1-1-1971

Involuntary nonconformity as a construct in social stress and learning.

Roger Charles Mannell
University of Windsor

INVOLUNTARY NONCONFORMITY AS A CONSTRUCT IN SOCIAL STRESS AND LEARNING

A Thesis
Submitted to the Faculty of Graduate Studies through the
Department of Physical and Health Education in
Partial Fulfillment of the Requirements
for the Degree of
Master of Physical and Health Education at the
University of Windsor

by

ROGER CHARLES MANNELL
B.P.E., McMaster University, 1970
B.A., McMaster University, 1970

Windsor, Ontario, Canada
1971

UNIVERSITY OF WINDSOR

FACULTY OF PHYSICAL AND HEALTH EDUCATION

I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY

SUPERVISION BY Roger Mannell

ENTITLED Involuntary Nonconformity as a Construct in Social Stress and Learning.

BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

DEGREE OF Master of Physical Education

Thesis Advisor

Thesis Approved

ABSTRACT

University of Windsor

MANNELL, ROGER CHARLES — Involuntary Nonconformity as a Construct in Social Stress and Learning, University of Windsor, 1971, 54 pp. (James Duthie)

The present study was designed to investigate the involuntary nonconformity construct empirically to determine if practice and socially induced stress influenced its effect. An experimental task was devised which required the subjects to make simultaneous responses to two sets of stimuli and allowed two levels of automation and socially induced stress to be presented to the subjects. The two groups under conditions of automation produced a significantly larger number of inappropriate responses in the test trials than the non-automated control groups. Practice and socially induced stress both tended to reduce the number of inappropriate responses produced in the test trials. The differences were significant at the 0.01 level and indicate that the involuntary nonconformity construct provides a parsimonious explanation of the inappropriate responses which occurred. The ability of social stress to buffer nonconforming responses is further indication of the value of the construct in explaining behavior in situations in which the individual wishes to conform but may be unable to do so. The findings may have application in many areas of sports where rules may be regarded as codified norms and highly rehearsed behavior predominates.

TABLE OF CONTENTS

CHAPTER I

THE PROBLEM

Physical educators draw heavily upon experimental psychology in their study of such variables as learning, habit formation, information processing and practice schedules in attempting to explain and control complex motor behavior in sports' situations. In such situations the behavior displayed by an individual is to be viewed, however, as socially determined as well as the result of previously learned responses. For a more complete understanding at this level, behavior should be examined within a social-psychological context, taking into consideration such variables as group norms, expectations and goals. We are investigating, in sport, motor behavior within a social system which must include the interactions and expectations of all participants.

Physical educators studying sport as a social phenomenon view specific games and contests as functioning in closely analogous ways to other social groups and systems. Motor behavior is then socially relevant behavior and, since in the human it is at one time or another learned, such behaviors are likely to be closely integrated with the norms or expectations of the social system within which the individual functions, that is, one expects the motor behavior performed to conform to the rules and norms which designate appropriate behavior. Within this frame of reference motor behavior may

be conforming or nonconforming with respect to the norms which are a structural component of the game or contest such as the offical rules, and expectations of team-mates, opponents, audience, and coaches.

A great deal has been written concerning the formation of social norms, their origin, enforcement, and the bases of conformity and nonconformity to them. Conforming and nonconforming behavior have been viewed as conceptually motivated (conscious and voluntary) and thus directly available to the influence of social rewards and sanctions. The basic assumption that a deliberate conscious decision precedes the conforming or nonconforming action is so much taken for granted that little consideration has been given to other possible sources of conforming behavior. La Fave (1968) has evolved a construct which suggests that conformity and nonconformity are not always the result of conscious decision, but that much of repetitive social behavior is nonvoluntary due to the automation of this behavior.

Experimental psychologists who have studied learning, habit formation and the automation of behavior have suggested that behavior, once conscious and voluntary, may under some conditions become unconscious and nonvoluntary through automation. Reference to the process of automation can be found as early as Buchanan (1812) while in his essay "Habit" James (1890) defended the evolutionary construct that "habits are functional". The development of the construct of the automatization of behavior is also indebted to Allport's (1937)

concept of functional autonomy which implies that behavior can persist independently of the conceptual motivation stage. Kimble and Perlmuter (1970) have examined and shown the existence of such a process.

The motor behavior performed in a game is partially the result of practice, learning and the establishment of habits. In teaching games players the physical educator stresses practice until those skills or responses deemed essential to goal attainment and team success have become habitual -- so automatic that a high probability of their occurrence can be assumed whenever the appropriate stimulus situation arises.

La Fave stipulates that the automation of certain social responses is originally functional since this allows the individual to utilize his conceptual functioning processes for important decisions and intellectual activity. Studies concerned with "time-sharing" and the automation of motor behavior have provided some indication that when an individual must attend to several tasks simultaneously and make responses to both, automation of one of the tasks may occur (Bahrick and Shelley, 1958; Bahrick, Noble, and Fitts, 1954). The games player must perform those motor skills directly related to scoring or achieving the game's objectives, interact with his team-mates and opponents, conform to the formal rules of the game, and anticipate and plan game strategies. Most of the time he must perform these various functions simultaneously. Therefore, the multiplexity of the demands on the games player in the game situation may cause

him to automate the more repetitive and invariable of the required responses.

The involuntary nonconformity construct derived by La Fave (1968) distinguishes a second type of nonconformity based on the automatization of behavior. As the label suggests, the social behavior of concern is nonconformity to a set of norms where the nonconformity is not the result of a conceptual decision, an error, or ignorance but rather it has as its source an automated response which is no longer socially appropriate due to a change in the norms which govern that behavior. If certain motor responses in a game become automated as previously suggested, a change in game rules or a team's normative structure may produce involuntary nonconformity.

If the validity of the involuntary nonconformity construct be substantiated, more interesting and significant questions may be examined. The construct provides a conceptual framework from which the physical educator may predict and explain motor behavior based on social determinants, as well as previous learning behavior.

The present study tested the La Fave (1968) involuntary nonconformity construct, utilizing a motor response as the dependent variable and a task in which certain group norms and forms of interaction could be altered. The study further examined the effects of practice and socially induced stress on the occurrence of the automated motor response after it was no longer appropriate. The following variables were

manipulated to produce the different treatment effects:

(1) Automation/Non-automation: A motor response was either automated or not automated by subjects. Automation was produced through repetition by the subject of a motor response in a task which demanded two simultaneous responses from him.

(2) Socially Induced Stress: This manipulation in the present study determined whether the two subjects performing the task worked as a group in which their motor responses were a form of interaction and socially relevant to the goals of the group (high stress) or whether the two subjects performed the required task independently of each other with no co-operation required (low stress).

Purpose

The purpose of the present study was first to test La Fave's involuntary nonconformity construct as it applies to motor behavior within the context of a game or contest by:

(1) Comparing the mean differences in the number of incompatible responses between groups in several stages of performing the newly required response.

The second purpose was to determine the effects of learning and socially induced stress, through varying the interaction permissible between subjects, on the occurrence of involuntary nonconformity by:

(1) Comparing the mean differences of the number of incompatible responses between three successive blocks of eight trials within each automated group for the test trials.

(2) Comparing the mean differences of the number of incompatible responses between groups in the interaction condition and those in the no interaction condition for three successive blocks of eight trials in the test trials.

The Design of the Experiment

1) Experimental Task: The task required the subject to make two different responses to complex sets of stimuli. A simple lever movement was utilized as the response to be automated and this response did not vary regardless of the differences in the stimulus throughout the preliminary trials. The lever response was altered in the test trials so that the two responses (designated as Ra and Rb) were incompatible and mutually exclusive. The second response required the subject to make a discrimination involving two alternatives about the stimulus and record this decision by pressing one of two buttons. The two tasks were performed simultaneously.

2) Experimental Groups: Based on the earlier distinction between the automated and non-automated variable and interaction and no interaction variable the following experimental groups were utilized:

i. Automated Interaction Group (AI): The subjects in this group automated Ra in the preliminary trials and attempted Rb in the test trials while performing the task as members of two-person groups.

ii. Automated No Interaction Group (AN): Each subject in this group automated Ra in the preliminary trials and attempted Rb in the test trials while performing the task independently of the individual with whom she was being tested.

iii. Non-automated Interaction Group (N/AI): The subjects in this group did not perform Ra in the preliminary trials and attempted Rb in the test trials while performing the task as members of two-person groups.

iv. Non-automated No Interaction Group (N/AN): Each subject in this group did not perform Ra in the preliminary trials and attempted Rb in the test trials while performing the task independently of the individual with whom she was being tested.

All four groups experienced two phases of the experiment; the preliminary trials and the test trials. The two non-automated groups performed the task in the preliminary trials by only making the discrimination and appropriate decision response. Two automated groups performed the task in the preliminary trials by making both Ra and the discrimination and decision response. All four groups performed both Rb and the discrimination and decision response in phase II involving the test trials.

3) Analysis of the Data: The mean number of incompatible lever responses (Ra when Rb was required) were computed for each of the four groups for each of three blocks (eight trials/block) of test trials. Where significant variance existed, the relationships of the groups to one another were calculated according to Newman-Keul's procedure for comparing individual means. This procedure would identify the existence of any significant differences between adjacent means, which were arranged in order of magnitude. Variance analysis was also calculated in order to determine whether continued practice and socially induced stress over the three blocks of trials produced any significant changes in the number of

incompatible lever responses produced.

Subjects

Women physical education students at the University of Windsor in 1971 were used in the present study. The 48 subjects were volunteers from the first, second, and third years and they volunteered for a scheduled testing time and were tested in groups of two. The treatments were randomly assigned to the subjects, with each group of 12 subjects receiving one of the four treatments.

CHAPTER II

RELATED LITERATURE

Conforming and nonconforming to a social norm has been viewed as a direct result of a conscious and voluntary decision which precedes the actual performance of the behavior. Following from this the decision to conform or nonconform is generally assumed to be accessible to group pressures and, therefore, an individual's behavior is under the influence of the group of which he is a member. Sherif (1956) has stated that social norms refer to any criteria of experience and behavior found in group interaction which regulates the behavior of individual members in relevant stimulus situations. Homans (1961) considered conformity for its own sake and conformity for social approval to be important determinants of conformity to a norm. Nonconformity would result from an individual valuing an activity incompatible with conformity strongly enough to give up the approval that the conformity would have brought and finding some rewarding activity that is incompatible with his conforming to a norm.

Krech et al. (1962) and Secord and Backman (1964) in their discussion of the related concepts of conformity, nonconformity, and group pressures imply that the individual consciously trades conformity for rewards derived from the group and that nonconformity results when greater reward is available through making an incompatible response. The individual is then seen to consciously decide whether to conform

or nonconform.

The research has examined this conceptually motivated conformity and nonconformity with respect to group pressures. The power of group pressure to induce conformity of judgement in the individual is revealed in the well known experiments of Asch (1951, 1952, 1956), in which he places an individual under group pressure that can be systematically manipulated and controlled. Crutchfield (1955) used a modified but similar technique. Conformity is clearly seen to be influenced by group pressure or the resulting stress produced by conflict between group expectations and individual desires.

In his classical essay, "Habit", James (1890) spoke of behavior which was not voluntary, that is, habits which simplify our movements, make them more accurate and diminish the conscious attention with which our acts are performed. James stressed the functional role which habit plays in our lives and felt that not only is it the right thing at the right time that is done nonvoluntarily, but the wrong thing is also, if it be an habitual action. Woodworth's (1918) "mechanisms may become drives" concept as well as Allport's (1937) related construct of "functional autonomy" refer to a similar type of process as that suggested by James. Allport (1937) regards adult motives as being infinitely varied, and self-sustaining, contemporary systems growing out of antecedent systems, but functionally independent of them.

Dunlap (1932) further distinguishes two types or sources

of behavior and uses the terms voluntary, nonvoluntary and involuntary. Voluntary action is assumed to be direct, and these responses are said to be voluntary in which the essential factor of choice, decision or desire is involved in the action itself. Responses designated as involuntary are those which the individual performs in spite of the fact that he decides not to make them. In a more recent examination of "volition", Kimble and Perlmutter (1970) conclude that a voluntary response begins as nonvoluntary and changes with age and experience so that it becomes voluntary. Later or perhaps at the same time an opposite trend is taking place. Highly practiced acts tend to recede from consciousness to become routinized and automatic and in this sense nonvoluntary. These authors feel the importance of this process of automatizing behavior is that it allows certain aspects of behavior to proceed while the individual devotes his attention to more demanding enterprises. From their experiments these authors found: involuntary responses become independent of their consequences, a fact revealed by relatively great resistance to extinction, they occur promptly to the appropriate signal, and conditions that call attention to automatized responses inhibit them.

Fitts and Posner (1967) and La Fave (1970) while working from different theoretical positions, have in their respective multi-stage theories of learning of complex skills described as a central component a stage at which the behavior becomes automatic. Though Fitts and Posner describe three

stages (Cognitive to Autonomous) and La Fave four stages (Molecular to Molar/Molecular Relativity) all postulate a transition from conceptual or voluntary behavior to automatous behavior. This automatic behavior becomes less subject to cognitive control, and less subject to interference from other ongoing activities or environmental distractions. Thus, a well-practiced task like dribbling a basketball may not interfere with planning one's next move.

The research involving time-sharing, that is the simultaneous performance of two different tasks suggest several important factors related to automation. First, under conditions of performing two tasks continued practice renders the predictable activity not only less susceptible to interference from a second task but permits the subject to utilize more of his processing capacity in performing the second task. Bahrick and Shelley (1958), Bahrick, Noble, and Fitts (1954) support this and also utilize the secondary task to measure the level of overlearning and automation in the more predictable task. In these studies the assumed gradual change from exteroceptive to proprioceptive control during prolonged practice of repetitive tasks is labelled "automation".

Bahrick et al. (1954), Bahrick et al. (1952), and Brown and Poulton (1961) indicate that when one of the two tasks is perceived as more important it is performed with less decrement than the less important task, suggesting that more attention and concern is given to the task perceived as most important.

Finally, Briggs and Wiener (1966) found that control loading becomes very important in simulators when used to train for skills requiring time-sharing among a variety of displays and control devices and to provide extensive training for automation.

Involuntary Nonconformity Construct

Viewing an attitude as a concept which implies a thinking process and, therefore, predisposing an individual to select certain types of behavior, La Fave (1958) asked what would happen if a conflicting attitude was substituted for one which was originally the basis of an automatic habit; would the old habit now viewed as inappropriate by its holder extinguish immediately or would it persist? James (1890) in stressing the functionalism of habits, failed to pursue the instances he mentioned in which automatic habits have proved dysfunctional. La Fave hypothesized that a conceptually ordered response grown automatous will often trip its victim up -- before he can substitute a response corresponding with his changed attitude. He labels the interval for which the old habit persists as the "habit lag" period.

The construct habit lag should not be confused with the concept of negative transfer as both are descriptive of different, though perhaps related, phenomena based on different types of antecedent behavior. La Fave and Teeley (1967) suggest that the concepts differ fundamentally in that habit lag is based on nonconceptually motivated behavior while negative transfer makes no distinction. Holding (1965) considers

the construct of negative transfer to be vague and not as yet validated. Little research is available and consistent findings are lacking concerning the negative transfer construct. Negative transfer may only be operational in the early stages of learning (Bruce, 1933). The habit lag construct concerns only incompatible responses (the conflict between old habits and newly desired responses), whereas the negative transfer construct involves the differential performance resulting when the original behavior or response varies in similarity to the second response.

Negative transfer deals with the situation in which an individual is consciously performing a motor response following training on a preceding task which differs in some way from the present task. The habit lag and consequently the involuntary nonconformity construct are more concerned with the inadvertent production of an old habitual response rather than a concern with the quality of performance of the new response as it is affected by the old. Negative transfer does not suggest that the old response will replace the new response but rather that the previous response will produce some decrement in performance of the newly required response.

The habit lag construct can be further differentiated so that involuntary nonconformity is a subset of habit lag events (La Fave and Teeley, 1967). The construct "attitude" appears synonymous with conceptual motivation and habit refers to the same type of learned behavior as does nonvoluntary behavior. The habit lag construct also provides a basis

from which to build a theoretical approach to a second class of conformity types. This allows two major types of conformity to social norms, conformity which is based on conceptual motivation and also nonconceptually motivated conformity. If the social norm changes so that the nonconceptually motivated conformity becomes inapt, it may, nevertheless, fail to extinguish for a time. Normative change, then, even when accompanied by a change of attitude may not prevent the individual from involuntary nonconformity to the new norm.

The normal, socialized member of society has internalized from his culture many norms which manifest themselves in the norms of those groups of which he is a member. However, in rapidly changing societies where social mobility is relatively high, the individual must often learn to conform to new social norms in conflict with the old social norms he was conforming to automatically. This type of conflict may cause an individual to inadvertently conform to an outmoded norm before he is able to stop himself, which causes him to nonconform involuntarily to the present norm.

The habit lag and involuntary nonconformity concepts were tested in an experiment within the context of a basketball game at a Detroit Catholic School between a sixth grade boy's team and an eighth grade girl's team, by girl's rules (this experiment was conducted in the early 1960's when the two sets of rules differed in operationally definable ways). Consistent with predictions from habit lag and involuntary nonconformity, the authors found that boys erred more often

than the girls by taking too many dribbles and crossing the half court.

To the present, no research has been reported in which the "habit lag" interval has been examined. Similarly, no research has been reported in which the effects of socially induced stress on nonconceptually motivated behavior resulting from the occurrence of involuntary nonconformity has been examined. Finally, well designed experiments have not been carried out or has experimental evidence been provided for the La Fave involuntary nonconformity construct.

CHAPTER III

METHODOLOGY

The La Fave and Teeley (1967) experiment, while providing partial support for the involuntary nonconformity construct, can not be interpreted as giving definite verification due to the lack of control groups which would allow the learning factor to be determined. The authors assumed that the boy's team had automated dribbling and center-line responses in accordance with boy's rules. To provide more stringent control and further examine the effects of socially induced stress on involuntary nonconformity a laboratory experiment was utilized for which a special instrument was designed.

Experimentation with "time-sharing" suggested that not only would an experiment requiring a subject to perform concommitantly two tasks facilitate the automation of the more expected task, but the necessity of performing two tasks simultaneously would provide an experimental situation closely simulating the social or sport situation in which the individual must cope with several sets of demands. The task was also designed so to allow the experimenter to control the amount of socially induced stress under which the subjects performed. This control was accomplished by having all subjects performing in pairs in which some worked together as a team and others as isolated individuals. The stressing or motivating factors may be designated as arising from two

sources: the above mentioned socially induced stress and the influence arising from the demand characteristics of the task and experimental setting itself. The former set of factors were manipulated by the experimenter and the latter were held constant for all subjects. The experimental task provided conditions of automation and non-automation and high stress and low stress.

Involuntary nonconformity was treated in the present study as the performance of the old automated response (Ra) which a norm change had since rendered inappropriate. Ra was considered to be an incompatible response in the above situation. By providing control groups which had not automated Ra the number of incompatible responses made strictly due to the learning process could be compared to the number of incompatible responses made due to both learning and involuntary nonconformity.

The subjects in the present study were female physical education students in their first, second, and third years at the University of Windsor during the winter term of 1971. The primary question was whether the automated and non-automated treatments produced incompatible response differences which would be attributed to involuntary nonconformity. A second question was whether the frequency of involuntary nonconformity decreases with practice and whether socially induced stress facilitates this decrease.

The Apparatus

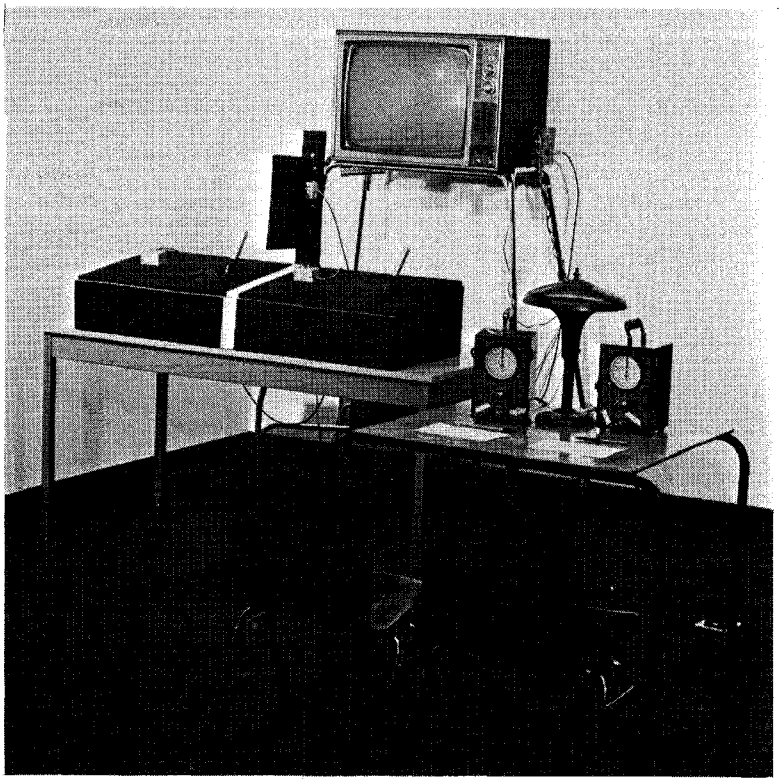
The apparatus allowed the performance of two tasks; 1-Primary task requiring a simple "expected" motor response, 2-Secondary task requiring vigilance, discrimination, and a decision-making response (Illustration I).

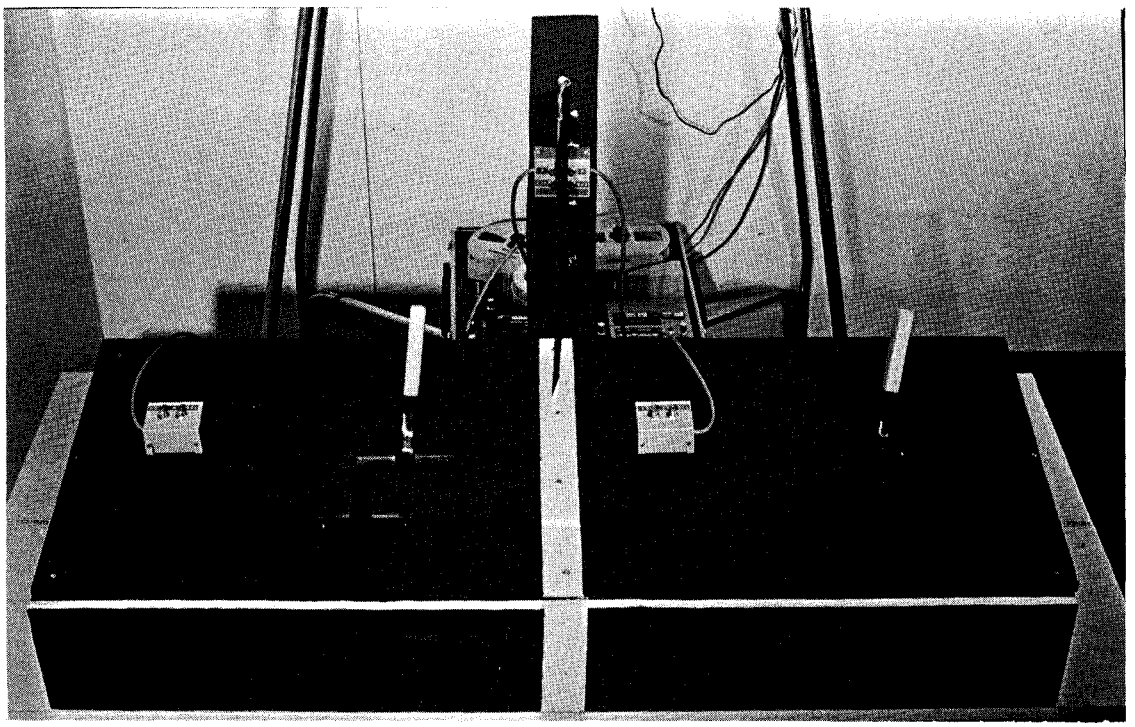
Components of the Apparatus:

(1) a television video tape with a series of 90 five to eight second sequences in which actual basketball action occurred. Fifty per cent of these sequences showed a foul being committed against the individual with the ball as he was in the act of shooting or dribbling, and 50% contained no foul. The foul and no foul sequences were randomly distributed. A "beep" dubbed onto the sound track was used to indicate when the subject was to judge whether a foul had or had not been committed; the "beep" sounded concommitantly with the occurrence of the foul in some cases and concommitantly with a good check in others. The sequences were presented continuously with the "beeps" occurring at periods four to seven seconds apart. Audio feedback was also prerecorded on the video tape supplying the correct decision (foul or no foul) two seconds following the audio "beep" and visual presentation.

(2) a lever which could be moved through a maze-like slot was used for the simple expected motor response. Since it was this response which was to be automated, a spring was used to provide control loading which has been shown to facilitate automation (Briggs and Wiener, 1966). The lever could

ILLUSTRATION I





be moved down-left-down-left (Ra) or down-left-down-right (Rb).

(3) two push-buttons, one for "foul" and one for "no foul", were used by the subject to indicate her decision.

(4) two lamps, one green (foul) and one red (no foul), were used to indicate the subject's response. These lamps were located in such a position that the subject could maintain her vigilance of the television screen and still see the lamps.

(5) a dual control panel was utilized with two of each of the lever, push-buttons, and lamps. The right and left halfs of the panel were identical with the lever located on the right-hand side of each half and the buttons on the left. A post with the lamps stood two feet above the back of the panel in the center and a hood which could be removed divided the lamps used to indicate the subject's own decision.

Measurement Apparatus:

Two chronoscopes were used to measure the movement time for the lever responses permitting reading to the nearest one thousandth of a second. These were connected into the lever electrical system and the chronoscope was started when the lever movement was initiated and stopped when the lever movement was complete. Two digital counters were similarly connected into the lever electrical system and depending which of Ra or Rb was designated by the experimenter the counter recorded each incompatible response that was made.

Functioning of Apparatus:

(1) the function of the push-buttons was to turn on the appropriate lamp which would indicate to each subject her response (foul or no foul).

(2) the function of the lever response was to activate the electrical system connecting the push-buttons and the lamps. The lever had to be moved down-left-down-left or down-left-down-right as designated by the experimenter before the buttons could cause the lamps to light up.

(3) the master control panel allowed the experimenter through a series of microswitches to control: (a) which lever response (Ra or Rb) activated the push-button-lamp system and (b) which lamp system (subject's own or partner's) was activated by lever response (a) or (b).

(4) the hood divider between the lamps when in position allowed each subject to see only her own responses; when removed each subject could see her own plus her partner's responses.

Test Movement

To perform the tasks the subjects stood in front and facing their respective sides of the panel. They placed their right hands on the lever and two fingers of their left hands on the push-buttons, and attended to the television screen for the presentation of the stimuli basketball scenes. When the subjects heard the "beep" and saw the situation to be judged, they immediately responded by performing Ra or Rb as designated and holding the lever against the end of the

slot. The decision and subsequent response was made almost simultaneously with the lever response since the subjects were told that they must make their choice before the correct decision was given. The lever had to be returned immediately to the start and the push-button released after hearing the decision given over the television sound system in preparation for the next trial.

Experimental Design

Four groups were used in the present study: 1-Automated interaction group (AI), 2-Automated no interaction group (AN), 3-Non-automated interaction group (N/AI), 4-Non-automated no interaction group (N/AN).

EXPERIMENTAL TREATMENTS

	Stress	
	High	Low
Automated	AI	AN
Non-automated	N/AI	N/AN

AI and AN performed both tasks in the practice and preliminary trials. These subjects were required to make Ra for the 64 practice and preliminary trials while making decisions concerning the occurrence of fouls. Under the conditions of the experiment neither subject was able to see what decisions the other was making. The instructions were worded so that the subjects were under the impression that it was only their answers and the speed with which these answers

were given that were of interest. This lead the subjects to treat the secondary task as the most important part of the experimental situation. Bahrick et al. (1954), Bahrick (1952), and Poulton (1961) indicated that when one of the tasks is perceived by the subject as more important it will receive most of his conscious attention. Since involuntary nonconformity is by definition the unconscious or involuntary production of a response, the ploy of leading the subjects to believe the primary importance of the secondary task was an attempt to make difficult and less probable their consciously attending to the lever response. The subjects were instructed:

(1) that their lever responses activated their push-button-lamp system and that they would be given an error score if they did not light up their lamp even if they pushed the right button.

(2) to make the lever response and decision when they heard the "beep" and saw the situation to be judged.

(3) to perform both tasks as quickly as possible because both the correctness of the decision and the time to make the decision were to be recorded.

(4) not to return the lever or release the button until hearing the answer.

(5) to return the lever when the answer was given even if either the lever response or decision had not been made; this would be recorded as an incorrect response.

N/AI and N/AN performed only the discrimination-decision task in the preliminary trials (the lever response was not needed here to activate the push-button-lamp system). These subjects were told:

(1) to make a decision and push the appropriate button when they heard the "beep" and saw the situation to be judged.

(2) to make the decision as quickly as possible because both the correctness and time of the decision were to be recorded.

(3) not to release the button until the answer was given.

All four groups in the second phase of 24 test trials performed both tasks. All groups had to make Rb while also making the decisions required by the secondary task.

AN and N/AN performed under conditions where Rb activated their own lamp systems and the hood prevented either subject from viewing the others' lamps. AN was told that they must now move the lever to the right to activate their lamps and this was demonstrated for them; they were not allowed to practice. N/AN were given these instructions after receiving instructions concerning the function and operation of the lever.

AI and N/AI performed under conditions where Rb activated, not their own but their partner's push-button-lamp system, so that each subject was dependent upon the other for activation of her lamp system before she could register an answer. The

hood was removed so that each subject could see both her own and her partner's decision. These subjects were told that they would now be participating as a team in the next series of trials and it was stressed that they were dependent upon each other. It was indicated that they would be scored as a team and the team would only receive a correct score when both subjects recorded a correct response. Again both the quickness and correctness of the decision were stressed. The subjects were encouraged to interact verbally in co-ordinating their responses.

Lever movement times were recorded for the 44 preliminary trials for AI and AN. Lever movement times were recorded for the 24 test trials for each group as well as the number of incompatible lever responses per block of eight trials.

The mean lever movement time per preliminary trial for AI and AN were graphed and compared for similarities in the performance and learning of Ra. Similarly, the mean lever movement time per trial for all four groups was plotted for the test trials. The mean number of incompatible lever responses were computed for each of the four groups for each of the three blocks of test trials.

Four groups of 12 subjects each were tested. The subjects performed two at a time under the same conditions, so that there were six experimental sessions per group. The testing took approximately 45 minutes as the subjects performed both phases of the experiment during one session. The experimenter when recruiting volunteers presented them with a schedule from which they indicated a time most convenient to them. When two

subjects came to a session one of the four treatments was randomly chosen to be used during that session, and the subjects were randomly assigned to a side of the apparatus. The testing covered a period of two weeks.

A comparison of the mean number of incompatible responses between groups AI and N/AI and groups AN and N/AN was made to examine the involuntary nonconformity construct.

A comparison of the mean number of incompatible responses on each succeeding block of eight trials between groups AI and AN was made to determine the effects of socially induced stress on the frequency of involuntary nonconformity.

A comparison of the mean number of incompatible responses on each succeeding block of eight test trials within groups AI and AN was made to determine the effects of learning on the frequency of involuntary nonconformity. The relationships of the means to one another were calculated according to Newman-Keul's procedure for comparing individual means (Kirk, 1969).

CHAPTER IV

RESULTS AND DISCUSSION

The present study was designed to investigate the involuntary nonconformity construct and determine the effects of learning and socially induced stress on the occurrence of involuntary nonconformity in young adult female subjects. To achieve this, four groups under a combination of automated and non-automated and interaction and non-interaction conditions were used. The number of incompatible lever responses (Ra when Rb was required) was the criterion used in testing the following hypotheses to substantiate the involuntary nonconformity construct:

(1) groups AI and AN would produce more incompatible responses than their respective control groups N/AI and N/AN on the initial eight test trials when a norm change made Ra inappropriate and Rb the required response.

It was further hypothesized that:

(2) the number of incompatible responses produced by groups AI and AN in the test trials would decrease from block one to block two and block two to block three as practice continued at performing Rb in accordance with the new norm.

Finally, it was hypothesized that:

(3) group AI would produce fewer incompatible responses than group AN for each of the three blocks of eight test trials.

The time required to complete the lever movement was also computed and investigated as a possible more sensitive measure of the performance and learning occurring in both the preliminary and test trials.

Preliminary Trials

Figure 1, showing the mean movement time per trial for each of groups AI and AN, reveals the expected similarity in response times over the full range of 44 trials. Both groups performed the lever response more rapidly with practice, but the performance times for both groups showed little improvement after trial 20. Figure 2 incorporates the same movement time data but the plotted points represent the mean movement time per group over blocks of 11 trials. Groups AI and AN produced times which differed more initially (0.12 seconds) while over the last three sets of 11 trials these two groups more nearly coincided producing curves closely parallelling one another with differences of 0.06, 0.04, and 0.05 seconds. Group AN had slightly faster mean movement times over all four sets of trials.

FIGURE 1. GROUP AI AND AN MEAN MOVEMENT TIMES FOR THE PRELIMINARY TRIALS

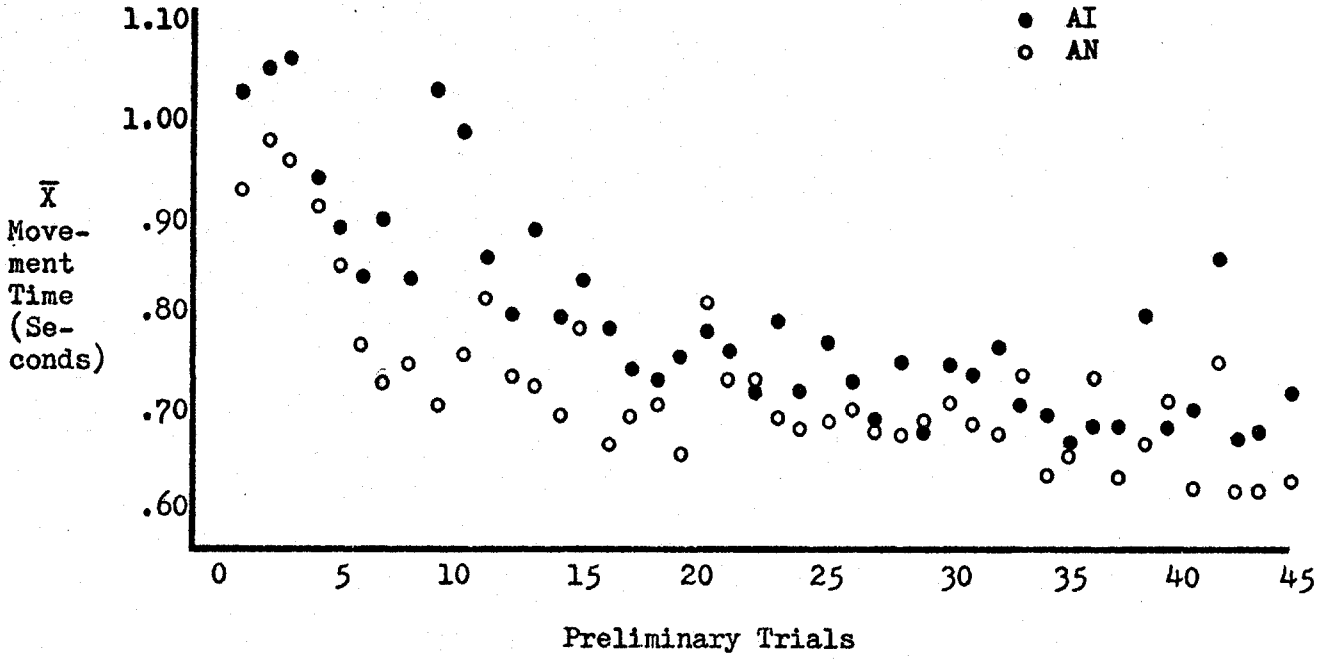
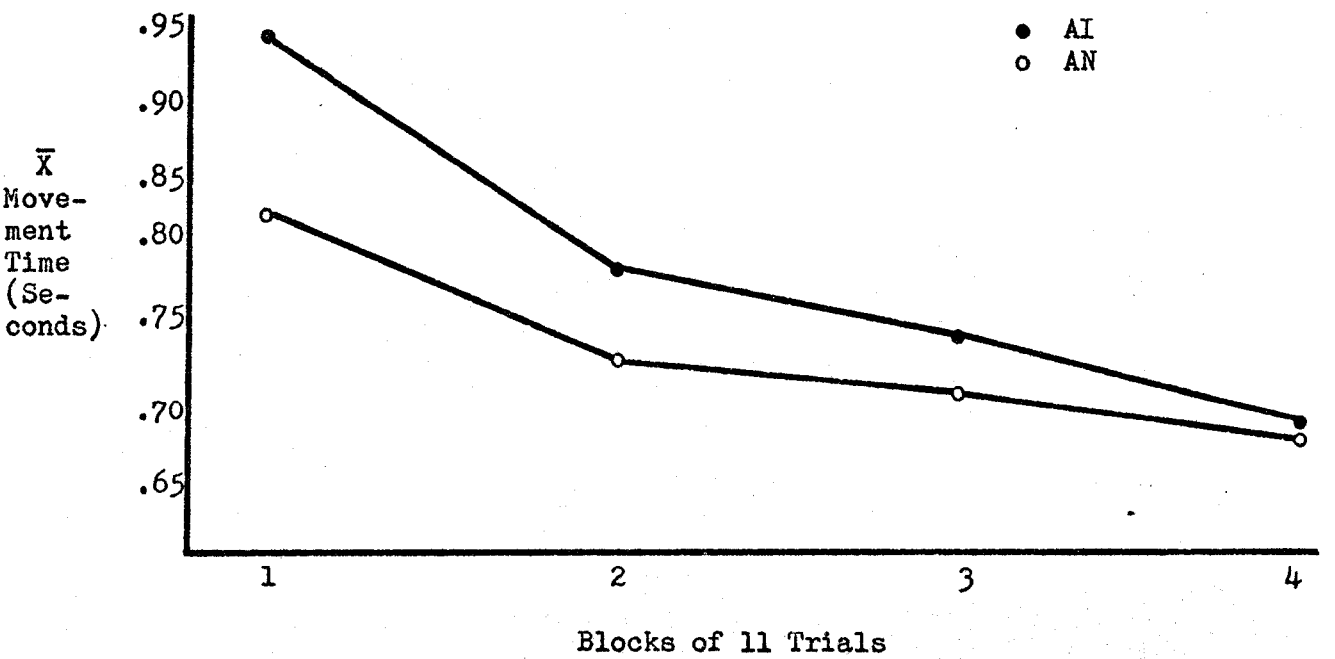


FIGURE 2. GROUP AI AND AN MEAN MOVEMENT TIMES PER 11 TRIALS FOR THE PRELIMINARY TRIALS



Test Trials (Lever Movement Times)

Lever movement times were obtained for groups AI, N/AI, AN, and N/AN on each of the 24 test trials. The mean movement time per trial for groups AI and AN was plotted in Figure 3. From Figure 3 both groups AI and AN show greater intertrial variance for the first 12 trials but after 12, both groups showed greater consistency of movement time and are represented by similar curves. Figure 4 shows that group AN had slightly faster movement times for Rb over the first two sets of eight trials (0.07 and 0.08 second difference) while both groups AN and AI had the same mean movement time over the last eight trials. Neither group improved greatly after trial 12. Groups N/AN and N/AI produced slower movement times than groups AN and AI for the 24 test trials (Figure 4 and 5). This was the first time either groups had performed a lever response.

Test Trials (Incompatible Responses)

An analysis of variance was made of the incompatible response data provided by groups AI, N/AI, AN and N/AN during the 24 test trials. Comparisons of the mean number of incompatible responses for each of the three blocks of eight trials were made between and within groups. The mean number of incompatible responses produced for each block of eight trials by each group and the F ratios for all possible comparisons between and within groups are shown in Table 1. The level of significance was set at 0.01. Minimally, one set of between group comparisons is significant for the first and

FIGURE 3. GROUP AI AND AN MEAN MOVEMENT TIMES FOR THE TEST TRIALS

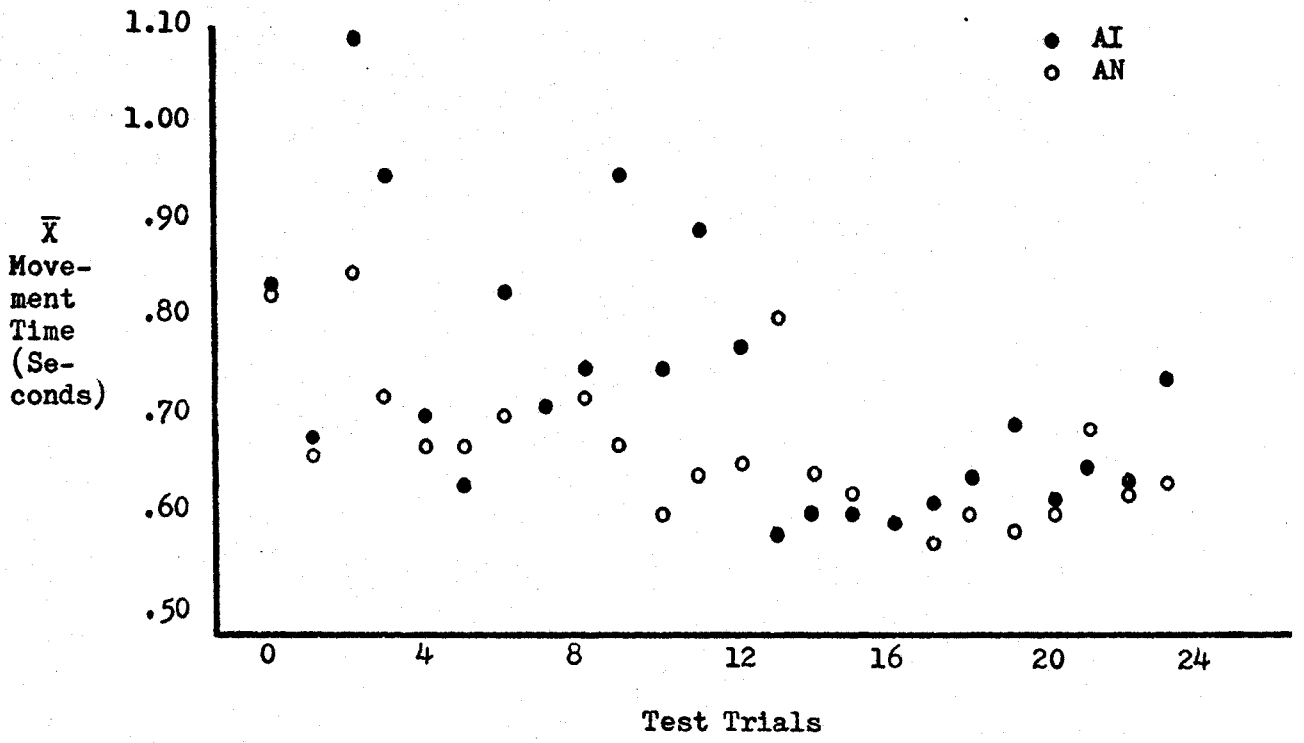


FIGURE 4. GROUP AI, N/AI, AN, N/AN MEAN MOVEMENT TIMES PER 8 TRIALS FOR THE TEST TRIALS

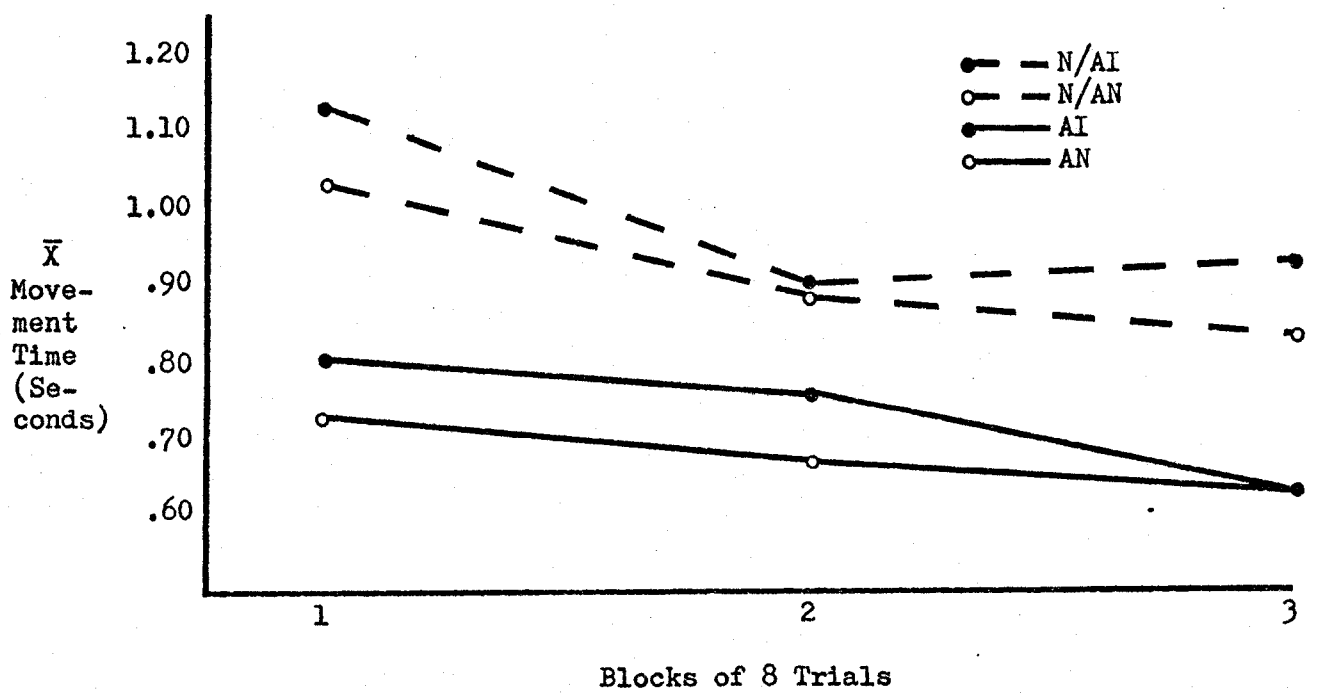
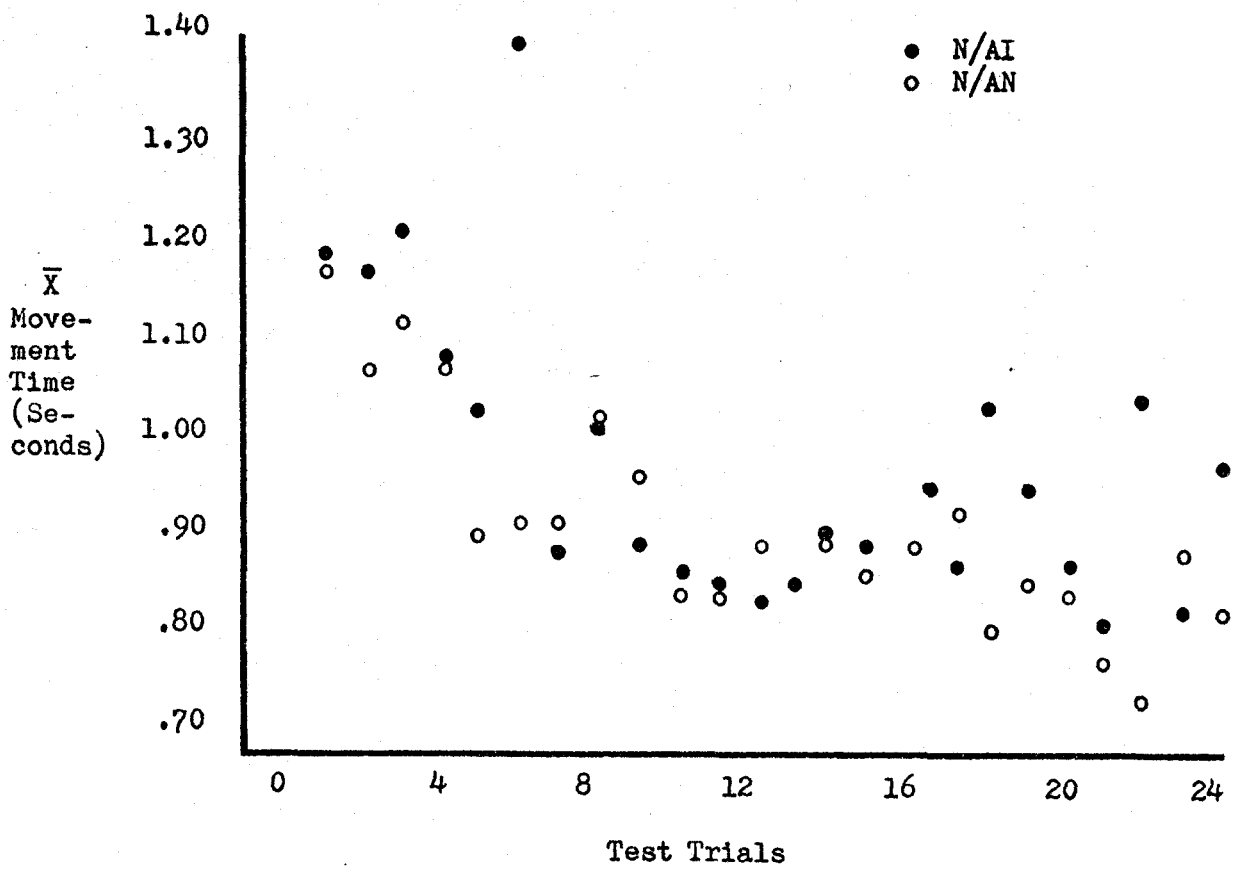


FIGURE 5. GROUP N/AI AND N/AN MEAN MOVEMENT TIMES FOR THE TEST TRIALS



second set of eight trials with F ratios of 39.55 and 24.20 respectively. Within group comparisons between successive blocks of test trials are significant for both automated groups AI and AN.

TABLE 1

Incompatible Response Means for All Groups

Groups	Block 1 (Trials 1-8)	Block 2 (Trials 9-16)	Block 3 (Trials 17-24)	F Ratio
AI	1.83	0.42	0.00	34.63 *
N/AI	0.08	0.00	0.00	00.007
N/AN	0.17	0.00	0.00	1.55
AN	2.25	1.17	0.00	22.64 *
F ratio	39.55 *	24.20 *	0.025	

*$p < 0.01$

Table 2 indicates those comparisons of the means for which significant differences were found between groups for Blocks 1 and 2 which had significant F ratios. The involuntary nonconformity construct was examined by comparing the mean number of incompatible responses produced by the two automated groups AI and AN with the two non-automated control groups N/AI and N/AN respectively. Support is shown for the construct in Block 1 with group AI having a mean of 1.83 and group N/AI a mean of 0.08 which is significantly different at the 0.01 level. Similarly, group AN with a mean of 2.25 was significantly different from its control group N/AN with a mean of 0.17. In Block 2 the involuntary nonconformity still

persists for AN as the difference between AN with a mean of 1.17 and N/AN with a mean of 0.0 is significant at the 0.01 level. The difference between AI with a mean of 0.42 and N/AI with a mean of 0.0 is no longer significant in Block 2 indicating the disappearence of the involuntary nonconforming behavior for this group.

TABLE 2

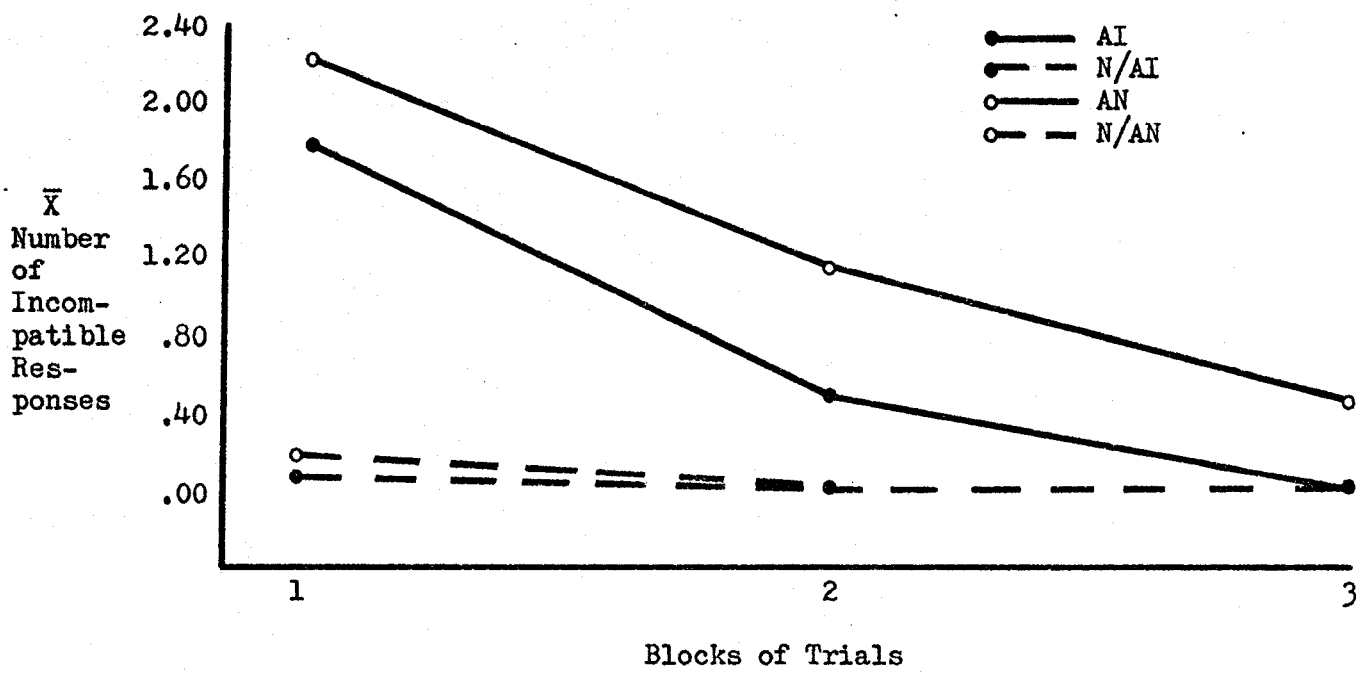
Comparison of Incompatible Response Means per Block Between All Groups

Block 1	Block 2
AI - N/AI *	AI - N/AI
AI - AN	AI - AN *
N/AI - N/AN	N/AI - N/AN
AN - N/AN *	AN - N/AN *

*$p < 0.01$

Table 3 indicates those comparisons of the means for which significant differences were found within groups between the three blocks of test trials. The effects of learning and socially induced stress on the frequency of the involuntary responses were examined by making comparisons of the means within the two automated groups and by comparing the means between the two automated groups AI and AN over the three blocks of trials. Group AI has a significant difference between Blocks 1 and 2 only, while for group AN a significant reduction in the number of incompatible responses is found between both Blocks 1 and 2 and Blocks 2 and 3. Figure 6

FIGURE 6. GROUP AI, N/AI, AN, N/AN INCOMPATIBLE RESPONSE MEANS FOR THE TEST TRIALS



clearly indicates that for both automated groups there is a reduction in the number of incompatible responses with practice with almost all subjects reaching error free performance in trials 17 to 24.

TABLE 3

Comparison of Incompatible Response Means Between Blocks Within Groups AI and AN

Group AI	Group AN
1 - 2 *	1 - 2 *
2 - 3	2 - 3 *

*$p < 0.01$

The effects of socially induced stress on involuntary nonconformity can be seen through a comparison of the automated groups AI and AN. In the first block of eight trials the means for AI and AN were 1.83 and 2.25 respectively which were not significantly different. The second block of eight trials produced means of 0.42 and 1.17 which were significantly different, while no significant difference was found for the third block of trials in which the means were 0.00 and 0.42. From Figure 6 the incompatible response means of group AI were in all cases lower than that of group AN.

A second method of examining the data was carried out to collaborate the findings which emerged from the above analysis of variance. Identical between and within group comparisons were made, using as the basis of the comparisons the number of subjects reaching a criterion set at seven correct responses (Rb) out of eight possible correct responses.

The nonparametric, chi-square test (Freud, 1970; Griffin, 1962) when applied revealed differences significant at the .05 level which corroborates the main findings arrived at with the analysis of variance.

Discussion

The tasks were presented in such a way as to lead the subjects to believe that the experimenter was evaluating the correctness and speed of their decisions in calling basketball fouls; that the lever response was only a preliminary movement to permit the execution of this more important decision task. The perceptual and ideational aspects of the decision task, it was hoped, would prevent the subjects from consciously attending the lever response. No evidence was found to cause the experimenter to suspect that the subjects believed otherwise; in most cases the subjects at the end of the session inquired as to their success in calling fouls compared to others, and in a considerable number of cases, argued about the decisions given over the audio system. It was necessary that the subjects became ego-involved with the basketball evaluation task ensuring that they attended maximally to this task. This decision task (judging basketball fouls) was selected because it was believed that it would interest physical education students. Observation of the subjects during the experiment demonstrated that the task was both ego-involving and challenging: comments of dismay at making the wrong decisions were prevalent throughout, subjects in group AI interacted verbally almost in all cases, indicating

when an incompatible response had been made and shouting encouragement to each other.

The preliminary trials used to automate Ra by groups AI and AN on the experimental task were instituted to ensure that some level of automation was reached before correct performance on the total task could be achieved. A check on the learning done by groups AI and AN prior to the test trials was the lever movement times recorded during the 44 preliminary trials. Little improvement on lever movement time over the last 24 trials demonstrated by conventional measures that little further learning can be inferred in this phase. Overlearning to some degree of automation was assumed to be occurring. The two groups while differing more initially, were very similar in their movement times towards the end of the preliminary session, and both groups entered the test trials with little difference in mean movement time. This was expected since both groups were under the same conditions during the preliminary trials and the treatments were randomly assigned to the subjects.

The mean movement times for the automated groups during the test trials produced performance curves quite similar to each other (Figure 6). As in the preliminary trials, group AN maintained a slightly faster average speed of movement over the first two blocks of test trials. Also, similar to the preliminary trials, greater variance in the mean movement time was found initially with the means becoming more consistent and less variable with practice in the later trials.

The experimental treatment of no socially induced stress versus socially induced stress appears to have produced no differential effects on the movement times of groups AI and AN. The introduction of a new response (Rb) for the test trials seems to be responsible for the initial increase in mean movement time variance shown by both groups.

The non-automated groups which had no previous exposure to Ra or Rb prior to the test trials produced mean movement times which were much slower than those times of the automated groups. The lever movement time measure which reflects the actual performance of the movement itself, indicated that for all groups, Rb was performed better with practice suggesting learning was occurring. A comparison of the automated and non-automated group times suggests that even though Rb was in conflict with Ra, positive transfer for the speed of the lever movement occurred. It might be expected that as involuntary nonconformity occurred, the mean movement times would have increased, but the largest incompatible response mean was 2.25 (that is, 2.25 incompatible responses out of eight trials) and increased movement times on approximately two out of eight trials would not significantly raise the mean movement time.

The involuntary nonconformity construct was supported. Groups AI and N/AI were both under task and socially induced stress in the test trials, the only difference between these two groups being that AI had previously automated Ra in conformance with the original norm while N/AI had no experience

with Ra. Groups AN and N/AN respectively were under similar conditions of experience as AI and N/AI differing in that they performed under conditions of task stress alone. The incompatible responses produced by N/AI and N/AN were classified as errors committed in the process of learning Rb. The number of errors produced by these groups was very small and not significant from zero. The incompatible responses produced by AI and AN were classified as the result of learning plus involuntary nonconformity. A comparison of groups AI and N/AI and groups AN and N/AN indicated a significantly greater number of incompatible responses was produced by the automated groups -- this difference was predicted by the involuntary nonconformity construct.

The mean number of incompatible responses for groups AI and AN when graphed (Figure 6) indicated that with practice, a reduction in the frequency of involuntary nonconformity occurred. Both groups showed a significant decrease from Block 1 to Block 2 with only group AN decreasing significantly from Block 2 to 3. No significant reduction may have been observed for group AI from Block 2 to 3 due to a "bottom effect". The decrease from Block 1 to 2 reduced the frequency of involuntary nonconformity in Block 2 to a level not significant from zero.

The experimental conditions of task plus socially induced stress can be equated with high stress while task stress alone can be equated with a low stress condition. Groups AI and AN performed under these two conditions respectively. A

comparison of the curves produced from the mean incompatible response scores showed that for all three blocks of trials, group AI had lower mean scores than group AN. For Block 1 no significant difference exists between AI and AN, but for Block 2 the difference was significant at the 0.01 level. For the third block of trials, no significant difference existed between the means as neither mean was significantly different from zero. High stress, in this case socially induced, appeared to have no significant effect on the occurrence of involuntary nonconformity initially, but increased the rate at which involuntary nonconformity was inhibited and reduced by the second block of trials as group AI produced involuntary nonconformity not significant from zero one block of trials before group AN.

CHAPTER V

SUMMARY AND CONCLUSIONS

The present study strongly supported the La Fave involuntary nonconformity construct as well as shedding light on certain questions raised by the La Fave and Teeley (1967) study. La Fave and Teeley were unable to account for the incompatible responses resulting in the process of learning the new responses. The addition of control groups which did not automate the original response allowed the learning variable to be considered in the present study. The highly significant difference between experimental and control groups (automated and non-automated) indicated that involuntary nonconformity provides a parsimonious explanation of the incompatible responses produced over and above those due to learning.

La Fave and Teeley found it puzzling that the boy's team made more errors during the second half of the game than the first. Although they stated no hypothesis concerning the learning variable, from habit lag it might have been expected that habit lag errors would decrease as practice of the new response as dictated by the rule change continued. These authors suggested that such an expected decrease could have been more than offset by lapses into old habit from increasing fatigue as the game progressed. The present experiment controlled for fatigue by utilizing a novel challenging response

with low energy cost and allowing subjects periodic rests. As a result, the number of incompatible responses due to involuntary nonconformity decreased significantly over time with practice, supporting the belief that fatigue had influenced the La Fave and Teeley results.

The experiment was also designed so that the lever response could be made a major component of co-operation and interaction between the members of the dyad for the socially induced stress groups. Subjects in groups AI and N/AI worked in a dyadic situation during the test trials and the production of an incompatible response violated the norms of that group as it hindered the groups performance on the experimental task. Therefore, involuntary nonconformity by one of the subjects would place that subject in a state of stress as a result of violating the group norm. Groups AN and N/AN performed as individuals during the test trials and, therefore, were not under socially induced stress if they nonconformed. It was found that under conditions of socially induced stress the frequency of involuntary nonconformity decreased more rapidly over time with practice than when under conditions of no socially induced stress.

The group may function as a source of stress for those individuals who consciously or unconsciously nonconform. In the consciously nonconforming subject, the stress results from the conflict between the individual's decision and subsequent nonconforming response and the individual's knowledge of the sanctions which the group is able to administer. This type of stress has been dealt with by constructs such as

Festinger's (1957) construct of "cognitive dissonance". When involuntary nonconformity occurs, the resulting stress is a function of a different set of conditions. The individual is in agreement with the group as to the appropriate response but has inadvertently nonconformed. The resulting stress is not a function of the conflict of deciding to conform or nonconform but rather a function of wanting to conform and not being able to do so. Therefore, the resulting stress does not "pressure" the individual to change her attitude but rather has the effect of putting her on the "alert" against the future initiation of the involuntary behavior.

If it is accepted that the stress arising from involuntary nonconformity places the individual on the alert, it may be hypothesized that several factors will indicate this shift in attention. A new response dictated by a norm change will initially require conscious attention to the old response to allow it to be inhibited and the new response initiated. It may be hypothesized that this decrease in the amount of attention available for the other tasks or problems in the immediate social environment will cause a decrement in their performance and, in some cases, a disruption of the behavior itself. Bahrick et al. (1954), Bahrick (1952) and Poulton (1961) by utilizing two tasks, both of which were evaluated for performance, found that the greater the attention required for one of the tasks the poorer the performance became on the second task. A second hypothesis which could easily be tested states that as the individual consciously initiates a new

response in place of an old response which had been automated, the time between the perception of the stimulus and initiation of the new response would increase. The increase in reaction time reflects the time taken to inhibit the old automated response, program the new response, and initiate the new response. It is also possible that when an individual is able to avoid involuntarily nonconforming, the cost may be determined by measuring certain physiological variables which indicate the individual's level of arousal. The level of arousal could be hypothesized to rise when the individual prevents involuntary nonconformity from occurring and substitutes the conforming response. The same line of reasoning suggests that the level or arousal would decrease as the individual automated the conforming response.

No attempt was made to treat the variable stress in a systematic way as research involving such theories as the U-hypothesis of stress and performance would require. The effect of socially induced stress on the occurrence and frequency of involuntary nonconformity in the involuntary nonconformer and her motor performance of the response was the major concern. The performance measure the "movement time" did not appear to be effected by the stress, whereas the frequency of involuntary nonconformity did.

The focus of the stress may be an important variable in predicting its effect on involuntary nonconformity. Stress has the effect of reducing involuntary nonconformity only when it keeps the individual on the alert against committing

further involuntary nonconformity responses, that is, when the stress prevents the subject from performing involuntarily. If the stress is not specifically related to the involuntary nonconforming response, then it would be predicted that the probability of involuntary nonconformity would be greatly increased since this stress would tend to focus the subject's attention elsewhere making it more likely for the stimulus situation to elicit the old automated response involuntarily.

Conclusions

1) The effect of automating Ra was to make the subjects more prone to involuntary nonconformance of Ra when the rules had been changed making Rb and not Ra appropriate.
2) With practice, the frequency of involuntary nonconformity decreased and the probability of the new rule or norm being conformed to increased significantly.
3) Subjects in the conditions of socially induced stress decreased their frequency of involuntary nonconformity more rapidly than those subjects in conditions of no socially induced stress.

The involuntary nonconformity construct appears to be a useful concept for examining the social psychological basis of sport's activity and behavior since highly learned and automated behavior characterizes sport's activity, and formal and informal sets of rules structure most games and contests. Though verbal responses are still used as the medium

by which team play is co-ordinated, many motor responses themselves are forms of interaction as game's players co-operate and initiate team strategy with their motor movements. The present study utilized a lever response as a primary means of interaction between team members and found that if the response had been automated in accordance with the norms structuring the interaction, and these norms were changed, involuntary nonconformity occurred. Therefore, it could be predicted that if the formal rules of the game are altered outmoding a response or the internal conditions of the game changed requiring new forms of co-operation and interaction, then involuntary nonconformity may occur if the old responses were automated.

Based on the involuntary nonconformity and habit lag constructs, a case may be made for always practicing game related skills under the conditions of the game itself. Practicing skills in an isolated situation may lead an individual to develop reasonable skill in performing the response consciously, but this does not mean that he will be able to reproduce this response in a game situation where he is confronted with many demands. Practice in the game situation, or at least a situation containing most of the components of the game situation, would be advisable so that automation of the skill will occur. If the individual had an old incorrect response that he was trying to correct or replace, it could be predicted that once back in the game situation involuntary nonconformity would occur.

The implications which can be drawn from the findings of the present study appear relevant to the socialization and social mobility concepts in the social sciences. The present study supports La Fave's belief that a second class of conformity types needs to be distinguished based on involuntary behavior rather than consciously motivated behavior. This second class of conformity and nonconformity delimits a narrower range of behavior, highly routine and automated, and the conditions under which it occurs can be more clearly defined and distinguished as compared to those conditions or circumstances which lead an individual to decide to conform or nonconform. Many routine social responses are taken so much for granted that they never attract conscious attention unless they fail to occur or are displaced by an inappropriate response. A large number of these routine responses began their evolution towards automation in early childhood and, hence, are a component in the socialization of a child into that part of society of which his parents are members. The nature of these responses is highly determined by the values and norms of the social milieu in which the individual grows and, therefore, it follows that this automated conforming behavior may be highly relevant to the concept of "social mobility". If an individual attempts to enter a new social group having different norms and values which outmoded the many routine responses he had automated, then familiar stimulus situations may cause him to involuntarily nonconform. The present study suggests that these nonconforming responses may be inhibited

and that the presence of relevant socially induced stress may facilitate this inhibition, but whether the results of the present study are applicable to responses which have been automated since childhood is uncertain.

LIST OF REFERENCES

Allport, G. W. Personality. New York: Henry Holt and Company, 1937.

Asch, S. "Effects of Group Pressure Upon the Modification and distortion of Judgement". In H. Guetzkow (Ed.), Groups, Leadership, and Men. Pittsburg: Carnegie Press, 1951.

Asch, S. Social Psychology. Englewood Cliffs, N. J.: Prentice-Hall, 1951.

Asch, S. "Studies of Independence and Conformity. A Minority of One Against a Unanimous Majority". Psychol. Monogr., 1956, 70, No. 9 (whole No. 416).

Bahrick, H. P., Fitts, P. M., and Rankin, R. E. "Effect of Incentives Upon Reaction to Peripheral Stimuli". J. exp. Psychol., 1952, 44, 400-406.

Bahrick, H. P., Noble, M., and Fitts, P. M. "Extra-task Peras a Measure of Learning a Primary Task". J. exp. Psychol., 1954, 48, 298-302.

Bahrick, H. P. and Shelley, C. "Time-sharing as an Index of Automation". J. exp. Psychol., 1958, 56, 388-393.

Briggs, G. E. and Wiener, E. L. "Influence of Time Sharing and Control Loading on Transfer of Training". J. of Appl. Psychol., 1966, 50, 201-203.

Briggs, G. E. "Transfer of Training (Chapter 7)". In E. Bilodeau's (Ed.) Principles of Skill Acquisition, New York and London: Academic Press, 1969.

Brown, I. and Poulton, E. C. "Measuring the Spare 'Mental Capacity' of Car Drivers by a Subsidary Task". Ergonomics, 1961, 4, 35-40.

Bruce, R. "Conditions of Transfer of Training". J. exp. Psychol., 1933, 16, 343-361.

Buchanan, J. The Philosophy of Human Nature. Richmond, Kentucky: Grimes, 1812.

Bugelski, B. and Cadwallader, T. "A Repraisal of the Transfer and Retroaction Surface". J. exp. Psychol., 1966, 52, 360-366.

Critchfield, R. "Conformity and Character". Amer. Psychol., 1955, 10, 191-198.

Day, R. "Relative Task Difficulty and Transfer of Training in Skilled Performance". Psychol. Bull., 1956, 53, 2.

Dunlap, Knight. Habits: Their Making and Unmaking. New York: Liverright Inc., 1932.

Festinger, L. A Theory of Cognitive Dissonance. Standford: Standford University Press, 1962.

Fitts, P. and Posner, M. Human Performance. Belmont, California: Brooks/Cole Publishing Co., 1967.

Fleishman, E. and Rich, S. "Role of Kinesthetic and Spatial-Visual Abilities in Perceptual-Motor Learning". J. exp. Psychol., 1963, 66, 6-11.

Freud, J. E. Statistics. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970.

Garvey, W. D. and Taylor, F. V. "Interactions Among Operator Variables, System Dynamics, and Task Induced Stress". J. Appl. Psychol., 1959, 43, 79-85.

Griffin, J. I. Statistics. New York: Holt, Rinehart and Winston, 1962.

Holding, D. Principles of Training. New York: Macmillan (Pergamon), 1965.

Homan, G. C. Social Behavior: Its Elementary Forms. New York: Harcourt, Brace and World, Inc., 1961.

James, W. The Principles of Psychology. Vol. 1. Henry Holt and Co., 1890.

Kimble, G. A. and Perlmuter, L. C. "The Problem of Volition". Psychol. Rev., 1970, 77, 361-383.

Kirk, R. E. Experimental Design: Procedures for the Behavior Sciences. Belmont, California: Brooks/Cole Publishing Co., Inc., 1969.

Krech, D., Crutchfield, R. S. and Ballachey, E. Individual in Society. New York: McGraw-Hill Book Co., Inc., 1962.

La Fave, L. "Habit or Attitude as the Central Tree in Educational Theory". Education Theory, 1958, 8, 172-178.

La Fave, L. and Teeley, P. "Involuntary Nonconformity as a Function of Habit Lag". Perceptual and Motor Skills, 1967, 24, 227-234.

La Fave, L. "The Concept of Involuntary Nonconformity in Social Science". Symposia Studies Series, The National Institute of Social and Behavioral Science, 1968.

La Fave, L. "Towards a Theory of Complex Motor Skills". A Paper Prepared for Presentation at the Second Canadian Psycho-Motor Learning and Sport Psychology Symposium, University of Windsor, Windsor, Ontario, Canada, October 26 to 28, 1970.

McGrath, J. E. (Ed.). Social and Psychological Factors in Stress. New York: Holt, Rinehart and Winston, Inc. 1970.

Osgood, C. "The Similarity Paradox in Human Learning: A Resolution". Psychol. Rev., 1949, 56, 132-143.

Poulton, E. C. "Copying Behind During Dictation". Quart. J. exp. Psychol., 1958a, 10, 48-55.

Poulton, E. C. "Measuring the Order of Difficulty of Visual-Motor Tasks". Ergonomics, 1958a, 1, 234-239.

Poulton, E. C. "The Optimal Perceptual Load in a Paced Auditory Inspection Task". Brit. J. Psychol., 1960, 51, 127-139.

Second, P. and Backman, C. Social Psychology. New York: McGraw-Hill Book Co., 1964.

Sherif, M. and Sherif, C. W. An Outline of Social Psychology. (Rev. ed.). New York: Harper, 1956.

Woodworth, R. S. Dynamic Psychology. New York: Columbia University Press, 1918.

V I T A

Born August 22, 1947 St. Catharines, Ontario

Graduated from Sir Winston Churchill, 1965

Graduated from McMaster University, 1970, B.P.E., B.A.

Married to Margaret Coombe, June 19, 1971