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EFFECTS OF ANXIETY, REINFORCEMENT AND TASK DIFFICULTY ON
PERFORMANCE AMONG SENIOR SECONDARY SCHOOL STUDENTS AT THREE
LEVELS OF INTELLIGENCE

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ABSTRACT

The present study was undertaken to examine the effects of anxiety, reinforcement and task difficulty on learning performance at three levels of intelligence. It was done on a sample of 504 students in SS 3 in various Secondary Schools in Calabar.

Anxiety scales (STATE and TRAIT) and an intelligence test were administered. The State anxiety scale was administered under three reinforcement conditions. The analysis of variance (ANOVA) was applied to the data obtained. Results showed that praise was better than reproof for the high anxious subjects, whereas reproof was better than praise for low anxious subjects. The paper sees the teacher as the appropriate agent who should administer reinforcements suitable to the student's level of anxiety.

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The education system is examination oriented not only in Nigeria but in most countries of the world. The examination achievement pressure is almost universally felt by the school and college going population in Nigeria. Among the Nigerian community there is a close connection between employment and the passing of external examinations. The average Nigerian parent is more interested in his child passing an examination than anything else. Thus achievement has an important role to play in today's examination system. There are many factors, however, that affect scholastic achievement, e.g, (a) intelligence (b) interest (c) achievement (d) previous scholastic achievement (e) socioeconomic status (f) reinforcement (g) type of task and difficulty level, etc. Some studies have been conducted with these factors. Among the noncognitive factors, anxiety is an important factor that needs investigation, since it has been shown that examination situations induce anxiety.

There is related literature available that also supports the theoretical consideration that anxiety affects achievement. There are studies by Macandless and Castaneda (1956), Sarason et al. (1960), which show that there is a negative relationship between anxiety scores and achievement scores.

A recent and different approach was taken by Lin and Mckeachie (1970), and Culler and Holahan (1980), who studied the role of

intellectual ability and study habits in academic performance for low and high test anxious students. Their results showed high test anxious students to have poorer ability and poorer study skills. They concluded that at least part of the academic performance decrement for high test anxious students may be due to less knowledge of the relevant materials as a function of differential skill. According to this line of reasoning, high test anxious students have good reason to be anxious. Not only does high anxiety produce poor performance but also poor ability produces high anxiety.

Operant learning theory by Skinner (1938) postulates that reward facilitates learning and its retention whereas threat hampers it. Instructions regarding reward or threat induce different amounts of anxiety among students. The purpose of this paper was to test the effects of anxiety, task difficulty and reinforcement on learning at three levels of intelligence. To test the above relationship, the study chose to test the following hypotheses:-

- (1) on the easy task, high anxiety (H A) subjects will perform better than low (L A) subjects at all levels of intelligence.
- (2) On the difficult task H A subjects will perform at a higher level than L A subjects at the upper level of intelligence, whereas at the middle and lower levels of

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intelligence anxiety will interfere with performance of H A subjects.

METHOD

Subjects

The sample consisted of 504 subjects (252 boys and 252 girls) of SSS 111 studying in various secondary schools in Calabar Municipality. The average age of boys was 16.9 years and for girls 16.4 years. The schools are homogeneous with regard to the socioeconomic status of the children, methods of teaching, and relative scholastic achievement. Equal numbers of subjects were taken from six intelligence/anxiety combinations of task difficulty and reinforcement according to their anxiety and intelligence scores.

Design

A factorial design was used. The AxBxL design (Linguist, 1953 p. 239) was employed for each of the two tasks. The independent variables of anxiety and reinforcement were referred to as A & B respectively and L represented the levels of intelligence. Anxiety was varied in two ways high and low, three reinforcement conditions were used (praise, reproof and praise + reproof) and three levels of intelligence were taken into consideration (high, middle and low). For each of the two tasks (easy and difficult) a 2x 3x 3 analysis of variance ANOVA design was used. This design provides for a total of 36 cells (18 for easy task and 18 for

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difficult task). Equal numbers of boys and girls were taken in each cell.

Materials

Anxiety among children was measured using the State-Trait Anxiety Inventory (STAI) developed by Spielbeyger, Gorsuch and Lushene (1970). It's X-1 form was used to measure state anxiety and X-2 form was used to measure general or trait anxiety among students. There were 20 statements for each of the forms. Both forms are self administraterable.

The Raven's Standard Progressive Matrices (Raven, 1960) was used as a measure of intelligence. The matrices test does provide a valid means of assessing a person's present capacity for clear thinking and accurate intellectual work (Raven, 1960 p.3). For comparative purposes the scale has proved useful and is being used internationally.

Two lists of 12 paired associates varied in association values (25% or above) whereas the response words included in the difficult list had only 1% association value for the stimulus words which were the same in the two lists.

None of the response words in either list had high association with any of the stimulus or response. words. Lists were varied in

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used by Castaneda (1961). The difficulty level of the two lists was tested. Fifty subjects learnt the difficult list and another fifty learnt the easy list. The method of anticipation and prompting was used, the trials taken, and the errors committed to learn the difficult list were significantly higher than those of the easy list ($p < .005$).

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PROCEDURE

The experiment was first discussed with the principals and the teachers concerned with the teaching of SSS III classes in the schools selected. The subjects were tested on the STAI in groups of fifteen to twenty. Groups of moderate sizes were preferred as they provided better communication between the children and the experimenter, and seemed likely to yield more reliable and valid results. The instructions written on the title page of the scale were read out and explained fully by the investigator. After being assured that subjects had followed the instructions, the anxiety scale was administered. Subjects who scored above the third quartile and below the first quartile were regarded as high anxious and low anxious, respectively. The total number of HA subjects and LA subjects thus obtained was 700 from which the final sample was selected. On subsequent days these subjects were administered the Ravens Progressive Matrices test of intelligence in groups of twenty.

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After scoring the forms three groups of subjects belonging to high, middle and low levels of intelligence were selected. High intelligence groups consisted of the top 25% subjects the average group included the middle 25%; and the bottom 25% constituted the low intelligence group. Out of these subjects in the anxiety/intelligence combination, both boys and girls were randomly assigned to the easy task and similar numbers of subjects were assigned to the difficult task. For each task equal numbers of subjects were selected for learning under the three reinforcement conditions, that is, praise, reproof and praise + reproof. The subjects were reinforced according to the reinforcement group they belonged.

Subjects in the praise group were praised on every right response by saying "yes, right, good, very good, fine, that's right too." The wrong responses were ignored. Those of the reproof group were reproofed on every wrong response by saying "Oh no, wrong too." The right response were commented on. The third group of subjects, under praise + reproof condition were praised for every right responses and reproofed for every wrong response. The reinforcement words were arranged in two orders and were spoken by the investigator in the predetermined orders to all the subjects.

RESULTS

The effects of the independent variables A (anxiety) B (reinforcement) and L (level of intelligence) were studied on the

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dependent variable of learning in terms of trials and errors, separately for boys and girls, and the trend of results revealed that by and large they were the same for the two sexes. As a result the analyses were carried out for the two sexes.

On the easy task the F ratios for the main effect of anxiety were not significant for trials as well as for errors. This, however, does not mean that anxiety is not a significant factor in performance on simple tasks. The obtained significant interactions of anxiety with intelligence (A x L) and reinforcement (A*B) revealed that whether anxiety interferes with or facilitates learning depends on the level of intelligence of the subject and the reinforcement under which he works. Only the significant interactions for trials was subject to further analysis of variance. Since the one for errors was significant for errors it was not applied to it. The obtained significant interaction effect for trials were $F(2,234) = 3.81$ $P < .05$ and $F(2,234) = 9.12$ $P < .01$, respectively.

The interaction effect for reproof (R) was highly significant $F(2,78) = 9.01$ $P < .001$. As for the errors, results were significant under praise and reproof conditions while for praise + reproof, the obtained result was non-significant. The F ratios for praise + reproof were $F(2,78) = 7.93$ $P < .001$, and $F(2,78) = 7.36$ $P < .005$.

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TABLE 1

MEAN TRIAL FOR ANXIETY X REINFORCEMENT X INTELLIGENCE(A x B x L INTEGRATION (EASY TASK) *

ANXIETY	REINFORCEMENT	INTELLIGENCE		
		L ₁	L ₂	L ₃
		HIGH	MIDDLE	LOW
(High Anxious) HA	Praise (P)	4.93	5.57	5.57
	R	4.86	5.72	8.93
	R + P	4.93	5.43	8.36
(Low Anxious) LA	P	5.07	7.07	7.71
	R	5.43	5.71	5.93
	P + R	6.22	6.43	7.93
*Critical Difference		1.20	(P.<05)	
		1.59	(P.<01)	

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TABLE 2

MEAN ERRORS FOR ANXIETY X REINFORCEMENT X INTELLIGENCE
(A x B x L INTEGRATION (EASY TASK)*

ANXIETY	REINFORCEMENT	INTELLIGENCE		
		L ₁	L ₂	L ₃
		HIGH	MIDDLE	LOW
HA	P	11.64	12.50	12.71
	R	11.50	13.50	23.36
	P + R	12.14	14.29	20.50
LA	P	10.43	17.07	20.29
	R	9.79	12.64	14.50
	P + R	15.43	13.79	25.00
*Critical Difference		3.17	(P.<05)	
		4.19	(P.<01)	

A Quick glance at the means in Tables 1 and 2 shows that under praise, HA subjects performed better than LA subjects at middle and low levels of intelligence, while differences at the upper and middle levels were not significant. Under praise + reproof HA subjects showed better performance than LA subjects at upper and lower levels while differences were not significant at the middle level.

When the effect of anxiety was studied separately under the three reinforcement conditions it was found that on trials, anxiety

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yielded significant results for praise and reproof, and for all the conditions on errors.

TABLE 3

MEAN TRIALS FOR ANXIETY X REINFORCEMENT X INTELLIGENCE
(A x B x L INTEGRATION (DIFFICULT TASK) *

ANXIETY	REINFORCEMENT	INTELLIGENCE		
		L ₁	L ₂	L ₃
HA	P	17.87	19.43	27.50
	R	18.87	26.43	30.79
	P + R	17.43	23.00	37.71
LA	P	17.14	22.21	23.21
	R	19.21	21.71	19.79
	P + R	19.00	20.29	22.29
*Critical Difference		3.92	(P<.05)	
		3.17	(P<.01)	

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TABLE 4

MEAN ERRORS FOR ANXIETY X REINFORCEMENT X INTELLIGENCE
(A x B x L INTEGRATION (DIFFICULT TASK) *

ANXIETY	REINFORCEMENT	INTELLIGENCE		
		L ₁	L ₂	L ₃
HA	P	76.07	90.50	162.71
	R	81.14	131.86	152.57
	P + R	74.57	122.29	211.00
LA	P	78.93	110.14	129.21
	R	94.29	104.93	101.50
	P + R	89.29	97.07	124.29
*Critical Difference		22.62	(P<.05)	
		29.85	(P<.01)	

On the difficult task, the anxiety factor yielded significant results both for trials and errors. The obtained results showed that the HA subjects performed better than LA subjects $F(2,78) = 6.69$ $p < .005$, and $F(2,78) = 6.04$ $P < .001$. Tables 3 and 4 show that under praise differences were not significant at the upper and middle levels of intelligence, while LA subjects surpassed HA subjects at the lower level of intelligence. Under reproof, and praise + reproof difference between the performance of HA subjects and LA subjects were not significant at the upper level,

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whereas LA subjects performed better than HA subjects at the middle and low levels.

The anxiety by reinforcement A x B interaction yielded significant F values for trails as well as errors. The obtained values were $F(2,234) = 6.31$ $P < .005$ and $F(2,234) = 4.80$ $p < .01$ for trials and errors. When the anxiety effect was studied separately under the three reinforcement conditions, it was found that the differences in the HA and LA subjects' performances were not significant under praise but were significant under reproof and praise + reproof.

DISCUSSION

The hypothesis that, on the easy task HA subjects would perform better than LA subjects at all levels of intelligence was partially supported for trails, especially at the upper and middle levels. However, at the lower level of intelligence, this hypothesis was confirmed under praise but not under reproof and praise + reproof. The results were not significant for errors though the trend was in the expected direction at all levels.

The superiority of the HA subjects to the LA subjects may be explained on the basis that the task, being pairs of high association values, gave no scope for competing response tendencies and hence, the task irrelevant responses were not elicited. As a result, the performance of HA subjects was not

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affected. On the contrary, learning on the easy task provided an opportunity for the HA subjects to gain confidence and overcome the fear of not finishing the task, thus leading to the reduction of anxiety.

Forhertz (1971) demonstrated that the test anxiety scores of HA subjects were reduced after performance on an easy task. A high test anxiety score signifies the high proneness of the given individual to be anxious in test-like situations. Even a high test anxious child will not show the signs of anxiety if he does not perceive the situation as threatening. The learning of such an easy task as the present one, could hardly be perceived as threatening by the high anxious subjects who belonged to the high and middle levels of intelligence.

The fact that the superiority of the HA subjects over the LA subjects was a function of the reinforcement condition under which the subjects worked, was evident from the significant A x B interactions found for trials and errors. Analyses of the anxiety variables under the three reinforcement conditions revealed that HA subjects performed better than LA subjects under praise and praise + reproof, while under reproof, the performance of LA subjects was superior to that of HA subjects.

On the difficult task anxiety interacted significantly with intelligence and reinforcement. Analyses of the anxiety effect at

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three levels of intelligence revealed that at upper and middle levels anxiety was not a significant factor in affecting learning, while LA subjects performed better than HA subjects at lower levels of intelligence. These results did not support the hypothesis that at upper and middle levels of intelligence, HA subjects would do better than LA subjects on the difficult task. However, the findings were not contrary to what was expected, because the trends were in the expected direction. For low ability subjects, the hypothesis, that LA subjects would perform better than HA subjects was substantiated. At the middle level of intelligence, LA subjects did better than HA subjects, as expected, though the results were not statistically significant.

The results were contrary to those of Ruebush (1960) who found that the performance of HA subjects was superior to that of LA subjects in the middle and low intelligence levels but inferior at high intelligence level.

On the whole, the results showed that praise is better than reproof for the HA subjects, whereas reproof is better than praise for the LA subjects.

ANXIETY, REINFORCEMENT, TASK DIFFICULTY AND PERFORMANCE**IMPLICATIONS**

The reinforcement conditions studied in this research are also those which are usually used, or can be used by teachers, in real life school learning situations.

The findings of this study therefore have important implications for children's learning in school, especially if our present national policy on education involving the 6,3:3:4 system is to succeed. This study suggests that the secondary school teacher should have knowledge regarding the personality of the child before dealing with him in one way or the other. The same treatment cannot do with all the pupils. It has been noted that whether children should be praised or reproofed for their performance should depend on the level of test anxiety of the child, and his ability to cope with the learning task.

Encouragement and praise will enhance learning in high anxious children because they are dependent on the positive and encouraging attitudes of others towards them. On the other hand, this treatment may impede learning in low anxious children because they become complacent under such conditions. They have to be constantly reminded that they can do still better and some sort of aversive stimulation is essential to keep them working. Hence, the teacher's role is to identify children whose anxiety levels are high and those whose anxiety levels are low.

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Though the primary task of the teacher is to teach, he cannot avoid influencing children's behaviour by his attitudes. He has a wider role to play than just being merely a teacher in the literal sense. He has to be aware of his students' problems and difficulties. The teacher who is conscious of children's problems is on the look out for signs of disturbance in his/her students. He observes each child's behaviour not only in the class but also in non-classroom situations. This kind of careful but informal observation is merely a conscious extension of the natural curiosity most teachers have about their students.

CONCLUSION:

In conclusion we may say that the present research suggests that the teacher, besides teaching, has also to perform the duty of identifying children with emotional problems and provide an atmosphere in the classroom which facilitates the learning process. Once this is followed there are greater chances that the 6 3 3 4 system of education will succeed.

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