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ABSTRACT

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A Comparative Test of Locus of Control Measures and IQ as Predictors of Children's Task Performance

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Abstract

In this study, locus of control and IQ were compared to assess the power of each as a predictor of performance on academic and non-academic tasks. Four locus of control scales--the Intellectual Achievement Responsibility Scale, the Academic Achievement Accountability Questionnaire, the Rotter I-E scale, the Origin-Pawn measure--and the Iowa Tests of Basic skills were group administered to a sample of 74 fifth-grade children over a two week period. Following this test procedure, the subjects were asked to perform a motor task (pasting stars in circles), a counting task where the subject had an option of selecting level task difficulty, a block stacking task, and a math test followed by a math problems task where subjects could select difficulty level. The performance measures were administered over a period of one week. Multiple regression analyses showed that performance prediction was contingent on sex of the child and task. The best predictor for academic related tasks was IQ, whole locus of control predicted performance on some, but not all non-academic tasks. The data were compared to previous research, and the utility of locus of control as a predictor of task performance was discussed.

An individual's perception of control over his reinforcement contingencies, (i.e., locus of control) seems to be an influential factor in his achievement and task performance. One exhibits internal control if an event, is perceived as contingent on his behavior, whereas one exhibits external control if an event is perceived as the result of luck or chance; that is, the event is controlled by others (Rotter, 1966). Most studies of locus of control in children have focused on the relation of internal-external control to school achievement (e.g., Crandall, Katkovsky, & Crandall, 1965; McGhee & Crandall, 1968). A general conclusion emerging from much of this research is that measures of locus of control predict best those behaviors with motivational determinants (i.e., grades in school), but locus of control is a relatively poor predictor of measures of knowledge (i.e., achievement test scores). This apparent inconsistency in prediction suggests further study of what factor or factors are taped by measures of locus of control.

The most frequently referenced locus of control measure, the Rotter I-E scale (Rotter, 1966), assesses general expectancies through the use of statements which reflect external environmental sources, impersonal social forces, and more personal significant others. Although this scale has been used more extensively with adults than children, Wolfgang and Poiven (Note 6) demonstrated its sensitivity to differences in classroom participation among sixth-, seventh-, and eighth-grade children. In their study, high participators were more internally controlled.

The Intellectual Achievement Responsibility (IAR) scale (Crandall, Katkovsky, & Crandall, 1965) is a more specific measure of locus of control in that it limits sources of external control to those persons who most often come into face-to-face contact with the child (e.g., parents, teachers, and peers). This instrument assesses children's beliefs in reinforcement in academic situations. In addition to a total internal score, the scale also generates sub-scores consisting of belief in internal responsibility for success (I+ score) and for failures (I-scores). Both subscores can be partitioned further into attribution of success and failure due to effort or undifferentiated. Although the scale's most consistent prediction has been to report card grades (Crandall, Katkovsky, & Crandall, 1965; McGhee & Crandall, 1968; Messer, 1972), this scale has predicted persistence at a complex puzzle, and free play of an intellectual nature (Crandall, Katkovsky, & Preston, 1962). However, sex differences in subscale scores compound the task of interpretation and prediction of the IAR. For example, McGhee and Crandall (1968) found that both I+ and I- scores predicted girls' performance on the Iowa Test of Basic Skills, while I- was a better predictor for boys. When report card grades were used, total I score, I+, and I- were the best predictors for girls, whereas I+ and I- were more sensitive predictors for boys. According to McGhee and Crandall (1968), the finding that I- is a better predictor of academic performance for boys suggests that boys' acceptance of responsibility for academic failure is a greater incentive to academic effort than responsibility for success. The dual pattern of I+ and I- as predictors for girls' performance may indicate two different orientations for girls. Some girls may be motivated by a desire for success, while others respond to a desire to avoid failure. However, Messer (1972) found that I+ score was a better predictor of grades and achievement for a sample of fourth-grade boys, while I- seemed to predict performance in girls.

The Academic Achievement Accountability (AAA) Questionnaire, developed by Clifford and Cleary (1972), assesses self-accountability in academic situations rather than focusing on self vs. others as factors in achievement which are tapped by the IAR. A second difference is that the AAA focuses on non-specific others as the agent of reinforcement which may apply to any factor in the classroom, while the IAR attributes external control to parents, friends, and teachers. Clifford and Cleary (1972) reported that the AAA measure of internality predicted fifth- and sixth-grade boys', but not girls' performance on tests of spelling, vocabulary, and mathematics. But the AAA measure of internality did not predict reliably vocabulary performance of fifth-and sixth-graders in a later study (Clifford, Note 2).

Locus of control also can be assessed by projective tests such as the origin-Pawn measure of personal causation (de Charms, 1968) which uses TAT type protocols with verbal rather than pictorial cues. It is assumed that one who scores as origin has a strong feeling of personal causation, while a pawn believes that his actions are determined by forces beyond his control. Thus origins are similar to internals and pawns are similar to externals. This relationship was not confirmed in a study by Kuperman (Note 5) using the Rotter I-E scale, or Crandall, Katkovsky, and Preston (1962) with the IAR scale, which suggests that projective measures may be tapping achievement motivation. However, Rotter (1966) has presented data which support the assumed relationship between internal control and achievement motivation, a more generalized attitude. Further, Carpenter (Note 1) found that internal-external control and achievement motivation varied with age, with a high relationship occurring among older children.

When locus of control and IQ are compared as predictors of academic achievement, the research findings are equivocal. For example, Gruen, Korte, and Baum (1974) reported that IQ was a more powerful predictor of grade point average, accounting for 20% of the variance, in a sample of second grade children. But controlling for IQ did not affect the correlation between locus of control and grade point average in a study by Messer (1972). In other studies, the effect of IQ seems to be mediated by sex of the child. Clifford and Cleary's (1972) data indicated that self-accountability (i.e., AAA questionnaire) was a better predictor of boys' performance on achievement tests, whereas IA was more predictive of girls' performance. However, when IQ was controlled in a study by Crandall and Lacey (1972), the IAR predicted performance on the Embedded Figures Test for 6-12 year old girls but not boys.

This inconsistency in measures of locus of control to predict academic performance could be attributed to the use of different measures of locus of control, subject characteristics, differences in measures of academic competence, or other factors. Nowicki and Strickland (1973) have argued that locus of control measures such as the IAR are too restricted in their assessment of perceived control, and that we need to assess a more generalized perception of control over reinforcement contingencies. Further, cognitive social learning theory suggests that perceptions about control of reinforcements should be related to other behaviors only when these behaviors are relevant to the exercise of control by the child. The assumption that children believe that their performance can determine course grades or academic achievement may be questionable, as suggested by Clifford and Cleary (1972). Children may perceive classroom performance as a noncontingent event, which would explain the inconsistent academic predictions emerging from the locus of control literature. A more valid test of the predictive power of locus of control should be obtained where the task is one in which the child clearly perceives that he controls the level of performance.

The purpose of the present study was to compare locus of control, personal causation, IQ, and anxiety as predictors of performance on academic and non-academic tasks where the child has some control over his performance.

Method

Subjects. The subjects for the study were 74 white fifth-grade children ($\bar{x}$ age 133.3 months, $s = 6$) consisting of 38 boys and 36 girls from a suburban school located in a largely middle class neighborhood. The children had completed the Iowa Test of Basic Skills prior to participating in the study.

Locus of control measures. These measures consisted of: the Rotter (1966) I-E scale, the Intellectual Achievement Responsibility (IAR) scale (Crandall, et al, 1965), the Academic Achievement Accountability (AAA) Questionnaire (Clifford & Cleary, 1972), and the Origin-Pawn (O-P) measure (de Charms, 1968). The subjects also completed the Children's Manifest Anxiety Scale (CMAS) -- a measure of general anxiety (Castaneda, McCandless, & Palermo, 1956).

Performance measures. The four performance measures ranged from academically related (e.g., arithmetic problems) to non-academic (e.g., block stacking), thereby providing a broad test of the predictive power of locus of control measures. Two of the tasks were group administered and the other two tasks were given to subjects individually.

The group administered tasks were (1) Circle task - This measure consisted of a sheet filled with rows of circles to be filled with pasted stars. The child was asked to predict the number of circles he could fill with stars in one minutes, and then given this period of time to fill as many circles as possible. The scores for this task consisted of task prediction, task performance (i.e., the number of circles filled), and discrepancy score (the difference score between prediction and performance). (2) Counting task - In this task, the child was given a booklet consisting of pages which contained columns of numbers with the number "1" interspersed among these other numbers. The particular combination of 1's with other numbers provided three lists of numbers which differed in the ease with which the 1's were readily perceivable. The easy list contained 1's and 0's, the more difficult list contained 1's, 4's, 7's, and 9's, and the most difficult list contained the numbers 1 - 9. Prior to beginning the task, the child counted a sample list to become familiar with the task for each of the three levels of list difficulty. Before each trial, the child was asked to select the difficulty level of the counting task--easy, more difficult, or very difficult--he wished to attempt. The child then was given one minute to count the 1's in the selected list and instructed to write the number of 1's he had counted when told to stop. The subjects were given three trials on this task. The scores for each trial consisted of the product of the list selection (which was weighted 1, 2, or 3 corresponding to the level of difficulty of the task) and the number of 1's counted for that trial. A total performance score, consisting of the sum of the scores for the three trials also was calculated. These scores reflect the subject's choice and accuracy.

The individually administered tasks were: (3) block stacking - The subject was given several 1½ inch square wooden blocks and asked to indicate the number of blocks he could stack with his non-preferred hand while blindfolded, after which he attempted to stack this number of blocks. Each subject was given two trials on the task. The scores for this task consisted of the subject's performance estimate for each trial, the actual number of blocks stacked on that trial, and the discrepancy score between estimate and actual performance. (4) arithmetic problems task - Each child received feedback on the number of arithmetic problems of six levels of difficulty correctly answered on an arithmetic problems practice test administered by the child's teacher two days earlier. The child then was asked to select an arithmetic problem, for six trials, of any of the six levels of difficulty and correctly answer it. The child was told he would receive points ranging from two for a problem of level one difficulty to 12 points for a level six problem for each correct answer, and the child was urged to earn as many points as possible. Before the problem selection for each trial, the subject was informed of the number of problems correctly answered at each difficulty level on the practice test. The score on the math problems task consisted of the sum of the products of the level of difficulty of the selected problem (1 - 6) and 1 for a correct answer or 0 for an incorrect answer for each of the six trials. Thus both choice and accuracy were components of the total score.

Procedure. The locus of control measures and the circle and counting performance tasks were administered to the subjects in their classrooms by two male experimenters. The items on the Rotter I-E and IAR scales were read to the students to control for reading difficulty. These measures were administered over a two week period with the constraint that no two similar measures were given to the subject during the same time period. All measures were presented in a randomized order. The two individually administered tasks --block stacking and arithmetic problems--, were administered to the subjects during the third week by the two male experimenters. A counterbalanced order of presentation was used for these tasks.

The stories written to the protocals for the Origin-Pawn measure of personal causation were scored by a trained rater whose accuracy previously had been compared with an expert rater. The inter-rater agreement was .85 (Pearson correlation).

Results

Locus of Control. Pearson correlations for the locus of control and IQ measures are presented in Table 1. Congruent with expectations, the Rotter I-E, IAR, and AAA scores for subjects were highly related (r's ranging from .61 to .63), whereas the correlation of these scales with the Origin-Pawn measure of

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Insert Table 1 about here

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personal causation were low, but significant, (r's ranging from .28 to .32). The IQ score from the Iowa Test of Basic Skills also was significantly correlated with the four locus of control measures (r's ranging from .40 to .52). Sex differences on the locus of control measures, including the subscales of the IAR, and IQ were nonsignificant (t's < 1 for all measures). The means and standard deviations for these measures appear in Table 2.

Insert Table 2 about here

Performance measures. A correlational nalysis applied to the four performance tasks showed that these tasks were not significantly correlated (Pearson r's from .09 to -.26), although trials on the block stacking and counting tasks were significant (Pearson r's from .30 to .52). Sex differences on the performance tasks were evaluated with a series of two-tailed t tests and all resulting values were nonsignificant ($p > .10$).

In order to assess the predictive power of the locus of control measures, and IQ, a regression analysis, followed by an univariate analysis of variance to determine significance, was performed on each task. Although sex differences on locus of control, IQ, and performance measures were absent, separate regression analyses were performed for each sex to investigate further the sex differences reported in the literature. Following the current trend in the literature, only those predictors which accounted for 5% or more of the variance are considered.

The regression data for the boys are presented in Table 3. Contrary to the data reported in the literature, (e.g., McGhee & Crandall, 1968), I-

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Insert Table 3 about here

(accepted responsibility for failure) was not the best overall predictor of task performance. In general, none of the locus of control measures consistently predicted performance across tasks. For two of the school related performance measures--math practice test and math problem--IQ was the best predictor, accounting for 57% and 35% of the variance respectively. Predictors of counting task performance varied across trials. On trials 1 and 2, I- effort (assuming responsibility for failure attributable to effort) was the most sensitive predictor accounting for 15% and 19% of the variance respectively. On trial 2, IQ and O-P combined with I- effort to explain 30% of the variance. The best predictor of performance on trial 3 was I-E score which accounted for 18% of the variance. An additional 6% of the variance was accounted for by I- effort. For total score on the counting task, I- effort accounted for 24% of the variance, with IQ explaining an additional 7%. On the non-school related tasks, total internal score on the IAR accounted for 22% of the variance associated with performance on the circle task, whereas for block stacking, score on the Rotter I-E scale accounted for 4% of the variance for trial 1 (a nonsignificant amount), and IQ score seemed to be the best predictor of performance on trial 2, accounting for 11% of the variance.

Locus of control was a more consistent predictor of performance for girls (see Table 4). The best predictor of performance on the counting task,

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Insert Table 4 about here

(one of the three school-related performance measures), was I+ (assuming responsibility for success), accounting for 24%, 37%, and 47% on trials 1,2, 3 and and total score respectively. Anxiety accounted for an addition 6% on trial 1. For trial 2, I- explained 44% of the variance with IQ accounting for an additional 11%. These two predictors accounted for over half of the variance.

On the math practice test and the math problems task, IQ was the best predictor, accounting for 31% and 20% of the variance, although I+ accounted for an additional 18% on math practice. Anxiety score on the CMAS accounted for most of the variance on both trials of the block stacking task (9% on trial 1 and 13% on trial 2), but I+ score on trial 1 and personal causation score (O-P) on trial 2 contributed 7% and 8% respectively to the prediction equation. Performance on the other non-academic related measure (circle task) was predicted best by I- effort. Overall, the prediction pattern across tasks suggests that I+ and I- scores predict performance for girls.

Following the suggestion of McGhee and Crandall (1968) that I- (assumption of responsibility for negative outcomes) may predict different outcomes for boys and girls, a median split was performed on the boys' and girls' I- scores. Separate t tests (two-tailed) were performed on each of the task measures for boys and girls. Low negative males ($\bar{x}$ = 11.46) pasted fewer stars than high negative males ($\bar{x}$ = 14.50) in the circle task (t = -2.83, df = 36, $p < .01$), but there was no difference in performance associated with I- scores for females. The I- score exerted some influence on the total counting task score for males (t = -1.76, df = 36, $p < .09$), with greater scores attributed to the high I- males ($\bar{x}$ = 414.40) than the low I- males ($\bar{x}$ = 331.50). Performance on the other trials of the counting task and the block stacking task were not significantly influenced by I- scores. For females, math problems score tended to be influenced by I- score with high I- females ($\bar{x}$ = 8.64) obtaining a greater score than low I- females ($\bar{x}$ = 6.90) on this task (t = -1.81, df = 34, $p < .08$). Score differences on the math practice test were of borderline significance for males ($p < .10$), but for this task, the scores of low I- males ($\underline{x}$ = 70.59) were greater than high I- males ($\underline{x}$ = 54.50). The pattern of scores for females was reversed with high I- females ($\underline{x}$ = 73.86) solving more problems correctly than low I- females ($\underline{x}$ = 63.30). The I- score also differentiated between males ($\underline{t}$ = -2.24, $\underline{df}$ = 36, $\underline{p}$ .05) and females ($\underline{t}$ = 3.15, $\underline{df}$ = 34, $\underline{p}$ .01) on the discrepancy score for block stacking trial 1, but the performance patterns again were reversed. Low I- males ($\underline{x}$ = 2.54), were more accurate in their performance estimation that high I- males ($\underline{x}$ = 5.90), while high I- females ($\underline{x}$ = 2.29) were more accurate than low I- females ($\underline{x}$ = 4.25). Discrepancy scores for I- males and females were not significantly different on the circle task or block stacking trial 2.

While the regression analyses provide information about the relative power of the locus of control measures to predict task performance, the analyses do not indicate the sensitivity of these measures to assess individual accuracy in predicting performance on a task. To analyze this aspect of locus of control, a series of two-tailed t-tests were performed on the subjects' discrepancy scores for the circle and block stacking tasks using a median split on each of the four locus of control measures. The resulting $\underline{t}$ values for boys and girls were nonsignificant ($\underline{p} > .10$ on all $\underline{t}$ tests), although the variability in discrepancy scores among subjects was extensive.

To assess further individual differences in children's ability to utilize information in a performance situation, subjects were divided into three groups based on the balance between their I scores on the IAR following the scheme suggested by Wolk and Eliot (1974). The three groups consisted of subjects whose I+ score exceeded their I- score by 3 (internals), subjects whose I- score exceeded their I+ score by 3 (externals), and subjects whose

I+ score exceeded their I- score by 1 (balance group). According to Wolk and Eliot (1974), individuals with unbalanced patterns of locus of control may attend to reinforcers associated with that inbalance while ignoring others. To test this assumption, a one way ANOVA, using the three I styles as the between-subjects factor, was applied to the counting task total scores since this task not only involved choice and accuracy by the subject, but also provided the subject with feedback on his performance. The F ratio for this analysis was 1.42, $df = 2/42$, $p > .10$. Inspection of the mean scores showed that the balance group had the highest score followed by the external group with the internals achieving the lowest score. Utilization of information by these three locus of control groups was examined further by analyzing the subjects' choice behavior on the math practice test to determine whether the child attempted to maximize his score by choosing on each trial the problem difficulty for which he had the most problems correct on the practice test. The proportion of maximized selections over the six trials for each of the three locus of control groups was calculated and comparisons between the groups were made using the z test for differences between two proportions. The analyses were nonsignificant ($z < 1$, $p > .10$ for the three comparisons).

Discussion

On the basis of this study, the following statements about locus of control scales seem to be in order: (1) Locus of control scales are not consistent predictors of performance on school related or non-school related tasks; (2) Locus of control apparently does not assess accuracy of individual prediction of performance on a task. But, what is measured by locus of control? The answer to this question seems contingent on the task and the sex of the child.

The motivational situations involving school related and non-school related tasks provided an optimal test for locus of control. Although both the IAR (Crandall et al, 1965) and the AAA (Clifford & Cleary, 1972) were designed specifically to predict school achievement, neither measure consistently predicted performance on the school related tasks for either boys or girls. Thus, on the mathematics problems and practice tasks, IQ, not locus of control (i.e., internality), was the best predictor of performance for both sexes; and while performance on the third school related task--counting--was predicted by sub scores of the IAR, there were sex differences. The best predictor for boys was I- effort (assumption of responsibility for failure associated with effort) with IQ a contributing factor, while I+ (assumption of responsibility for success) was more predictive of girls' performance. The failure of the IAR scale to predict performance on the math tasks may have been due in part to their achievement test characteristics which only indirectly tap motivational factors assessed by the IAR (McGhee & Crandall, 1968). The emergence of IAR as a predictor in the counting task where motivational factors were more salient seems to support this argument. However, this explanation does not account for the failure of the AAA Questionnaire to predict performance on the math problems and counting task since these performance measures provided the child with options to maximize success, a performance factor which the AAA was developed specifically to assess (Clifford & Cleary, 1972). It would appear that the AAA Questionnaire has low predictive validity, but the problem also may be one of construct validity.

Inconsistent prediction on the non-school related tasks provides further evidence of the specific focus of the IAR and AAA measures. Although total I score for boys and I- effort score for girls predicted performance on the circle task where motor ability was involved, neither measure predicted performance on block stacking, another motor task. Rather, score on the Rotter I-E scale and IQ were the best predictors of boys' block stacking, whereas anxiety level seemed to predict girls' performance, although the addition of I+ score on trial 1 and O-P score on trial 2 added to this prediction equation for girls. The emergence of different predictors on the circle task may have occurred because this task was viewed by boys as a competitive situation which they felt somewhat confident in mastering as reflected in the appearance of I total as a predictor. For girls, this task may have provided fear of failure motivation since it differed from the usual school regime, thus the emergence of I- effort. While a competence motive was present in the block stacking, this task also involved a skill factor. The emergence of anxiety as a predictor of girls' block stacking is characteristic of internal girls who are likely to exhibit anxiety in problems demanding skill (Crandall,Note 3). Thus fear of failure may have contributed to girls' performance on block stacking as well. The positive correlation between Rotter I-E score and boys' block stacking on trial 1 suggests that boys may have felt luck or chance was involved, since a high score on the I-E scale denotes external orientation. But the emergence of IQ as a predictor of performance on trial 2 suggests that brighter boys may have recognized this skill component.

Neither the Rotter I-E scale nor the Origin-Pawn measure of personal causation were major predictors of performance on any of the tasks, although each contributed to some of the prediction equations. The Rotter I-E scale is better suited for adults which may explain in part its low predictive power in this study with children. The Origin-Pawn measure has been adapted for use with children, but this scale, because of its projective characteristics, may have tapped achievement motivation rather than control over reinforcement contingencies. Its contribution to the prediction of non-school related tasks suggests that this may have occurred. The recently developed Nowicki-Strickland Locus of Control Scale for Children (Nowicki & Strickland, 1973) was not included in this study. However, Goodwin and Green (Note 4) compared this locus of control measure with SAT scores as predictors of circle task performance in fourth-grade children. The locus of control scale correlated significantly with boys' performance, whereas SAT scores were more highly correlated with girls' performance.

While locus of control seems to predict performance on some tasks, it apparently does not predict accuracy of performance estimation. The nonsignificant results for differences in performance estimation among internals and externals suggests that one may perceive control over reinforcement contingencies, but this sense of control does not generalize to appraisal of one's anticipated performance. That is, belief in self responsibility for one's actions does not necessarily imply that one can realistically predict performance on a task. The inability of locus of control to predict performance across tasks as well as expectancy of performance may be attributed to several factors, one of which seems to be the specificity inherent in measures of internal-external control (Rotter, 1966).

Locus of control also does not seem to predict differences in information utilization. Further, the data in this study indicate that subjects with a balanced I+ I- pattern made more effective use of information than those more strongly oriented to assuming responsibility for success or failure. This relationship seems logical in that those subjects with a balanced locus of control pattern can be less selective in their screening of information. Further, there is little evidence in this study to show that internals are more effective utilizers of information than externals. The inability of the various locus of control measures to differentiate between internals and externals on performance expectancies fails to support the contention of Crandall and Lacey (1972) that internals and externals should differ on this dimension.

Although sex differences in locus of control have been dealt with extensively in other reports (e.g., Crandall, 1969; Maccoby & Jacklin, 1974; McGhee & Crandall, 1968; Stein & Bailey, 1973), the present study provides some additional insights about these differences. Contrary to the conclusions of McGhee and Crandall (1968), in the present study, I- was not a more consistent predictor of boys' performance and I+ and I- scores were not consistent predictors of girls' performance. Rather the predictive power of these measures was contingent on the type of task. Sex differences were not as evident on achievement oriented tasks such as the math practice test and the math problems task where IQ predicted performance for both boys and girls. The strongest support for the McGhee and Crandall sex difference prediction appeared for the counting task where motivational factors were salient because of the option on list selection. On the purely motor task of filling circles, internal control seemed to influence boys' performance, whereas a specific aspect of internality--responsibility for failure--influenced girls' performance. When the task demands shifted to skill components, as in the block stacking, sex differences in predictors emerged, and the predictors changed to anxiety for girls and IQ for boys. Thus, for both sexes, it appears that locus of control predicts best performance on tasks where a motivational component, such as an option to maximize outcome, is salient. In this type of task, the predicted sex differences seem to emerge, perhaps as a result of the differential socialization alluded to by McGhee and Crandall (1968).

The analyses of I- (responsibility for failure) and its relation to task performance and expectancy provide further insight into the dynamics of sex differences. High and low responsibility for failure in males and females differed in performance and expectancy. High responsibility for failure accelerated performance on the motor task (filling circles) and one of the option tasks (counting) for boys, but low responsibility for failure boys correctly solved more arithmetic problems on the practice test. The pattern for females was more consistent in that high responsibility for failure females obtained greater scores on the practice math test as well as the subsequent problems test. High I- females also were more realistic in their performance estimation on block stacking, whereas among males, the low I- group was more accurate. Perhaps avoiding failure is a strong motivational factor for boys, especially in those activities where they are expected to do well (e.g., competitive situations, certain skill areas, etc., which may have been tapped in the circle and counting tasks). However, this desire to avoid failure can impede performance in academic achievement areas, such as math, and in expectation of performance, because of over-estimation of one's ability.

That is, boys may take more risks. According to Stein and Bailey (1973), females are more anxious about failure, more cautious in risk taking, and more likely to accept responsibility for failure. Thus high I- females should be motivated to perform better, especially in academic areas because of cultural expectations,also this female should exhibit less discrepancy in her performance expectations because she tends to be more cautious in her estimation as noted by House and Perney (1974) who found that females had lower expectancies. The performance estimation scores for the circle and block stacking tasks in the present study tend to support the discussed sex differences in expectancy. Females' performance estimates were lower on the two tasks, although the difference was significant only for block stacking trial 1, and as a result, the discrepancy between estimation and performance was lower for females. While one can argue that females were more conservative because of the competitive situation in a heterogeneous setting with boys, this explanation does not account for the sex difference in the individually administered block stacking task.

In summary, prediction of task performance by locus of control measures and IQ appears to be contingent on the type of task and the sex of the subject. IQ seems to predict tasks of academic achievement, while locus of control predicts performance on some, but not all, tasks with a motivational component. This conclusion seems reasonable given that the sample in this study consisted of fifth-grade children, one of the age groups included in previous studies, and given that the mean scores and standard deviations for the locus of control measures were not significantly different from those previously published. As yet unanswered is the question of whether locus of control results in greater achievement or is the result of achievement.

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Footnotes

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[1] We are grateful to Ruth Day, Yale University, for suggesting the counting task.

TABLE 1

Correlations of Locus of Control Measures and IQ[1]

Measure	O-P	AAA	I-E	IAR	IQ
Origin-Pawn	-	.28**	.32**	.28**	.49**
AAA		-	.63**	.62**	.50**
Rotter I-E			-	.61**	.52**
IAR				-	.40**

[1] N = 74

** $p < .01$

TABLE 2

Means and Standard Deviations of Locus of Control Scales and IQ for Boys and Girls

Predictor Measure	Boys $\bar{x}$	Boys s	Girls $\bar{x}$	Girls s
O-P	3.37	2.54	3.37	2.26
AAA	10.45	4.46	11.16	3.69
Rotter I-E	11.39	5.32	12.05	5.09
I total	21.61	8.45	22.47	9.37
I+	11.47	4.81	12.05	4.91
I-	9.95	4.14	10.45	4.57
I+ effort	5.16	2.55	5.50	2.51
I- effort	4.34	2.20	4.61	2.40
CMAS	16.16	7.47	19.79	8.23
IQ[1]	48.71	27.34	56.32	32.[illegible]4

[1] IQ is expressed in percentile rank

TABLE 3

Multiple Regression Analyses for Boys Using Performance on Circle Task, Block Stacking, Counting Task, Mathematics Practice Test, and Mathematics Problems as Criterion Variables[1]

Predictor Variables	Multiple R	R^2	R^2 Change	r	F	p <
Circle Task Performance						
I total	.52	.27		.52	13.47	.01
O-P	.57	.32	.05	.38	8.35	.01
Block Stacking-Trial #1						
I-E	.20	.04		.20	1.49	ns
Block Stacking-Trial #2						
IQ	.34	.11		.34	4.62	.05
Counting Task-Trial #1						
I- effort	.38	.15		.38	6.19	.05
Counting Task-Trial #2						
I- effort	.44	.19		.44	8.62	.01
IQ	.50	.25	.06	.27	5.91	.01
O-P	.55	.30	.05	.02	4.83	.01
Counting Task-Trial #3						
I-E	.43	.18		.43	8.13	.01
I- effort	.49	.24	.06	.40	5.51	.01
Counting Task Total						
I- effort	.49	.24		.49	11.08	.01
IQ	.56	.31	.07	.30	7.87	.01

TABLE 3 Continued

Predictor Variables	Multiple R	R^2	R^2 Change	r	F	p <
Math Practice Test						
IQ	.76	.57		.76	48.01	.01
Math Problems						
IQ	.59	.35		.59	19.40	.01

[1] N = 38

TABLE 4

Multiple Regression Analyses for Girls Using Circle Task, Counting Task, Block Stacking, and Math Problems as Criterion Variables[1]

Predictor Variables	Multiple R	R^2	R^2 Change	*r*	*F*	*p* <
Circle Task						
I- effort	.45	.20		.45	9.24	.01
O-P	.52	.27	.07	.36	6.36	.01
Block Stacking-Trial #1						
CMAS	.30	.09		.30	3.58	ns
I+	.40	.16	.07	.19	3.33	.05
Block Stacking-Trial #2						
CMAS	.37	.13		.37	5.55	.05
O-P	.46	.21	.08	.26	4.74	.05
Counting Task-Trial #1						
I+	.49	.24		.49	11.35	.01
CMAS	.55	.30	.06	.36	7.41	.01
Counting Task-Trial #2						
I-	.66	.44		.66	28.20	.01
IQ	.74	.55	.11	.60	21.47	.01
Counting Task-Trial #3						
I+	.61	.37		.61	21.36	.01
Counting Task Total						
I+	.69	.47		.69	32.45	.01

TABLE 4 Continued

Predictor Variables	Multiple R	R^2	R^2 Change	r	F	p <
Math Practice Test						
IQ	.56	.31		.56	16.40	.01
I+	.70	.49	.18	-.06	16.57	.01
O-P	.77	.59	.10	.04	16.24	.01
Math Problems						
IQ	.44	.20		.44	8.79	.01

[1] N = 36