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Performance on tasks of varying complexity with and without experimentally induced relaxation.

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PERFORMANCE ON TASKS OF VARYING COMPLEXITY WITH AND WITHOUT EXPERIMENTALLY INDUCED RELAXATION

by

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ABSTRACT

With the arousal optima for complex tasks being lower than those for simple tasks, the present study tested the hypothesis that arousal reduction would improve performance on a complex task and impair that on a task of moderate complexity if relaxation induction is a valid method of arousal reduction as indicated by decreased skin conductance.

Twenty subjects were administered complex and moderately complex performance tasks both with and without relaxation induction in a counterbalanced design. Measures of skin conductance were recorded at predetermined intervals as an approximate measure of arousal level.

The results indicated that skin conductance was significantly reduced with relaxation to support the hypothesis that relaxation induction is a valid method of arousal reduction. Complex task performance was improved with relaxation for both orders of relaxation induction. Moderately complex task performance was improved with relaxation in the nonrelaxed-relaxed order, but impaired with relaxation in the relaxed-nonrelaxed order. The hypothesis that relaxation induction produces differential changes in performance on complex and moderately complex tasks was at least supported in the relaxed-nonrelaxed order of induction.

Weaknesses in the design with possible confounding of variables are discussed with respect to improvement for future studies.

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INTRODUCTION

It has been shown by Yerkes and Dodson (1908) and others (Berlyne, 1960; Bindra, 1959; Bolles, 1967; Montague, 1953) that optimal arousal levels for simple tasks are higher than those for complex tasks. Arousal optima are task-specific (Fiske & Maddi, 1961), such that running, for example, has a higher optimal arousal level than solving a mathematical problem.

Arousal may be viewed as a function of relevant and irrelevant sensory input with respect to the requirements of the assigned task (Fitts & Posner, 1967), that is, information required or not for the successful performance on the given task. To maintain the optimum level of arousal for a task, therefore, the amount of task-irrelevant information should decrease as the task-relevant information increases. "This idea is in accord with the common experience that repetitive (simple) tasks can often be performed best while one is listening to the radio or to an outside conversation, but that serious (complex) work involving much concentration is hampered by outside stimulation" (Fitts & Posner, 1967, pp. 36-37).

Task complexity may be defined in terms of the amount of uncertainty such that, for example, a task requiring the subject to make a choice of one of four equiprobable responses is more complex than a task with two equiprobable responses to choose from. As the amount of uncertainty increases, the optimal level of arousal decreases. Referring to Figure 1 in which the relationship between

level of arousal and task complexity is hypothetically illustrated, the arousal optima are at levels D and H for the complex and moderately complex tasks respectively.

In the present study, it was expected that the subject's initial level of arousal would be higher than the optimum for the moderately complex task. This is because of the "anticipatory arousal" (Berlyne, 1960) resulting from a normal subject's "arousal tonus" and his initial uncertainty as to what to expect upon entering the experimental situation. Reduction of this initially high level of arousal, therefore, would improve performance on both the complex and moderately complex tasks by approaching the optima of D and H respectively for these tasks. If the arousal level was reduced past the optimum of H for the task of moderate complexity, however, performance would be impaired on this task, but complex task performance would improve further as the level of arousal approaches the optimum for the complex task while departing from that of the moderately complex task. However, if the subjects initially had a low arousal level, its reduction would result in impaired performance on both tasks. If relaxation induction is a valid method of arousal reduction, it should result in the above described changes in performance on complex and moderately complex tasks, depending upon the subject's initial arousal level.

The effectiveness of relaxation induction in reducing the level of arousal may also be measured by such physiological measures as skin conductance, EEG, heart rate, etc. (Grossman, 1967; Hebb, 1966; Leukel, 1968; Sternbach, 1966). Physiological measures of arousal are possible because the adrenal gland secretes a hormone, adrenalin, into the blood

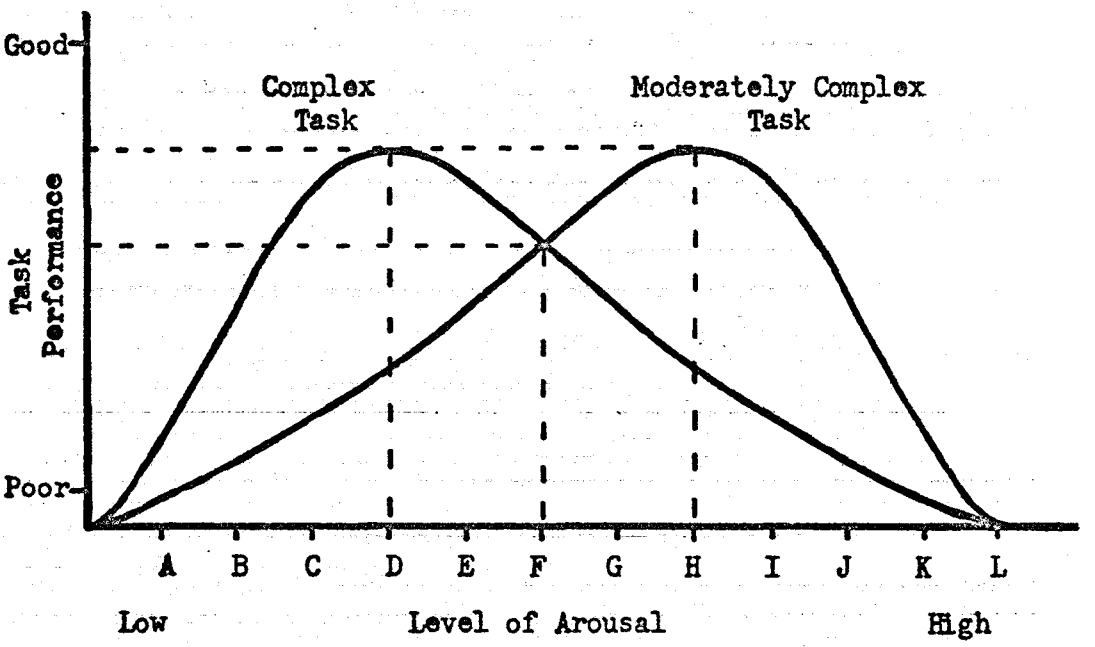

Figure 1. The relationship between level of arousal and performance on complex and moderately complex tasks.

stream which acts directly on smooth muscles and on the glands of external secretion such as the sweat glands. Adrenalin also excites the arousal system directly. Since the arousal system excites the sympathetic nervous system, which excites the adrenals, this makes a closed system. However, the arousal system and cortex also form a closed circuit, each exciting the other. The arousal system is therefore the focal point where the two feedback systems unite. Since the sweat glands are part of this loop, skin conductance is one of the valid, though approximate, measures of arousal.

The effects of relaxation on task performance could thus be interpreted in terms of its effect on arousal level, which can be measured physiologically by skin conductance. Since the task-specific arousal optima (Fiske & Maddi, 1961) are generally unknown, predictions about the effects of relaxation on task performance can be made only in general terms. If physiological measures of arousal levels during the experiments are available, however, the effects of relaxation on task performance may be checked against them.

In summary, the present study tested the following hypotheses:

1) Relaxation induction is a valid method of reducing level of arousal as indicated by decreased skin conductance.
2) The optimum level of arousal for a complex task being lower than that for a task of moderate complexity, relaxation should produce differential changes in the performance on these tasks depending on the subject's initial arousal level.
   a) Relaxation induction will improve performance on complex and impair that on moderately complex tasks, if the initial level

of arousal is relatively high.

b) Relaxation induction will impair performance on both types of tasks if the initial arousal level is low.

The first hypothesis was tested by measuring skin conductance immediately before and after relaxation induction. Since level of arousal is reflected by skin conductance, a decrease in skin conductance would indicate that arousal level was reduced by relaxation induction. The second hypothesis was tested by comparing task performance (number of correct responses) and levels of arousal (as indicated by skin conductance measures) during performance with and without relaxation induction.

METHOD

Subjects.

The sample consisted of 20 naive male students randomly chosen from the University of Windsor undergraduate population. Their median age was 20 with a range of from 18 to 25 years.

Apparatus.

A 500μA Bach-Simpson ammeter (model 1347SC) was used to measure skin conductance in amperes accurate to within 5% as determined by Cervin and Grewe (1967). Silver-chloride electrodes were used with a salt-base paste.

A well padded vinyl armchair with two foam cushions for the subject's neck and lower back were used to seat the subjects.

Relaxation Induction Procedure.

Relaxation induction was operationally defined as the state achieved by the verbatim induction procedure of Appendix I based on Jacobson's (1938) method.

Performance Tasks.

Two ten-item performance tasks, one complex and one of moderate complexity as described in Appendix II, were recorded on audio tape to standardize their presentation to the subjects. The moderately complex task preceded the complex task in the presentation order. Both tasks were recorded at the rate of one digit per second with a ten-second interval between items during which the subject was to respond. Task complexity was determined by a pilot study in which seven subjects were

administered the two tasks by means of a tape recorder. The average percentage of correct responses was found to be 30% for the complex task and 70% for the task of moderate complexity.

Design.

The design was a 2 X 2 counterbalanced design. Two groups of subjects were tested on the two performance tasks under two conditions: with and without relaxation induction. Group I was tested with relaxation first, followed by testing without the relaxation induction. Group II was tested under the same two conditions, but in a reversed order: without the relaxation induction, followed by testing with relaxation. The dependent variable was the difference in the number of correct responses on each task under the two relaxation conditions: relaxed minus nonrelaxed.

Procedure.

The subjects were randomly assigned to one of two groups of ten subjects each: Group I was administered performance tasks with, then without relaxation. Group II was administered the same performance tasks, first without, then with relaxation induction.

Subjects were seated in the armchair with their feet flat on the floor and their arms resting on the arms of the chair. The index and middle fingers of their left hand were then cleaned with rubbing alcohol and the silver-chloride electrodes were applied with electropaste and held in place with surgical tape.

A five-minute period followed in which the subject sat quietly in the armchair and the initial skin conductance was measured and recorded at one-minute intervals.

Group I was then administered the relaxation induction procedure with periodic measures of the skin conductance being taken at predetermined intervals according to the record sheet of Appendix III. The reading of the relaxation induction procedure was adjusted to the rate at which the subject relaxed himself. Following the verbatim induction of Appendix I, the subjects in Group I were administered the performance tasks by means of a tape recorder. A second tape recorder was used to record the subjects' responses. A three-minute period then followed in which (normal) muscle tonus was restored by means of the tonus induction procedure of Appendix I. The performance tasks were administered a second time in the same order of complexity (moderately complex followed by complex task), but without relaxation.

Group II received the two performance tasks under the same conditions, but in the opposite order of relaxation induction.

RESULTS

The raw data for skin conductance measures and performance for all subjects is presented in Appendix IV.

Skin Conductance Measures

The mean measures of skin conductance recorded immediately before and after relaxation induction for the two orders of relaxation induction are presented in Table 1. It can readily be seen that the mean skin conductance decreased with relaxation induction for both orders of relaxation. The mean skin conductance before and after relaxation was higher for the relaxed-nonrelaxed order than the nonrelaxed-relaxed order. Data from preliminary studies indicated that there was an upward drift in the measures of skin conductance of five microamperes from the basal level. The effect of a drift of five microamperes on the measures of skin conductance was not considered significant.

A t-test for correlated measures (Winer, 1962) of skin conductance before and after relaxation induction indicated that the decrease in skin conductance was significant at the .005 level of confidence as shown by the t-test summary in Table 2. This decrease in skin conductance was predicted, supporting the first hypothesis that relaxation induction is a valid method of reducing level of arousal.

TABLE 1

Mean Skin Conductance

Immediately Before and After Relaxation Induction

With Relaxed-Nonrelaxed and Nonrelaxed-Relaxed Orders

	Skin Conductance in Microamperes	
Order of Relaxation	Before Relaxation	After Relaxation
Relaxed-Nonrelaxed	192	163
Nonrelaxed-Relaxed	174	146
Mean for Both Orders	183	154.6

TABLE 2

Summary of t-test for Correlated

Skin Conductance Measures

Before and After Relaxation Induction

N	df	t_{obs}
20	19	3.89**

**p < .005

The mean basal skin conductance measures for the relaxed-nonrelaxed and nonrelaxed-relaxed orders are presented in Table 3. The mean basal skin conductance level for the relaxed-nonrelaxed order is higher than that for the nonrelaxed-relaxed order.

The t-test of the mean basal skin conductance levels for the two orders of relaxation is summarized in Table 4. The t obtained was 0.29. With 18 degrees of freedom, the t obtained would have to be ±1.73 to be significant at the .05 level of confidence. Thus the obtained t was not significant, indicating that "anticipatory arousal" levels of the relaxed-nonrelaxed and nonrelaxed-relaxed groups did not differ significantly. Since the levels of "anticipatory arousal" were not significantly different, therefore, task performance differences between the two groups may not be attributed to differences in basal arousal levels.

TABLE 3

Mean Basal Skin Conductance Levels

for Relaxed-Nonrelaxed and Nonrelaxed-Relaxed Orders

Order of Relaxation	Basal Skin Conductance Levels
Relaxed-Nonrelaxed	188.9
Nonrelaxed-Relaxed	181.0
Mean Difference Between Orders	7.9

TABLE 4

Summary of t-test

of Basal Skin Conductance Levels

for Relaxed-Nonrelaxed and Nonrelaxed-Relaxed Orders

N	df	t_{obs}
20	18	0.29

The mean measures of skin conductance in microamperes recorded during complex and moderately complex task performance with and without relaxation induction are presented in Table 5. The mean differences in skin conductance with and without relaxation were -21.5 and -26.0 microamperes for the moderately complex and complex tasks respectively with the lower skin conductance being in the condition with relaxation induction on both tasks.

The t-tests for correlated measures (Winer, 1962) of skin conductance during the complex and moderately complex performance tasks with and without relaxation induction are summarized in Table 6. The difference in arousal levels during performance on the moderately complex task with relaxation induction, as compared to without relaxation, was significant at the .005 level of confidence in the predicted direction, that is, skin conductance was lower with relaxation induction. The difference in arousal levels during performance on the complex task with and without relaxation induction was significant at the .005 level of confidence in the predicted direction, that is, skin conductance was lower with relaxation. Skin conductance during moderately complex task performance was lower than that during complex task performance, both with and without relaxation induction. The decrease in skin conductance during performance on both tasks with relaxation induction indicates that the reduction in arousal level produced by relaxation was maintained during performance on the complex and moderately complex tasks.

TABLE 5

Mean Skin Conductance

During Complex and Moderately Complex Task Performance

With and Without Relaxation Induction

Relaxation Induction	Level of Task Complexity	
	Moderately Complex	Complex
Without (NR)	181.0	187.0
With (R)	159.5	161.0
Mean Difference [Δ(R - NR)]	-21.5	-26.0

Note.—The mean difference [Δ(R - NR)] was obtained by subtracting the mean skin conductance measure without relaxation (NR) from the mean measure with relaxation (R) during performance of the two tasks.

TABLE 6

Summary of t-tests for Correlated
Skin Conductance Measures
During Complex and Moderately Complex Task Performance
With and Without Relaxation Induction

Level of Task Complexity	N	df	t_{obs}
Moderately Complex	20	19	9.24**
Complex	20	19	11.99**

**p <.005

The mean measures of skin conductance recorded immediately before and after task performance for the relaxed-nonrelaxed and nonrelaxed-relaxed orders with relaxation are presented in Table 7. It can readily be seen that the mean skin conductance was higher immediately after task performance.

A two-factor analysis of variance of the order of relaxation induction with repeated measures (Winer, 1962) of skin conductance recorded immediately before and after task performance with relaxation is presented in Table 8. The main effect of the order of relaxation was not significant, indicating that the relaxed-nonrelaxed and nonrelaxed-relaxed orders did not differ significantly with respect to the skin conductance measures recorded immediately before and after task performance with relaxation. The main effect of skin conductance immediately before and after task performance with relaxation was significant, however, at the .01 level of confidence. Skin conductance was significantly higher immediately after task performance, therefore, indicating that the level of arousal increased during task performance. The effect of interaction between order of relaxation and skin conductance immediately before and after task performance was not significant.

TABLE 7

Mean Skin Conductance
Immediately Before and After Task Performance
for Relaxed-Nonrelaxed and Nonrelaxed-Relaxed Orders
With Relaxation

Order of Relaxation	Skin Conductance	
	Before Tasks	After Tasks
Relaxed-Nonrelaxed	163	171
Nonrelaxed-Relaxed	146	151
Mean for Both Orders	154.9	161

TABLE 8

Summary of Analysis of Variance
of Skin Conductance Immediately Before and After Task Performance
With Relaxation
and Order of Relaxation Induction

Source	df	MS	F
Between subjects			
A (order of relaxation)	1	3422.5	0.55
Within subjects			
B (skin conductance)	1	422.5	15.05**
AB	1	22.5	0.80

**$p < .01$

Task Performance Measures With and Without Relaxation Induction.

The total number of correct response scores for the complex and moderately complex tasks performed without relaxation induction (NR) were subtracted from the respective response scores performed with relaxation (R) to yield the improvement [$+\Delta$(R - NR)] or impairment [$-\Delta$(R - NR)] in performance. The means of these score differences for the two orders of relaxation induction are presented in Table 9. It can readily be seen that moderately complex task performance was impaired and complex task performance improved in the relaxed-nonrelaxed order. For the nonrelaxed-relaxed order, however, performance on both tasks improved, with the larger improvement being on the complex task.

A two-factor analysis of variance of the order of relaxation induction with repeated measures (Winer, 1962) on the tasks of varying complexity is presented in Table 10. The main effect of the order of relaxation induction on performance was significant at the .05 level of confidence with the larger improvement on both tasks being in the nonrelaxed-relaxed order. Performance in the relaxed-nonrelaxed order was impaired on the task of moderate complexity and improved on the complex task. The effects of interaction between order of relaxation and task complexity were not significant, however, as shown in Table 10. The main effect of task complexity was significant at the .01 level of confidence in the predicted direction, with a larger improvement in performance on the complex task than on the task of moderate complexity. The second hypothesis that relaxation induction produces differential changes in performance on complex and moderately complex tasks is at least supported in the relaxed-nonrelaxed order.

TABLE 9

Mean Performance Score Differences
for Complex and Moderately Complex Tasks
With Relaxed-Nonrelaxed and Nonrelaxed-Relaxed Orders

	Level of Task Complexity					
	Moderately Complex			Complex		
Order of Relaxation	R	NR	Δ	R	NR	Δ
Relaxed-Nonrelaxed	8.1	8.3	-0.2	5.8	4.1	1.7
Nonrelaxed-Relaxed	8.5	7.4	1.1	6.5	4.0	2.5

Note.—The total number of correct response scores for the complex and moderately complex tasks performed without relaxation induction (NR) were subtracted from the respective response scores performed with relaxation (R) for each subject to yield the improvement [+Δ(R - NR)] or impairment [-Δ(R - NR)] in performance.

TABLE 10

Summary of Analysis of Variance
of Task Complexity
and Order of Relaxation Induction

Source	df	MS	F
Between subjects			
A (order of relaxation)	1	13.225	7.16*
Within subjects			
B (task complexity)	1	30.625	20.75**
AB	1	1.225	0.84

Note.—Since the two performance tasks consisted of only ten items per task, there was a limitation of variability with regard to the total number of correct responses possible. This limitation of variability would result in a small denominator in the F ratio, thus producing a spuriously high (significant) F. The main effects of order of relaxation and task complexity may not be significant at the .05 and .01 levels of confidence respectively, therefore, but may be significant at the .08 and .03 levels respectively (Gulliksen, 1950; Lindquist, 1953).

*$p < .05$

**$p < .01$

The results indicate that relaxation induction is a valid method of arousal reduction as shown by decreased skin conductance. They also indicate that relaxation produced changes in performance on the two tasks. Although level of arousal increased during task performance in the "relaxed" condition, the arousal level during task performance remained sufficiently reduced to produce performance changes on the tasks. Performance on the complex task was improved with relaxation for both orders of relaxation induction. Moderately complex task performance was impaired with relaxation, but only in the relaxed-nonrelaxed order. When performed in the nonrelaxed-relaxed order, moderately complex task performance improved. The improvement in complex task performance was larger when the tasks were administered in the nonrelaxed-relaxed order. The initial levels of "anticipatory arousal" between the two orders of relaxation were not significantly different, indicating that differences in task performance between the two orders may not be attributed to differences in basal arousal levels existing prior to treatment. The results indicate, moreover, that reducing the level of arousal, as shown by decreased skin conductance, improved performance on the complex task in both orders of relaxation induction.

DISCUSSION

Although relaxation induction was found to reduce level of arousal, the effects of relaxation on task performance must be interpreted with caution. For example, one limitation of the present study is found in the constant order with which the two performance tasks were administered, the task of moderate complexity always preceding the complex task. There is some confounding, therefore, of task order with the effect of relaxation on task performance. Counterbalancing the order of task administration is one possible method of teasing out this confounding in future studies.

Another limitation of the present study is found in the use of the same performance tasks with and without relaxation induction. Interferences from the relaxation induction reduced the effects of learning on the repeated measure of task performance. Counterbalancing the order of relaxation induction also reduced the possibility that the effect of learning would be attributed to relaxation: in the nonrelaxed-relaxed order, the effect of learning increased performance in the "relaxed" condition, but in the relaxed-nonrelaxed order, however, the effect of learning increased performance in the "nonrelaxed" condition. Since the same effect of learning increased performance both with and without relaxation, the learning effect was not responsible for differences in performance in the two conditions. If learning was enhanced by relaxation, however, then the effects of learning were confounded with relaxation. If such confounding does exist, its effect on performance may be teased out in future studies by means of parallel

forms of the two tasks.

An exosomatic measure of skin conductance was used in the present study which, characteristically, produces a slight "tingling" sensation at the point of contact with the surface electrodes. This sensation is not conducive to relaxation because it comprises a source of irrelevant sensory input which increases arousal level. It may be argued, therefore, that the procedure itself altered the level of arousal which it was purported to have measured. The increase in arousal level during task performance in the "relaxed" condition is partially explained by this procedural side effect, but confounding exists with the change in arousal level produced by the performance tasks themselves. One possible method of overcoming this technical problem in future studies would be the use of an endosomatic measure of skin conductance in which the subject's skin conductance is measured without an external electrical application and, therefore, without the undesired sensation.

Although relaxation induction reduced level of arousal for both the relaxed-nonrelaxed and nonrelaxed-relaxed orders, the arousal levels before and after relaxation were higher for the relaxed-nonrelaxed order (see Table 1). This difference in arousal levels may be explained in terms of reduction of the relatively high "anticipatory arousal." In the nonrelaxed-relaxed order, the tasks of the "nonrelaxed" condition provided relevant sensory input for the subject to attend to; that is, anticipation of what to expect in the experimental situation was reduced by supplying task-relevant information. Since the subject's anticipation was reduced, the level

of "anticipatory arousal" decreased. The reduction in "anticipatory arousal" was also assisted by the temporal difference before treatment during which the subject sat comfortably in the armchair. Subjects in the nonrelaxed-relaxed order sat in the chair for a longer period of time before the relaxation induction. When relaxed after this decrease of "anticipatory arousal," therefore, subjects in the nonrelaxed-relaxed order would have begun the relaxation induction with a lower level of arousal than those in the relaxed-nonrelaxed order who began the induction with a relatively high level of "anticipatory arousal." The importance of this arousal difference lies in the fact that the relaxed-nonrelaxed order would have required a larger net decrease in arousal level to achieve the same level in the "relaxed" condition as that for the nonrelaxed-relaxed order.

The effect of "anticipatory arousal" on the "relaxed" condition for the two orders of relaxation may be contingent, therefore, upon temporal differences; in the relaxed-nonrelaxed order, relaxation induction was administered immediately after the measure of basal arousal level (when level of "anticipatory arousal" was probably higher); in the nonrelaxed-relaxed order, however, relaxation induction was preceded by the "nonrelaxed" condition (when "anticipatory arousal" level was probably lower). The difference in "anticipatory arousal" levels at the onset of relaxation induction for the two orders of relaxation may provide an explanation for the higher arousal levels both before and after relaxation for the relaxed-nonrelaxed order.

In terms of task performance, this difference in arousal levels for the two orders of relaxation means that the arousal level would be

closer to the optimum level for the complex task in the "relaxed" condition for the nonrelaxed-relaxed order. As shown in the present study, performance on the complex task improved more for the nonrelaxed-relaxed order. Since arousal optima are assumed to be lower for moderately complex tasks and the arousal levels before and after relaxation induction were higher for the relaxed-nonrelaxed order, the arousal level was probably closer to the optimum level for the task of moderate complexity for the relaxed-nonrelaxed order. This difference in arousal levels for the two orders of relaxation was reflected in impaired moderately complex task performance with relaxation in the relaxed-nonrelaxed order. The effects of relaxation on task performance occurred by modifying the arousal level so that it approached the optimum for complex tasks and departed from it for moderately complex tasks.

Since relaxation is one aspect of some hypnotic states (Hilgard, 1965; London, 1967; Weitzenhoffer & Hilgard, 1959), the present study may perhaps be used to explain the conflicting findings (Barber, 1965; Parker & Barber, 1964) of the effects of hypnosis in task performance. If the level of arousal is reduced by the relaxation which may be included in the hypnotic induction, then "hypnosis" would be expected to increase performance on complex tasks and impair that on simple tasks since the arousal level is approaching and departing from the arousal optima of the complex and simple tasks respectively. In actual fact, however, the situation is not so straightforward since motivational instructions are often included in the hypnotic induction procedure (Ludwig & Lyle, 1964; Parker & Barber, 1964) which increase the level of arousal (Fitts & Posner, 1967; Ludwig & Lyle, 1964). The

effects of task motivational instructions and hypnotic induction are in opposition to each other so that there is an interaction. Combining task motivational instructions with hypnotic induction would not always be expected to affect performance because the effects of the two operations on level of arousal may simply cancel each other out. If the arousal level is decreased more by relaxation than it is increased by the motivational instructions, complex task performance would improve and simple task performance would be impaired. If the increase in arousal level by motivational instructions is larger than the decrease in arousal by relaxation, the result would be impaired performance on the complex task and improved performance on the simple task as the arousal level departs from and approaches the optima for the complex and simple tasks respectively.

APPENDIX I

RELAXATION INDUCTION PROCEDURE

RELAXATION INDUCTION

Verbatim Introduction.

This experiment requires that you relax yourself. In order to help you to relax, I will show you one method of self-relaxation which has been found very effective. Even if you have practiced relaxation before with another method, it is important for the purposes of experimental control and standardization that you follow the procedure which I will outline. Although I will indicate the procedure for you to use, it is still up to you to relax yourself. I will merely guide and assist you in relaxing yourself, but the responsibility for relaxation rests with you. I would appreciate it if you would follow the instructions which I will outline.

[Measure skin conductance.]

Since some people come to this experiment feeling more tense or relaxed than others, it is important for the purpose of experimental control that everyone begin at roughly the same level. In order to accomplish this, it is necessary to tense each muscle group before relaxing it. Since most people are not really aware of the tenseness of their muscles, they may report that they are relaxed when in fact they are quite tense, or vice versa. Tensing the muscles before relaxation will help in becoming aware of this tension. This is basically the procedure which I would like you to use: when I ask you, please tense each muscle group and immediately relax it. In letting go of the muscles, you will experience a very pleasant sensation. This feeling

is not mysterious in any way, but occurs as a result of paying attention to the difference between tensing and relaxing the muscles. By concentrating on this difference in feeling, you become aware of how much more relaxed you have become by simply letting go of your muscles so that the chair supports your body rather than the tension of your muscles.

[Measure skin conductance.]

When tensing a group of muscles which I will indicate, it is important that you avoid any movement of your body. This may be achieved by contracting the muscles and yet at the same time holding back. For example, make a fist with your right hand and feel both the extensor and flexor muscles of your right arm contract at the same time. Now release the muscles. Since both muscles were contracted, there was no movement of your fist in either an upward or downward direction. Should only one of these muscles have been contracted, however, your fist would have moved. To demonstrate how to hold back, I will now hold your wrists down on the arms of the chair and you are to try and bend your arms upward. [Experimenter holds subject's wrists.] Now try to bend your arms. Now let go. Just release your muscles. You will notice that your arms did not move at all, yet the muscles were tense. It is possible for you to do this with the other muscle groups without my assistance. I will merely indicate to you which groups of muscles you are to tense and then release. Remember that you are not to tense the muscles until indicated.

[Measure skin conductance.]

Verbatim Induction Procedure.

We will begin with the foot muscles. While leaving your feet flat on the floor, tense the muscles of your toes and arches by pushing down on the floor with your toes. Go ahead and tense these muscles. Now let go. Note the difference in letting go after tensing the muscles of your feet. Once more, tense and release. Pay attention to the muscles involved as relaxation takes place, becoming more and more relaxed. Very soothed and comfortable. The procedure for each of the other muscle groups will be the same.

When I tell you, tense the muscles of your calves by pushing the heels of your feet towards you against the bottom of the chair while keeping your feet flat on the floor. Okay, tense and release. Note how relaxing the muscles feel when you let go after tensing them. Once more, tense and release. Note the difference between the tension and relaxation.

[Measure skin conductance.]

When instructed, tense the muscles of your legs by stretching your legs forward while at the same time holding them back so that you can feel the tension without moving your legs. Go ahead, tense and release. Note the sensation that you experience in letting go of the muscles. Again, tense and release. Feel how warm and relaxed these muscles have become. Very relaxed and comfortable with no tension at all.

Now review the muscles of your body which you have relaxed and if there is any tension at all in any of these muscles, relax them

further by tensing the muscle group and then releasing it as you did before. Go ahead and relax any muscles which you feel could be even more relaxed than they are now. Just let yourself go so that you are very relaxed and comfortable.

[Measure skin conductance.]

When told to begin, tense the muscles of your hands by making a claw with your hands as if you were closing them, but at the same time holding back so that you feel the muscles of your fingers and the lower part of your forearms become tense. Go ahead, tense and release. Pay attention to the muscles involved as they relax. Once more, tense and release. Note how even more relaxed the muscles have become.

Tense the muscles of your arms by pushing your arms on the arms of the chair. Okay, tense and release. Pay attention to the difference you feel as you relax after tensing the muscles. Again, tense and release. Note how even more relaxed these muscles feel as they relax even further, becoming heavier and heavier. Just let yourself go and relax.

[Measure skin conductance.]

Now review the muscles of your body which you have relaxed and if there is any tension remaining, relax them even further. Go ahead and relax these muscles so that there is no tension at all.

Tense the muscles of your lower back by pushing your hips forward while at the same time holding back so that there is no movement, yet you can feel the tenseness. Go ahead, tense and release. Feel how

relaxed the muscles have become. Again, tense and release. Feel how even more relaxed the muscles become. You may feel yourself becoming heavier and heavier and sinking further into the chair. That's all right, just let yourself go. Let the chair support you. Relax even further so that there is no tension at all. Very relaxed and comfortable and soothed.

[Measure skin conductance.]

When I tell you, tense your stomach muscles by making the abdomen hard. Okay, tense and release. Pay attention to the muscles involved as they relax. Once more, tense and release. You may feel your breathing becoming easier and slower and more regular as you relax. Just let yourself relax.

Tighten your chest muscles by contracting them so that you can feel the tension of these muscles. Go ahead, tense and release. Let yourself go. Again, tense and release. You will find that your breathing becomes easier as you relax these muscles. Just let yourself relax even further so that your breathing becomes slower, more regular, and very relaxing.

[Measure skin conductance.]

When told, tighten your shoulder muscles by pushing your shoulders against the back of the chair. Now, tense and release. Feel how soothed and relaxed these muscles become. Again, tense and release. Note how even more relaxed these muscles become as you release them by simply letting go further.

Now review the muscles which you have relaxed and if there is any tension remaining, relax them further by simply paying attention to the sensation you experience in letting go after tensing them. Go ahead and relax any muscles which you feel could be even more relaxed.

[Measure skin conductance.]

When I tell you, tighten the muscles of your neck by pushing your head against the back of the chair. Okay, tense and release. Pay attention to the muscles involved. Again, tense and release. As you relax these muscles, you may feel your head sinking into the chair. Just let your head fall back into the chair so that the chair supports you as much as possible. Just let yourself relax.

Tighten your chin, throat, and tongue muscles by pushing your tongue against the roof of your mouth. Now, tense and release. Pay attention to the muscles involved as they relax. Once more, tense and release. You may find that you have a strong desire to swallow as you relax these muscles. That's okay, just go ahead and swallow and note how even more relaxed yet these muscles become as you swallow. Very relaxed and soothed and comfortable.

[Measure skin conductance.]

When I tell you, tense the muscles of your cheeks as you would when you draw the corners of your mouth back, but hold the muscles so that there is no movement. Now, tense and release. Note how relaxed these muscles have become. Again, tense and release. Pay attention to the muscles involved as they relax so that they become completely relaxed with no tension at all. Warm and relaxed and soothed.

Now review the muscles which you have relaxed and if there are any muscles which could be even more relaxed than they are now, go ahead and relax them further.

[Measure skin conductance.]

Tense the muscles of your jaws by pushing your teeth together. Go ahead, tense and release. Pay attention to the muscles involved. Once more, tense and release. Note how these muscles have relaxed even further, very relaxed, and soothed, and comfortable.

Tighten the muscles across the top of your cheeks and upper lips as you would when wrinkling your nose, but hold back so that there is no movement. Go ahead, tense and release. Note how warm and relaxed these muscles have become when you released them. Again, tense and release. Pay attention to the muscles as warmth and relaxation flow through them. Warm and relaxed.

[Measure skin conductance.]

When I tell you, tense the muscles of your forehead and the top of your head as you would by frowning, but hold back so that you can feel the tension without moving. Go ahead, tense and release. Note how these muscles feel as they relax. Again, tense and release. Pay attention to the muscles involved as they relax so that they become completely relaxed with no tension at all.

Now review the muscles of your body. Even though you may feel more relaxed than you ever have before, you can become even more relaxed yet by letting go even further so that there is no tension at

all in any of your muscles. Relax completely. Relax every muscle of your body. Just let yourself be limp, limp, limp. Relax more and more, more and more. Relax completely. Your whole body feels heavy, heavier, and heavier. Like lead. Just let yourself relax even further so that the chair supports you completely.

[Measure skin conductance.]

[Administer performance tasks.]

Tonus Induction Procedure.

I am going to count backwards from ten to one and I would like you to count along mentally with me. As we count backwards, your normal muscle tonus will return to your body. You will feel your muscles become a little bit tense as the muscles begin to support your body once more as they did when you first sat down. The chair will not be supporting you as much as your muscles regain their normal tonus. We will begin counting now. Ten, nine, eight, seven, six, five, four, three, two, one.

APPENDIX II

PERFORMANCE TASKS

MODERATELY COMPLEX TASK

Instructions to Subject.

I am going to read a series of three pairs of numbers, one at a time. Your task is to repeat one of the three pairs of numbers in the opposite order from which they are presented. I will say "first," "middle," or "last" to indicate which pair of numbers you are to reverse. For example, if I say "8-9, 5-2, 4-3, middle," you would respond by saying "2-5." The series of numbers can be read only once, so listen carefully. We will begin now.

Tasks.

[1]	7-3	9-4	1-5	LAST	(5-1)
[2]	8-2	6-7	4-1	MIDDLE	(7-6)
[3]	5-3	1-4	6-8	FIRST	(3-5)
[4]	2-7	9-3	8-1	MIDDLE	(3-9)
[5]	6-4	1-7	2-9	LAST	(9-2)
[6]	8-5	6-3	4-2	FIRST	(5-8)
[7]	9-7	4-8	1-6	MIDDLE	(8-4)
[8]	5-7	3-2	9-1	FIRST	(7-5)
[9]	2-1	6-5	7-4	LAST	(4-7)
[10]	9-5	3-6	7-2	MIDDLE	(6-3)

Scoring.

The number of correct responses was recorded to yield a total correct score out of a possible ten correct. A correct response consisted of the appropriate reversal.

COMPLEX TASK

Instructions to Subject.

I am going to read a series of numbers, one at a time, in which the last number has been left off. Your task is to respond by saying the next number which would complete the series. I will signal by saying the word "blank" when you are to respond. The series of numbers can be read only once, so listen carefully. We will begin now.

Tasks.

[1]	1 7 13 19 25 31 BLANK	(37)
[2]	11 2 71 8 42 6 52 BLANK	(7)
[3]	181 172 163 154 BLANK	(145)
[4]	2 8 1 4 3 12 6 BLANK	(24)
[5]	95 59 58 85 84 48 47 BLANK	(74)
[6]	2 4 3 9 4 16 5 BLANK	(25)
[7]	30 15 14 7 6 3 BLANK	(2)
[8]	9 14 11 16 13 18 15 BLANK	(20)
[9]	4 12 1 3 6 15 2 BLANK	(5)
[10]	144 12 121 11 100 10 81 BLANK	(9)

Scoring.

The number of correct responses was recorded to yield a total correct score out of a possible ten correct. A correct response consisted of the appropriate number required to complete the series.

APPENDIX III

SAMPLE RECORD SHEET

RECORD SHEET

Order of Relaxation Presentation: I) R-N .....
II) N-R .....
Subject No.: .....
Age: .....
Education: .....
Date Tested: .....

Basal Skin Conductance

(initial 5 minutes)

1) .....μA
2) .....μA
3) .....μA
4) .....μA
5) .....μA

Relaxation Skin Conductance

Introductory Instructions:

1) .....μA
2) .....μA
3) .....μA

Induction Procedure:

1) .....μA
2) .....μA
3) .....μA
4) .....μA
5) .....μA
6) .....μA
7) .....μA
8) .....μA
9) .....μA
10) .....μA

Performance & Skin Conductance

WITH Relaxation [.....]

Moderately Complex: response (inst'ns)	skin c.:	Complex: response (inst'ns)	skin c.:
	.....μA		.....μA
1)	.....μA	1)	.....μA
2)		2)	
3)	.....μA	3)	.....μA
4)		4)	
5)	.....μA	5)	.....μA
6)		6)	
7)	.....μA	7)	.....μA
8)		8)	
9)	.....μA	9)	.....μA
10)	.....μA	10)	.....μA

Performance & Skin Conductance

WITHOUT Relaxation [.....]

Moderately Complex: response (inst'ns)	skin c.:	Complex: response (inst'ns)	skin c.:
	.....μA		.....μA
1)	.....μA	1)	.....μA
2)		2)	
3)	.....μA	3)	.....μA
4)		4)	
5)	.....μA	5)	.....μA
6)		6)	
7)	.....μA	7)	.....μA
8)		8)	
9)	.....μA	9)	.....μA
10)	.....μA	10)	.....μA

APPENDIX IV

RAW DATA

Order of Relaxation: R-N
Subject No.: 1
Age: 19
Education: I Arts
Date Tested: 23/3/71

Basal Skin Conductance
(initial 5 minutes)
1) 170 μA
2) 160 μA
3) 160 μA
4) 170 μA
5) 160 μA

Relaxation Skin Conductance
Introductory Instructions:
1) 170 μA
2) 160 μA
3) 170 μA
Induction Procedure:
1) 170 μA
2) 160 μA
3) 150 μA
4) 150 μA
5) 140 μA
6) 130 μA
7) 130 μA
8) 130 μA
9) 130 μA
10) 130 μA

Performance & Skin Conductance WITH Relaxation [1st]

	Moderately Complex: response: (inst'ns)	skin c.: 130 μA	Complex: response: (inst'ns)	skin c.: 130 μA
1)	C	130 μA	C	140 μA
2)	X		X	
3)	C	140 μA	C	140 μA
4)	C		X	
5)	X	140 μA	X	150 μA
6)	C		C	
7)	C	130 μA	C	140 μA
8)	C		C	
9)	X	140 μA	X	140 μA
10)	C	130 μA	X	150 μA

Performance & Skin Conductance WITHOUT Relaxation [2nd]

	Moderately Complex: response: (inst'ns)	skin c.: 160 μA	Complex: response: (inst'ns)	skin c.: 160 μA
1)	C	160 μA	C	160 μA
2)	C		X	
3)	C	170 μA	X	170 μA
4)	C		X	
5)	C	170 μA	X	160 μA
6)	C		X	
7)	X	170 μA	C	170 μA
8)	C		C	
9)	X	170 μA	X	170 μA
10)	C	170 μA	X	170 μA

Note.—subjects' responses were recorded as correct (C) or incorrect (X).

Order of Relaxation: N-R
Subject No.: 2
Age: 19 years
Education: II Arts
Date Tested: 23/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 140 μA
2) 140 μA
3) 130 μA
4) 140 μA
5) 140 μA

Relaxation Skin Conductance
Introductory Instructions:

1) 140 μA
2) 130 μA
3) 140 μA

Induction Procedure:

1) 140 μA
2) 140 μA
3) 130 μA
4) 120 μA
5) 120 μA
6) 120 μA
7) 110 μA
8) 120 μA
9) 110 μA
10) 110 μA

Performance & Skin Conductance WITH Relaxation [2nd]

	Moderately Complex: response (inst'ns)	skin c.: 110 μA	Complex: response (inst'ns)	skin c.: 120 μA
1)	C	110 μA	C	120 μA
2)	X		X	
3)	C	110 μA	C	120 μA
4)	X		C	
5)	C	120 μA	X	120 μA
6)	C		C	
7)	X	120 μA	C	110 μA
8)	C		C	
9)	C	110 μA	X	110 μA
10)	X	120 μA	C	110 μA

Performance & Skin Conductance WITHOUT Relaxation [1st]

	Moderately Complex: response (inst'ns)	skin c.: 130 μA	Complex: response (inst'ns)	skin c.: 130 μA
1)	C	130 μA	C	140 μA
2)	X		X	
3)	C	130 μA	C	140 μA
4)	C		X	
5)	C	140 μA	X	150 μA
6)	X		C	
7)	C	140 μA	C	140 μA
8)	C		C	
9)	C	130 μA	X	140 μA
10)	X	130 μA	C	140 μA

Order of Relaxation: R-N
Subject No.: 3
Age: 21 years
Education: II Arts
Date Tested: 23/3/71

Basal Skin Conductance
(initial 5 minutes)
1) 270μA
2) 260μA
3) 260μA
4) 270μA
5) 270μA

Relaxation Skin Conductance
Introductory Instructions:
1) 270μA
2) 260μA
3) 270μA
Induction Procedure:
1) 270μA
2) 270μA
3) 260μA
4) 260μA
5) 250μA
6) 240μA
7) 250μA
8) 240μA
9) 240μA
10) 240μA

Performance & Skin Conductance
WITH Relaxation [1st]

	Moderately Complex: response: (inst'ns)	skin c.: 230μA	Complex: response: (inst'ns)	skin c.: 230μA
1)	C	240μA	C	230μA
2)	X		X	
3)	X	240μA	C	240μA
4)	C		C	
5)	C	230μA	X	240μA
6)	C		C	
7)	C	230μA	C	230μA
8)	C		C	
9)	X	240μA	X	240μA
10)	C	230μA	C	240μA

Performance & Skin Conductance
WITHOUT Relaxation [2nd]

	Moderately Complex: response: (inst'ns)	skin c.: 270μA	Complex: response: (inst'ns)	skin c.: 270μA
1)	C	270μA	C	270μA
2)	C		X	
3)	C	260μA	C	260μA
4)	X		C	
5)	C	270μA	X	270μA
6)	C		X	
7)	C	260μA	X	270μA
8)	X		C	
9)	C	260μA	X	270μA
10)	X	270μA	C	260μA

Order of Relaxation: N-R
Subject No.: 4
Age: 21 years
Education: III Arts
Date Tested: 23/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 200 μA
2) 200 μA
3) 210 μA
4) 210 μA
5) 200 μA

Relaxation Skin Conductance

Introductory Instructions:

1) 200 μA
2) 210 μA
3) 200 μA

Induction Procedure:

1) 200 μA
2) 200 μA
3) 210 μA
4) 200 μA
5) 200 μA
6) 200 μA
7) 190 μA
8) 190 μA
9) 190 μA
10) 190 μA

Performance & Skin Conductance
WITH Relaxation [2nd]

Moderately Complex: response (inst'ns)		skin c.:	Complex: response (inst'ns)		skin c.:
		190 μA			180 μA
1)	C	190 μA	1)	C	180 μA
2)	X		2)	X	
3)	C	190 μA	3)	C	190 μA
4)	C		4)	C	
5)	X	200 μA	5)	X	190 μA
6)	C		6)	C	
7)	C	190 μA	7)	X	190 μA
8)	C		8)	C	
9)	C	190 μA	9)	X	190 μA
10)	C	180 μA	10)	C	180 μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

Moderately Complex: response (inst'ns)		skin c.:	Complex: response (inst'ns)		skin c.:
		210 μA			200 μA
1)	C	210 μA	1)	C	200 μA
2)	C		2)	X	
3)	C	200 μA	3)	C	210 μA
4)	C		4)	X	
5)	X	200 μA	5)	X	210 μA
6)	C		6)	C	
7)	C	190 μA	7)	X	210 μA
8)	X		8)	X	
9)	C	200 μA	9)	X	210 μA
10)	C	200 μA	10)	C	200 μA

Order of Relaxation: R-N
Subject No.: 5
Age: 21 years
Education: III Commerce
Date Tested: 23/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 150 μA
2) 160 μA
3) 160 μA
4) 160 μA
5) 160 μA

Relaxation Skin Conductance

Introductory Instructions:

1) 170 μA
2) 180 μA
3) 180 μA

Induction Procedure:

1) 180 μA
2) 170 μA
3) 160 μA
4) 160 μA
5) 150 μA
6) 150 μA
7) 150 μA
8) 140 μA
9) 140 μA
10) 130 μA

Performance & Skin Conductance
WITH Relaxation [1st]

	Moderately Complex: response: (inst'ns)	skin c.:	Complex: response: (inst'ns)	skin c.:
		130 μA		140 μA
1)	C	130 μA	C	130 μA
2)	C		X	
3)	X	140 μA	C	140 μA
4)	X		C	
5)	C	140 μA	X	150 μA
6)	C		C	
7)	C	130 μA	C	140 μA
8)	X		X	
9)	C	140 μA	X	150 μA
10)	C	140 μA	C	140 μA

Performance & Skin Conductance
WITHOUT Relaxation [2nd]

	Moderately Complex: response: (inst'ns)	skin c.:	Complex: response: (inst'ns)	skin c.:
		180 μA		170 μA
1)	C	180 μA	C	170 μA
2)	C		X	
3)	C	170 μA	X	180 μA
4)	C		C	
5)	C	170 μA	X	190 μA
6)	C		C	
7)	C	170 μA	X	190 μA
8)	C		X	
9)	C	180 μA	X	190 μA
10)	C	170 μA	C	190 μA

Order of Relaxation: N-R
Subject No.: 6
Age: 18 years
Education: I Arts
Date Tested: 24/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 130μA
2) 140μA
3) 140μA
4) 140μA
5) 130μA

Relaxation Skin Conductance

Introductory Instructions:

1) 150μA
2) 140μA
3) 140μA

Induction Procedure:

1) 140μA
2) 140μA
3) 130μA
4) 140μA
5) 130μA
6) 130μA
7) 120μA
8) 120μA
9) 120μA
10) 110μA

Performance & Skin Conductance
WITH Relaxation [2nd]

	Moderately Complex: response: (inst'ns)	skin c.: 110μA	Complex: response: (inst'ns)	skin c.: 120μA
1)	C	110μA	C	120μA
2)	C		X	
3)	C	110μA	C	120μA
4)	C		C	
5)	X	120μA	X	120μA
6)	C		C	
7)	C	120μA	C	110μA
8)	C		C	
9)	X	120μA	X	120μA
10)	C	110μA	C	120μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

	Moderately Complex: response: (inst'ns)	skin c.: 130μA	Complex: response: (inst'ns)	skin c.: 130μA
1)	C	130μA	C	130μA
2)	C		X	
3)	C	130μA	X	140μA
4)	C		C	
5)	C	130μA	X	140μA
6)	X		C	
7)	C	140μA	C	140μA
8)	X		X	
9)	C	140μA	X	150μA
10)	C	130μA	C	140μA

Order of Relaxation: R-N
Subject No.: 7
Age: 22 years
Education: III Arts
Date Tested: 24/3/71

Basal Skin Conductance
(initial 5 minutes)
1) 90μA
2) 90μA
3) 90μA
4) 80μA
5) 90μA

Relaxation Skin Conductance
Introductory Instructions:
1) 90μA
2) 90μA
3) 90μA
Induction Procedure:
1) 80μA
2) 80μA
3) 80μA
4) 80μA
5) 80μA
6) 80μA
7) 80μA
8) 80μA
9) 80μA
10) 90μA

Performance & Skin Conductance
WITH Relaxation [1st]

	Moderately Complex: response (inst'ns)	skin c.: 90μA	Complex: response (inst'ns)	skin c.: 90μA
1)	C	80μA	C	90μA
2)	C		X	
3)	C	90μA	C	90μA
4)	C		C	
5)	C	90μA	X	90μA
6)	C		C	
7)	C	90μA	X	100μA
8)	C		C	
9)	C	80μA	X	100μA
10)	C	90μA	X	100μA

Performance & Skin Conductance
WITHOUT Relaxation [2nd]

	Moderately Complex: response (inst'ns)	skin c.: 100μA	Complex: response (inst'ns)	skin c.: 100μA
1)	C	100μA	C	100μA
2)	C		X	
3)	C	100μA	C	100μA
4)	C		C	
5)	C	100μA	X	100μA
6)	C		X	
7)	X	100μA	X	110μA
8)	C		C	
9)	C	100μA	X	110μA
10)	C	100μA	X	110μA

Order of Relaxation: N-R
Subject No.: 8
Age: 20 years
Education: II Arts
Date Tested: 24/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 310μA
2) 310μA
3) 300μA
4) 310μA
5) 320μA

Relaxation Skin Conductance

Introductory Instructions:

1) 320μA
2) 320μA
3) 310μA

Induction Procedure:

1) 310μA
2) 300μA
3) 300μA
4) 310μA
5) 300μA
6) 290μA
7) 290μA
8) 290μA
9) 280μA
10) 280μA

Performance & Skin Conductance
WITH Relaxation [2nd]

Moderately Complex:			Complex:		
response: (inst'ns)		skin c.: 280μA	response: (inst'ns)		skin c.: 280μA
1)	C	280μA	1)	C	280μA
2)	C		2)	C	
3)	C	290μA	3)	X	290μA
4)	C		4)	C	
5)	C	290μA	5)	C	280μA
6)	C		6)	X	
7)	C	280μA	7)	X	290μA
8)	C		8)	C	
9)	C	280μA	9)	X	290μA
10)	C	290μA	10)	C	280μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

Moderately Complex:			Complex:		
response: (inst'ns)		skin c.: 310μA	response: (inst'ns)		skin c.: 310μA
1)	C	310μA	1)	C	310μA
2)	C		2)	X	
3)	C	300μA	3)	X	320μA
4)	C		4)	C	
5)	C	300μA	5)	C	310μA
6)	X		6)	X	
7)	C	310μA	7)	X	320μA
8)	C		8)	C	
9)	C	300μA	9)	X	320μA
10)	X	310μA	10)	X	320μA

Order of Relaxation: R-N
Subject No.: 9
Age: 22 years
Education: III Arts
Date Tested: 24/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 220μA
2) 220μA
3) 220μA
4) 230μA
5) 230μA

Relaxation Skin Conductance
Introductory Instructions:

1) 220μA
2) 220μA
3) 220μA

Induction Procedure:

1) 220μA
2) 220μA
3) 210μA
4) 210μA
5) 210μA
6) 220μA
7) 210μA
8) 210μA
9) 200μA
10) 200μA

Performance & Skin Conductance WITH Relaxation [1st]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 210μA	response: (inst'ns)	skin c.: 210μA
1)	C	210μA	C	210μA
2)	C		X	
3)	X	210μA	C	210μA
4)	C		X	
5)	C	200μA	X	210μA
6)	C		X	
7)	C	210μA	C	200μA
8)	X		X	
9)	C	210μA	X	210μA
10)	C	210μA	C	210μA

Performance & Skin Conductance WITHOUT Relaxation [2nd]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 230μA	response: (inst'ns)	skin c.: 220μA
1)	C	230μA	C	220μA
2)	C		X	
3)	C	220μA	C	220μA
4)	C		X	
5)	X	220μA	X	230μA
6)	C		X	
7)	C	220μA	C	230μA
8)	C		X	
9)	X	230μA	X	230μA
10)	C	220μA	X	230μA

Order of Relaxation: N-R
Subject No.: 10
Age: 19 years
Education: I Commerce
Date Tested: 25/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 150μA
2) 150μA
3) 150μA
4) 140μA
5) 140μA

Relaxation Skin Conductance

Introductory Instructions:
1) 140μA
2) 150μA
3) 140μA

Induction Procedure:
1) 140μA
2) 140μA
3) 140μA
4) 130μA
5) 120μA
6) 120μA
7) 130μA
8) 120μA
9) 120μA
10) 120μA

Performance & Skin Conductance
WITH Relaxation [2nd]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 120μA	response: (inst'ns)	skin c.: 110μA
1)	X	120μA	C	110μA
2)	C		C	
3)	C	110μA	C	120μA
4)	C		C	
5)	C	120μA	X	120μA
6)	C		C	
7)	C	120μA	X	120μA
8)	X		C	
9)	C	110μA	X	120μA
10)	C	120μA	C	120μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 140μA	response: (inst'ns)	skin c.: 140μA
1)	C	140μA	C	130μA
2)	C		X	
3)	C	130μA	X	130μA
4)	X		X	
5)	X	140μA	X	140μA
6)	C		C	
7)	C	140μA	X	140μA
8)	X		C	
9)	C	130μA	X	140μA
10)	C	140μA	C	130μA

Order of Relaxation: R-N
Subject No.: 11
Age: 21 years
Education: II Arts
Date Tested: 25/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 180μA
2) 170μA
3) 180μA
4) 170μA
5) 170μA

Relaxation Skin Conductance

Introductory Instructions:

1) 170μA
2) 170μA
3) 170μA

Induction Procedure:

1) 170μA
2) 170μA
3) 160μA
4) 160μA
5) 160μA
6) 150μA
7) 140μA
8) 140μA
9) 140μA
10) 130μA

Performance & Skin Conductance
WITH Relaxation [1st]

	Moderately Complex: response: (inst'ns)	skin c.: 130μA	Complex: response: (inst'ns)	skin c.: 140μA
1)	C	130μA	C	130μA
2)	C		X	
3)	C	140μA	C	140μA
4)	X		C	
5)	C	140μA	C	140μA
6)	C		C	
7)	C	140μA	C	140μA
8)	C		C	
9)	C	130μA	X	130μA
10)	C	140μA	C	130μA

Performance & Skin Conductance
WITHOUT Relaxation [2nd]

	Moderately Complex: response: (inst'ns)	skin c.: 160μA	Complex: response: (inst'ns)	skin c.: 170μA
1)	C	160μA	C	160μA
2)	C		X	
3)	C	170μA	X	170μA
4)	C		X	
5)	X	160μA	C	170μA
6)	C		C	
7)	X	160μA	C	160μA
8)	C		C	
9)	C	170μA	X	170μA
10)	C	170μA	C	170μA

Order of Relaxation: N-R
Subject No.: 12
Age: 21 years
Education: III Arts
Date Tested: 25/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 120μA
2) 120μA
3) 120μA
4) 120μA
5) 130μA

Relaxation Skin Conductance

Introductory Instructions:

1) 130μA
2) 120μA
3) 130μA

Induction Procedure:

1) 130μA
2) 130μA
3) 120μA
4) 120μA
5) 120μA
6) 110μA
7) 110μA
8) 110μA
9) 100μA
10) 100μA

Performance & Skin Conductance
WITH Relaxation [2nd]

	Moderately Complex: response: (inst'ns)	skin c.: 100μA	Complex: response: (inst'ns)	skin c.: 100μA
1)	C	100μA	C	100μA
2)	X		X	
3)	C	100μA	C	110μA
4)	C		X	
5)	X	100μA	X	110μA
6)	X		C	
7)	C	110μA	C	110μA
8)	C		C	
9)	C	110μA	X	110μA
10)	C	110μA	C	110μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

	Moderately Complex: response: (inst'ns)	skin c.: 130μA	Complex: response: (inst'ns)	skin c.: 120μA
1)	C	130μA	C	120μA
2)	X		X	
3)	C	130μA	C	130μA
4)	C		X	
5)	C	130μA	X	130μA
6)	C		X	
7)	C	130μA	X	130μA
8)	C		X	
9)	C	120μA	X	130μA
10)	X	130μA	C	120μA

Order of Relaxation: R-N
Subject No.: 13
Age: 21 years
Education: III Commerce
Date Tested: 25/3/71

Basal Skin Conductance

(initial 5 minutes)

1) 200 μA
2) 210 μA
3) 200 μA
4) 200 μA
5) 200 μA

Relaxation Skin Conductance

Introductory Instructions

1) 190 μA
2) 190 μA
3) 200 μA

Induction Procedure

1) 210 μA
2) 200 μA
3) 190 μA
4) 190 μA
5) 180 μA
6) 180 μA
7) 170 μA
8) 170 μA
9) 170 μA
10) 170 μA

Performance & Skin Conductance WITH Relaxation [1st]

	Moderately Complex: response (inst'ns)	skin c.: 170 μA	Complex: response (inst'ns)	skin c.: 170 μA
1)	C	170 μA	X	170 μA
2)	C		X	
3)	C	170 μA	X	180 μA
4)	C		C	
5)	C	170 μA	C	180 μA
6)	C		C	
7)	X	180 μA	C	170 μA
8)	C		X	
9)	C	170 μA	X	170 μA
10)	C	170 μA	C	170 μA

Performance & Skin Conductance WITHOUT Relaxation [2nd]

	Moderately Complex: response (inst'ns)	skin c.: 200 μA	Complex: response (inst'ns)	skin c.: 200 μA
1)	X	210 μA	C	210 μA
2)	C		X	
3)	C	210 μA	C	200 μA
4)	C		X	
5)	C	200 μA	X	210 μA
6)	C		C	
7)	C	200 μA	X	210 μA
8)	X		C	
9)	C	200 μA	X	210 μA
10)	X	210 μA	X	210 μA

Order of Relaxation: N-R
Subject No.: 14
Age: 19 years
Education: I Arts
Date Tested: 26/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 120μA
2) 120μA
3) 120μA
4) 120μA
5) 110μA

Relaxation Skin Conductance

Introductory Instructions:

1) 120μA
2) 120μA
3) 120μA

Induction Procedure:

1) 120μA
2) 120μA
3) 110μA
4) 110μA
5) 110μA
6) 110μA
7) 100μA
8) 100μA
9) 100μA
10) 100μA

Performance & Skin Conductance
WITH Relaxation [2nd]

	Moderately Complex:			Complex:	
	response: (inst'ns)	skin c.: 100μA		response: (inst'ns)	skin c.: 100μA
1)	X	100μA	1)	C	100μA
2)	C		2)	C	
3)	C	100μA	3)	C	100μA
4)	C		4)	X	
5)	C	100μA	5)	C	100μA
6)	C		6)	C	
7)	C	110μA	7)	C	100μA
8)	C		8)	X	
9)	C	110μA	9)	X	110μA
10)	C	100μA	10)	C	110μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

	Moderately Complex:			Complex:	
	response: (inst'ns)	skin c.: 120μA		response: (inst'ns)	skin c.: 120μA
1)	X	120μA	1)	C	120μA
2)	C		2)	X	
3)	C	120μA	3)	C	130μA
4)	C		4)	X	
5)	C	120μA	5)	X	130μA
6)	C		6)	C	
7)	C	120μA	7)	X	130μA
8)	X		8)	X	
9)	C	120μA	9)	X	130μA
10)	X	120μA	10)	C	130μA

Order of Relaxation: R-N
Subject No.: 15
Age: 22 years
Education: III Commerce
Date Tested: 26/3/71

Basal Skin Conductance
(initial 5 minutes)
1) 200μA
2) 200μA
3) 200μA
4) 200μA
5) 210μA

Relaxation Skin Conductance
Introductory Instructions:
1) 210μA
2) 210μA
3) 210μA
Induction Procedure:
1) 210μA
2) 200μA
3) 200μA
4) 200μA
5) 200μA
6) 200μA
7) 190μA
8) 190μA
9) 190μA
10) 180μA

Performance & Skin Conductance
WITH Relaxation [1st]

Moderately Complex:			Complex:	
response: (inst'ns)		skin c_o: 180μA	response: (inst'ns)	skin c_o: 180μA
1)	C	180μA	1) C	180μA
2)	C		2) X	
3)	C	190μA	3) C	190μA
4)	X		4) X	
5)	C	180μA	5) C	190μA
6)	C		6) C	
7)	C	180μA	7) C	190μA
8)	C		8) C	
9)	C	180μA	9) X	190μA
10)	C	180μA	10) C	190μA

Performance & Skin Conductance
WITHOUT Relaxation [2nd]

Moderately Complex:			Complex:	
response: (inst'ns)		skin c_o: 210μA	response: (inst'ns)	skin c_o: 200μA
1)	C	210μA	1) C	200μA
2)	C		2) X	
3)	C	210μA	3) C	200μA
4)	C		4) X	
5)	X	210μA	5) C	200μA
6)	C		6) C	
7)	C	210μA	7) X	210μA
8)	C		8) C	
9)	C	210μA	9) X	210μA
10)	C	200μA	10) X	210μA

Order of Relaxation: N-R
Subject No.: 16
Age: 19 years
Education: I Science
Date Tested: 27/3/71

Basal Skin Conductance
(initial 5 minutes)
1) 270 μA
2) 270 μA
3) 280 μA
4) 280 μA
5) 270 μA

Relaxation Skin Conductance
Introductory Instrustions:
1) 270 μA
2) 270 μA
3) 280 μA
Induction Procedure:
1) 270 μA
2) 270 μA
3) 260 μA
4) 260 μA
5) 260 μA
6) 250 μA
7) 250 μA
8) 250 μA
9) 240 μA
10) 240 μA

Performance & Skin Conductance
WITH Relaxation [2nd]

Moderately Complex:			Complex:		
response: (inst'ns)		skin c.: 240 μA	response: (inst'ns)		skin c.: 240 μA
1)	C	240 μA	1)	C	240 μA
2)	C		2)	X	
3)	C	240 μA	3)	C	250 μA
4)	C		4)	C	
5)	C	250 μA	5)	C	250 μA
6)	C		6)	C	
7)	C	250 μA	7)	X	250 μA
8)	C		8)	C	
9)	C	240 μA	9)	X	250 μA
10)	C	240 μA	10)	C	250 μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

Moderately Complex:			Complex:		
response: (inst'ns)		skin c.: 270 μA	response: (inst'ns)		skin c.: 270 μA
1)	C	270 μA	1)	C	270 μA
2)	X		2)	X	
3)	C	270 μA	3)	C	280 μA
4)	C		4)	X	
5)	C	270 μA	5)	X	280 μA
6)	C		6)	C	
7)	X	280 μA	7)	X	280 μA
8)	C		8)	X	
9)	C	280 μA	9)	X	280 μA
10)	C	270 μA	10)	C	270 μA

Order of Relaxation: R-N
Subject No.: 17
Age: 19 years
Education: II Arts
Date Tested: 27/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 230 μA
2) 230 μA
3) 240 μA
4) 240 μA
5) 230 μA

Relaxation Skin Conductance

Introductory Instructions:

1) 230 μA
2) 230 μA
3) 230 μA

Induction Procedure:

1) 230 μA
2) 230 μA
3) 220 μA
4) 220 μA
5) 220 μA
6) 220 μA
7) 210 μA
8) 210 μA
9) 210 μA
10) 210 μA

Performance & Skin Conductance
WITH Relaxation [1st]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 210 μA	response: (inst'ns)	skin c.: 210 μA
1)	C	210 μA	C	210 μA
2)	X		X	
3)	C	210 μA	C	210 μA
4)	C		X	
5)	C	210 μA	C	220 μA
6)	X		C	
7)	C	210 μA	X	220 μA
8)	C		C	
9)	C	210 μA	X	220 μA
10)	C	210 μA	C	220 μA

Performance & Skin Conductance
WITHOUT Relaxation [2nd]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 240 μA	response: (inst'ns)	skin c.: 230 μA
1)	C	240 μA	C	230 μA
2)	C		X	
3)	X	240 μA	C	230 μA
4)	C		X	
5)	C	240 μA	X	240 μA
6)	C		C	
7)	C	240 μA	X	240 μA
8)	C		X	
9)	C	230 μA	X	240 μA
10)	C	230 μA	C	240 μA

Order of Relaxation: N-R
Subject No.: 18
Age: 25 years
Education: III Arts
Date Tested: 27/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 140 μA
2) 140 μA
3) 140 μA
4) 130 μA
5) 140 μA

Relaxation Skin Conductance

Introductory Instructions:

1) 150 μA
2) 150 μA
3) 140 μA

Induction Procedure:

1) 140 μA
2) 140 μA
3) 140 μA
4) 130 μA
5) 130 μA
6) 130 μA
7) 120 μA
8) 120 μA
9) 120 μA
10) 110 μA

Performance & Skin Conductance
WITH Relaxation [2nd]

Moderately Complex: response: (inst'ns)		skin c.:	Complex: response: (inst'ns)		skin c.:
		110 μA			120 μA
1)	C	110 μA	1)	X	120 μA
2)	C		2)	X	
3)	C	120 μA	3)	X	130 μA
4)	C		4)	X	
5)	C	120 μA	5)	C	130 μA
6)	C		6)	C	
7)	C	120 μA	7)	X	130 μA
8)	C		8)	C	
9)	C	120 μA	9)	X	130 μA
10)	C	120 μA	10)	C	130 μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

Moderately Complex: response: (inst'ns)		skin c.:	Complex: response: (inst'ns)		skin c.:
		140 μA			140 μA
1)	C	140 μA	1)	C	140 μA
2)	X		2)	X	
3)	C	140 μA	3)	X	150 μA
4)	C		4)	X	
5)	C	140 μA	5)	X	150 μA
6)	X		6)	C	
7)	X	140 μA	7)	X	150 μA
8)	X		8)	C	
9)	C	140 μA	9)	X	150 μA
10)	C	140 μA	10)	X	150 μA

Order of Relaxation: R-N
Subject No.: 19
Age: 19 years
Education: I Arts
Date Tested: 27/3/71

Basal Skin Conductance
(initial 5 minutes)

1) 170 μA
2) 170 μA
3) 180 μA
4) 180 μA
5) 180 μA

Relaxation Skin Conductance
Introductory Instructions:

1) 180 μA
2) 180 μA
3) 180 μA

Induction Procedure:

1) 180 μA
2) 170 μA
3) 170 μA
4) 170 μA
5) 170 μA
6) 160 μA
7) 160 μA
8) 150 μA
9) 150 μA
10) 150 μA

Performance & Skin Conductance WITH Relaxation [1st]

	Moderately Complex: response (inst'ns)	skin c.:	Complex: response (inst'ns)	skin c.:
		150 μA		160 μA
1)	C	150 μA	X	160 μA
2)	X		X	
3)	C	150 μA	C	160 μA
4)	C		X	
5)	C	150 μA	C	160 μA
6)	C		C	
7)	X	160 μA	X	160 μA
8)	X		X	
9)	C	160 μA	X	160 μA
10)	C	160 μA	C	160 μA

Performance & Skin Conductance WITHOUT Relaxation [2nd]

	Moderately Complex: response (inst'ns)	skin c.:	Complex: response (inst'ns)	skin c.:
		180 μA		170 μA
1)	C	180 μA	X	180 μA
2)	C		X	
3)	C	180 μA	X	180 μA
4)	X		X	
5)	C	170 μA	C	180 μA
6)	C		C	
7)	X	170 μA	X	180 μA
8)	C		X	
9)	C	170 μA	X	180 μA
10)	C	170 μA	C	180 μA

Order of Relaxation: N-R
Subject No.: 20
Age: 20 years
Education: I Arts
Date Tested: 27/3/71

Basal Skin Conductance
(initial 5 minutes)
1) 120μA
2) 120μA
3) 120μA
4) 130μA
5) 130μA

Relaxation Skin Conductance
Introductory Instructions:
1) 140μA
2) 140μA
3) 140μA
Induction Procedure:
1) 140μA
2) 130μA
3) 130μA
4) 120μA
5) 120μA
6) 110μA
7) 110μA
8) 110μA
9) 110μA
10) 100μA

Performance & Skin Conductance
WITH Relaxation [2nd]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 100μA	response: (inst'ns)	skin c.: 100μA
1)	C	100μA	C	100μA
2)	C		C	
3)	C	100μA	C	110μA
4)	C		C	
5)	C	100μA	X	110μA
6)	X		C	
7)	C	110μA	C	110μA
8)	C		C	
9)	C	110μA	X	110μA
10)	C	110μA	C	100μA

Performance & Skin Conductance
WITHOUT Relaxation [1st]

	Moderately Complex:		Complex:	
	response: (inst'ns)	skin c.: 130μA	response: (inst'ns)	skin c.: 130μA
1)	C	130μA	C	130μA
2)	X		X	
3)	X	130μA	C	130μA
4)	X		X	
5)	C	130μA	X	140μA
6)	C		X	
7)	C	130μA	X	140μA
8)	C		X	
9)	C	130μA	X	140μA
10)	C	130μA	C	140μA

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