SOCIAL REINFORCER EFFECTIVENESS UNDER ISOLATION AND TASK REVERSAL CONDITIONS IN ELEMENTARY SCHOOL CHILDREN

RUSSELL WALDRON GRIMES

15060

SOCIAL REINFORCER EFFECTIVENESS UNDER ISOLATION AND TASK REVERSAL CONDITIONS IN ELEMENTARY SCHOOL CHILDREN

by

Russell Waldron Grimes
Department of Psychology

Submitted in partial fulfillment
of the requirements for the degree of
Master of Arts

Memorial University of Newfoundland
St. John's, Newfoundland
April, 1971

ACKNOWLEDGEMENT

The author wishes to express his appreciation and to offer his sincere thanks to Dr. A. Kozma, under whose supervision the present research was done and whose encouragement and guidance made this thesis possible; and to N. Braveman and Dr. J. MacDougall who assisted in the earlier stages of this project.

The author also wishes to express his gratitude to Dr. L. Hayweiser who was instrumental in the organization of the final draft.

The author is indebted to the following people: Mr. W. Ford, principal of St. Andrew's School, Mr. W. Bishop, principal of Vanier Elementary School and Sister Mary Pittman, principal of Pius X Girls School, for their cooperation in making available the subjects necessary for this study.

Thanks are also due to Barbara Kelland who typed the manuscript and to Frances Willis and my wife, Doris, who assisted in typing draft after draft while the thesis underwent changes.

ABSTRACT

The present study investigated the relationship between social isolation, task reversal and age in a two-choice probability learning situation. An equal number of high and low anxious girls from grades 2, 4 and 6 underwent 0 and 15 minutes of social isolation. Following isolation Ss were given a two-choice probability learning task in which they received social reinforcement for correct responses. When Ss reached a probability matching level of responding the reinforcement contingencies were reversed. Significant effects were found for isolation, age, reversal and the isolation x age interaction. The results are discussed in terms of Spence's theoretical formulations on the relationship between drive level and association strength of the correct response.

TABLE OF CONTENTS

INTRODUCTION

Social isolation studies have consistently shown that brief periods of social isolation can increase social reinforcer effectiveness on subsequent learning tasks (Gewirtz & Baer, 1958a, b; Hill & Stevenson, 1964; Kozma, 1969; Lewis, 1965; Lewis & Richman, 1964). In the study by Gewirtz and Baer (1958a) preschool Ss (4 and 5 years old) were tested with the two-response form of the marble sorting task. Adult approval of the initially non-preferred response resulted in a greater increase in the relative frequency of this response following 20 minutes of social isolation when compared with a non-isolated condition. A follow-up study (Gewirtz & Baer, 1958b) included a satiation condition along with the isolation and control conditions. The satiation condition like isolation, preceded the learning task. During the satiation period Ss received approval and support in drawing and cutting tasks. The results supported the earlier study in that social reinforcement was least effective following satiation and most effective after isolation.

Lewis (1965), Lewis and Richman (1964) used a two-choice

probability learning problem consisting of a deck of cards with pictures of cats and dogs to evaluate social reinforcer effectiveness. Ss were required to guess whether the next card would be a cat or a dog. The cat: dog ratio was .7:.3. Following each response, Ss were shown the card and all correct responses were socially reinforced. Lewis and Richman found that Ss who underwent three minutes of social isolation prior to the learning task chose the more frequently occurring event more often than the negative social encounter group and a positive social encounter group. The negative group performed significantly better than the positive group.

Social reinforcer effectiveness has been shown to occur after a variety of social isolation intervals. Earlier investigations used a very short and a long isolation interval (between 3 and 20 minutes). Dowart, Ezerman, Lewis and Rosenhan (1965), Kozma (1969), Lewis (1965), Lewis and Richman (1964), have found that a short (3 minutes) period of isolation is sufficient to increase the effectiveness of social reinforcement. Gewirtz and Baer (1958a,b) Kozma (1969), Lewis (1965), Walters and Ray (1960) found that longer isolation periods (18-20 minutes) increase social reinforcer effectiveness. Lewis (1965) obtained an increase in social reinforcer effectiveness following social isolation (social

isolation effect-SIE) for 3 and 12 minute isolation intervals, but failed to find one for 6 and 9 minute intervals.

The major conclusion which follows from this review of the isolation literature is that both short and prolonged isolation periods lead to increased susceptability to social reinforcement. On the basis of the conclusion of the social isolation studies it is predicted that under pre shift conditions in a two-choice probability learning task, the isolated Ss will require fewer trials to reach criterion than non-isolated Ss.

The SIE has been given several interpretations (social deprivation, arousal, frustration, stimulus deprivation, specific anxiety). The one common characteristic in all the explanations is that isolation increases Ss drive level, which is subsequently reduced by social reinforcement. According to such an explanation one would expect isolated Ss to do better during a pre-than a post-shift condition. This expectation is based on Spence's (1958) theoretical formulations on the relationship between drive level and association strength of the correct response. Spence points out that drive interacts in a multiplicative manner indiscriminatively with all response tendencies (habit). When habit strength is greater for the incorrect response,

then high drive will impair the acquisition of the correct response more than low drive would (i.e, net excitatory potential for the incorrect response is larger under high drive).

In the two-choice probability learning paradigm a reversal in contingencies leads to an inappropriate association of high response tendencies with the least frequent (incorrect) event. Under high drive conditions (Isolation) excitatory potentials leading to the selection of the least frequent event should be greater than under low drive conditions (non-isolation), and acquisition of the now more frequent event should be more retarded under high than low drive.

Consistent supporting evidence comes from as diverse a source as successive discrimination reversal (SDR) learning paradigms (Feldman, 1968; Gossette & Hood, 1968). Gossette and Hood (1968) for example, found that drive (D) had an immediate effect after the shift while incentive (K) had a consistent effect which resulted in an increase in learning. Accordingly, it is predicted that isolated Ss will have a slower acquisition rate after reversal than non-isolated Ss.

Another measure of drive is anxiety. As a check on the operation of an isolation induced drive, the Children's Manifest Anxiety Scale (CMAS) was included in the study.

Spence (1956) in his theory of emotionally based drive employed the Manifest Anxiety Scale (MAS) as a means of determining the emotional responsiveness (re) of S. Anxiety as measured by the MAS is related to re, which in turn, contributes to drive level. The CMAS was adapted from the MAS as a measure of the child's tendency to experience a general and chronic state of anxiety. It is also assumed to be an operational measure of Spence's hypothetical emotional response construct (re) (Castaneda, 1961; Castaneda, Palmero & McCandless, 1956). In the present study the aim was to control this form of drive and to accomplish this isolated and non-isolated Ss were matched on CMAS scores.

The probability learning studies which have investigated the single reversal of reinforcement contingencies under non-isolation conditions indicated that older children respond to the reversal shift more efficently than younger Ss (Jones and Liverant, 1960; Kessen and Kessen, 1961). Jones and Liverant (1960) used 5 and 10 year old school Ss in a probability learning task involving ratios of .7:.3 and .9:.1 in the preshift condition. In the post shift situation the reinforcement ratios were changed to .3:.7 and .1:.9 reinforcement ratios respectively. The older Ss performed at a higher level than younger Ss on the first three blocks of 20 trials in the reversal situation. It took the younger Ss 80 trials to reach the same level of responding as the

older Ss. However after 100 trials on the reversal task the Ss who were initially trained on the .7:.3 reinforcement ratio were still not responding at a probability matching level. It was not possible to determine whether either group had reached an asymptote since more reversal trials are necessary. Jones and Liverant used Estes' (1954) explanation to account for the behavior of the different age levels. Estes suggests that previous experience is important in determining whether or not S will maximize or match the probability of occurrence of the stimulus event. Older children tend to match the probability of occurrence of the stimulus event while younger children maximize, that is, they tend to respond with a probability of unity to the more frequent event. When the reinforcement contingencies are reversed the matching strategy will facilitate learning since Ss using this strategy will make more responses to the now more frequent event.

Crandall, Solomon and Kellaway (1961) found that when the ratio of reinforcement in a probability learning task was shifted after 80 trials from .8:.2 to .5:.5 reinforcement ratio for an additional 80 trials, there was no difference in performance between 7 year old and 16 year old Ss. In both groups the responses matched the probability frequency of the stimulus event. The failure to find a difference between the two age levels in initial level of performance following

the reversal shift may be due to several factors. In the Jones study the Ss were much younger (5 to 10 years old) whereas in the Crandall study the Ss were 7 to 16 years old. There was also a procedural difference. The reinforcement ratios shifted from .9:.1 and .7:.3 to .1:.9 and .3:.7 respectively in Jones' study. The results of the Jones study suggest that older Ss will show superior performance under post shift conditions. This prediction is based on Estes' findings that older Ss tend to match the probability of occurrence of the stimulus event. Consequently, with a reversal of reinforcement contingencies the probability matching response will result in fewer incorrect choices. It is predicted then that under non-isolation conditions older Ss will require fewer trials to reach criterion in the post shift task than younger Ss.

Since there is some suggestion in the literature (Lewis, 1966; Lewis,Wall & Aronfreed, 1963; McCuller & Stevenson, 1960; Stevenson, 1961; Stevenson & Cruse, 1961) that social reinforcer effectiveness decreases with age, one would expect isolation to be much more effective for younger than older Ss. Lewis (1966) investigated social reinforcement effectiveness under non-isolation conditions for two age levels (3 to 5 and 6 to 8) in a two-choice probability learning task. Ss were required to guess which

of two cards would appear next (a picture of a rabbit or bird). The cards were randomly arranged in the ratio of .7:.3 rabbits and birds respectively. S was reinforced by E saying either "Good", "Fine" or "That's good". The results indicated that nursery school Ss (3 to 5 year olds) were significantly superior on the two measures of performance: (a) the total number of responses to the most frequently reinforced response across 100 trials and (b) the total number of responses in the last 20 trials.

McCullers and Stevenson (1960) tested children at four age levels (3,5,8 and 10 years of age) in three-choice probability learning task. The Ss were placed in two groups with an equal number of Ss from each age level. The experimental group received both physical (marbles) and verbal reinforcement (Group VR). The other group received no verbal reinforcement (Group NVR) and therefore served as a control group. A male E was used for all Ss. The dependent variable was the number of responses to the verbally reinforced knob. It was found that verbal reinforcement had a much greater influence on the performance of younger Ss than on the performance of older Ss. A comparison on the performance of older Ss under VR condition with performance of older Ss under NVR revealed that there was no difference between the two types of reinforcement.

Stevenson (1961) tested boys and girls at each of three age levels (3 to 4, 6 to 7 and 9 to 10 years of age) in a marble dropping task. Following an initial minute during which a baseline for performance was established, E verbally reinforced two out of every five responses each minute for the next 5 minutes. The increment in response occurring after the first minute of the game was used as the measure of performance. The results show that the average difference scores obtained for Ss tested by female E showed a decrease across the three age levels while scores obtained for Ss tested by male E showed a consistent increase across the three age levels. The increase in social reinforcement effectiveness with increase in age when reinforcement is administered by male E is in opposition to results of other studies (Lewis, 1966; Lewis, Wall & Aronfreed, 1963;McCullers & Stevenson, 1960; Stevenson & Cruse, 1961). It is questionable whether or not this study does in fact measure social reinforcer effectiveness since Stevenson did not include a non-reinforced group. Such a group would have indicated whether or not the increase in performance was due to social reinforcement.

The conclusions from studies which have investigated social reinforcer effectiveness under non-isolation conditions indicate that social reinforcers are most effective with younger Ss. Since isolation supposedly increases susceptibility to social reinforcement, it might be expected that Ss most susceptible to such reinforcement will be most affected by

the isolation procedure. Accordingly, the final prediction of the present study was that younger isolated Ss would require fewer trials to reach criterion during pre shift than older isolated Ss in comparison to their non-isolated controls.

In summary the following predictions were tested in the current investigation:

(a) Fewer trials to criterion would be required by isolated than non-isolated Ss under the pre shift condition.

(b) More trials to criterion would be required by isolated than non-isolated Ss under the post shift condition.

(c) Fewer trials to criterion would be required by older than younger non-isolated Ss under the post shift condition.

(d) Fewer trials to criterion would be required by younger than older isolated Ss (as compared to non-isolated Ss) under the pre shift condition.

METHOD

Subjects:

The subjects were one hundred and twenty girls from grades 2,4 and 6. Forty Ss from each grade. (see Table 5 Appendix A for mean age and standard deviation of each grade).

Apparatus and Materials:

The learning task consisted of two decks of 60 cards. Each card portrayed either a cat or a dog. The cat-dog ratio of the two decks was .8:.2 and .2:.8 respectively. This ratio was maintained within each set of 10 cards. The order in which the cats and dogs appeared was randomly determined for every 10 cards with the exception that neither could occur more than five consecutive times.

The cards were kept in a box 24 inches long, 10 inches high, and 6 inches deep. The only open side was facing E.

Procedure:

The Children's Manifest Anxiety Scale (CMAS) was administered in each grade. The Ss were divided

at their respective medians into high anxious (HA) and low anxious (LA) groups. From the resulting six anxiety X grade groups, half of the Ss were randomly assigned to each of the two social isolation conditions (0 and 15 minutes).

Each S was taken individually to the isolation room by a male assistant, seated on a chair, and instructed to wait while the assistant made some preparations. Following these instructions, the assistant immediately entered the adjacent room and waited for the appropriate isolation period before signalling E, who was waiting in another room. The 0 group only approximated 0, since one second isolation was required to keep instructions constant for all groups.

At the termination of the isolation period the assistant signalled E. E then entered the isolation room and sat at the table across from S. S was shown a card of a cat and one of a dog, asked to identify the cards and state her preference. She was then told that she would be required to play a game consisting of her trying to guess which picture, a cat or a dog, would appear on the next card. After S made her choice, she was shown the correct event, and the card was removed. All Ss were reinforced for each correct response by E saying either "Good", "Right", or "Fine".

For all Ss the deck contained the higher ratio of their non-preferred choice for the pre-reversal condition. For this aspect of the task the trials continued until S responded to the more frequently occurring event on 8 out of 10 trials per block of 10 trials. The deck was administered forward and backward until this criterion was reached. Following this the other deck of cards (reversal situation) was used until S again responded to the more frequently occurring event on 8 out of 10 trials per block of 10 trials. E recorded Ss' responses on a check list.

Design and Analysis:

Two levels of anxiety (HA and LA), three grade levels (2, 4 and 6), two isolation conditions (0 and 15 minutes) resulted in 12 treatment groups of ten Ss each.

Learning scores ((a) number of trials to criterion (b) number of responses to the least frequent event i.e. "error") were analyzed by a 2 x 3 x 2 x 2 analysis of variance with repeated measures on the last factor. The first three factors represent the 12 treatment conditions (between Ss variables), while the last factor refers to pre and post reversal shift (a within Ss variable).

RESULTS

A preliminary analysis of trials to a criterion of matching (,8:.2) for each block of 10 trials showed only a significant reversal effect ($P < .05$). Since blocks are in the mind of E and not S a second analysis was performed. The second analysis was based on a criterion of matching independent of blocks, that is, 8 out of 10 responses to the more frequent event for any 10 trials in the sequence. Significant effects were obtained for isolation ($P < .05$) age ($P < .05$, reversal ($P < .01$) and the isolation x age interaction ($P < .05$) with the isolation x age x reversal interaction approaching significance ($P < .10$) (Table 1). Learning score means and standard deviations for all treatment conditions are shown in Table 2.

Since the second analysis involved overlearning on the part of some Ss in pre shift, an analysis was performed on post shift scores of all Ss. Pre shift scores of Ss that equalled or exceeded the second criterion level were divided into high and low overlearning scores (median split) and an analysis was performed on post shift scores of all Ss. The overlearning analysis indicated that in the present study overlearning did not influence subsequent learning in the post shift task (Table 3). The lack of an overlearning effect or a significant interaction involving overlearning supports findings by Yellen and Yellen (1969).

Table 1

Analysis of Variance for Learning Scores

Source of Variance	Sum of Squares	df	Mean Squares	"F"
Between Ss	63255.56	119		
Isolation (A)	2059.20	1	2059.20	4.10*
Age (B)	3733.97	2	1866.99	3.72*
Anxiety (C)	266.70	1	266.70	<1
AB	1206.52	2	603.26	1.20
AC	105.34	1	105.34	<1
BC	1306.82	2	653.41	1.30
ABC	351.96	2	175.98	<1
Error (between)	54225.05	108	502.08	
Within Ss	43808.50	120		
Reversal (D)	4009.84	1	4009.84	13.03**
AD	2633.44	1	2633.44	8.56**
BD	621.08	2	310.54	1.01
CD	579.70	1	579.70	1.88
ABD	1771.06	2	885.53	2.88
ACD	10.01	1	10.01	<1
BCD	186.60	2	93.30	<1
ABCD	755.12	2	377.56	1.23
Error (within)	33241.65	108	307.79	

*P <.05
**P <.01

Table 2

Learning score means and standard deviations for all treatment conditions.

	Grade					
	2		4		6	
	Isol.	Non-Isol.	Isol.	Non.Isol.	Isol.	Non-Isol.
Pre shift ($\bar{X}$)	25.3	50.4	42.7	45.1	29.0	38.8
SD	8.7	26.2	28.5	20	10.5	26.7
Post shift ($\bar{X}$)	35.9	32.4	34.0	31.5	22.4	26.0
SD	21.8	16.3	27.4	15.2	12.3	9.8

Table 3

Analysis of Variance for Overlearning Scores

Source of Variance	Sum of Squares	df	Mean Square	"F"
Overtraining (A)	403.30	1	403.30	1.23
Age (B)	2325.70	2	1162.85	3.56*
Isolation (C)	17.60	1	17.6	<1
AB	54.00	2	27.0	<1
AC	1104.20	1	1104.20	3.38
BC	297.10	2	148.55	<1
ABC	555.40	2	277.70	<1
Error (within)	35310.0	108	326.9	
Total	40067.30	119		

*P < .05

The main isolation effect in the absence of an isolation x age interaction suggests that all age levels were susceptible to social isolation. Inter group differences were not significant for any individual group but rather for all groups together. For this reason the differential effectiveness of social reinforcement was impossible to determine directly. Although the isolation effect was similar across all groups it does not answer the question whether isolation was more effective for Grade 2,4, or 6, at this point of analysis.

The reversal effect suggests learning is faster after reversal than before. The implication here is that training in a non-reversal problem faciliated subsequent learning. The interpretation has to be modified due to the significant age x reversal interaction and the age x isolation x reversal interaction approaching significance. The age x reversal interaction suggests that the reversal problem was facilitated for Grade 4 and 6. However, inspection of Fig. 1 indicates that this interaction is an artifact attributable to the approaching three way interaction. Therefore the findings of the current study are best represented by this triple interaction.

For Grade 4 and 6 Ss under isolated and non-isolated conditions it appears that pre shift training facilitated subsequent reversal. The same results occurred with the

Grade 2 non-isolated Ss. However with the Grade 2 isolated Ss the post shift condition required more trials than pre shift (Table 4, one tailed "t" test was used because predictions were directional).

The triple interaction thus appears to be due to the fact that for Grade 2 Ss the difference between isolated pre and post reversal performances is in the opposite direction of all the other groups (isolated or non-isolated) (Fig. 1). For Grade 2 Ss the interference for the reversal task under the isolated condition was greater than that for all other groups. The interaction therefore shows that for Grade 2 Ss both predictions (a) and (b) were supported. For Grades 4 and 6 Ss however, only hypothesis (a) can be considered supported.

A mean comparison test was used to evaluate hypothesis (c) (Table 6, Appendix A, one tailed "t" test was used because predictions were directional). Although results were in the appropriate direction, they failed to reach significance. Accordingly, no difference in the post shift performance of younger and older non-isolated Ss was discernible in the current investigation.

To evaluate hypothesis (d) differences were first obtained between isolated and non-isolated controls in the pre shift conditions. Next a comparison among the obtained differences was made ("t" test, Table 7, Appendix A).

These results show that hypothesis (d) is partially supported. Grade 2 isolated Ss required fewer trials to reach criterion during the pre shift condition than Grades 4 and 6 isolated Ss in comparison to their non-isolated controls.

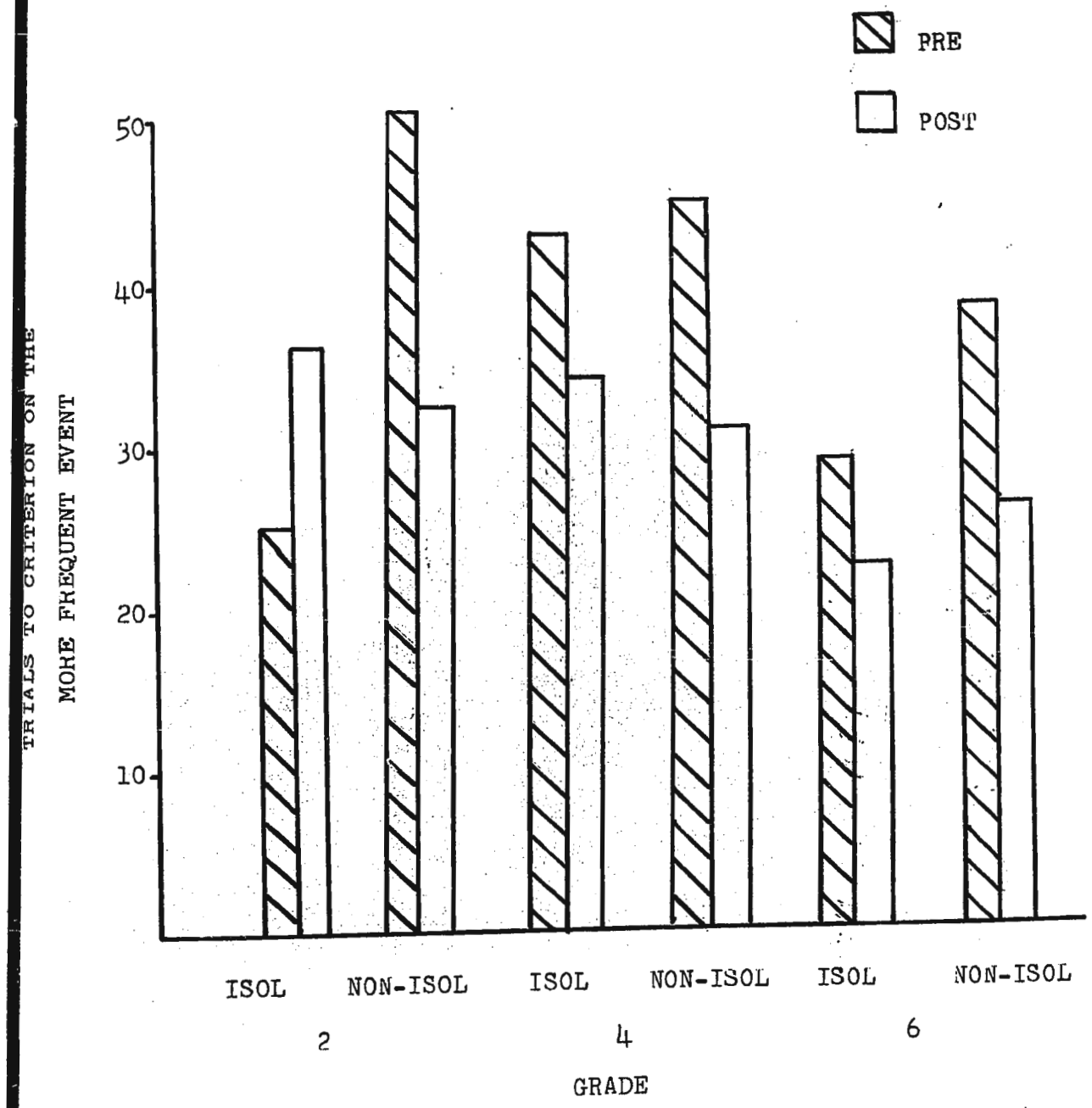

Figure 1. Mean learning scores for PRE and POST shift with anxiety levels pooled.

Table 4

Mean Learning Score Comparisons of Pre and Post Isolation and Pre and Post Non-Isolation for Grade 2 Ss.

	Pre	Post	"t"
Isolation	25.3	35.9	1.90*
Non-Isolation	50.4	32.4	3.27**

* $P < .05$ (one tailed)

** $P < .01$

DISCUSSION

For Grade 2 Ss the findings are consistent with Spence's theortical formulation on the relationship between drive level and association strength of the correct response. This interpretation attributes the faster learning of isolated Ss to the high drive condition produced by isolation. Isolation serves as a source of social deprivation which is subsequently reduced by social reinforcement in the learning task. This has been shown to occur in previous investigations (Gewirtz & Baer, 1958a, b; Hill & Stevenson, 1964; Kozma, 1969; Lewis,1965; Lewis & Richman, 1964).

Another prediction from Spence's Theory was that, in a probability learning paradigm with a reversal in reinforcement contingencies, high drive will retard learning in the reversal situation. A reversal in contingencies leads to an inappropriate association of high response tendencies with the least frequent event. Under high drive (isolation) excitatory potentials leading to the selection of the least frequent event would be greater than under low drive conditions (non-isolation) and the acquisition of the now more frequent event would be more retarded under high than low drive. These were precisely the findings for Grade 2 Ss.

In the case of Grade 4 and 6 Ss Spence's theory finds little support. Neither hypothesis (a) or (b) was confirmed. Although there was a trend in the predicted direction, learning in the pre shift condition did not appear to be significantly different for Grades 4 and 6 from their non-isolation controls. It is, therefore, possible that 15 minutes of isolation is insufficient to produce an isolation effect in older Ss, or that older Ss are less susceptible to social reinforcement (hypothesis d).

The former explanation is more consistent with the findings for these Ss on the reversal data. Grade 4 and 6 isolated Ss did not show the same impairment in learning the task after reversal as did Grade 2 Ss. If isolation did not induce a sufficiently high drive level in these Ss, then there would not be interference on reversal. Failure to obtain support for hypothesis (a) and (b) may, therefore, be attributed to the lack of success of the isolation manipulation for these older Ss.

Results on hypothesis (c) were in the predicted direction, but, again did not reach significance. It may have been that on such a simple task, prior training in the non-reversal shift condition generalized for all Ss.

Hypothesis (d) is partially supported. Isolation appeared to be more effective for younger than older Ss.

What remains unclear is whether the greater effect of isolation is due to increased motivation, greater susceptibility to social reinforcement, or both. These questions will have to be answered in subsequent studies.

Methodological difficulties were encountered in the use of a learning criterion based on blocks of 10 trials. In the present study learning was considered to have occurred when S responded at a level equal to the frequency of the stimulus event. That is, S responded correctly on 8 out of 10 trials per block of 10 trials. Analysis of learning scores in terms of blocks of 10 trials showed only a reversal effect. When responses were considered in terms of 8 correct in any sequence of 10 trials this proved to be a much more sensitive indicator of learning.

Findings of the present study indicate that isolation is a better indicator of drive than anxiety questionnaires since there was an isolation effect but no difference between high and low anxious Ss. Future studies should consider the use of anxiety scores in the upper and lower quartile rather than dividing high and low anxious Ss at the median. Such a procedure would accentuate the differences between high anxious and low anxious Ss and this increased difference would be a better measure of the value of anxiety questionnaires as indicators of drive.

SUMMARY AND CONCLUSION

Forty girls each from Grades 2,4 and 6 were divided into HA and LA Ss and then assigned to either 0 or 15 minutes of social isolation. Following the isolation period Ss were given a two-choice probability learning task. When Ss responded at a probability matching level the reinforcement contingencies were reversed.

Analysis of the learning scores showed that all age levels were susceptible to social reinforcement. The reversal effect suggested that training in a non-reversal task facilitated subsequent learning for Grades 4 and 6 Ss. However, for Grade 2 Ss the difference between isolated pre and post reversal performance was in the opposite direction.

The findings for Grade 2 Ss were interpreted as supporting Spence's theory on the relationship between drive level and association strength of the correct response.

REFERENCES

Castaneda, A. Differential position habits and anxiety in children as determinants of performance in learning. J. exp. Psychol., 1961, 257-258.

Castaneda, A; Palermo, D.S. and McCandless, B.R. Complex learning and performance as a function of anxiety in children and task difficulty. Child Developm., 1956, 327-332.

Crandall, V.J., Solomon, D., and Kellaway, R. A comparison of the patterned and non-patterned probability learning of adolescent and early grade school children. J. genet. Psychol., 1961, 99, 29-39.

Dorwart, W., Ezerman, R., Lewis, M., and Rosenhan, D. The effects of brief social deprivation on social and non-social reinforcement. J. pers. soc. Psychol., 1965, 2, 111-115.

Estes, W.K. Individual behavior in uncertain situations: an interpretation in terms of statistical association theory. In R.M. Thrall, C.H. Coombs, and R.L. Davis (Eds.), Decision Processes. New York: Wiley, 1954. pp. 127-137.

Feldman, J.M. Successive discrimination reversal performance as a function of level of drive and incentive. Psychon. Sci., 1968, 13 (5), 265-266.

Gewirtz, J.L., and Baer, D.M. Deprivation and satiation of social reinforcer as drive conditions. J. abnorm. soc. Psychol., 1958a, 57, 165-172.

Gewirtz, J.L., and Baer, D.M. The effect of brief social deprivation on behaviors for a social reinforcer. J. adnorm. soc.Psychol., 1958b, 56, 49-56.

Gossette, R.L. and Hood, P. Successive discrimination reversal measures as a function of motivational and incentive levels. Perceptual and motor Skills, 1968, 26, 47-52.

Hill, K.T., and Stevenson, H.W. Effectiveness of social reinforcement following social and sensory deprivation. J. abnorm. soc. Psychol., 1964, 68, 579-584.

Jones, M.H., and Liverant, S. Effects of age differences on choice behavior. Child Develpm., 1960, 31, 673-680.

Kessen, W., and Kessen, M.L. Behavior of young children in a two-choice guessing problem. Child Develpm., 1961, 32, 779-788.

Kozma, A. The effects of anxiety, stimulation and isolation on social reinforcer effectiveness. J. exp. child Psychol., 1969, 8, 1-8.

Lewis, M. Social isolation: A parametric study of its effect on social reinforcement. J. exp. child Psychol., 1965, 2, 205-218.

Lewis, M. Probability learning in young children: The binary choice paradigm. J. genet. Psychol., 1966, 108, 43-48.

Lewis, M., and Richman, S. Social encounters and their effect on subsequent reinforcement. J. abnorm. soc. Psychol., 1964, 69, 253-257.

Lewis, M., Wall, A.M. and Aronfreed, J. Developmental changes in the relative values of social and non-social reinforcement. J. exp. Psychol., 1963, 66, 133-137.

McCullers, J.C., and Stevenson, H.W. Effects of verbal reinforcement in a probability learning situation. Psychol. Reports, 1960, 7, 439-445.

Spence, K.W. Behavior Theory and Conditioning. New Haven, Connecticut: Yale University Press, 1956.

Spence, K.W. A theory of emotionally based drive (D) and its relation to performance in simple learning situations. Amer. Psychol., 1958, 13, 131-141.

Stevenson, H.W. Social reinforcement with children as a function of CA, SEX of E and SEX of S. J. abnorm. soc. Psychol., 1961, 63, 147-154.

Stevenson, H.W. and Cruse, D.B. The effectiveness of social reinforcement with normal and feebleminded children. J. Pers., 1961, 29, 124-135.

Walters, R.H. and Ray, E. Anxiety, Social isolation, and reinforcer effectiveness. J. Pers., 1960, 28, 257-267.

Yellen, Donald R. and Yellen, Delphine. The overtraining reversal effect in a probability learning situation. Psychon. Sci., 1969, 14, 152.

APPENDIX A

Table 5

Mean age and standard deviation for each grade

	Grade		
	2	4	6
Mean	7.96	9.82	11.98
SD	.298	.439	.757

APPENDIX A-

Table 6

Mean learning score comparisons of the three Grade levels for non-isolated Ss under the post shift condition.

	Grade 2	Grade 4	Grade 6	"t"
Mean	32.4		26.0	1.52*
Mean		31.5	26.0	1.38*
Mean	32.4	31.5		0.18

* $P < .10$ (one tailed)

APPENDIX A

Table 7

Mean differences and t values of learning score comparisons between isolated and non-isolated controls for each Grade in the pre shift condition.

Grade	2		4		6	
	$\bar{X}$	"t"	$\bar{X}$	"t"	$\bar{X}$	"t"
2			22.7	4.13**	15.3	2.78*
4					7.4	1.35
6						

* $P < .01$

** $P < .001$