DEPARTURES

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FORM-DISCRIMINATION LEARNING IN ADOLESCENT RETARDATES AS A FUNCTION OF PUNISHMENT & NUMBER OF IRRELEVANT COLOUR CUES

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ABSTRACT

The role of Punishment operationalized in a 'response-cost' paradigm, in expediting discrimination process of the mentally retarded subjects was in vestigated. 30 retarded adolescents, after they had been tested individually on a battery of tests, underwent the experiment which also sought to explore another variable of Number of Irrelevant Colour Cues. Six equal groups, matched on mean Standford-Binet Mental Age, were allocated to the treatments in a 2 (Punishment Contingency) x 3 (Number of Irrelevant Colour Cues), factorial design. Colour-form objects were used as discriminanda in this two choice simultaneous form-relevant discrimination task. Results obtained on two measures – Number of Acquisition Trials & Percentage Errors – clearly granted an indubitable facilitation due to the Punishment procedure. The other main variable also produced its significant effects. The results were interpreted in the light of Zeamanian postulates expounding attentional mechanisms. (**Key Concepts**: *Form Discrimination, Punishment, Adolescents retardates, Colour Cues).*

INTRODUCTION

Traditionally, experimental psychologists have arranged for a "neutral" contingency for the incorrect responses made by the subjects in a two-choice discrimination learning situation. Under this frequently existing condition of every correct response being followed by a rewarding outcome, the assumption that 'no reward' or 'neutral' feedback would efficiently serve to distinguish the associated preceding event form its rewarded counterpart gained deeper ground. The adversarial stray thought of punishing the subjects for their errors in learning situations with an aim to minimize their occurrence and expedite the learning process, needed time to transcend the diktats of experimentalist's superego. His earlier experimental efforts selected severer forms of punishment like electric shock, loud buzzer sounds, etc with animals and yet the facilitation of learning process was obtained (Muenzinger, 1934). Only much later

the 'noxious' dimension of the Punishment could be abandoned and substituted with a qualitatively different one of 'withdrawing the reward'. Brackbill and O'Hara (1958) tested the main hypothesis that kindergartners would learn a discrimination faster under a reward – punishment (R-P) condition than under a condition of reward only ®. Candy was used as a reward and interestingly, for the R-P group, the punishment employed was that of returning one candy (out of the total pool accumulated for correct performance) for each of the incorrect responses. The findings upheld the hypothesis although they could not activate a systematic research orientation of behavioural scientists. Sporadic studies supporting the proficiency in learning ascribable to Punishment procedure continued being reported. Attentional and motivational hypotheses either singularly or in combination, were invoked to theoretically explain this expediency of learning due to the addition of punishing outcome. The mental retardate, as an individual suffering from numerous deficits in his cognitive and adaptive systems, is pronouncedly poor in discrimination process. Zeaman and coworkers have attributed an "attentional deficit" to him which delays his orientation to the relevant dimension in a multidimensional discrimination task (Zeaman & House, 1963 and Fisher & Zeaman, 1973).

Yet, it has been emphasized that retardates' attention is "progammable", implying that is merely a control aspect rather than a structural, immutable aspect. The present study defined for itself as one of the objectives of realizing the facilitation in discrimination process of the mentally retarded adolescents through employing a punishment procedure of 'Incorrect Response Cost' and expecting to minimize their attentional deficit insofar as it is programmable.

A discrimination learning task, with its multiple dimensions, represents a very amorphous and complex situation for the subject, in particular for the retardates, who are caught in a dilemma about making a choice. Pursuing the reasoning offered by Zeaman & House (1963), the role of the variable of irrelevant dimensions in the retardate discrimination process becomes significant. A dimension in a two-choice discrimination is considered to be irrelevant if both the cues along it are linked up only with a 50 p.c. reinforcement schedule. Due to this mandate, an operation by any cue along the irrelevant dimension keeps providing 50 p.c. reinforcement. And there is no sufficient task tension for a retardate to invigorate his efforts to search for the relevant dimension

whose two cues are associated with 100 pc and 0pc reinforcement schedules. The "disattention deficit" hypothesis proposed by Routh (1973) stating that the retardates might be deficient in their ability to withdraw attention from irrelevant stimuli highlights the point. The notion that a task would become more difficult for the retarded subjects in either of the two events: (a) by increasing the number of irrelevant dimension and (b) by increasing the number of cues along a particular irrelevant dimension, seemed tenable.

Literature abounds with investigations which have focussed upon the number of irrelevant dimensions as a variable interacting with the process of discrimination acquisition with the process of discrimination acquisition but there is an unexplainable neglect of the conceptual status of the number of irrelevant cues as a variable, increasing the number of irrelevant cues for the retardates should ordinarily make the task resolution more difficult for them and a clear directionality of results is predictable. However, complications arise out of another facet comprising of different types of learning which become possible with an increase in number of cues. As Tighe (1972) posited that with number of irrelevant cues being two, discriminations can be acquired on the basis of object-reinforcement (either reward or punishment) relations. Whereas with the number of cues exceeding two, discriminations have to be preponderantly acquired on the basis of dimension-reinforcement relations. Whereas with the number of cues exceeding tow, discriminations have to be preponderantly acquired on the basis of object-reinforcement (either reward or punishment) relations. It also appears a logical presumption that to be able to abstract the dimensions, age of the subjects could be another deciding variable. Indeed, Cole, *et al* (1973) found age to be such a significant variable. Additionally, it was sought to explore the operation of this variable in mental retardates' acquisition of form-colour object discriminations.

METHOD

SAMPLE

Such retardates from Shepherd institution at Ogoja whose dossiers indicated an IQ of 50 and above, and who evinced no physical handicap were selected for a rigorous screening on a battery of tests comprising of two performance tests (Segun Form-Board Test, Nagpur norms & Draw-A-Man Test, adapted the experiment by 1956), an intelligence test (Stanford-Binet Intelligence Scale, 1960 revision, and a Colour-Blindness Test (Dvorine Pseudo-Iso-

chromatic plates). Finally, 51 subjects could be selected, out of which only 30, 20 males and 10 females (Mean (A=191.57 months; SD=18.64; Ranger=159-216 mos) participated in this experiment. These subjects were equally divided into six groups matched on mean Mental Ages on Standford-Binet Intelligence Scale The six groups were then randomly assigned to the six treatments. Table 1 provides the mean mental age in months (groupwise) on Stanford-Binet Scale and other statistical values.

TABLE 1
TREATMENT DISTRIBUTION OF STANFORD-BINET MENTAL AGE (IN MONTHS)

Treatment Conditions

	6-P	6-NP	4-P	4-NP	2-P	2-NP
Mean	69.2	68.2	71.0	70.6	68.4	68.2
SD	5.86	4.15	6.24	7.44	8.99	14.18
Range	63.78	64-75	62-78	60.81	56-80	55.88

STIMULUS MATERIALS AND APPARATUS

Seven wooden forms, that of a rectangle, a square, a circle, a triangle, a star, a cross, and a hexagon. Each in six colours-red, yellow, green, blue, black, and white, yielded a total of 42 objects. Size dimension in these forms was controlled by equating their heights to 5.1cms and thickness to 1.5cms.

Two identical plastic tripod cups, coloured indigo blue were used to keep the money hidden inside. Inside of the cups was spongelined so that loading of coins did not produced any sound and clue to the subjects. A screen with a base painted dull grey was used for presenting the discriminanda atop these cups to the subject.

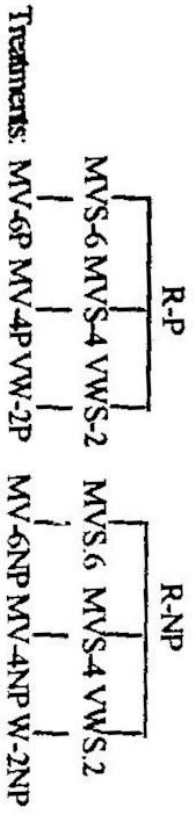
Two naira coins were used as reward and fancy boxes were provided to the subject for storing these.

DESIGN

A 2x3 factorial design with the independent variables of Punishment contingency and Number of cues along the Irrelevant Colour dimension was planned to be executed in a two-choice, simultaneous, form discrimination experiment. Two levels of the variable of Punishment were: (I) Reward-Punishment condition (R-P), in which a correct choice was followed by a reward while the incorrect choice was punished by having to return the reward; and (ii) Reward-No Punishment condition (R-NP) which differed from the R-P in not punishing the incorrect choice.

For the second variable, three levels of the variable of number of irrelevant colour cues were manipulated following a recommendation advanced by Shepp & Turisi (1966). Accordingly, two types of presentation schedules

– Multiple-Variable Schedule (MVS) and Variable-Within Schedule (VWS)- were adopted. A MVS employs more than two cues from the irrelevant dimensions and was utilized for two levels, i.e 4 cues and 6 respectively. The remaining third level was incorporated by employing two colours cues in a VWS. The basic format of six treatments constituting this experiment is patterned below.



PROCEDURE

The process of experimentation was subdivided into three distinct phases: (i) Preference Determination Session, (ii) Adaptation Phase, and (iii) Main Experiment.

i. **Preference Determination Session:** In the pilot studies, it has been noted that subjects possessed their own idiosyncratic choices for particular objects, influenced by either their colour or form or a compound of colour-form. To rule out any coincidence of a subject's choice of the discriminanda to-be-used with him, this session was necessitated. Choices patterns of the subjects for the dimensions of form, colours, and position were obtained by exposing the to a pool of 36 wooden coloured objects – excluding six rectangles. Later it was taken care that any strong choice, if manifested by a particular subject, did not serve as either the positive or negative discriminandum.

ii **Adaptation phase:**

Soon after the "Preference Determination Session" was over, the subject was ushered into this phase aimed at imparting the "idea of the game". This phase was designed as a miniature, two-choice form-discrimination experiment, run under the conventional paradigm of Reward for every correct choice and No Reward (nor any punishment) for incorrect choice. The reward used here was a one naira coin. An altogether different presentation schedule (than the ones to be employed in the Main Experiment) – Variable-Between Schedule (VBS),

considered to be the easiest one, for it presents only one irrelevant cue on one trial was used. For illustration, the first four trials are presented below:

LEFT	RIGHT
Trial 1 Red Rectangle (+ve)	Red Star (-ve)
Trial 2 Blue Rectangle (+ve)	Blue Star (-ve)
Trial 3 Red Star (-ve)	Red Rectangle (+ve)
Trial 4 Blue Rectangle (+ve)	Blue Star (-v) and so on

Rectangle, a hitherto unpresented object, was used as a positive discriminandum for every subject. The negative discriminandum was subject-specific, being the least chosen form in the previous session. Again the two colours which were not preferred very much were selected as the two irrelevant colour cues. The other irrelevant dimension of position was controlled by randomizing it according to the series prepared by Gellerman (1933). The subject was instructed in pigin English a verbatim translation of the contents is cited here:

"The" tests" that we are going to conduct can yield money for you, if your carefully listen to what I am saying now. You will be shown two coloured wooden objects placed atop these two cups (pointing towards the cups). You have to first carefully attend to these objects and then pick up one of them. Then peep inside that cup from where you've picked up the object whether there lies two-naira coins or not. If you find the coins, that will be yours. By and large you have to learn the method to earn the coins everytime. The coins would be lying under one of the objects only. Whatever money you collect, after the "test" is over, would be yours and from that you can purchase anything of your liking. So try hard to win as much money as you can. Remember you have to carefully attend to both the objects before you pick one up".

Only one session, comprising of fifteen trials, was envisaged for this phase and the subjects' performance was recorded in terms of number of errors he committed. The task being a fairly easy one, it was expected that some of the subject could acquire the solution. In accordance a criterion of 10 consecutive correct responses was kept as the successful performance. Regardless of whether one learnt it or not, an exposure to fifteen trials was an essential step.

iii **Main Experiment:**

This final phase conducted on the next day involved the learning of a form-discrimination problem in all the six treatments. The stimulus material essentially remained the same with the exclusion of six rectangles. The main content as well as emphasis of the in-

structions also remained the same as used in the previous phase. For the treatments incorporating punishment contingency, instruction of this effect were recited which is presented below:

"If you find the coins, you can keep them yourself. However, if the coins are not lying in the cup, then you will have to return one coin from your earned money. So that if you are not attentive, you will keep losing your coins, and thus would not be able to make a purchase of your choice".

Caution was observed in selecting the discriminanda for a subject consulting his preference pattern and in no case, a form, highly preferred, was ever chosen. Similarly, the negative discriminandum employed in the adaptation phase was also excluded.

The presentation schedules had been prepared in advance by duly randomizing for position dimension as also for various colour cues. The experiment was carried out in successive sessions, each session consisting of 50 trials per day. No subject was allowed more than six sessions.

Two objects in various colours, out of the total repertoire, were chosen for particular subject according to the allocated presentation schedule. On every trial these objects were placed atop the cups, one out of which contained 2 naira coins inside. These two cups were placed 10 inches apart on the screen. After the subject had made his choice of the objec would remove the lid and look fo coins. If the found them, he c store them in the fancy box, other he had to return one from his pool der punishment conditions) or si sit back without having to pay any The screen was rotated back fo filling of the next trial. Halfway thro the session, part of the instructi was repeated again. At the begin of a fresh session, the next day, a of the instructions were again minded.

Three criteria affirming the acquisi of the discrimination were posited any one of these three, once fulfil by any subject within one session, sulted in the termination of the exp ment. The first criterion required subject to choose the positive obj for an uninterrupted run of 15 tria The second criterion permitted a ma mum of 5 errors in 25 trials. And t third criterion was a spontaneous u provoked verbalizing of the corre cue by the subject. The third crit rion owed its incorporation to an ob servation that the retarded subject frequently hypothesized all sorts o thinkable possibilities as solution to th problem.

The final session, i.e the sixth one whenever needed was planned to b educative in an effort to explore whether subtle cue-providing would help in acquiring the discrimination. At the outset, he was reminded that this

being the last and the final session, he should be extremely attentive towards the objects in case he wants to participate in future experiments. Besides, another strategy was to help him in expressing the name of the cue which influenced his choice on a trial.

Two measures of data were utilized to analyze the subject's performance: (a) Percentage Errors-derived for a subject by calculating the proportion of total Number of Errors to the Number of Acquisition Trials and multiplying with 100.

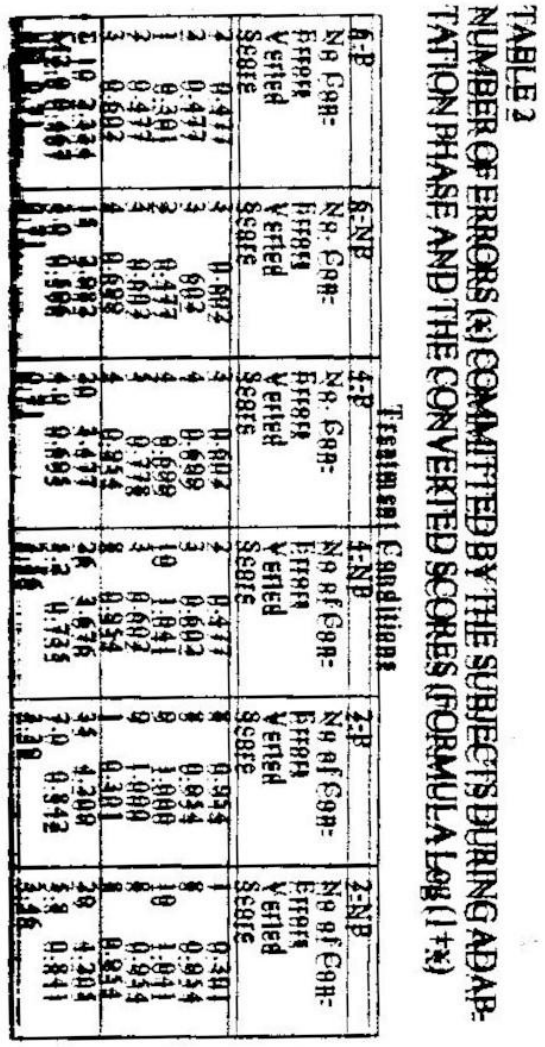


TABLE 2

NUMBER OF ERRORS (X) COMMITTED BY THE SUBJECTS DURING ADAPTATION PHASE AND THE CONVERTED SCORES (FORMULA Log (1+X))

RESULTS

ADAPTATION PHASE

The performance of the subjects in terms of the number of errors committed by them in a run of 15 trials has been entered in Table2. A conspicuous observation pleads the case to be that of heterogeneity of variance among the six groups. To test the significance of the same, Bartlett's test was applied to these data.

X^2 value found to be significant beyond. 05 level (X^2 = 11.20; df=5). Tackling this problem seemed necessary before F-test could be applied. Thus the scores were converted according to this formula X = log (1xX) since a higher proportionality between means and SDs was found than that between means and variances. The converted scores have also been cited in the same table. Analysis of variance of these data was carried out. F-value has not been found to be significant, indicating that the groups did not differ significantly in terms of their discrimination ability as tapped by a simpler task used here – featuring no punishment for incorrect responses.

TABLE 3

NUMBER OF ERRORS (x) AND THE CONVERTED SORES (FORMULA: x − x+5) OF THE MAIN EXPERIMENT

Treatment Conditions												
6-P		6-NP		4-P		4-NP		2-P		2-NP		
No Con-Trials	Verted Score	No. Con-Trials	Verted Score	No. Con-Trials	Verted Score	No of Con-Trials	Verted Score	No of Con-Trials	Verted Score	No of Con-Trials	Verted Score	
(i)	2.74	249	15.80	15	3.94	165	12.86	125	11.20	(ii)	6.36	
90	9.51	21	4.64	17	4.18	(i)	6.67	(ii)	9.15	200	14.16	
16	4.06	17	4.18	17	4.18	25	5.05	147	12.14	250	15.83	
15	3.94	15	3.94	40	6.36	140	11.85	40	6.36	272	16.51	
15	8.09	250	15.83	15	3.94	150	12.27	18	4.30	250	15.83	

MAIN EXPERIMENT

Number of Acquisition Trials: Table 3 lists the number of acquisition trials as required by the subjects under various treatment conditions. In addition, the table also cites the converted scores of these very data as necessitated due the significant heterogeneity of their variance ($p < .01$). This time a higher correlation between means a variances has been obtained and ea raw score (X) has been converted X + 5 (Bartlett, 1936 in Edward 1960). These data were then su jected to ANOVA in a 3x2 factori design.

The two main variables have be found to have exercised significant i fluence in creating differences in ter of acquisition trials. The variable Punishment contingency yielded highly significant F-value [F(1,2 =9.90; P<.005]. The second variab of Number of Irrelevant Colour cue also resulted in a significant F-valu [F(2,24)=3,53; p<.05]. The interac tion between the two variables has no been found to be significant.

Duncan's New Multiple Range Tes was applied to further explore the sig nificance of the differences betwee VW-2NP and MV-4P) betwee VW02NP and MV-6P ($p<01$), an between MV-4NP and MV-4P (p 05) were found to be significant.

Percentage Errors: The data on per centage errors and also the numbe of errors have been tabulated (Table 4). On confirming the non-significance of heterogeneity of variance of data on percentage errors, these were analyzed with ANOVA. An identical set of findings to the one produced by the previous measure, was obtained here also. F-value for the variable of Punishment contingency has been found

to be again significant [F(1.24)=8.32, p<.01)] as also for the variable of Number of Irrelevant Colour Cues [F(2.24=4.12; p<.05]. Interaction between the two variables has been found to be non-significant. Duncan's Test as applied to the various treatments means, revealed significant differences between VW-2P and MV-4P (p<.05), MV-4P and VW-2NP (p<.05).

Comparison of Number of Errors in Adaptation Phase and Experiment: To handle the possibility that the earlier-existing trend of differences in the six groups of subjects (as obtained in the Adaptation Phase), might have contributed their share in producing the significant influence as obtained here in, analysis of covariance was carried out on the two sets of performance. F-values has been found to be significant beyond. 05 level (F(5,23)=3.16; p<.05], allowing us to repose more confidence in the differences being attributed to the independent variables manipulated in the main experiment.

Summarising the major outcomes from this experiment, the variable of Punishment Contingency seems to have operated in a way as to facilitate the acquisition of discrimination as well as created a contingency of reducing the percentage errors significantly. The findings for the variable of Number of Irrelevant cues to be the most difficult one in terms of both the measures. Finally, no less important is the heterogeneity of the subjects in various treatments.

TABLE 4

NUMBER OF ERRORS AND ERRORS DURING THE MAIN EXPERIMENT

Treatment Conditions													
6-P		6-NP		4-P		4-NP		2-P		2-NP	
No Con-Errors	Verted Score	No. Con-Errors	Verted Score	No. Con-Errors	Verted Score	No of Con-Errors	Verted Score	No of Con-Errors	Verted Score	No of Con-Errors	Verted Score
0	0	106	42.57	0	0	71	43	50	40.00	7	17.5
36	40	3	14.29	1	5.88	12	27.27	32	35.56	84	42.0
1	6.25	2	11.76	1	5.88	5	20.0	55	37.41	122	48.8
0	0	0	0	9	22.5	52	37.14	9	22.50	132	48.53
20	30.77	100	40.0	0	0	62	14.33	2	11.11	120	48.0
Σ57	77.02	211	108.62	11	34.26	202	168.77	148	146.58	465	204.8
M 11.1	45.40	42.2	21.72	2.2	6.85	40.4	33.75	29.6	29.32	93.0	40.97
SD 16.18	18.7	55.55	18.68	4.29	9.23	33.53	9.83	26.53	12.21	57.47	13.41

DISCUSSION

The present experiment is confined in its scope of explicating the process of facilitation by Punishment procedure to the retardate discrimination process. The process is distinguished by a chain of two responses, required to be learnt by the subject: (a) attending to the relevant dimension and (b) associating the two cues (in a two-choice situation) with their respective reinforcement contingencies (Zeamanian framework). The operations of the reward for the correct choice and punishment/non reward have further been postulated to produce consequent changes in acquisition or extinction for both the initial attentional response and the later cue selection response at variable rates. It is a logical deduction, then, that the irrelevant dimension, which certainly have a substantial initial probability of being attended to and also get intermittently reinforced, will have to be gradually (or at whatever rate) disregarded by way of the extinction of attentional response, in order to permit the criterial performance.

The set of two distinct conditions of Reward-Punishment and Reward-No Punishment as employed herein, to obtain the effects of Punishment contingency, features an obvious commonality of reward strengthening both the responses to the positive discriminandum. However, the former conditions excel the latter because of a direct extinguishing action over the observing response to any irrelevant dimension, e.g. position and colour. This process continues until the subject has come to a stage where the probability of his attending to the relevant dimension supersedes all other probabilities (towards irrelevant dimensions) by an "indirect reinforcement" principle. Illustrating this principle, we state the postulate of Zeaman & House (1963) model that the sum of the probabilities of attending to all the dimensions, relevant or irrelevant, would always be equal to unity. Thus, extinction of attending probabilities to one or more dimension is bound to result in a corresponding increment in the hitherto unattended (or attended to with a lower probability) dimensions. By way of this dynamic reshuffling of the probabilities of attention towards different dimension, chosen to be the relevant by the investigator, reaches the peak in this distribution matrix and the subject exhibit the criterion acquisition subsequently. Punishment contingency expedites this crucial process of redistribution of the pre-experimental matrix of attentional probabilities to various dimensions.

The role of Punishment continues hereafter in the next task of the sub-

ject of discriminating between the positive and negatives cues. The probability of his picking up the negative cue, in a two-choice situation, on a particular trial is 0.5. in the event of this choice, another punishing outcome would ensure. The processes of direct extinction of the negative instrumental response and the resultant indirect reinforcement of the positive instrumental response again get activated by the Punishment contingency thus expediting this discrimination too. Apart from the attentional facility generated by the punishing feedback to a negative choice, the subjects learning under reward punishment conditions, seemed to have developed a stronger craving for the money, as and when, it was won by them. The awareness of the perpetual risk that the acquired pool might be depleted, produced a solemn attitude, an augmentation of the value of the coin and probably a greater influence of the rewarding process. Contrariwise, their counterparts, having become used to consistent inflation of their bank due to intermittent reinforcement, did not show the same craving. The interaction between Punishment and Reward lent a contextual increment to the perception of reward per se and might have confounded the facilitative aspects of punishment by contributing its own unmeasurable share.

Yet another finding that Punishment significantly reduced the percentage errors along the course of learning merits discussion. The irrelevant dimension being a associated with a 50 p.c reinforcement schedule in a two-choice situation (by its very definition), the errors do get reinforced on an equivalent schedule. However, with the Punishment operating, the subject no longer enjoys the guaranteed 50 pc .reinforcement schedule. Instead his exclusive operation along as irrelevant dimension results in a 50pc. reinforcement-50pc punishment schedule. And the particular type of procedure utilized here for punishing each punishment annulling one reward, such an operation would prompt any possibility of subject reaping any reward at the end of the session. It is this zero pc. "effective" reinforcement schedule for the irrelevant dimensions which can be safely assigned with the result of minimal operation along irrelevant dimensions or negative cue, and in other words, significantly lesser percentage errors.

Implicit in the above going discussion has been the requirement of a certain minimum number of incorrect choices so that the punishment contingent upon them can be invoked. However, we cannot escape noting the subjects who have learnt the discrimination either without committing even a single error or very few errors during sprint to the criterion. These subjects have appeared under both the R-P (N=8) and R-NP condition (N=4) and are

primarily responsible for the heterogeneity obtained in these data. Zeaman's model does permit a variation in the initial probabilities of attending to a particular dimension (say, form) and it could well have been that these are the subjects who coincidentally happened to be the form preferrers. Testing the significant effects due to Punishment if these subjects were to be excluded, Mann Whitney Test was applied on the remaining data. A significant U-value ($p<.01$) obtained, dispelled any doubt about the facilitation due to punishment.

Regarding the second variable, the present experiment, was inspired by a lead from the Zeaman &House (1963) model which sustained doubts between a theoretical postulate that variations in irrelevant colour cues would not correspondingly increase the parameter of relevance-P, and the extra theoretical stance that variable irrelevant cues, due to an increased novelty effect might command higher attentional probability and, thus retard the acquisition. The between-groups analysis in the experiment, confirms the extra theoretical view as manifested in both the measures. However, the data would not support a linear relationship between the number of irrelevant colour cues and concomitant increment in task complexity. The discrimination task with 2 irrelevant cues, proved to be the most difficult. Zeaman & Denegre (1967) have ascribed the difficulty of two-valued conditions to the generating of a conflict between approach/avoidance tendencies of Trial 1 and 2. During experimentation too, doubts regarding the subjects in treatments VW-2NP and VW-2NP frequently arose as to whether they were learning the two possible permutations independently, instead of being able to abstract them into a dimension. To verify this speculation four out of these ten subjects, after they had acquired the criterion, were given the same two forms but coloured differently form the ones used in the main experiment. The were asked to choose the objects which had fetched them money. Two of the subject failed to pick up the right object. Rest of the six subjects could not be experimented, having finished their experiments long before the possibility of testing this speculation could be thought of by the investigator.

The result of 4 cues task being the easiest, could be interpreted as that optimum number of cues required by the present sample of subjects to abstract their relevant colour dimension. Whereas, 6-cues task providing a larger number of permutations might have produced the novelty effects and the consequent distractions.

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