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THE EFFECTS OF VARIATIONS IN COGNITIVE REHEARSAL
ON PAIN TOLERANCE

by

Richard W. J. Neufeld

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The undersigned certify that they have read, and recommend
to the Faculty of Graduate Studies for acceptance, a thesis entitled
" The Effects of Variations in Cognitive Rehearsal on Pain Tolerance",
submitted by Richard Neufeld in partial fulfillment of the requirements
for the degree of Master of Science.

..... Paul Davidson
Supervisor

..... Samuel D. Craig

..... John Boyd
Boyd

Date Nov 22/69

ABSTRACT

Several aspects of rehearsing an aversive experience were investigated in relation to subsequent tolerance of the experience. The aversive experience consisted of undergoing radiant-heat pain to the forearm. Rehearsal in the form of observing another person undergoing the experience was compared to rehearsal in the form of hearing a detailed description of the experience. The content of rehearsal involving the same pain stimulus as that to be experienced ("relevant") was compared to the content involving a different type of pain stimulus than that experienced ("irrelevant"). The effect of rehearsal during the first versus the second exposure to the pain stimulus was also investigated. The above three two-level factors were combined factorially to form a split-plot factorial 22.2 design (Kirk, 1968).

The Repression-Sensitization Scale (Byrne, 1961) was administered in order to investigate the relationship of this personality dimension to the effect of repeated pain.

Results showed that after the first exposure to the pain, Ss whose rehearsal was "relevant" had significantly higher pain tolerance than those whose rehearsal was "irrelevant". In addition, the pain tolerance of Ss whose rehearsal was "irrelevant" decreased significantly from the first to the second exposure.

In evaluating the effects of pain repetition as related to "repression-sensitization", it was found that only "repressors" who

were alerted about impending pain significantly changed over repeated exposures, having less pain tolerance upon the second exposure than upon the first.

The results were related to previous findings. Clinical implications and suggestions for future research were presented also.

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I. INTRODUCTION

A. The Importance of Psychological Factors Involved in Pain Tolerance

The importance of psychological factors involved in reaction to pain-inducing stimuli has been emphasized by several investigators (cf. Beecher, 1957). They have presented evidence which demonstrates that such factors are responsible for the wide variety of responses to the same pain-inducing stimuli. Concurrently, manipulation of psychological factors has been shown to affect pain reaction (cf. Blitz and Dinnerstein, 1968).

Kornetsky (1954) contends that low pain tolerance is associated with high anxiety about the pain experience. In an attempt to manipulate anxiety, one group of subjects was treated in a "formal manner" during the experiment. Another group of subjects were treated "informally". The experimental apparatus and the experimental procedure were explained to the latter group in a "congenial manner". The "informal" treatment was successful in reducing the intensity of pain according to the verbal report of the subjects.

It has been suggested that an effective method of reducing anxiety about pain is to distract the subject. Conn (1961) suggests that attention to the stimulus increases anxiety about the experience. The result is reduction in tolerance. Conn cites clinical incidents where such agents as placebos, opiates, hypnosis and lobotomy have relieved pain. Conn contends that these agents free the patients from preoccupation with their pain which results in less anxiety. In his study, Conn

found that introducing novel topics of discussion to subjects raised their tolerance of pain.

Morosko (1966) found that if patients were presented with white noise while undergoing dental work, the amount of pain they said they could stand increased. Kanfer and Goldfoot (1966) also found distraction to be effective in raising tolerance. While undergoing the cold-pressor test (immersion of the hand in water of 2° C), one group in their study viewed and described slides. Another group attended to the pain by describing to the experimenters the sensations involved in the cold-pressor experience. The slide-distracted group endured the cold significantly longer than the group focusing on their sensations. Distraction has also been found effective in reducing phantom-limb pain (Morgenstern, 1964).

Nisbett and Schachter (1966) found that a group of subjects, which was told that a placebo would increase autonomic activity, tolerated more electric shock than a group of subjects which was told that any autonomic activity was attributable to the shock itself.

Blitz and Dinnerstein (1968) altered reports of pain through changing instructions given to subjects. Subjects were asked to report when pain was severe enough to warrant an analgesic. A group told not to confuse a feeling of "severe discomfort" with a feeling of "pain" responded later than a group not given this "advice".

Some authors have suggested that reactions to pain follow some of the expectations suggested by cognitive-consistency theories. Zimbardo, Cohen, Weisenberg, Dworkin, and Firestone (1966) used

cognitive dissonance to produce the same effects as actually lowering the voltage of electric shock. Moss and Meyer (1966) found that reported intensity of post-surgical pain decreased when the patient became more responsible for his own pain-relieving treatment. Buss and Portnoy (1967) as well as Lambert, Libman, and Poser (1960) changed pain tolerance by presenting subjects with tolerance norms of reference groups.

It has been suggested that "cognitive style" relates to the way individual reactions to the same pain stimulus may differ. Petrie, Collins and Solomon (1958) and Petrie (1960) described two groups of individuals that they have classified on the basis of kinesthetic aftereffects. They were labeled "augmenters" and "reducers". The perceptions of "augmenters" were said to be less affected by prior perceptions than the perceptions of "reducers". Petrie has contended that the responses to pain of "augmenters" are exaggerated while the responses of "reducers" are inhibited. Byrne (1961) has described two types of individuals which he labels "repressors" and "sensitizers". Byrne states that those classified as "repressors" characteristically react to threat with denying, repressing and avoiding behaviors. "Sensitizers", on the other hand are said to react with approaching and intellectualizing behaviors. It has been found that subjects classified as "repressors" tolerate pain less upon a second confrontation than upon the first, whereas the tolerance of "sensitizers" does not change from the first to the second confrontation (Mis, 1969).

Hemphill, Hall, and Crookes (1952) found that pain tolerance differed for patients with different psychiatric diagnoses. Patients diagnosed as "anxiety cases" were more reactive to pain than those diagnosed as "depressives". The least tolerant were "anxiety cases" and the most tolerant were those diagnosed as "endogenous depressives".

B. Rehearsal of Stress as an Agent of Threat Reduction

Rehearsal of stress has been shown to be effective in reducing arousal to threat. Folkins, Lawson, Opton, and Lazarus (1968) investigated two components of Wolpe's "systematic desensitization". These investigators designated "relaxation" and "cognitive rehearsal" as the two components. Clearly imagining the stressful event constituted "cognitive rehearsal". They found that "cognitive rehearsal" was more effective in reducing arousal to a stress film than the "relaxation" treatment or both "cognitive rehearsal" and "relaxation" together.

In investigating whether or not the effects of stress rehearsal on psychological stress extended to physical stress (pain), Mis (1969) had subjects rehearse an experience involving radiant-heat pain. This detailed rehearsal was followed by actual application of the heat. It was found that the rehearsal was successful in lengthening the period of time subjects were willing to tolerate the heat.

An explanation of the effects of rehearsal on stress reaction has been advanced by London (1964):

The repeated elicitation of vivid imagery produces a discrimination set such that the patient increasingly learns to distinguish between the imaginative, cognitive, affective aspects of experience and the sensory and overt muscular aspects....

The closer the imagery comes to representing "real" experience of the most complete sort without being followed by the actual experience it simulates, the more the patient's expectation of disastrous action with its disastrous consequences is reduced....
(p. 130).

The importance of the extent to which rehearsal must resemble the actual pain experience, if tolerance is to increase, warrants investigation.

It seems apparent that a major function of rehearsing a stressful event would be that of reducing strangeness or uncertainty. There is evidence that uncertainty about an experience involving a noxious stimulus increases the aversiveness of the situation. In a study by Jones, Bantler, and Petry (1966), subjects were required to perform instrumental responses in order to receive information about electric shock. If the responses were performed, subjects were rewarded with information about the intensity and time of onset regarding the next shock. It was found that reducing uncertainty in this way was effective in establishing the instrumental responses. The authors of this study suggest that the removal of uncertainty decreases anxiety. Thus, responses which were followed by reduction in uncertainty would be reinforced.

Rehearsal of anticipated threat is often used in the clinic to reduce uncertainty about the upcoming event. Women awaiting childbirth often have the entire experience outlined to them beforehand.

Before giving an injection, a nurse often tells a child that it will feel like a slight prick.

Alternately, instead of hearing what is to occur, the patient may be shown another patient undergoing the procedure without apparent harm. Laboratory studies have shown that observing another person harmlessly interacting with a feared object reduces the observer's fear of the object (Bandura, Grusec, & Menlove, 1967; Bandura & Menlove, 1968).

Showing the patient what is to happen to him and telling him what will happen have often been used interchangeably in the clinical setting. The implications of using one mode of preparation rather than another has not been investigated. Many details available using the visual modality, involved in observing the upcoming event, are lost if a verbal description is used. On the other hand, many details provided by verbal description, such as those relating to the sensations to be experienced, are lost in the observing procedure.

In referring to techniques of anxiety reduction, Andrew (1967) comments on rehearsal as follows:

The mechanism by which knowledge can aid in reducing anxiety is called by Janis (1958, 1962, 1965) 'rehearsal'. The feeling of strangeness is reduced if one knows what to expect (Selye, 1965), a feeling of familiarity in the face of impending threat should place less of a strain on the adaptive mechanisms (Caplan, Grosser *et al.* 1964; Janis, 1958, 1962, 1965; Jones *et al.*, 1966). It is possible that Janis' concept of 'rehearsal' may work within Lazarus' (1966) theoretical framework, by permitting appraisals to be more precisely drawn out -- what Lazarus calls 'reappraisal'. In some way, repeated exposures to a stimulus seem to change reactions to it (pp. 8, 9).

The effectiveness of rehearsal, as a method of reducing stress, has been demonstrated by Lazarus and his co-workers (cf. Folkins et al. 1968). However, information on certain important aspects of this technique remains unavailable. Information about the importance of how rehearsal is presented is lacking. The importance of similarity to the actual experience also remains in question. London (1964) and Folkins et al. (1968) have emphasized that rehearsal must bear close resemblance to the actual experience if the person's preparation is to be effective. In addition, repeating the actual experience may affect reaction to it. However, systematic investigation of these factors remains to be carried out. Enlightenment with regard to such factors should provide improvement of procedures involving rehearsal as a method of assisting people to cope with aversive stimuli.

II. STATEMENT OF THE PROBLEM

If the clinical use of rehearsing an aversive experience is to be refined, questions about certain important aspects of this technique should be answered.

The present study proposed to investigate whether or not pain tolerance was affected by the mode of rehearsing. Modes of rehearsal, which are often used interchangeably in clinical practice, may in fact have different effects. In the present study, two modes were investigated. One involved observing another person experiencing an aversive stimulus. The other involved hearing the aversive experience described in detail.

A second factor considered was the relevance of the rehearsal. The "relevant" rehearsal had, as its subject matter, the specific pain to be experienced. The "irrelevant" rehearsal dealt with an aversive stimulus dissimilar to that which was subsequently experienced.

The effect of rehearsal when the aversive stimulus was repeated was also studied. It has been suggested that repetition of exposure may be an important factor to be considered in studying reaction to aversive stimuli (cf. Andrew, 1968).

Thus, the effects on tolerance of rehearsal mode, rehearsal relevance, and stimulus repetition, as well as the interaction of these factors, were investigated.

The effect of alerting the subject to an impending threat, without actually rehearsing the threatening event, is not clear. It is

possible that warning of a threat to come, with no further detail, is an effective technique for raising tolerance of the event. Janis (1962), on the other hand, points to field observations that suggest an ambiguous warning increases stress. The present study compared subjects warned of pain to come with subjects unwarned. Neither group received information as to the nature of the pain:

Mis (1969) found that "repressors" differed from "sensitizers" in their reaction to repeated pain. However, in her study, the pain stimulus was changed from the first to the second exposure. It is not clear how "sensitizers" would compare with "repressors" in reaction to repetition of the same pain stimulus. This study investigated the effects of repeating the same pain stimulus on the reaction of "repressors" as compared to that of "sensitizers".

III. METHOD

Subjects

The subjects (Ss) were 74 female volunteers from nursing classes at the Calgary General Hospital. Two Ss were discarded from the experiment as their tolerance of the pain stimulus (see below) exceeded that at which tissue damage has been found to occur (Mis, 1969). Hence, the experimenter intervened and terminated the stimulus for these two Ss.

Apparatus

The radiant-heat apparatus was used to produce the experimental pain as this method has been shown to be reliable and convenient (Hall, 1953; Davidson & McDougall, 1969; Mis, 1969). The radiant-heat apparatus resembled that used by Davidson and McDougall (1969). It was based on the Hardy-Wolff-Goodell model modified by Clark and Bindra (1956). A specially-constructed box contained a 250-watt infrared lamp which delivered constant 116mc./cm.^2 heat to the S's forearm. The heat was switched on by the experimenter (E). The switch which terminated the heat, was accessible to S. A Standard timer (accurate to .01 sec.), attached to the apparatus through a relay, recorded the duration of the heat. The E terminated the heat himself, if 70 seconds elapsed, in order to avoid tissue damage to S.

Experimental Design

A split-plot factorial 22.2 design (Kirk, 1968) was used to

evaluate the following three factors and their interactions; (a) mode of rehearsal ("observation" ((O)) versus "verbal description" ((V)); (b) relevance of rehearsal to the forthcoming pain (same pain ((S)) versus different pain ((D)); and (c) repetition of exposure to the pain stimulus (first exposure ((1)) versus second exposure ((2)).

The number of observations per cell (n) was selected according to the desired power of the analysis-of-variance F test. An n of 12 rendered a minimal probability¹ of .92 that a difference equivalent to 1 error variance between groups included in the evaluation of main treatment effects would be detected ($\alpha = .05$).

Two other groups formed a C.R.-2 design (Kirk, 1968). The first group was given no rehearsal but was informed that a pain stimulus was to be applied after fifteen minutes. The second group of Ss was told only to wait in the experimental room for the same length of time. After their wait, the stimulus was applied.

Procedure

Prior to entering the room in which the experiment was conducted, all Ss answered the Repression-Sensitization scale (Byrne, 1961).

¹This probability (.92) pertains to mode (A) and relevance (C) main effects. The observations for each level of A and C are r(levels of C=2) .n=24 and p(levels of A=2). n=24 respectively. The test for repetition (B) involves prn= 48 observations with a corresponding increase in 1- β over .92. In addition, it should be noted that the differences are relative to the error variance used to test the effects. The defining differences relating to F tests using the "within" error term as the denominator are less than those using the "between" term when these differences are translated into absolute values.

After completing the scale, Ss were administered the treatment appropriate to the group to which they were assigned. The specific treatments for the respective groups are described below.

Observation-same (OS) The Ss in this group were first given the following instructions:

We want to find out how prior experience affects the way people react to a pain stimulus. A pain stimulus will be applied at the end of the session. A pain stimulus will first be applied to this person.

The model (a twenty-three-year-old female) then sat in front of the heat apparatus and her right forearm was blackened. After the model's right arm was securely attached to the front of the box, the following instructions were read to her in the presence of S:

The intensity of the heat will increase gradually until your arm begins to hurt. When it hurts a lot so you would like the stimulation stopped, press the switch near you with your free hand. This is not to see how much you can take, and as soon as you press the switch, the stimulation will be shut off.

A cardboard sheet had been placed in front of the hole before S entered the room so as to protect the model's arm. Before the S was fastened to the box, the cardboard was removed by the E sticking his finger through the hole in an inconspicuous manner while adjusting the position of the box. The model underwent the stimulation for 60 seconds in a "serene" manner with no overt signs of stress. The timer was visible at all times to E only. The model watched E's watch inconspicuously so as to know when 60 seconds had elapsed. After pressing the switch that both terminated the heat and

registered the duration of the stimulus on the timer, the model was released from the apparatus and left the room.

Observation-different (OD) The procedure for this group was identical to that for the OS group, except that after the S was told that a pain stimulus would first be applied to another person, the model received pain involving the pressure algometer (Merskey & Spear, 1964). The flat tip of the pressure algometer was placed just above the thumb nail of the left hand with the palm on the table. A constant pressure of one kg. was applied for 60 sec. The E simulated the appearance of moderate pressure being applied. The following instructions were given to the model in the presence of S prior to the simulated application of pressure:

The pressure on your thumb will remain constant until it begins to hurt. Say "stop" when it hurts a lot so you would like the stimulation stopped. This is not to see how much you can take and as soon as you give the indication, the stimulation will be stopped.

Here also, the model underwent the stimulation in a "serene" manner with no overt signs of stress. After the pressure was terminated, the model left the room.

Verbal-description-same (VS) The Ss in this group were given the following instructions:

We want to find out how prior experience affects the way people react to a pain stimulus. A pain stimulus will be applied at the end of the session. The short tape you are now going to hear will give you practice in imagining scenes as well as a detailed pain-stimulus description. Please keep your eyes closed while listening to the tape.

The tape² was adapted from Folkins et al. (1968). It involved instructions to imagine vividly scenes which the S could choose herself. This "practice in imagining" was followed by instructions to imagine the experience involving the radiant-heat apparatus. A detailed description of the heat apparatus, the procedure involved in the heat administration, and sensations associated with the radiant-heat stimulus were presented to S. The sensations described were those reported by three acquaintances of E to whom the radiant-heat had been applied before the tape had been made. The three people had unanimously reported the following sequence of sensations: (a) a feeling of "warmth"; (b) a "pricking" sensation; (c) a "slight burning" feeling; (d) a "burning feeling which hurt".

Verbal-description-different (VD). The procedure for this group duplicated that for the VS group except that after the "practice in imagining", the tape recording described the apparatus, procedure, and sensations involved in pressure pain as inflicted by the pressure algometer. The sensations described were those reported by the same three acquaintances of E who were used in preparing the VS group's tape (see above). The sequence of sensations described were as follows: (a) a "slight pinching" sensation; (b) a "dull ache" (c) a "severe ache".

²The taped descriptions may be obtained from the author by writing to him at the Department of Psychology, University of Calgary, Calgary Alberta.

Anticipation (A). The Ss in this group were given the following instructions:

We want to find out how prior experience affects the way people react to a pain stimulus. A pain stimulus will be applied at the end of the session. There will now be a short interval-right after, the pain stimulus will be applied.

The E then pretended to be busy with organizing papers for fifteen minutes (the approximate time taken for the observational and verbal-description rehearsals).

Control (C). The Ss in this group were told "We will be ready in fifteen minutes." The E then pretended to be busy with organizing papers for fifteen minutes (as in the A group's treatment, above).

After being administered the assigned treatment, each S had both forearms blackened with washable black ink where the heat was to be applied (an area of 2 cm. in diameter). This was to remove individual differences in conductance of the heat attributable to differential skin pigmentation. The heat was administered twice, once to each forearm after the arm was securely attached to the apparatus. Before the heat was switched on, the following instructions were read to S:

The intensity of the heat will increase gradually until your arm begins to hurt. When it hurts a lot so you would like the stimulation stopped, press the switch near you with your free hand. This is not to see how much you can take and as soon as you press the switch, the stimulation will be shut off.

The E then switched on the heat.

IV. RESULTS

The summary of the SPF-22.2 (Kirk, 1968) analysis of variance evaluating the three factors (mode of rehearsal, relevance of rehearsal and repetition of pain) is given in Table I.

Results did not indicate a relationship between the manner in which the painful experience was rehearsed (observation of another's experience versus having the experience described via a tape recording) and subsequent tolerance of the experience ($F < 1$). The main effects of rehearsal relevance to the ensuing experience only approached statistical significance ($F = 3.07$, $df = 1/44$, $p < .10$). Similarly, the interaction of relevance with mode of presentation only approached statistical significance ($F = 2.94$, $df = 1/44$, $p < .10$).

The interaction of relevance of rehearsal with first versus second exposures to the pain (B X C) was statistically significant ($F = 4.19$, $df = 1/44$, $p < .05$). This interaction appeared reliable from one mode of rehearsal to the other as there was no interaction of B X C with A.

In examining simple main effects, it was found that the group which had the "relevant" rehearsal differed from the group which had the "irrelevant" rehearsal only on the second exposure to the pain ($F = 5.47$, $df = 1/44$, $p < .03$). Higher tolerance was found in the "relevant"-rehearsal group. Also, difference in tolerance from exposure one to exposure two was found only for the group which had the "irrelevant" rehearsal. This group decreased in tolerance from the first to the second exposure ($F = 4.67$, $df = 1/44$, $p < .05$). The B X C interaction is represented in Figure I.

TABLE I

Analysis of Variance Summary

Source	df	MS	F
Mode (A)	1	30.4	
Relevance (C)	1	363.3	3.07*
A X C	1	348.6	2.94*
<u>Ss</u> within groups	44	118.2	
Trials (B)	1	15.4	
B X C	1	63.3	4.19**
A X B X C	1	1.0	
B X <u>Ss</u> within groups	44	15.1	

* $p < .10$

** $p < .05$

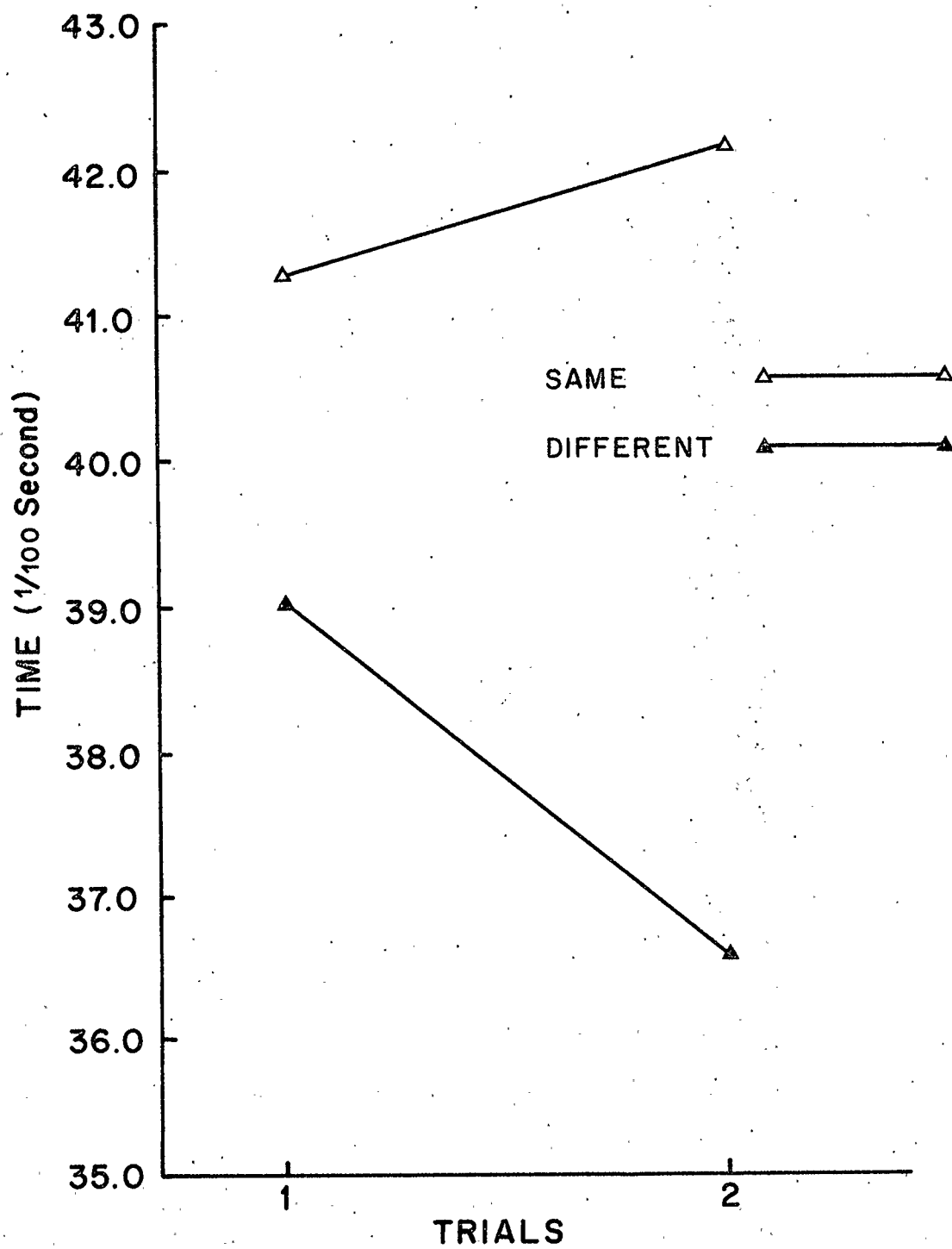


Figure I. Relevance by Exposures Interaction.

Comparing group A (merely anticipating the pain) to group C (neither anticipation nor rehearsal) rendered a statistically insignificant difference. Similarly, comparing group C with the groups receiving rehearsal rendered a statistically insignificant difference. The above comparisons utilized "Dunn's procedure" (1961) for planned non-orthogonal comparisons.

Evaluation of the effects of pain repetition in relation to the personality dimension "repression-sensitization" (R-S) is presented in Table II. The Ss were classified according to whether they were above (S) or below (R) the R-S mean score of 41.54. Correlated t-tests were used to evaluate reaction to repeated pain for "repressors" as compared to "sensitizers" in the "non-rehearsal" groups (C and A). The total of four comparisons rendered a per-family error rate of .04 (Ryan, 1962; Wilson, 1962). Only "repressors" in group A reacted significantly differently on the second exposure as compared to the first ($t = 2.53$, $df = 1/36$, $p < .01$), with a decrease in tolerance on the second exposure.

TABLE II

Planned Orthogonal Comparisons between Trials in Relation to
 Repression-Sensitization for "Non-Rehearsal" Groups

		Exposure 1	Exposure 2	Correlated <u>t</u> -tests
Above R-S Mean ("sensitizers")	Anticipation	41.50	43.27	N.S.
	Control	43.96	44.93	N.S.
	Anticipation	42.30	33.88	2.53*
Below R-S Mean ("repressors")	Control	39.59	39.69	N.S.

* $p < .01$. Per-Family $\alpha = .04$.

V. DISCUSSION

Preparation for a threatening experience through prior knowledge has been a much-used technique in every-day life. A student preparing for an examination often attempts to familiarize himself with the surroundings in which he will be writing. This reduces the strangeness of the situation when the time for the examination arrives.

Young children in the primary grades are often introduced to the classroom, accompanied by their parents, before school officially begins. It is assumed that this type of prior experience will help allay anxiety when the child must attend classes on his own. One might contend that wedding rehearsals serve a similar purpose.

In clinics, where patients must undergo procedures involving pain (such as most dental work), prior information is often used in an informal way. A nurse or fellow patient might describe what is to come. The common procedure of having long lineups for hypodermic injections allows the person at the end of the line to see what is to happen (many times).

The roles of several factors associated with stress rehearsal have needed clarification. One of these involves the mode by which prior information is presented. Is tolerance of an aversive stimulus affected differently if one observes another person experiencing the stimulus beforehand as opposed to hearing a detailed description of the experience beforehand? Results from the current study indicate that these two modes of rehearsing the experience do not differ in their

effects on tolerance.

Another question involves the content of rehearsal. How relevant to the actual experience must the content be? From analysis of the data of this study, it appears that similarity of rehearsed pain to pain experienced directly affects tolerance of the direct pain. However, this is found only after the initial exposure to the direct pain. It was observed that the group which had the "relevant" rehearsal had greater tolerance than the group which had the "irrelevant" rehearsal. It is possible that the initial exposure made the Ss in the "irrelevant" group aware that their preparation was irrelevant. Such awareness may increase anxiety and apprehension. Hence, the aversiveness of the painful situation could increase (Jones, Bantler and Petry, 1966). On the other hand, this would not be likely to occur with Ss whose experience was in line with their rehearsal. The above possibility seems compatible with the observation that the "irrelevant"- rehearsal group's tolerance went down with the second exposure while the "relevant" rehearsal group's tolerance did not change.

From the present data, it would seem that care should be taken in programming similarity of the rehearsal experience to the actual experience. Indications are that when a person's information about a forthcoming pain experience is contradicted by the actual experience, tolerance for the actual experience is reduced.

The implications, for tolerance, of simply warning a S about future pain has needed clarification. In the clinical setting, the question of whether or not to "surprise" the patient with the pain may

often arise. In the current study, Ss who were told in advance that a pain stimulus would be applied had the same tolerance as those told nothing about the pain.

In the present study, Ss rehearsing the pain were no more tolerant of it than those in the control group. Mis (1969), on the other hand, found that rehearsal was effective in raising tolerance. However, she had Ss rehearse the pain twice. The rehearsals were separated by one day and the pain was experienced after the second rehearsal. From the present study, it does not appear that her findings are generalizable to a single rehearsal before pain. To the extent that such repetition of rehearsal is responsible for the difference in results between Mis' study and the present study, it would appear that the effective procedure is the more cumbersome one. If such repetition of rehearsal is an important factor (and this bears investigation) it would seem appropriate, in clinical practice, to have the patient rehearse a day, wait a day, and then return for another rehearsal. It is possible that more details of the impending threat are perceived (and, consequently, uncertainty and strangeness is more effectively reduced) when rehearsal is experienced more than once. In addition, an intervening time period between rehearsal and the actual pain may provide extended opportunity for the person to evolve strategies of coping with the impending harm (Janis, 1958). Folkins et al. (1968) found that rehearsal sessions separated by one week helped Ss cope with psychological stress. However, Watkins (1969), who programmed rehearsal sessions only eight hours apart, did not find this procedure

effective in increasing tolerance of psychological stress.

A future experiment could examine the effects of giving Ss two rehearsals as compared to Ss receiving one rehearsal and Ss receiving no rehearsal. The importance of a time interval between rehearsal and the actual pain could be investigated also. One set of Ss might be given two rehearsals separated by a day (as in Mis' study). Another set of Ss might experience two rehearsals, wait a day, and then experience the pain. A third group might rehearse once, wait a day, and then experience the pain. Fourth and fifth groups might rehearse twice and once before pain, respectively, with no intervening time period between rehearsal and pain. The above study would also evaluate any effect of sequence of rehearsals and time interval.

The finding that "repressors", in the anticipation group only, went down in tolerance after the first exposure, differed from the finding of Mis (1969). However, as has been noted Mis, used a different stimulus on the second exposure than on the first. Hence, there may be an effect of changing the stimulus on the way in which "repressors" and "sensitizers" react to repeated pain. Further research may be of value in clarifying the role of anticipation and stimulus change on the reaction of "repressors" and "sensitizers" to repeated pain. A future experiment may involve a factorial design incorporating the following: (a) "repressors" versus "sensitizers"; (b) anticipation versus no anticipation; and (c) change in pain stimulus from the first to the second exposure versus no such change.

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APPENDIX I

Analysis of variance on simple main effects.

(B X C interaction significant)

MS C at B₂ = 364.98, df = 1

F = 5.47* (p < .03)

MS C at B₁ = 61.66 (N.S.)

MS within cell = 66.63, df = 44

MS B at C₁ = 8.15 (N.S.)

MS B at C₂ = 70.52, df = 1

F = 4.67* (p < .05)

MS B X S W. G. = 15.08, df = 44

* Required F for analysis of components of

B X C interaction = (r-1) (q-1) F for

B X C = 1 x 4.08 = 4.08

(Myers, p. 345)

APPENDIX II

Planned non-orthogonal comparisons between Control Ss and
"Anticipation" Ss and between Control Ss and Rehearsals.

Control - Anticipation = $40.01 - 38.80 = * 1.21$ (N.S.)

Control - Rehearsal groups = $40.01 - 39.68 = ** .33$ (N.S.)

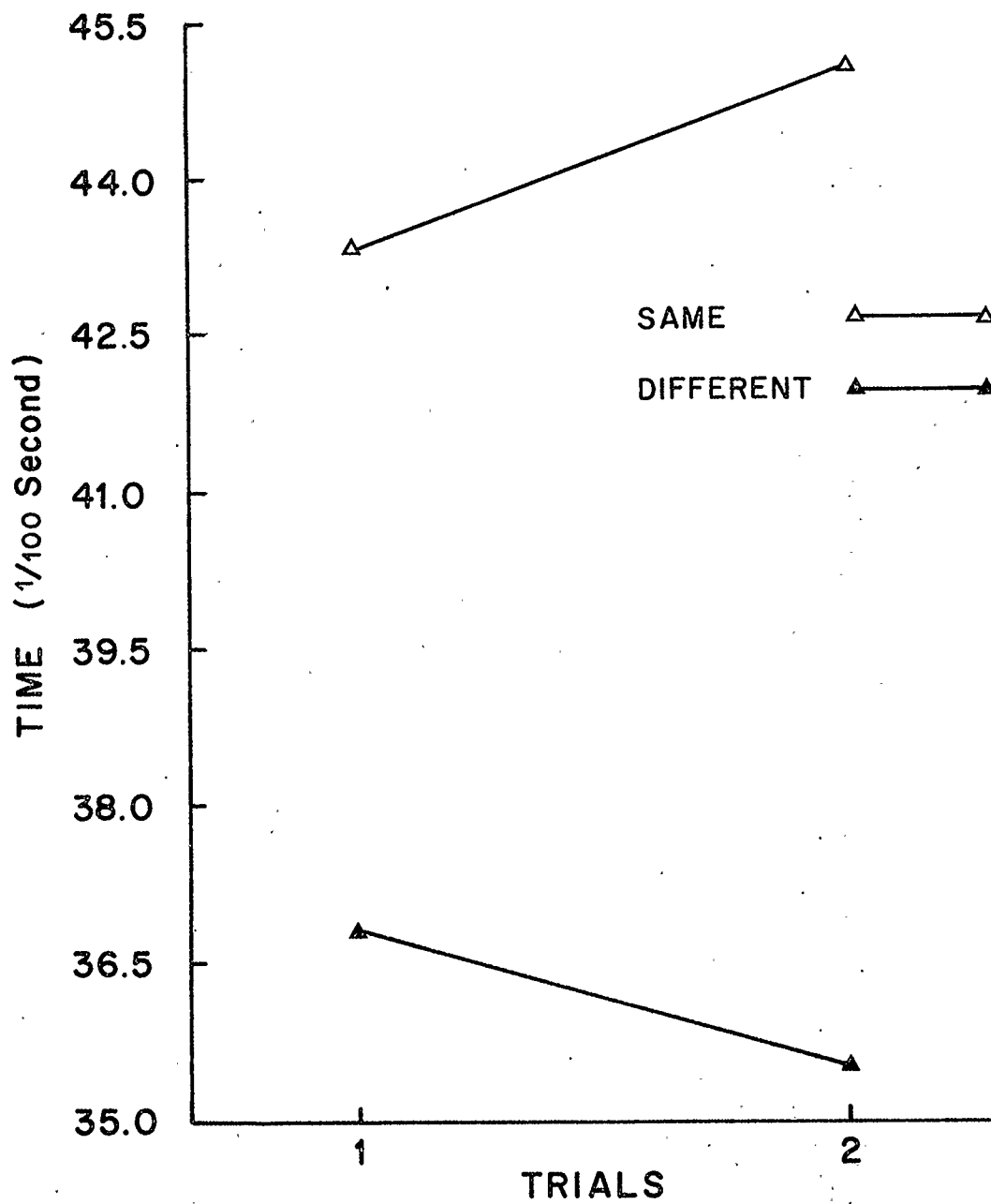
* critical d (pair-wise comparison) = 9.64

** critical d (non-pair-wise comparison) = 23.85

(Dunn, 1961)

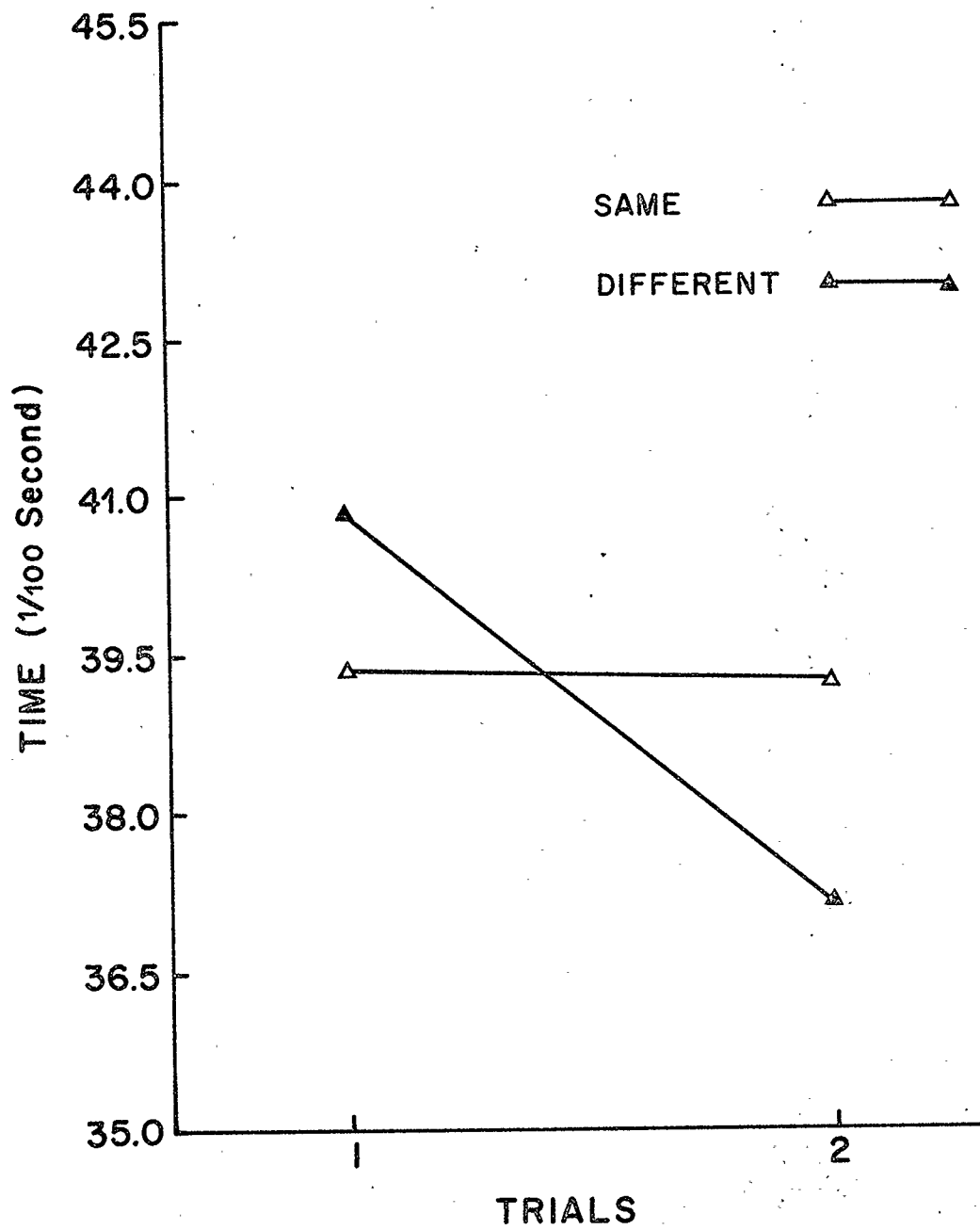
APPENDIX III

Relevance X Exposures for Verbal Description



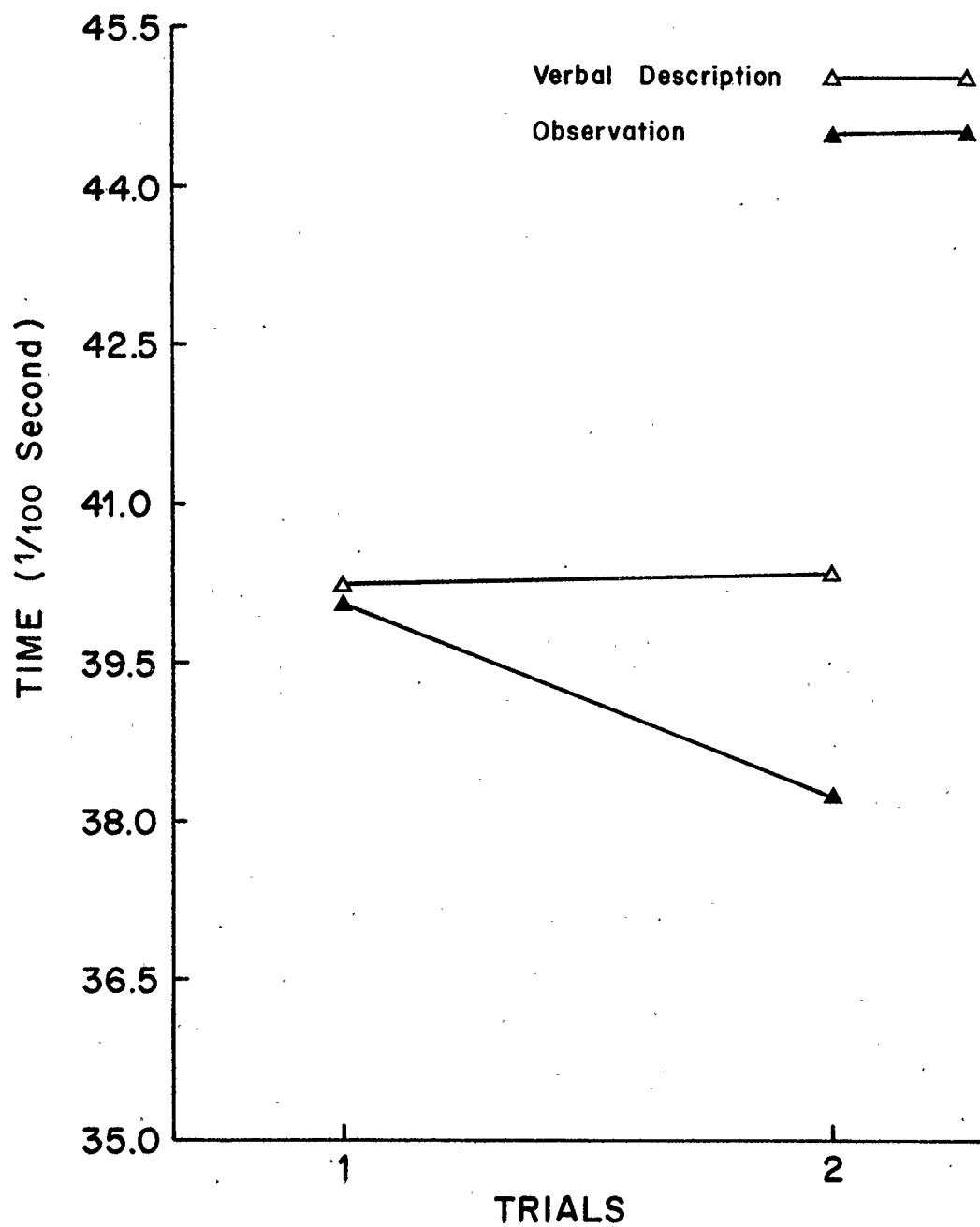
APPENDIX IV

Relevance by Exposures for Observation



APPENDIX V

Mode by Exposures



APPENDIX VI

R - S at Anticipation & Control

