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Attention and Resistance To Extinction

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ATTENTION AND RESISTANCE TO EXTINCTION

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Biography

Rev. Camillus W. Vahl, O. F. M. was born on January 18, 1931 in Chicago, Illinois. He entered the Franciscan Novitiate in August of 1951. In June of 1954 he received the A.B. degree in Philosophy and was ordained to the priesthood June 24, 1958.

Father Vahl did undergraduate work in Psychology at Washington University, St. Louis, Missouri and subsequently taught psychology and education courses for three years at Our Lady of Angels Franciscan Seminary, Cleveland, Ohio. Fr. Vahl undertook graduate work in Psychology at Loyola University, Chicago, Illinois, during the summer of 1963 and was awarded the A.M. degree in Experimental Psychology on January 31, 1965.

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CHAPTER I

THE PROBLEM AND RELATED LITERATURE

Contemporary Learning Theory (Mowrer, 1960) places a heavy emphasis upon secondary reinforcement in its attempt to explain the stability of learned emotional (autonomic) responses, but it seems apparent that attention (Mowrer, 1960a) is a large factor in the resistance to extinction exhibited by such habits. Observations of laboratory animals often indicate inattention to a CS that has been paired with negative reinforcement (e.g. shock paired with a light), which, supposedly, increases resistance to extinction. On the human level, inattention to aversive stimuli is a frequent observation. Presumably, inattention plays a large role in dissociation, repression and, most evidently, in instrumental avoidance behaviors (Vahl, 1964). Consequently, not attending to the conditioned stimulus is thought to be lawfully related to the maintainance of such learned responses (emotions) and, therefore, an important variable in explaining the stability and longevity of such behavior.

This relationship of attention to resistance to extinction is also suggested by Reciprocal Inhibition Theory (Wolpe, 1958). Among its variant procedures, one approach is to have aversive stimuli

imaginally presented to the client in an attempt to countercondition the associated fear. Recent among the ever-growing number of Action, or Behavior, Therapies (London, 1964) is that of Implosive Therapy (Stampfl, 1960).

The central aim of Implosive Therapy is to present anxiety-laden imagery to the client in an attempt to arouse maximal states of felt anxiety. It is postulated that the fear associated with such conditioned stimuli will extinguish when elicited to the imagery that will evoke it. In everyday life the client employs varieties of behavioral and ideational avoidance responses to escape these CS and the consequent arousal of anxiety or learned fear; but concentrated imaginal confrontation with these CS obstructs the avoidance behavior, elicits much felt anxiety and leads to the extinction of the learned fears (Levis, 1962). Implicit herein is the notion that attention (or its lack) has much to do with the resistance to extinction such habits exhibit.

Although attention and its relationship to learning is a relatively neglected topic (Hill, 1963), presumably due to the difficulty of establishing a functional operational-definition thereof (Mowrer, 1960), this relationship is implicit in a wide variety of learning theory experimentation. The literature concerning avoidance conditioning and extinction studies has stressed a host of

factors relative to the phenomenon of resistance to extinction (Lawson, 1963): 1) schedules of reinforcement, 2) frequency of reinforcement, 3) quality of reinforcement, 4) delay of reinforcement, 5) frustration effects, 6) secondary reinforcement, 7) effortfulness of response, 8) distribution of extinction trials, 9) competing responses and, 10) the role of punishment. A great deal of this literature suggests that the length of time and/or manner of the presentation of the CS is a crucial factor in the extinction and/or maintenance of the learned behavior (Kimble, 1961).

Page and Hall (1953) trained rats to go from one side of an apparatus to the other to avoid shock and, following training to a criterion, extinguished the rats in two different ways. One (control) group received ordinary extinction trials beginning immediately after conditioning. For the other (experimental) group the first five trials were blocked. These animals were put in the starting box on each trial and restrained there for fifteen seconds. Following these five trials, the experimental animals were extinguished in the same way as the control group. The number of trials required to produce extinction was 38 for the control group and 13 for the experimental group, indicating that the prolonged confrontation with the CS by the experimental animals accelerated the extinction process.

Denny, Koons and Mason (1959) trained rats to jump out of a box to avoid shock. The escape area, for the different groups, was either a box like the starting box where shock was administered or an open area which was perceptually much different from the starting box. Extinction was found to be faster when the start and escape areas were similar.

Bitterman, Fedderson and Tyler (1953), on a combination elevated runway and single jumpstand, trained rats to run to the end of the runway and jump to food. They were reinforced fifty percent of the trials and not on the others, on an irregular pattern. During the acquisition phase of the experiment, there were two main groups. One, a discrimination group, received reinforcements and non-reinforcements, respectively, in goal boxes of different colors (black and white). The other main group, a non-discrimination group, entered the same goal box on both reinforced and non-reinforced trials. In extinction, each of the main groups was subdivided into two main subgroups. One of these, a secondary reinforcement group, was extinguished using the goal box previously associated with reinforcement. The other subgroup, a non-secondary reinforcement group, was extinguished with the previously negative goal box in the case of the discrimination group, and with a new goal box, opposite to that used in training, in the case of the non-discrimnation group. Resistance to extinction was reduced by using the pre-

viously reinforced goal box; thus, presenting the CS that was originally paired with reinforcement, rather than a goal box of a different color, accelerated the extinction process.

Studies of latent extinction also suggest that attention to the CS is an important factor in resistance to extinction. Moltz' study (1955) is typical. Sixty rats received forty trials in a T-maze and then were extinguished in one of three ways. One control group was extinguished in the ordinary manner. The other two experimental groups received four one-minute latent extinction trials in the goal box. For one of these groups the food cup, a powerful secondary reinforcer, was present during latent extinction. For the other latent extinction group it was not. In subsequent tests, these groups displayed quite different resistance to extinction. The number of correct responses required to meet a criterion of extinction was 4.7 for the control group, 5.4 for the group given latent extinction without the food cup and 2.2 for the group given latent extinction with the food cup present. The only significant differences were between the group subjected to extinction with the food cup present and the other two groups.

In a recent study, Spence (1963) reported: "Rate of extinction of the conditioned eyelid response in humans is a function of the degree of discriminability of the procedural changes that occur with

the shift from acquisition to extinction. Extinction is greatly retarded when these changes are minimized or the subject is distracted by another task." Spence seems to be saying that the more prominent the CS and the more concentrated attention the subject can give to the CS the less resistance to extinction there will be.

Solomon, Kamin and Wynne (1953), in the study of traumatic avoidance learning, using dogs as subjects, reported that ordinary extinction procedures were ineffective, but that a glass barrier which kept the dogs in the presence of the CS was effective, at least for some of the dogs. Because of the UCS employed (subtetanizing shock) the glass barrier, when combined with counter punishment for jumping, was the most effective extinction procedure.

Subception studies, in general, provide the clearest suggestion that resistance to extinction is governed by the variable of attention to the CS (Hall, 1961). Lazarus and McCleary (1951), using impoverished stimuli, demonstrated that the GSR will discriminate conditioned from neutral stimuli (nonsense syllables) when the subject's verbalized identifications are incorrect. The phenomenon of autohomic discrimination without awareness, or subception, was confirmed by Lowenfeld (1956). After he had conditioned his subjects and demonstrated autonomic discrimination he informed his subjects that they would not be shocked again. When the stimuli continued

to be presented at impoverished levels the GSR continued. But when the stimuli were presented at speeds which permitted easy recognition the GSR extinguished very rapidly.

Wall and Guthrie (1959) corroborated Lowenfeld's findings. These authors postulated: a) a conditioned response will continue to be elicited when the conditioned stimuli are impoverished by rapid tachistoscopic exposures so as to make correct verbal report improbable; b) a response of this nature will continue to be elicited despite assurance of no more shock; c) a response of this nature still being elicited despite no reinforcement will be markedly reduced following repeated exposures of the original reinforced stimuli without reinforcement at speeds permitting correct verbal report; and, d) a response of this nature still being elicited without reinforcement will be minimally reduced following repeated exposures of comparable neutral stimuli at speeds permitting correct verbal report. The experimental results confirmed all four hypotheses. Whatever the validity of these subception studies, or the other studies previously cited, they do suggest that attention, or the subject's prolonged encounter with the CS, is an important determinant of resistance to extinction.

Summarily, and in view of the implications of Behavior Theory and the cited learning theory experimentation, the present experiment

is designed to study the relationship of attention to resistance to extinction. Admittedly, attention is a difficult concept to define (Mowrer, 1960a). For our present purposes attention will be defined, operationally, in terms of the amount of time the conditioned stimulus is presented to the subject. It is hypothesized that resistance to extinction is inversely related to the amount of time the CS is presented to the subject.

A previous study was conducted in which shock was paired with one of three nonsense syllables presented on a memory drum. Exposures of the CS during the extinction trials was 0.5 seconds for one group and 1.5 seconds for another group. The experimental results were inconclusive and, presumably, the factor of visual attention was not under control. In this study, therefore, an auditory stimulus was paired with shock on the assumption that it is much more difficult for subjects to escape an auditory stimulus. Thus, during the extinction phase of this experiment, the CS was presented to one group of subjects for the duration of one second and the CS, for the other group, was sounded for a period of six seconds. All other things being equal, it was specifically hypothesized that the group to which the CS was presented for the longer period of time would be less resistant to extinction than the group to which it was presented for the shorter period of time.

CHAPTER II

THE EXPERIMENT

Subjects: sixty-four male college students were randomly assigned to five groups, four experimental and one control.

Apparatus: the experiment was conducted in the Psychogalvanometer Research Laboratory at Loyola University. Subjects were seated in a cushioned armchair. Two small finger-bottles were attached to the left arm of the chair and were filled with Ringer Solution; two thin copper plates were inserted in the finger-bottles and wired to the psychogalvanometer.

The radio jack of a transistor-radio earplug was wired to a Harvard Inductorium coil, itself wired to an Everready 1.5 volt Ignitor Battery to which an on-off button was attached. A large and noisy exhaust fan was turned on during each experimental session to mask out extraneous noise. A Herr-Osborne Psychogalvanometer, powered by a 9 volt battery, was used to measure ohms change in resistance in the subjects.

Two separate tape recordings were composed for the experiment.

Tape A consisted of:

2 minutes of semi-classical music (Adaptation Period)

2 minutes of semi-classical music with four organ tones occurring every thirty seconds for the duration of one second (Adaptation)

7 minutes of semi-classical music with fourteen organ tones occurring every thirty seconds for the duration of one second (Acquisition Phase)

2 minutes of semi-classical music with four organ tones occurring every thirty seconds for the duration of one second (Test for learning period)

2 minutes of semi-classical music with four organ tones occurring every thirty seconds for the duration of one second (Acquisition Phase)

15 minutes of semi-classical music with thirty-six organ tones occurring every twenty-five seconds for the duration of one second.

The recording on the second tape, Tape B, was exactly the same except that the last fifteen minutes consisted of:

15 minutes of semi-classical music with thirty organ tones occurring every thirty seconds for the duration of six seconds.

The musical background was supplied to eliminate the otherwise monotonous thirty minutes of sounding organ tones. Organ tones were used since all CS presentations could be easily controlled regarding sameness of tone, volume and duration for all the subjects. The tones were sounded for at least one second so that the CS could be easily distinguished from the musical background; this also allowed sufficient time for the administration of shock. These tones were spaced every thirty seconds in order to allow sufficient recovery time for the GSR itself.

The first four minutes of the tape recording allowed the subject to adapt to both the musical background and the organ tones. The subsequent seven minutes was the first stage of the Acquisition Phase of the experiment. The following two minute period constituted a test for learning to insure learning equivalence for all subjects in all groups. The next two minute period was the second stage of the Acquisition Phase followed by the fifteen minute Extinction Phase of the experiment.

By this procedure it was possible to present to all subjects of all groups an almost identical experimental situation. In view of the extensive number of variables considered relevant to the galvanic skin response and its measurement (Woodworth & Schlosberg, 1962), an attempt was made to equate all factors for all subjects

and thereby leave as little error variance as possible for the subsequent statistical analysis. Thus, the musical background was the same for all subjects. The intertrial interval was the same for all subjects, during Acquisition (one second organ tones occurring every thirty seconds) and during Extinction (one and six second organ tones, respectively, occurring every twenty-five seconds). The shock apparatus and the amount of shock administered was held constant; the total time for the experimental session was the same for all subjects. The outstanding difference was that the CS was presented, during Extinction, for one second to some and for six seconds to other subjects.

Procedure: Each subject was instructed to wash and dry his hands. The loud exhaust fan was then turned on. The subject was instructed to sit down, with feet flat on the floor, and to put two of his fingers into the bottles containing the Ringer Solution. He was then instructed to hold the radio jack between the thumb and forefinger of his other hand and to find as comfortable a position as possible so as to eliminate all movement throughout the entire experiment. Shock was administered once or twice so as to dissipate the subject's initial apprehension. The basic resistance of each subject was then adjusted on the psychogalvanometer and the subject was allowed to sit quietly for five minutes in order that a stable basic resistance measure could be obtained. The subject was then

instructed to close his eyes so as to eliminate distractions and to sit as quietly as possible and listen to the tape recording.

Shock was administered to all the subjects in the following manner: during the first and second phase of Acquisition shock was administered 0.5 seconds after the onset of the organ tone (18 trials in all) and it lasted for 0.5 seconds until the offset of the organ tone. The amount of shock administered in all trials for all subjects was 5 volts (.06 milliamperes).

Groups 1, 2, 3 and 4 (experimental groups) all received these initial instructions; Group 5 (control) received the same instructions but the radio jack was not presented to them since no shock was to be administered to this group in order to make sure the organ tone itself was not an aversive stimulus and a cause of learning. Groups 1 and 2 continued throughout the entire experiment under the above cited instructions; Tape A (one second CS) was presented to Group 1 and Tape B (six second CS) to Group 2. Group 3 was presented with Tape A, and Tape B was presented to Group 4. Groups 3 and 4 were told that no more shock would be given during the remaining part of the experiment and the radio jack was removed from between their fingers. This procedure occured just prior to the first Extinction trial. (The removal of the jack was required after six subjects were eliminated since mere belief in the verbal instruction that

no more shock would be administered did not work; they considered this an experimental ruse.) These subjects were then instructed to sit as quietly as possible, eyes closed, and listen to the remainder of the recording.

This latter procedure was introduced to rule out the variable of expectancy as a possible source of GSR responding during the Extinction trials. The literature (Mowrer, 1938; Lindley & Moyer, 1961) indicates that instructions to the effect that no more shock will be administered reduces the magnitude and the frequency of the GSR during Extinction. Groups 3 and 4, therefore, were introduced to eliminate the expectancy of shock as a possible explanation of GSR responding in Groups 1 and 2. All groups, however, were studied in relation to the same experimental hypothesis and not in contrast to one another. Finally, all subjects were instructed to keep the experiment secret until a date well after the completion of the entire experiment.

Analysis: GSR responses (lowered resistance in terms of ohms) were recorded for all trials, for both Acquisition and Extinction. The basic resistance of each subject was recorded and a Ratio Score was obtained (mean ohms drop divided by basic resistance) indicating individual magnitudes of response to shock relative to their basic, but differing, resistances and used for a comparative

analysis of all subjects. This latter procedure is required since variability in conditioning differed from subject to subject because of their varying resistances, possible inequalities of shock administered, timing differences regarding the 0.5 second onset of the shock itself, etc.

A criterion of thirty extinction trials was established; the number of responses occurring during extinction and the number of the last trial on which a response was given were recorded. A t-test was scored for all obtained group measures.

CHAPTER III

THE RESULTS

Tables 1 and 2 show the results for all four experimental groups of subjects. Groups 1 and 2 were not significantly different with regard to their respective learning ability ($t = .36$); this was also true for Groups 3 and 4 ($t = 1.15$). Ten subjects (not listed) in the control group gave no measureable responses to the organ tone itself. Tape A was presented to five of these control subjects and Tape B to the remainder; no learning was obtained for any of these subjects. Ten subjects were eliminated from the experiment: six because of no learning, two who did not follow instructions and two others because of temporarily defective equipment.

Table 1 presents an analysis of experimental groups 1 and 2; these subjects were not instructed regarding the cessation of shock and are, therefore, labeled as the Expectancy Groups. Two measures of extinction are presented: total number of Responses given throughout the thirty extinction trials (only those responses elicited two seconds after the onset of the CS were recorded), and the Last Trial on which a response was given to the CS. Regarding

the measure Last Trial (t = 1.5), Groups 1 and 2 are almost identical. This is illustrated in Figure 2 in which the subjects of Groups 1 and 2 are ranked. Regarding the number of Responses (t = 1.89) recorded during extinction, the group mean averages differ at approximately the .07% Level of Confidence; cf. Table 3, a summary presentation of the mean average differences between groups.

This analysis of the Responses elicited during extinction is illustrated in Figure 1. When all the subjects in Groups 1 and 2 are ranked it can be seen that all members of Group 2 (six second CS) fall below all members of Group 1 (one second CS). However, the t-test score (.07%) does not reveal significant differences between the groups themselves.

An analysis of the Ratio Scores for these Expectancy Groups (mean ohms drop during Acquisition divided by basic resistance) shows no significant differences between Group 1 and Group 2 when you take into account the magnitude of their respective response to shock. The most that can be said for Groups 1 and 2 in relation to the experimental hypothesis is: when the total number of Responses occurring during Extinction is considered, the Group to whom the CS has been presented for the longer period of time (six seconds) approximates the .05% Level of Significance; the experimental results, however, are not significant and, therefore,

TABLE 1

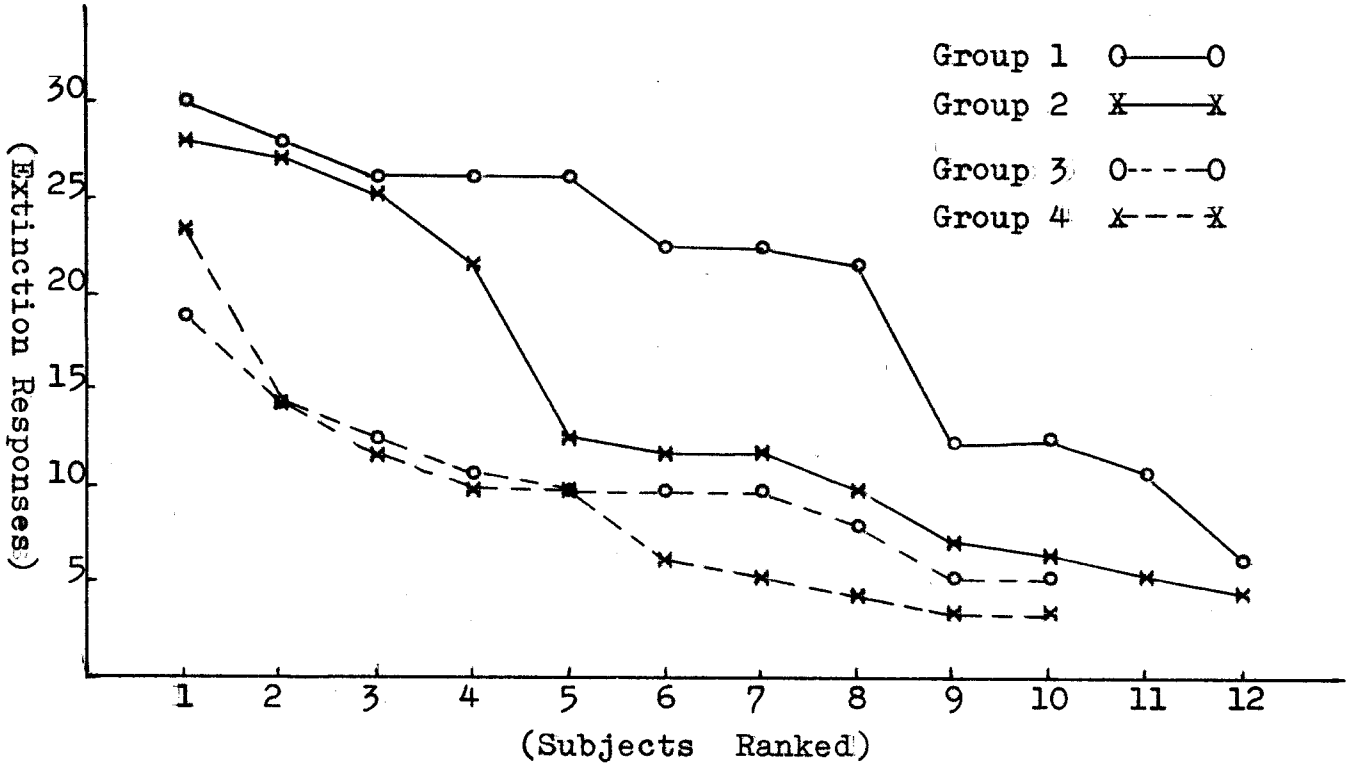
TOTAL NUMBER OF RESPONSES ELICITED DURING EXTINCTION; LAST TRIAL ON WHICH A GSR OCCURRED AND MEAN RESPONSE MAGNITUDE TO SHOCK.

EXPECTANCY GROUPS						
	Group 1			Group 2		
Subject	Ratio Score	Responses	Last Trial	Ratio Score	Responses	Last Trial
1	.045	23	30	.055	6	11
2	.033	30	30	.057	7	29
3	.019	26	30	.025	25	28
4	.016	22	30	.010	4	9
5	.023	6	19	.065	10	24
6	.046	11	14	.065	22	25
7	.018	26	29	.024	28	30
8	.025	23	29	.013	5	21
9	.023	28	30	.010	13	30
10	.016	26	30	.037	12	27
11	.043	13	30	.019	27	30
12	.010	13	30	.011	12	19
Mean	.031	20.58	27.6	.039	14.25	23.6

TABLE 2

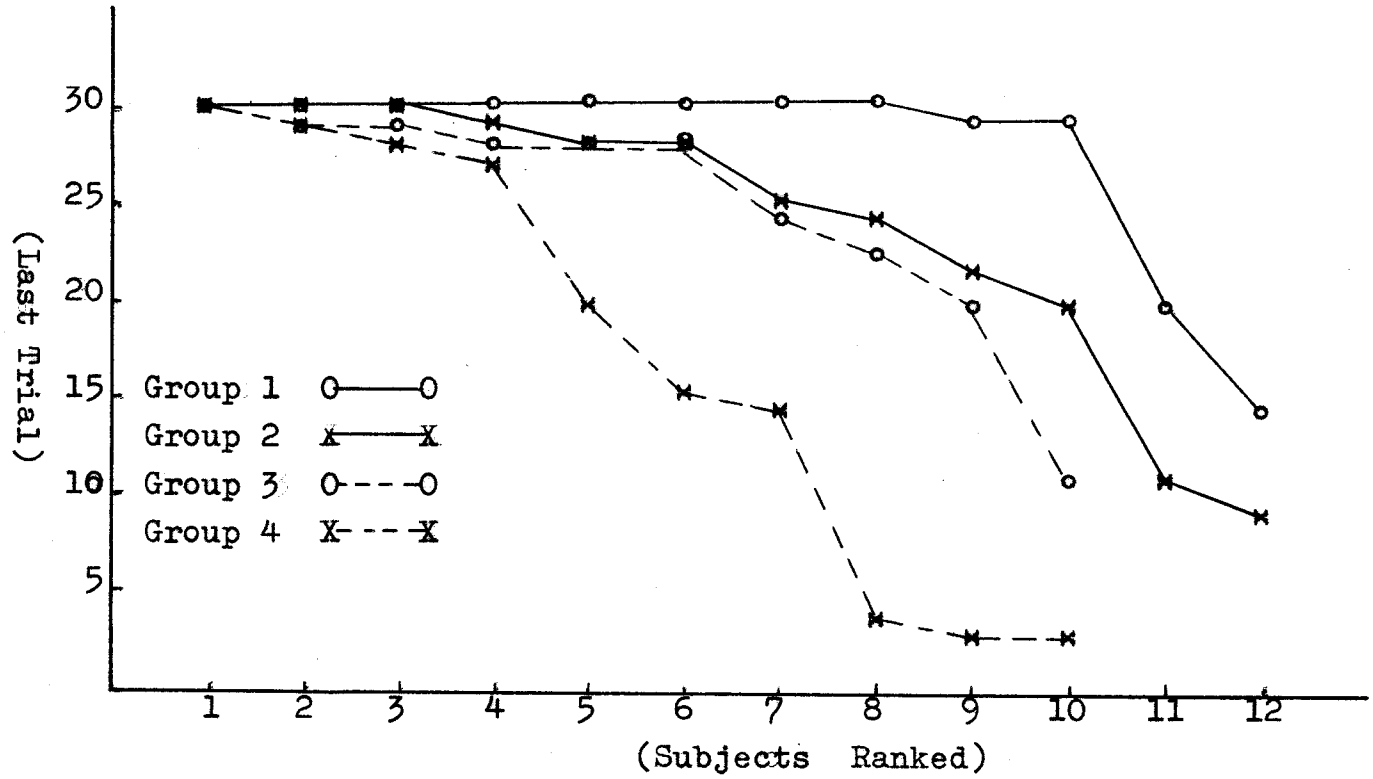
TOTAL NUMBER OF RESPONSES ELICITED DURING EXTINCTION; LAST TRIAL ON WHICH A GSR OCCURRED AND MEAN RESPONSE MAGNITUDE TO SHOCK.

NO EXPECTANCY GROUPS						
	Group 3			Group 4		
Subject	Ratio Score	Responses	Last Trial	Ratio Score	Responses	Last Trial
1	.026	19	24	.010	10	29
2	.015	10	22	.025	6	20
3	.025	10	19	.019	5	15
4	.040	8	29	.035	12	28
5	.066	5	29	.049	3	3
6	.038	11	28	.037	3	3
7	.055	10	28	.051	14	27
8	.040	5	11	.046	10	14
9	.023	13	28	.043	23	30
10	.031	14	30	.047	4	4
MEAN	.036	10.5	24.8	.035	9	17.3



Total Number of Responses During Extinction for all Subjects

Figure 1



The Last Trial on which a GSR occurred for all subjects

Figure 2

the null hypothesis cannot be rejected in this instance.

TABLE 3

SUMMARY OF t-TEST SCORES
FOR ALL EXTINCTION MEASURES IN ALL GROUPS.

Measure:	df	Groups 1 & 2	df	Groups 3 & 4
Responses	22	1.89	18	.64
Last Trial	22	1.50	18	1.90

Table 2 shows the same two extinction measures for Groups 3 and 4. They were labeled No Expectancy Groups since all these subjects were instructed that no further shock would be administered and the jack was removed from between their fingers. Regarding the number of responses ($t = .64$) recorded during extinction, no significant differences exist between Groups 3 and 4. Cf. Table 3 and see Figures 1 and 2 for an illustration of these resultant data. Figures 1 and 2 show the expected drop in magnitude and frequency of GSR responding for Groups 3 and 4 as well as the greater similarity between these two groups as opposed to the Expectancy Groups.

Regarding the Last Trial ($t = 1.90$) on which a CR did occur, Groups 3 and 4 differ at the .08% Level of Confidence. This comparative analysis is illustrated in Figure 2. An analysis of the Ratio Scores for Groups 3 and 4 show no clear cut differences for subjects of varying magnitude of response to shock in relation to the experimental hypothesis. The most that can be said for Groups 3 and 4 in relation to the hypothesis is: when the Last Trial is considered, subjects to whom the CS is presented for the longer period of time (six seconds) approximate the .05% Level of Significance; however, the results are not significant and the experimental hypothesis is not supported by the performance of the No Expectancy Groups.

A straight line transformation of the curves obtained for the individual Ratio Scores indicates a trend, i.e. subjects with lower Ratio Scores tend to follow the hypothesis. This is also true for the Ratio Scores obtained for Groups 1 and 2. Since there seems to be no experimental evidence on this point, it would require further experimentation to support the contention that magnitude of response is a confounding variable in the present experiment.

Summarily, the hypothesis: resistance to extinction is inversely related to the amount of time the CS is presented to the subject, is not significantly supported by the results of this experiment.

CHAPTER IV

DISCUSSION AND SUMMARY

A simple rejection of the hypothesis: resistance to extinction is inversely related to the amount of time the conditioned stimulus is presented to the subject, would obviate further discussion of the results of this experiment. However, because of the theoretical premises on which the hypothesis is based, the suggestion offerred by a wide variety of experimentation and the factors involved in this particular experimental design, further investigation seems warranted. A number of possibilities suggest themselves in such a discussion.

In itself, the experimental hypothesis is generic, but the experimental design, upon closer observation, demands a high degree of measureable discriminability of the autonomic processes involved. The experimental design presumes the effects of one second versus six second presentations of the conditioned stimulus is observably discriminable and that the proposed inverse relationship between attention (so defined) and resistance to extinction is lawfully related in terms of differing and small fractions of

temporal duration of the conditioned stimulus. This may not be true at all, whereas the hypothesis itself may be actually correct. The postulated inverse relationship could be valid irrespective of any alleged and highly specified time ratio.

For all practical purposes, one second presentations of the conditioned stimulus, may be, in some instances, as temporally effective for extinction to occur as six second presentations of the CS. If this were true, the variance in Group 1 and Group 3 would be easily explanable. As a matter of fact, only two subjects in Group 1 and only three subjects within Group 3 differ significantly from other subjects in the same groups, respectively. This reasoning suggests that future experimentation in this area present an "impoverished" conditioned stimulus and contrast it with a CS perduring for one, two or three seconds.

Additionally, more extinction trials (e.g. fifty, instead of thirty) would perhaps show more clear cut differences between the experimental groups. This seems reasonable in view of the fact that ten of the twelve subjects in Group 1, and, at least, six of the ten subjects in Group 3 continued to respond to the conditioned stimulus beyond the thirtieth extinction trial. In such an experimental design, the five subjects in Group 2 and the four subjects in Group 4, observed to be responding on the thirtieth trial, may

have been observed to extinguish significantly sooner than all subjects against whom they were matched. Only further experimentation, however, can provide evidence for the reasonableness of these contentions.

Even if we grant the validity of these suppositions, however, we are still faced with explaining why some members of each of the groups differ, i.e. why some to whom the CS is presented for one second extinguish so rapidly and why some to whom the CS is presented for six seconds maintain the conditioned response for so long a time. A comparative analysis of the Ratio Scores assigned to these atypical subjects gives no clue as to why they differ; such an analysis, however, suggests that the higher the Ratio Score (average ohms drop divided by basic resistance) the more difficult it is to discriminate one group of subjects from another. In the revised experimental design here suggested, matched Ratio Scores might possibly indicate subgroup differences and, therefore, explain variances within any one group. Short of this, speculation would turn our attention to such variables as: cognitive functions (Landis & Hunt, 1935), differential conditionability (Eysenck, 1961), neurological components of the galvanic skin response (McCleary, 1950; Lindsley, 1951; Martin, 1961) and the host of other factors considered relevant to GSR conditioning (Woodworth & Schlosberg, 1962).

The set design in this experiment, however, attempted to cut across a wide variety of variables certainly involved in all galvanic skin response conditioning by presenting tape recordings to all subjects in all groups. This device allows, presumably, many variables to be bypassed simply because so many factors are equated for all the subjects to be tested. Coupled with more extinction trials, matched subjects in terms of Ratio Scores and using an impoverished CS for one group during extinction, the contribution of many such variables to error variance could be ferreted out by subsequent statistical analysis.

Discussion of this kind of experimentation concerns: instructional set (Mowrer, 1938; Lindley & Moyer, 1961), presence of the UCS during extinction (Spence, 1963), intensity of the UCS (Wickens, 1963), etc. As Mowrer and others (Cook & Harris, 1937) have pointed out, instructions to the effect that no more shock will be administered markedly reduces the magnitude of the GSR; the results of this experiment (cf. Figure 1) confirms this observation. Additionally, Stampfl (1961) has argued that increasing numbers of stimuli within the stimulus complex to which a response is conditioned increases resistance to extinction; recall that the jack which delivered shock was removed from the subjects in the No Expectancy Groups! These, and many other variables, can be eliminated, it seems, by using tape recordings that cut across all these factors,

i.e. equate them for all subjects.

Thus, a further experimental alteration would be to increase the volume of shock or use an intermittent schedule of reinforcement in order to obtain a more stable GSR for those in the No Expectancy Groups. In this way, subjects would continue to be divided into Expectancy and No Expectancy groups in order to control the variable of expectancy itself, but all subjects would give readily measureable responses and, hopefully, readily discriminable responses.

The experiment in this article contained a number of uncontrolled variables. Room heat varied, but the Ratio Score analysis did not reflect the influence of this variable. Some subjects were more apprehensive than others. Some counted by 1000s to discover the time interval between presentations of the conditioned stimulus; other subjects focused upon the background music in an attempt to identify the melodies. None of the questions asked of the subjects, however, revealed any one consistant reaction that possibly influenced the results obtained.

Some subjects easily relaxed as the experiment progressed. Because of room heat and the pleasureable music some were tempted to cat-nap; none actually did. Slight differences in the volume of

the tape recorder existed and, no doubt, auditory acuity differed from subject to subject. None of these variables, however, observably influenced the conditioned response or the conditioning process itself. Depending upon your frame of reference, you can emphasize these various factors and their control, or, by redesigning the experiment as suggested, leave such error variance possibilities for statistical analysis, thereby minimizing their overall importance. Since such variables (and many others that were undoubtedly operative) do not easily lend themselves to control, the author considers the suggested redesigning of the experiment to be profitable and warranted by the obtained results.

Summarily, forty-four subjects were divided into Expectancy and No Expectancy Groups and further divided into one second and six second groups. Shock was paired with an organ tone and the resultant conditioned response extinguished by presenting the CS to some subjects for one second and for six seconds to others. On the basis of the Responses elicited during Extinction, the Expectancy Groups differed at the .07% Level of Significance. On the basis of the Last Trial on which a response was elicited, the No Expectancy Groups differed at the .08% Level of Significance. The experimental results do not significantly support the hypothesis that resistance to extinction is inversely related to the amount of time the CS is presented to the subject.

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APPROVAL SHEET

The thesis submitted by Reverend C. W. Vahl, O.F.M. has been read and approved by three members of the Department of Psychology.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to content, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the Degree of Master of Arts.

2/2/1965
Date

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Signature of Adviser