Experiment 1 demonstrated that prediction of exam performance obeys an averaging rule just as the studies by Singh et al (1979) and by Gupta and Singh (1981) had shown. Even though children much younger than those used in experiments of Gupta and Singh (1981) and Bhargava (1983) served as subjects, there was no evidence for any developmental change at all. Does it imply then that prediction of task performance obeys parallelism and converging pattern for all tasks in India?

Experiments by Kun et al (1974) and by Surber (1980) had studied performance on puzzles and performance in weight-lifting contest, respectively. Both tasks were non-academic, and their results showed that 8-9-year-olds in the United States evinced clear fan pattern in Motivation x Ability effect. The first purpose of Experiment 2 was, therefore, to examine interaction effect of nature of task and developmental level of subjects on prediction of task performance by 9-13-year-olds.
In research by Singh and Bhargava (1982a, 1982b), the same group of postgraduate students of management followed an adding rule in prediction of exam performance but multiplying rule in prediction of life performance. Bhargava (1983) further showed that this multiplying rule is true with prediction of life performance alone. When the same group of postgraduate students and a much more experienced and older group of professional managers predicted performance of management trainees, they followed an adding-type rule. These findings suggest that the causal schemata for prediction of task performance are linked with nature of task. If this hypothesis is correct, then the fan pattern is not necessarily a characteristic of 20-year-olds (Bhargava, 1983) but can also be obtained with younger children in India.

To test this hypothesis of interaction between nature of task and developmental level, Experiment 2 studied prediction of performance in the puzzle and music competitions. The First task is comparable to that of Kun et al (1974). It can thus allow a direct test of hypotheses of nature of task and cultural difference as explanation for the failure of the linear fan pattern in Motivation x Ability effect in all studies of Indian children.
The second task of singing performance is novel, for it has not been studied so far. More importantly, this is one task where trying cannot compensate for one's singing ability. It was predicted, therefore, that judgment of performance in singing competition might yield the linear fan shape even with younger children in India.

The second purpose of Experiment 2 was to further test integrational capacity in children. Information utilization and order effects were thus analyzed as a function of nature of task and age of the subjects. As already noted, Kun et al (1974) demonstrated recency effect on judgment by children of Standard I. There was not any effect of order of presentation on judgments by children of Standards III and V. In Experiment 1 of the present research, however, recency effect of motivation information was present in judgments by children of Standard IV. Order of presentation of information had affected origin of the response scale in case of other children. Experiment 2, therefore, intended to resolve this inconsistency between the results of Kun et al (1974) and Experiment 1. By studying prediction of performance in puzzle competition, Experiment 2 provided direct comparison of order effects on judgments by Indian and American children.
Method

Subjects

Ninety-six children from the Central School, Shahibaug, Ahmedabad, Gujarat, served as subjects. These subjects were selected to complete 16 cells of a 2 x 2 x 2 x 2 design, having standard of subjects (Standard IV versus Standard VIII), nature of task (puzzle versus music competition), sex of subjects (male versus female), and order of presentation of information (motivation-ability order versus ability-motivation order) as factors. There were 6 subjects in each of these 16 cells. The mean ages for the children of Standard IV and VIII were 9 years 7 months and 13 years 6 months, with respective ranges of 8 years 7 months to 10 years 2 months and 12 years 8 months to 14 years 4 months.

Stimuli and Designs

The stimulus persons were 10-year-olds who were to participate in either a puzzle or music competition to be organized in school. They were described with respect to their motivation and ability. Each type of information was shown by a row of seven vertical bars. They all had width of 1 centimeter but varied in height from 1-7 centimeters.
Motivation of the stimulus child was described by the number of days of prior preparation for participation in the competition. It ranged from 1 to 7 days of prior preparation by the stimulus child. This information came from mother of the child. The ability to solve puzzle was described by the opinion of a teacher who had known the child very well. The teacher indicated how good was the child in puzzle solving. This was also shown by the appropriate marks in one of the seven vertical bars. Ability to sing was described by the opinion of music teacher as to the clarity, sweetness, and tenderness of voice of the stimulus child.

Profiles of nine stimulus persons were prepared according to a 3 x 3 (Motivation x Ability) factorial design. The three levels of two factors were 2nd, 4th, and 6th vertical bars. An example of the profile of a child with low motivation and high ability is shown in Figure 8.

Five practice examples were also constructed. Four examples were based on extreme levels of motivation and ability, and they were intended to serve as end anchors. One example was taken from the set of main stimuli. These

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2 Children were reminded of a film song by Lata Mangeshkar and Kishore Kumar to illustrate the highest musical ability.
Figure 8. An example of the profile of a stimulus child with low motivation and high ability. Similar profiles were used in Experiments 2 and 3.
practice examples and one additional filler profile were also presented along with the main set of nine stimuli during data collection.

Descriptions of these stimulus children were presented in a booklet. The first five pages had profiles of the five practice examples in a randomized order. The remaining fifteen pages of the booklet consisted of a random combination of the nine main stimulus children, five practice examples, and one filler description. These profiles had an identification number between 1-15.

Procedure.

The general procedure of Experiment 2 was similar to that of Day 1 of the Experiment 1. The same female experimenter collected data from all the ninety-six children. Each subject looked at the information about motivation and ability of the stimulus child and predicted performance of stimulus child in either puzzle or music competition by pointing at one of the 21 steps of the ladder scale.

Judgments were made over three trials, using three different booklets which had profiles of the very same stimulus children in different randomized orders. As in the previous experiment, judgments of the first trial were
considered to be additional practice. Judgments from the second and third trials were coded and analyzed. The subject received 5 toffees and thanks for his or her participation in the experiment.

Results

Data of Experiment 2 were subjected to a $2 \times 2 \times 2 \times 2 \times 3 \times 3$ (Standard of subjects x Nature of task x Sex of subjects x Order of presentation x Trials x Motivation x Ability) analysis of variance. In this analysis, the first four factors were between-subjects factors, whereas the last three factors were within-subjects factors (Winer, 1971). Summary of analysis of variance is shown in Appendix-D. Principal results from this analysis will be presented under three subheadings, namely, patterns in Motivation x Ability effect, integrational capacity, and valuation of motivation and ability.

Patterns in Motivation x Ability Effect

Puzzle competition. The first two graphs on the left side of Figure 9 display mean judgment of performance in puzzle competition as a function of motivation (curve parameter) and ability (listed on horizontal axis) of the stimulus children. The first graph shows a clear pattern of parallelism, $F(4,80) = 1.17$. This means that
Figure 9. Mean judgment of performance in puzzle-competition (left side) and in music competition (right side) as a function of motivation and ability of stimulus children.
children of Standard IV followed an adding-type rule. The second graph from left displays judgment by children of Standard VIII. This graph has a converging pattern, $F(4, 80) = 2.57, p < .05$. This converging trend was statistically supported by the presence of a significant Linear x Linear trend, $F(1, 23) = 7.67, p < .01$, and absence of Linear x Quadratic, Quadratic x Linear, and Quadratic x Quadratic trends, $F(1, 23) = 3.99, .36, .01$. It appears, therefore, that judgments by children of Standard VIII can be represented by an averaging rule with differential weighting (Bhargava, 1983, Case E, p.4) or an inverted multiplying rule (Singh, 1982).

The results presented above demonstrate a developmental trend in prediction of performance in puzzle competition. Children of Standard IV evince a parallelism pattern, whereas children of Standard VIII present a converging pattern, $F(4, 160) = 2.55, p < .05$. This trend is contrary to the developmental trend reported by Kun et al (1974). At the same time, these results are consistent with the cultural difference hypothesis (Gupta & Singh, 1981; Singh, 1981; Singh et al, 1979).

Music competition. The two graphs on the right side of Figure 9 exhibit pattern in prediction of performance in music competition. Here also there is a developmental
trend, for Standard x Motivation x Ability effect was substantial, $F(4, 160) = 10.42, \ p < .01$. The graph for children of Standard IV shows divergence toward right, $F(4, 80) = 32.62, \ p < .01$. Partition of this interaction effect into Linear x Linear, Linear x Quadratic, Quadratic x Linear, and Quadratic x Quadratic yielded $F(1, 23) = 150.92, 15.06, .00, \text{ and } .04$ in order. Since Linear x Quadratic trend is also statistically significant, the divergence cannot be described as perfectly linear fan pattern. Nevertheless, the Linear x Linear component is substantial. Accordingly, it may be interpreted that judgments by children of Standard IV may best be represented by a multiplying-type rule.

The fourth graph for children of Standard VIII has a clear pattern of parallelism, $F(4, 80) = .60$. This implies that children of Standard VIII predicted performance in music competition according to an adding-type rule.

Age and task differences. According to the hypothesis of interaction between nature of task and developmental level, the pattern in Motivation x Ability effect is expected to vary as a function of nature of task and age of the subjects. Results pertaining to prediction of performance in puzzle and music competitions discussed
above clearly support the hypothesis. In puzzle task, children of Standard IV and VIII showed parallelism and converging patterns, respectively. In music task, these two groups of subjects had fan and parallelism patterns. In overall analysis of variance, therefore, Standard x Motivation x Ability, Task x Motivation x Ability, and Standard x Task x Motivation x Ability effects were all statistically significant, $F(4,320) = 8.43, 5.84, \text{ and } 2.74$. The hypothesis of interaction between age of subjects and nature of task thus received reasonable empirical support.

**Integrational Capacity**

**Information utilization.** Data of each of the 96 children were analyzed separately to find out the number of significant main effects. Eighty-two percent of the children used both motivation and ability information in their judgments. Table 3 presents number of children from the four groups who had main effects of both motivation and ability as statistically significant.
TABLE 3

Number of Standard IV and VIII Children Having Two Main Effects in Prediction of Performance in Puzzle and Music Competition

<table>
<thead>
<tr>
<th>Standard</th>
<th>Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Puzzle</td>
</tr>
<tr>
<td>IV</td>
<td>18</td>
</tr>
<tr>
<td>VIII</td>
<td>22</td>
</tr>
</tbody>
</table>

It appears that the distribution of children across the four cells is about the same, $X^2 (1) = 2.17$. There is thus no age or task trend in the utilization of information. The failure of 18 percent of the children to utilize both pieces of information is surprising, for they do not belong to the preoperational stage. This failure may possibly be accounted for by the low statistical power of the test, for each test of main effect had degrees of freedom of 2 and 8.

Order effects. In overall analysis of variance, order of presentation of motivation information did not produce any reliable effect on prediction of performance. The Order x Motivation, Standard x Order x Motivation, Task x Order x Motivation, Sex of subjects x Order x Motivation, Standard x Task x Order x Motivation, Standard
Sex of subjects x Order x Motivation, Task x Sex of subjects x Order x Motivation, and Standard x Task x Sex of subjects x Order x Motivation effects were all statistically nonsignificant, $F(2,160) = 1.57, 2.55, .30, .33, 1.91, .32, .35, \text{ and } 1.84$. It can thus be said that motivation information does not produce any order effect in prediction of performance in nonacademic domains.

The situation with effect of order of presentation of ability information was, however, different. In analysis of variance, Order x Ability and Task x Order x Ability effects were both statistically significant, $F(2,160) = 4.66$ and $6.44, p < .01$. The profiles of these two interaction effects are shown in Figure 10.

The second graph on the left side of Figure 10 presents order effect of ability information. It is clear that ability produced much stronger effect when it appeared in motivation-ability order than when it appeared in ability-motivation-order. There is thus a clear recency effect.

This recency effect is restricted to puzzle task alone. The third and fourth graphs of Figure 10 present order effect of ability information on prediction of performance in puzzle competition and music competition,
Figure 10. Profiles of Standard x Ability effect, Order x Ability effect, and Task x Order x Ability effect.
respectively. It is clear that the recency effect operated in puzzle task, $F(2, 80) = 11.98, p < .01$, but not in music task, $F(2, 80) = .17$. Further analysis of the puzzle task disclosed that the recency effect was present with children of both Standards IV and VIII$^3$, $F(2, 40) = 5.86$ and $6.82, p < .01$. The magnitude of recency effect was exactly the same at both age levels, for Standard x Order x Ability effect was absent, $F(2, 160) = .32$.

The present finding of recency effect of ability information on puzzle task questions the acceptance of recency effect as an index of cognitive capacity of children. In experiment of Kun et al (1974), this effect was present at the level of children of Standard I. In the present research, it is present with older children but does not generalize to either motivation information or to music task. This suggests that order effects in children's judgment reflect more on the properties of judgmental task than on the cognitive capacity of children. This confirms the hypothesis that order effects are indices of the requirements of the task.

**Valuation of Motivation and Ability**

**Valuation of motivation.** In overall analysis of variance, Task x Motivation, Standard x Task x Motivation, and Standard x Task x Sex of subjects x Motivation effects

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$^3$ For these analyses, see Appendix-E. Data were analyzed in a number of ways. Only relevant $F$ ratios have been reported to support the interpretation.
were all statistically significant, $F(2, 160) = 4.38, 11.73,$
and $7.00, p < .01$. Profiles of these interactions are shown in Figure 11.

The first graph on the left side of Figure 11 presents profile of Task x Motivation effect. Children seem to believe that motivation plays more important role in puzzle competition than in music competition.

This conception, however, does not seem to be shared by all children, because Standard x Task x Motivation effect was also statistically significant. Profile of this three-factor interaction is shown in the second and third graphs on the left side of Figure 11. Children of Standard VIII seem to believe that motivation plays more important role in prediction of performance in puzzle competition than do children of Standard IV. In contrast, children of Standard IV assign greater important to motivation in prediction of performance in music competition than children of Standard VIII.

From the graph, it also appears that children of Standard IV give equal importance to motivation in prediction of performance in both the music and puzzle competitions, $F(2, 80) = 1.37$, whereas children of Standard VIII give greater importance to motivation in puzzle than in music competition,
file of Task x Motivation effect, Task x Standard x Motivation effect, and x Sex of subjects x Motivation effect.
$F(2,80) = 12.65, p < .01$. Perceived importance of motivation thus varied not only as a function of nature of task but also as a function of developmental level of children.

The four graphs on the right side of Figure 11 display profile of Standard x Task x Sex of subjects x Motivation effect. There is a clear indication that boys and girls of Standards IV and VIII differ in their perception of effectiveness of motivation as a determinant of performance in the music and puzzle competitions. Male children of Standard IV assign greater importance to motivation in prediction of performance in puzzle competition but girls assign greater importance to motivation in prediction of performance in music competition. Exactly the reverse is true at the level of Standard VIII.

Considered together, these results suggest that there is no universal conception about the effectiveness of motivation in determination of performance. Perceived effectiveness of motivation depends upon the characteristics of the subject, for example, age and sex, as well as nature of task.

**Valuation of ability.** In overall analysis of variance Standard x Ability effect, $F(2,160) = 19.80, p < .01$, was highly significant. Profile of this interaction is shown on the left side of Figure 10. It is clear that children of
Standards IV and VIII differed in their perception of effectiveness of ability as a determinant of performance. It seems that children of Standard IV considered ability to be more important determinant of performance than did children of Standard VIII. Perceived effectiveness of ability factor thus changed as a function of developmental level of the subjects.

Discussion

There are three main findings of Experiment 2. The first and most important is that pattern in Motivation x Ability effect depends upon the nature of task and developmental level of the subjects. In puzzle task, the pattern changed from parallelism to convergence. In music task, however, the pattern changed from divergence to parallelism. The finding of multiplying-type rule by children of Standard IV is the first demonstration of the fan pattern with Indian children.

Even though Experiment 2 used prediction of performance in puzzle competition, results obtained with Indian children are markedly different from those of the United States. This confirms the findings of Gupta and Singh (1981) and Bhargava (1983) that school students in India follow an adding-type rule in prediction of performance in a number of tasks. This
provides greater generality to the cultural difference hypothesis (Gupta & Singh, 1981; Singh, 1981; Singh et al, 1979).

The demonstration of approximate linear fan pattern in prediction of performance in music competition confirms the main hypothesis of Experiment 2 that it is possible to obtain linear fan pattern with younger children in India. This result clearly shows that Indian children have the ability to follow multiplying rule, and that their failure to use multiplying rule in prediction of performance in some task situations reflect on their causal schemata for those tasks. Such causal schema for a task changes as a function of age and experience of the subject is clearly borne out by the presence of parallelism pattern in prediction of performance in music competition by children of Standard VIII. The first purpose of Experiment 2 has thus been achieved, for it has successfully demonstrated an interaction between nature of task and developmental level of the subjects.

The second important finding of the present research is the effect of order of presentation of ability information on prediction of performance in puzzle competition. Children of both Standards IV and VIII assigned greater importance to ability when ability information appeared
second in sequence than when it appeared first in sequence. In research by Kun et al (1974), recency effect was a characteristic of children of Standard I. Children of Standards III and V showed no effect of order of presentation of information at all. Their result of recency effect with younger children may be interpreted as indicative of a limited cognitive capacity. But the present findings of recency effect of ability information in puzzle task and of no order effect of motivation information in music task suggest that these order effects are also linked with nature of task. Moreover, they have very little bearing on the cognitive capacity of the subjects.

The third important finding is that the effectiveness of motivation as a determinant of performance varies as a function of the developmental level and sex of the subjects as well as nature of task. Gupta and Singh (1981) claimed that 6-7-year-olds in India believe in the great power of trying as a determinant of performance. Results of the present research suggest that there is a wide variation in the perceived effectiveness of motivation as a determinant of performance.

In sum, it can be said that pattern in Motivation x Ability effect depends on nature of task and developmental level of subjects. With some tasks, it is possible to
yield multiplying-type rule even with 8-9-year-olds in India, and prediction in singing contest is one such task. This result brings a major qualification on the cultural difference hypothesis but does not reject it altogether.