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The Effect of Overlearning and the Associative Value of the Stimuli Upon Reversal Learning

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THE EFFECT OF OVERLEARNING AND THE ASSOCIATIVE VALUE OF THE STIMULI UPON REVERSAL LEARNING

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Ralph D. Marken

It has generally been acknowledged that the transfer of training is an area of great practical importance, and, in fact, it is basic to the concept of the foundations of education. The transfer of training refers to the fact that the learning or training that has taken place in one task carries over, or transfers, to a second. Our Western culture has portrayed the importance of this area through the organization of a large number of institutions in order to train both children and adults. The general belief has been that such training will carry over to situations in everyday living.

The area of transfer has initiated many points of view. Some of the experimental evidence that has been accumulated in this area (Harlow, 1949; Duncan, 1960) reveals that all transfer effects cannot be related to an analysis of specific stimulus and response relationships. The other influences that enter in can be termed general factors.

It has been demonstrated by Harlow (1949) that the number of trials required to learn a task declined as a function of the number of tasks that were learned. He found an increase in learning efficiency as more and more problems were provided for the organism to solve. However, this increase in efficiency was not contributed to transfer effects based on similar stimuli used on consecutive problems. Harlow attempted to explain these results in terms of a new process which he called a "learning set" or "learning to learn."

The formation of learning sets has been investigated in a variety of species with a number of different learning situations. One type of learning situation which might be placed under the learning set category is the discrimination reversal and the related overlearning.

The overlearning reversal situation can be demonstrated in a two choice discrimination problem. The positive stimulus in one series of trials becomes the negative stimulus for the next series. The overlearning reversal situation usually involves the training of a subject on a discrimination task until some criterion is met. That is, the subject learns to respond to stimulus A rather than to stimulus B. Upon reaching the criterion for original learning, the subject is given overlearning trials with A still positive and B negative. After a set number of overlearning trials is reached, the subject is reinforced for responding to stimulus B, and stimulus A is no longer reinforced.

The overlearning reversal situation can be illustrated by the work of Reid (1953). In his study three groups of rats were trained on a simple black-white discrimination problem in a Y maze. All three groups learned the original discrimination, with the black card positive, to criterion. Upon reaching this criterion, they received either 0, 50, or 150 overlearning trials before being reversed. The number of trials required to reach the same criterion with the white card positive was then determined for all three groups. It was found that the group which was given 150 overlearning trials learned the reversal task significantly faster than did the controls. This phenomena was called the overlearning reversal effect (ORE).

Since Reid's study a number of investigators have been interested in determining if these findings could be extended to other discrimination situations. It has been found that reversal behavior varies according to the task (Capaldi, 1963; Clayton, 1966; Cross, 1966; Hill, 1962; Ison, 1961), species (Cross, 1966; Mackintosh, 1965), and the developmental level of the species (Gollin, 1964; Kendler, 1962), as well as the type of schedule of reinforcement (Birch, 1960; Capaldi, 1957; Caul, 1964; D'Amato, 1960; Furth, 1964; Wagner, 1963). There have also been several different interpretations for the occurrence of the ORE.

Reid, the first investigator to describe the ORE, proposed that the overlearning trials result in the "response of discriminating". His observations of the animals in the learning situation suggested that the overlearning trials provided the rats with the opportunity to learn to stop at the choice point and look at both the positive and negative stimuli prior to making a response. Pubols (1956) supported this kind of response within the discrimination learning experiment when he found an ORE in a position discrimination task.

Reid's hypothesis was tested by Brookshire, Warren and Ball (1961) who reasoned that if the organism learns a discriminating response, then this response should generalize to a new stimulus dimension. They did find an ORE when the Ss were reversed on the same task but not when they were reversed to a new task or stimulus dimension. Mackintosh (1962) also followed this line of reasoning and failed to find an ORE when rats were reversed to a new stimulus dimension.

In the learning of a reversal, it is generally assumed that the previously correct response must be extinguished prior to the learning of the new response. As a result, a number of experimenters have assumed that the overlearning trials result in the strengthening or development of some process which, in turn, results in the more rapid extinction of the originally reinforced response when the discrimination is reversed.

Capaldi and Stevenson (1957) found an ORE in a simultaneous discrimination task and interpreted the effect in terms of differential extinction rates. These writers suggested that the more reinforced trials given to the originally positive stimulus, the easier it is to discriminate nonreinforcement when reversal training begins. They suggest that the overtraining trials result in the Ss being better able to discriminate the change in reinforcement.

A further hypothesis was advanced by D'Amato and Jagoda (1961) who reasoned that an essential component of simple discrimination learning is the development of avoidance tendencies toward the negative stimulus. They concluded that the S must extinguish his avoidance tendencies towards the negative stimulus and it is this factor that makes reversal learning so difficult.

D'Amato and Jagoda found that if their Ss were forced during overlearning to have a number of trials to the negative stimulus, the facilitative effect of overlearning disappeared. They concluded that the ORE occurs because of the lack of experience with the negative stimulus and therefore extinction of avoidance responses to this stimulus.

Another explanation of the ORE was conceived by Birch, Ison and Sperling (1960). They defined discrimination in terms of running speeds or latencies. Using rats in a straight runway and a single stimulus presentation, they obtained an ORE. The criterion for learning of the original discrimination task was defined in terms of the amount of time taken to go down the runway. An examination of the response speeds to the positive and negative stimuli indicated the reversal problem difference for the groups may be attributed to the differential rates of extinction. This does not necessarily mean that overlearning reduces resistance to extinction.

Many of the investigators who have reported results on the number of responses to the former positive stimulus after reversal, have found that the S receiving overlearning continue to respond to the former positive stimulus for more trials. This persistance, by Ss receiving overlearning, to respond longer to the former positive stimulus after reversal is not a denial of the ORE. Ss receiving overlearning may learn the reversal task in less trials than a group receiving no overlearning but may, at the same time, take longer after reversal learning begins to make their first correct response.

In an experiment by Mackintosh (1963) it was shown that overlearning does in fact increase resistance to extinction. Mackintosh carried out extinction of the original response after overlearning occurred to a criterion of equal choice to the positive and negative stimulus over 10 trials. This is the only reported study where extinction was carried out before reversal. The other studies that speak of extinction are referring usually to the number of trials during reversal before the S starts responding consistently to the new positive stimulus.

Most Es would agree with the results of Mackintosh in that resistance to extinction is usually considered to be an increasing function of the amount of reward obtained. The more overlearning that is administered the more reinforced trials the S receives, and, therefore, the greater the resistance to extinction. The present study examines the tendency to respond to the former positive stimulus, but extinction is not carried out in the manner that Mackintosh has done.

The ORE has been confirmed by Capaldi and Stevenson (1957), Komaki (1961), Mackintosh (1962, 1963a, 1963b), and Pubols (1956). All of the above experiments involved some variant of a black-white discrimination problem. In other variants of the overlearning reversal situation, the ORE has been reported when using rats by D'Amato and Jagoda (1961), Brookshire, Warren, and Ball (1961), Birch, Ison, and Sperling (1960), Ison and Birch (1961), and by North and Clayton (1959).

That the ORE occurs, however, has not been supported by all of the experiments in this area. A number of experimenters have been unable to replicate the influence of the overlearning variable on reversal learning. Paul (1966) failed to find an ORE using a verbal discrimination task and a memory drum. Mackintosh (1965) obtained an ORE for rats but not for chicks in similar experiments. Negative results have also been reported by Hochman using children (1966), Hill and Spear using rats (1963), Gollin using children (1966), Brookshire, Warren and Sterner using monkeys (1966), Erlebacher using rats (1963), Cross and Boyer using monkeys (1966), and Clayton using rats (1966). The variability of the ORE has led to some doubt as to whether or not the phenomena exists. The experimenters have arrived at different results using the same conditions and subjects as similar as possible. The difficulty, however, might not be in any one variable, but in an interaction of more than one variable.

Behavior is a continuous process and activities learned in the laboratory are as much a part of it as activities learned outside the laboratory. The variables that an experimenter selects for analysis are imbedded in a growing matrix and are interpretable only in terms of interactions within it. Experiments on overlearning reversal should attempt to look at these interactions.

All things considered, perhaps the most important variable found in the learning task is the meaningfulness of the material that is used. A number of studies have been carried out in the area of verbal learning where the meaningfulness of the stimuli were manipulated. It has been generally found that the rate of learning and the degree of retention are affected by the meaningfulness of the stimuli.

In this study the author attempts to control a new variable in an overlearning reversal study by controlling the meaningfulness of the stimuli. Some of the disagreement among the Es who have looked for the ORE may be related to the relevance of the stimuli to the class of subjects being used or to an interaction between these stimuli and the amount of overlearning received.

In this experiment the relevance of the associative value of the stimuli in an overlearning reversal task will be examined as well as the persistance to respond to the former positive stimulus after reversal. That is, (1) Does the associative value of the stimuli have an effect upon the occurrence of the ORE, and (2) Do human Ss who have received overlearning tend to respond to the former positive stimulus upon reversal for more trials than do subjects receiving no overlearning as has been found for animals?

HYPOTHESES

In view of the foregoing factors the following hypotheses are put forth;

1. Overlearning of a discrimination task will facilitate the learning of the reversal of that task.

2. Stimuli with a high associative value will facilitate the learning of the reversal of a discrimination task.

3. The overlearning reversal effect is dependent upon an interaction of both the amount of overlearning and the associative value of the stimuli.

4. Subjects receiving overlearning will not continue to respond to the former positive stimulus after reversal for as many trials as subjects receiving no overlearning.

METHOD

A 2 X 3 factorial design was used in order to facilitate the analysis of the reversal learning and to test the hypothesis that the two independent variables, associative value of the stimuli and the amount of overlearning, have an influence on reversal learning. This design also enables the experimenter to examine whether or not the two independent variables interact in their effect on reversal learning.

The two levels of the first factor, H and L, are assigned to the associative value of the stimuli. H corresponds to the stimuli with a high associative value and L to the stimuli with a low associative value. The three levels of the second factor, 0, 50, and 100, designate the amount of overlearning that was administered. The amount of overlearning received was either 0%, 50%, or 100% which corresponds respectively with 0, 50, and 100.

Ten Ss were randomly assigned to each of the six experimental groups. The designation of each group and its experimental treatment is as follows:

Group	Treatment
H0	High associative, 0% overlearning
H50	High associative, 50% overlearning
H100	High associative, 100% overlearning
L0	Low associative, 0% overlearning
L50	Low associative, 50% overlearning
L100	Low associative, 100% overlearning

Subjects

The Ss used in this experiment consisted of 60 students enrolled in either their freshman year in college or their senior year of high school. The two schools from which the Ss were chosen were Central Washington State College and Ellensburg High School. These two schools were selected largely because of their convenient location.

The sample used consisted of twelve college freshmen enrolled in an introductory psychology course and 48 high school seniors. The Ss were randomly assigned to one of the six experimental groups. The only restriction placed on the assigning of the Ss was that only two of the college students appear in each of the six experimental groups. Thus, each experimental group consisted of eight seniors and two freshmen.

All of the Ss were selected on a volunteer basis. The freshmen were contacted by phone and asked if they would participate in a learning experiment. The high school seniors were notified through a school bulletin that they could volunteer for a learning experiment during their study hall hour. Because the high school students could be used for only one hour, the college students were also limited to the length of time of one hour. Four of the Ss had to be dropped from the study. Two of the volunteers were not used due to their inability to learn the original task in less than 50 trials. Fifty trials was established as a criterion because a S taking more trials than this would, in all probabilities, not be able to complete the overlearning and reversal trials in one hour. The other two subjects were dropped due to their expressed lack of interest and cooperation.

Apparatus

The apparatus used in this experiment was the Lafayette, model number 303B, memory drum. The memory drum is set up for paired associate learning. The Ss viewed four windows. Each window was fitted with a cover which enabled the E to present two stimuli at a time in each of two different windows.

The stimuli presented for learning consisted of six pairs of three consonant nonsense syllables. The syllables were drawn from sets of three consonant syllables with known associative value (Stevens, 1951). The pairs of syllables with the low associative had an average associative value of 2%. The average value for the high associative list was 94%. (See appendix A)

The syllables were presented through the use of white paper tapes which contained randomly ordered repetitions of the six pair lists. The syllables were typed on the tape in capital letters with a standard elite typewriter. A single trial consisted of one time through the six pairs of syllables. Each trial contained the same six pairs of syllables but their order within the list was randomized. Also the window in which each member of a particular pair was presented was also randomized so that on one trial, one member of the pair would appear to the S's left and on the next trial it might appear to the S's right. This randomization was carried out to eliminate any position effects from entering in.

The apparatus presented each stimulus pair for four seconds after which a shutter lifted to expose the next pair of syllables. The amount of time for each stimulus presentation was automatically controlled by the memory drum.

Reinforcement was given through a red light. It was assumed that the knowledge of results or of a correct answer would be reinforcing to the S. A red light was situated on top in the center of the memory drum. The light was operated by the E by means of a push button switch. If the S gave the "correct" answer, the light was switched on until the next stimulus pair was presented. If an incorrect response was given, the light remained off.

All experimenting was carried out in rooms where disturbances and extraneous variables could be kept at a minimum. The only furniture that occupied the rooms were a table and two chairs. One of the rooms did contain a piano, but it was not in a position that would distract the S. The college students were run in a college testing room and the high school students were run in a small study room in the high school. The rooms were adequately lighted, enabling the Ss to properly view the syllables.

Procedure

Upon arrival at the testing situation, and after introductions, the S was seated. The S was then told that; "This study is being conducted to find out how we learn pairs of words. Your complete cooperation would be appreciated."

"You will see two nonsense syllables. One of the syllables will be correct and one will be wrong. You are to tell me whether the correct one is on your left or your right. At first you will have to guess which is the correct syllable. If you give a correct answer, the red light in front of you will come on; if the answer is incorrect the light will remain off. Are there any questions?"

The S was then presented with a list of six pairs of nonsense syllables of either a high or a low associative value. Each list of six pairs represented one trial. However, the S could not tell one trial from the next because the stimuli appeared to him as one continuous list. The S had to choose a member of each pair until he reached the criterion for the original learning which was four out of five trials without an error, that is, the S chooses the member which was designated as "correct" by flashing the red light.

When the S reached the criterion for the original learning, he was given either 0%, 50%, or 100% overlearning. The number of trials of overlearning that the S received was determined from the number of trials taken to reach the criterion on the original learning task. For example, if it took the S 30 trials to reach criterion, he received either 0, 15 or 30 trials of overlearning, depending on whether he was in the 0%, 50% or 100% overlearning group.

After the S had completed his overlearning trials, he was started on the reversal learning task. During reversal learning the originally positive stimulus became negative, and the formerly negative stimulus was now the positive one. The S was administered the reversal task until the reversal learning criterion was reached, (four out of five trials without error--criterion).

Upon completion of the reversal learning trials, the S was thanked for his cooperation in the experiment. It was also pointed out to the S that it would be appreciated if he would not discuss the experiment until it was completed.

RESULTS

Original learning

The primary comparison in this study concerns criterion acquisition on the reversal task as well as the tendency to respond to the former positive stimulus during reversal learning. Because there is a difference in the number of trials required to learn high associative and low associative value words, an analysis of covariance was applied to correct for the initial difference in ease of learning.

To check this assumption, a comparison was made of performance during the original learning between these stimulus syllable sets. The mean number of trials to criterion for the original learning were 21.6, 22.4, 21.0, 27.3, 26.8, and 27.1 for groups H0, H50, H100, L0, L50, L100 in that order. The mean and standard deviation for the high associative value groups was 21.66 and 9.95 consecutively. The low associative value groups had a mean of 27.06 and a standard deviation of 8.35. When a t test was applied to these two means, a value of 2.36 was obtained which is significant at the .05 level of significance. This result indicates that on the original learning task, the <u>S</u>s who were in an experimental group which had high associative value stimuli, learned the original task in significantly fewer trials than did the <u>S</u>s in the low associative value groups. This result is consistent with what would be expected in a learning task with stimuli of different associative values.

<u>Analysis of the overlearning reversal effect</u>

The performance measures which served as indices of the degree of difficulty in the learning of the reversal task were the number of trials taken to reach the reversal criterion. The six experimental groups were compared by means of an analysis of variance (Table 1). An analysis of covariance was also carried out to take into account the differences in the number of trials taken to learn the original task. The covariate control measure is the number of trials taken to learn the original learning task.

Table 1--Analysis of Variance and Covariance for the Number of Trials taken to Learn the Reversal Task

Analysis of Variance				Analysis of Covariance		
Source	d.f.	M.S.	F	d.f.	M.S.	F
Associative Value (A)	1	307.75	11.11*	1	290.06	10.42*
% of overlearning (B)	2	178.85	6.54*	2	179.23	6.44*
A X B	2	71.45	2.61	2	70.88	2.54
Error	54	27.34		53	27.83	
Total	59			58		

* P < .05

The error mean square for the analysis of variance and the analysis of covariance differ by only .49. The adjusted associative value mean square and the adjusted overlearning mean square are lower for the analysis of covariance. A .05 level test of significance in the analysis of covariance indicates that there is a significant difference in both of the main factors. However, there is not a significant interaction effect. Thus, when a linear adjustment is made for the effect of variation due to differences in the rate of learning in the original learning task, as measured by a covariate, there are statistically significant differences within the two main factors but not between them.

The data on reversal learning was such that a test for multiple comparisons could be carried out. Table 2 shows the various comparisons that were made by the Newman-Keuls method. The differences which proved to be significant at the .05 level are indicated by asterisks.

Table 2--Comparisons of Treatments by the Newman-Keuls Method

	HO	H50	H100	LO	L50	L100
HO						
H50				**	**	
H100	**			**	**	
LO						
L50						
L100					**	

The information from this table indicates that the treatment group receiving high associative value stimuli and 100% overlearning (H100) learned the reversal task significantly faster than the groups receiving high value stimuli and no overlearning (HO), low value stimuli and no overlearning (LO) as well as the group receiving 50% overlearning (L50). The high value stimuli and 50% overlearning group (H50) reversed significantly faster than the low value groups receiving no overlearning (LO) and 50% overlearning (L50). The low associative value group receiving 100%

overlearning (L100) differed significantly from the low group receiving 50% overlearning (L50).

The means and standard deviations for the three categories of overlearning are: 0% overlearning: M = 14.95, SD = 6.37; 50% overlearning: M = 13.5, SD = 6.32; 100% overlearning: M = 9.2, SD = 3.93. When a t test was applied to these values it was found that the groups receiving 100% overlearning learned the reversal task significantly faster than did the groups receiving either 0% or 50% overlearning ($p < .05$). There was no significant difference between 50% and 0% overlearning.

<u>Persistence to Respond to Original Task</u>

The tendency to respond to the former positive stimulus after reversal was measured by the number of trials taken before the <u>S</u> responded an equal number of times to both the former positive stimulus and the new positive stimulus. That is, the persistence to respond to the former positive stimulus is defined as the number of trials taken before the <u>S</u> makes half his responses to the new positive stimulus on six consecutive pairs or one trial.

This was also studied through an analysis of variance (Table 3). The results indicate that the degree of overlearning and the associative value of the stimuli have no effect on the tendency to respond to the former positive stimulus after reversal. The means and standard deviations for the persistence to respond to the former positive stimulus for the three degrees of overlearning are: 0%: M = 2.83, SD = 2.48; 50% overlearning: M = 3.70, SD = 2.52; 100% overlearning: M = 4.63, SD = 2.72. When a t test was applied to these values, no significant differences were found.

Table 3--An Analysis of Variance of the Persistence to respond to the Originally Positive Stimulus

Source	SS	d.f.	MS	F
Associative Value (A)	19.82	1	19.82	2.85
% of overlearning (B)	31.82	2	15.91	2.82
A X B	1.52	2	.76	
Error	375.46	54	6.95	
Total	428.62	59		

.05(s,54) = 3.15

All of the foregoing results can be applied to each of the four hypotheses. The first hypothesis stated that overlearning of a discrimination task will facilitate the learning of the reversal of that task. The analysis of variance and covariance indicated that there is a significan difference in the overlearning factor when averaged over the associative value factor. An examination of the means to reversal criterion for each of the three levels of overlearning indicates that 100% overlearning is significantly superior to 0% and 50% overlearning. The 0% and 50% overlearning groups did not differ in their number of trials to reach reversal criterion.

These results would partially support the first hypothesis in that 100% overlearning was superior. The reason that the hypothesis was not fully supported is due to the fact that the 50% overlearning group did not differ significantly from the 0% overlearning group.

The second hypothesis stated that the reversal of a discrimination task would be facilitated when the stimuli have a high associative value. The case was supported by the analysis of variance. The significant associative value factor indicates that the associative value of the stimuli do have an effect on the learning of a reversal task. The high associative stimuli have a significantly greater facilitative effect than the low value stimuli.

The lack of a significant interaction effect between the two main factors indicates that their effects are independent of each other. That is, 100% overlearning facilitates reversal learning no matter what the associative value of the stimuli might be. The high associative value stimuli also aid reversal learning no matter what level of overlearning might be administered.

Hypothesis four stated that the overlearning groups would not continue to respond to the original positive stimulus upon reversal as long as would the groups receiving no overlearning. The analysis of variance, using the number of trials that the S continued to respond to the former positive stimulus during reversal as the criterion, failed to support this hypothesis. The levels of learning were also compared by means of a t test and no significant differences were obtained.

DISCUSSION

The present situation differed from those in which the effect of overlearning on the learning of a reversal has been studied in that the meaningfulness of the stimuli to the Ss was controlled. The importance of the presence or absence of meaningful stimuli during the learning may help to explain the apparently conflicting results which have been obtained in overlearning reversal studies.

The results of this study, which have just been described, will, for reasonable parameters, predict a faster learning of a reversal task for Ss receiving high associative value stimuli than for Ss receiving low associative value stimuli. This helps to shed some light on those overlearning reversal studies using stimuli from opposite ends of a continuum in terms of associative value.

An important consideration in the discrimination learning situation should be the similarity of the stimuli that are used. The greater the dissimilarity of the stimuli used as discriminanda, the more readily discrimination learning should take place. This should follow since the generalization of the avoidance strength to the positive stimulus and the generalization of approach strength to the negative stimulus should grow progressively weaker as the positive and negative stimuli become more distant on the stimulus continuum.

It is unlikely that the presence of the overlearning effect in the present study could have been predicted from the recent suggestion (e.g. Birch et al., 1960) that the effect may be attributable to a nonmonotonic relation holding between the number of acquisition trials and resistance to extinction. According to this interpretation, reversal is faster after overlearning simply because overtraining leads to faster extinction of the approach response or, more generally, of the original habit.

The present study did not carry out extinction as has been done in some previous studies (Mackintosh, 1963). A measure of the persistance to respond to the former positive stimulus was used in place of extinction. This was done for two reasons: a) the lack of S time and b) pilot Ss indicated a strong tendency to respond to the original positive stimulus when all reinforcement was withdrawn and it was concluded that the Ss would become bored before an ex-extinction criterion could be reached.

The results indicate that the following situation is possible. Where the overlearning reversal effect occurs, one cannot logically attribute the more rapid reversal of the overtrained Ss to a lesser persistance to respond to the former positive stimulus after reversal. Although this study cannot be considered to be a refutation of non-monotonicity because extinction was not carried out, it does fail to support some similar designs which were in support of this factor.

In the Murrillo and Capaldi studies (1961), the S was required to guess whether or not a piece of cloth was present in a covered well by responding "in" or "out." Their "extinction" trials (cloth no longer present in the well) were really reversal trials since the S was reinforced for responding "out." Thus they were dealing with the effects of overtraining on reversal learning rather than on extinction. Therefore, it is only inferentially that their results and the results of this study can be claimed as either support for or against the hypothesis of nonmonotonicity between the amount of training and the resistance to extinction.

The obtained results on the overlearning variable are consistent with results obtained by others finding the ORE. The addition of the group of high school and college Ss provides the possibility of further generalizing the overlearning reversal relationship. This study, like several of the previous studies, Reid (1953), Pubols (1956), Capaldi and Stevenson (1957), would predict that the learning of a reversal task is in part a function of the amount of overlearning that has been received on the original task.

As stated before, other studies have suggested that overlearning trials result in the "response of discriminating" (Reid, 1953), different extinction rates (Mackintosh, 1963), avoidance tendencies (D'Amato and Jagoda, 1961), and different running speeds or latencies (Birch, Ison and Sperling, 1960). This investigator sees a new dimension as part of the explanation--that the S does not really learn the reversal task in reversal learning, but uses his original learning as the cue for reversing answers in the experiments. In other words, in the foregoing experiment it was hypothesized that many Ss were really saying to themselves, "not the original response answer", but "the new nonsense syllable is now correct." The meaningful cue, then, remains the original syllable and the S does not really relearn the answer but merely responds from his original learning. This explanation is quite similar to that used by Kendler and Kendler (1959), to explain reversal learning. It seems logical that a follow-up study could be done in which the E would check to make sure that the S really learns the new stimulus dimension rather than merely switches choices by using the original stimulus as the key. To check the hypothesis that the S does not learn the reversal task, the S could be measured on his mastery of the reversal task after the reversal criterion has been met. It could be that the overlearning group fails to learn the reversal task but the no-overlearning group does due to the latter's inability to use the original task as cues for the reversal learning because of the lack of mastery of that task.

SUMMARY

The overlearning reversal effect for a visual discrimination task was studied as a function of the associative value of the stimuli used and the amount of overlearning received. The sample consisted of six groups of ten Ss each who were volunteers from college freshmen and high school seniors. Each of the Ss were randomly placed into one of two groups depending on whether they were to receive stimuli of a high or a low associative value. They then learned to criterion the correct member of each of six pairs of three letter nonsense syllables which were presented by a standard memory drum. Each S then received either 0%, 50% or 100% overlearning before learning the reversal of the original task.

A 2 X 3 analysis of variance was used to analyze the results. The results indicated that the Ss who received 100% overlearning learned the reversal task in fewer trials than did the Ss receiving 0% or 50% overlearning. The

latter two did not significantly differ. *S*s who received high associative value stimuli also learned the reversal task in fewer trials than did *S*s who received stimuli with a low associative value. These results were explained in terms of the *S*s using the original correct stimuli as cues for the learning of the reversal task rather than actually learning the new task.

Appendix A--Low and High Associative Value Pairs

	Low Associative Value		High Associative Value	
Pair Number	2%		94%	
1	QJH	CXJ	BLD	BNK
2	XFQ	DJX	LFT	RNK
3	QJF	BQJ	FLP	GRL
4	ZJQ	ZBJ	HLD	LRD
5	XZF	FHJ	BND	CHL
6	ZXJ	XJF	GLD	JMP

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