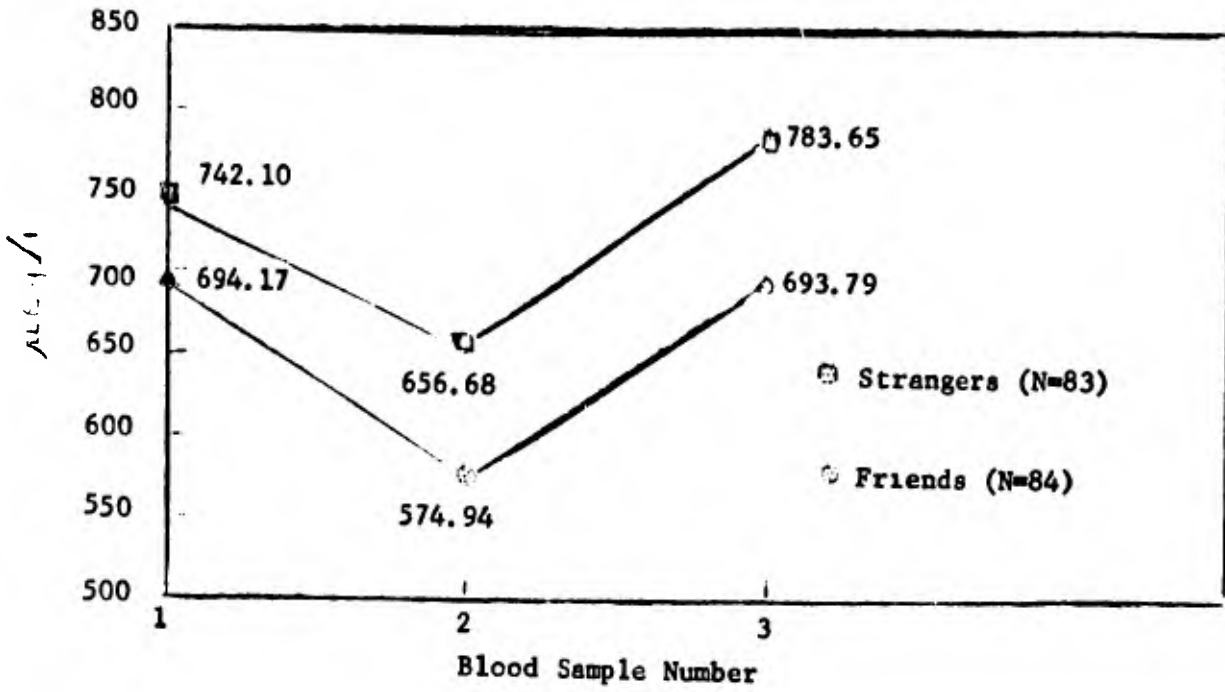


FIGURE 3

FFA Levels for Negro Versus
White Conditions

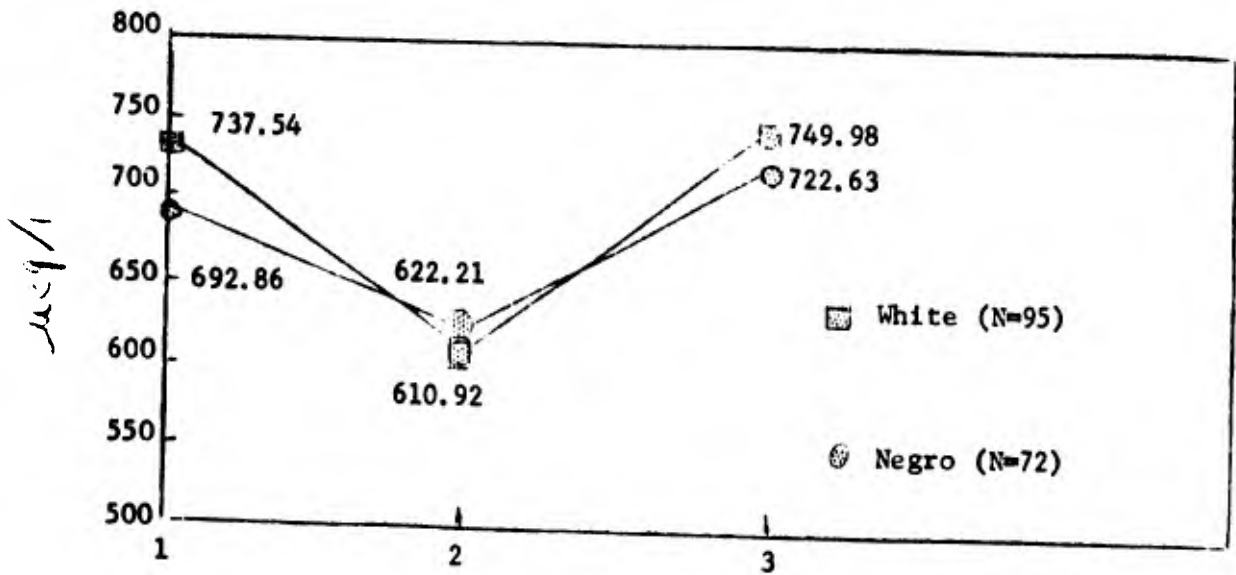


FIGURE 4

FFA Levels for Negro Versus
White and Morning Only Versus
Afternoon Conditions

