EXPERIMENT 3

The results of Experiment 1 and 2 supported the multiplying hypothesis of Heider (1958) and Vroom (1964). However, they appear to be inconsistent with a result reported by Bhargava (1983) who found evidence for a parallelism pattern in prediction of job performance of management trainees. The subjects in his study were also managers. There is, however, a major difference between Bhargava's study and Experiment 1 and 2 of the present study. The stimulus persons were management trainees in Bhargava's study but supervisors in the present study. Since management trainees belong to managerial group parallelism may reflect an egalitarian attitude toward ingroup members.

Experiment 3 had two objectives. One was to replicate the parallelism pattern obtained by Bhargava, using management trainees as stimulus persons. The other purpose of this experiment was to further study imputation about missing information by managers.

For the purpose of unambiguous identification of underlying rule when parallelism is obtained, this experiment used tests based on the logic of two-stage model. As in the
case of Experiment 2, several pieces of information about motivation were manipulated along with one piece of ability information. It was postulated that if the subjects followed adding rule, the motivation information will be first averaged and then added to the ability information.

Experiment 3 contained two designs based on the two-stage logic. However, they differed with respect to manipulation of motivation information. Design 1 was a 2 x 3 x 3 (Cue x Motivation x Ability) factorial. The cue factor stood for the number of pieces of neutral motivation information. The two situations arose by combining either none or two pieces of neutral motivation information with low, moderate, and high level of motivation. If the motivation information are averaged, it is natural to postulate that in the plot of Cue x Motivation, the single-cue curve will cross over the three-cue curve (Anderson, 1965). However, if the motivation and ability are added at the second stage, parallelism is predicted in the plot of Cue x Ability as well as in the common plot of Motivation x Ability effect from the two-information and four-information conditions.

Design 2 was a 2 x 3 x 3 (Number of isovalent Motivation x Motivation x Ability) factorial. The factor of isovalent motivation corresponded to the set size of motivation information which was either one or three. This formulation of
two-stage information processing logic corresponds to Equation 10 to 14 for different integration rules. As already discussed, if averaging is the mode of integrating motivation information, in the plot of Number of Isovalent motivation x Motivation, the curve corresponding to three motivation information can be predicted to cross over the curve based on only one motivation information. Further, just as in the case of Design 1, there is correspondence in respect of parallelism; if adding is the rule, not only there would be parallelism in the plot of Isovalent Motivation x Motivation, but also in the common plot of Motivation x Ability from the two-cue and four-cue profiles.

Method

Stimuli and Designs

Descriptions of stimulus management trainees were prepared in the same way as in case of subordinates. The levels of motivation and ability were identical and had seven verbal levels: Extremely low, very much below average, below average, average, above average, very much above average, and extremely high.

There were two main stimulus designs. Design 1 was a $2 \times 3 \times 3$ (Number of average Motivation Information x Motivation x Ability) factorial. The number of average
motivation information constituting two levels were either nil (0), or two (2); the three levels of motivation and ability were extremely low, average and extremely high.

Design 2 was a 2x3x3 (Set-size of motivation information x Motivation x Ability) factorial. The size of the descriptive set were manipulated by including one (1) and three (3) similar pieces of motivation information.

Design 3 and 4 had information about motivation alone and ability alone, respectively. Both the ability and motivation had three levels as in Design 1 and 2.

The four designs together generated 33 stimulus profiles. In addition, eleven descriptions were prepared to serve as fillers and end anchors. The end anchors had extreme motivation information from four sources. These were meant to orient the subjects to use the entire response scale.

The subjects rated 12 practice examples and 37 experimental profiles. The practice examples consisted of two end anchors, five single-cue descriptions, three four-cue descriptions, and two-cue descriptions. The 37 experimental profiles contained four profiles from the practice set, including the two end anchors.
Procedure

As in the previous experiments, the subjects were run individually and they were explained about their task and role through instruction sheet as well as verbally. After the subjects finished rating of practice examples, they rated the stimuli profiles thrice. The index cards containing the description of profiles were thoroughly shuffled for each rating. The analysis presented here is based on the data of all the three replications.

Subjects

The subjects were 19 managers participating in a management development program on Corporate Planning at the Indian Institute of Management, Ahmedabad. The participation in the experiment was voluntary in response to an appeal made by the programme coordinator. The average age of the subjects was 42 years and 6 months; the range was from 26 years to 57 years. On an average, the subjects had put in 16 years and 4 months of service.

Results

The analysis of variance for Design 1 and 2 are given in Appendices C-1 and C-2, respectively. The major results of these analysis are presented below.
Two-Stage versus One-Stage Integration

Figure 8 presents six two-way factorial plots of Cue x Motivation, Cue x Ability, and Motivation x Ability interactions from Design 1 in the first three panels and of Set-size x Motivation, Set-size x Ability, and Motivation x Ability interactions from Design 2 in the three right panels. The first panel from left lends support to averaging hypothesis. Addition of neutral pieces of motivation information has reduced the steepness of the curve due to averaging of motivation information. As compared to curve based on just one type of information depicted on the abscissa, the curve with digit 0 crosses over the curve with digit 2. A strong support to the averaging hypothesis was also provided by analysis of variance, the Cue x Motivation interaction had $F(2,36) = 89.865, \ p < .01$.

A different kind of evidence for the averaging hypothesis is provided by the fourth panel from the left based on Design 2 data. According to this version of the hypothesis, responses based on greater number of similar pieces of information is more extreme than those based on less number of similar pieces of information (Anderson, 1967; Kaplan, 197a, 1971b; Lewin & Kaplan, 1974). It is clear from the Equation 10 to 14 that this set-size effect arises due to averaging of initial impression with given overt information. In conformity with the hypothesis, given motivation information
Figure 8. Factorial plots of Number of Average Motivation Information x Motivation, Number of Average Motivation Information x Ability, Motivation x Ability, Set-size of Motivation Information x Motivation, Set-size of Motivation Information x Ability, and Motivation x Ability effects from Experiment 3. Three graphs on the left are from Design 1; three graphs on the right are from Design 2. The abbreviations EL, AV, and EH refer to Extremely low, Average, and Extremely high levels, respectively.
were averaged at the first-stage. The curve based on 3 isovalent pieces of motivation information has steeper slope than the one based on just one piece of motivation information.

The second and fifth panels provide distinguishing tests between one-operation averaging and two-operation model. Consider the fifth panel first. The two-set-size curves are parallel. This pattern implies that the effect of ability information is independent of the effect of the set-size of motivation information. This evidence agrees with the two-operation, averaging-adding model but rejects the one-operation averaging model.

The two-operation model of information processing hypothesis also predicts parallelism among the two curves corresponding to different levels of average information in the second panel from left. This does not find support due to distortion arising from end effect. With this exception, however, parallelism pattern in the two panels can be accepted and it can be asserted that Design 1 and 2 lend support to the two-stage information processing hypothesis.

Parallelism Pattern

It has been indicated earlier that the main purpose of this experiment was to replicate the parallelism pattern in
the plot of Motivation x Ability effect and diagnose the algebraic rule characterising it. Plots of this interaction are in the third and sixth panels from Design 1 and 2, respectively. The visual evidence obtained from the third panel is of parallelism, $F(4,72) = 1.127$.

The predicted parallelism, however, fails to show up in the rightmost panel. This is due to the end effect. This deviation from parallelism was also reflected in statistical analysis where Motivation x Ability interaction was significant, $F(4,74) = 5.792, \ p < .01$. Trend analysis further shows that both the Linear x Linear and Quadratic x Linear trends are significant. The quantitative results confirm the distortions arising from end effect.

While the analysis of the Motivation x Ability interaction give broad evidence for parallelism, these are not enough to establish that the integration rule followed is adding, for parallelism can arise from an adding rule or an equal weight averaging rule. A diagnostic test for this can be had from the common plot of Motivation x Ability effect for two levels of number of average motivation in Design 1 and for two set sizes in case of Design 2. These two tests are shown in the two rightmost panels in Figure 9 where only curves with solid lines are taken into
Figure 9. Combined factorial plots of Ability x Motivation and Motivation x Ability effects from Design 1 and 2 of Experiment 3. The dashed curve is based on information listed on the horizontal axis.
account. A clear picture of parallelism fails to appear due to end effect distortions in both the panels. This distortion is especially marked for curves corresponding to extremely high level of motivation. However, for other two motivation levels, there is strong evidence for parallelism.

A strong support for adding and against averaging is present in the patterns displayed by solid curves corresponding to the average level of motivation. These curves in the two panels look identical as indeed they are based on the same data. The solid curve corresponding to four-cue stimuli have three pieces of average motivation information combined with three levels of ability information listed on the horizontal axis. The other curve represents combination of one piece of average motivation information with different level of ability. If the averaging rule is to hold good, the latter curve should have steeper slope and therefore cross over the former curve. Parallelism of these two curves validates the adding rule and gives evidence against the averaging rule.

**Imputations**

The results of Design 1 and 2 have supported the adding rule and therefore it is possible to make unambiguous analysis of the imputation about missing information
of the subjects by making use of single-cue designs. The rules of imputations has to be seperately analyzed for missing motivation and missing ability information.

There is evidence of similiarity in imputations of two types of missing information. When the information about ability was missing, subjects imputed an ability value that was a direct function of the given motivation information. The missing motivation information likewise was imputed a value which directly depended on the given ability information.

Evidence for this interpretation of missing information is available from the four panels of Figure 9. In the first two panels on the left, the dashed curves are based on information about motivation alone. With prior knowledge that the subjects followed adding rule to integrate motivation and ability information, it is possible to determine the rule for imputation about missing information. If subjects imputed a constant value to the missing ability information, then the dashed curves in these two panels should form a parallelism pattern. There is no evidence for it at all. Instead, the crossover of the solid curves/dashed curve shows that managers imputed a value of ability which was directly dependent on the given motivation information. In the two panels on the
right, the dashed curves are based on information about ability alone. These curves also cross over the solid curves. Using the same logic, it may be said that the imputation of missing motivation information was a positive function of the value of given ability information.

Discussion

There are three main findings of Experiment 3. First, it has been revealed that for the task of predicting job performance of management trainees, the subjects followed adding rule. The experiment thus replicates the findings of Bhargava (1983).

The experiment has also shown that the subject followed two-stage information processing strategy when faced with more than one piece of motivation information and ability. This is replication of findings of Experiment 2.

Finally, the imputation about missing information for the experimental task is found to be uniform for both the motivation and ability information; missing information is taken to be a direct function of the given information.