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MULTIDIMENSIONAL INPUTS AND REWARD ALLOCATION: AN INTEGRATION-THEORETICAL ANALYSIS

By

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Multidimensional Inputs and Reward Allocation: An Integration-Theoretical Analysis

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Abstract

Many situations require us to distribute rewards and resources between different members of a group. The members are often described with respects to their age, sex, experience, personality, and productivity. Distribution of rewards and resources requires that all these qualitatively different inputs be properly considered. How are multidimensional inputs handled in allocations of one-dimensional reward or resource? In Experiments 1-4, the allocation tasks had heterogeneous inputs such as effort on job and actual performance or behavior toward administration and actual performance and allocators were college students and professional managers. All the four experiments indicated that allocators calculate separate equity ratios for each input of the allocation task and then average the two ratios in determination of reward. The commonly held belief that all the inputs are converted to a common currency of deservingness and then reward is allocated did not receive any support at all. In Experiments 5-8, the allocation task consisted of performance over two periods and the allocators were college students, professional managers, and union leaders. While college students and professional managers converted the two-year performance in a unitary measure of deservingness as is commonly believed, union people followed the model employed in Experiments 1-4. The instructions to divide fairly and to minimize conflict between the two claimants affected the perception of inputs and not the rule of reward distribution. Implications of these findings were discussed for management of reward systems in Indian organizations.

INTRODUCTION

Many situations require us to distribute rewards and resources between different members of a group. The members are usually described with respects to their age, sex, experience, productivity, behavior, etc. Distribution of rewards and resources thus requires that all these qualitatively dissimilar inputs be properly considered. How are multidimensional inputs handled in allocations of one-dimensional reward or resource?

Adams (1965), Anderson (1976), and Aristotle (See Walster & Walster, 1975, p. 25) all three agree that reward for a person should be proportional to his input or contribution to the group. But they differ in the structure of comparison between persons involved in the exchange as well as between input and reward (Anderson & Farkas, 1975). For simplicity in presentation, therefore, the present report will be restricted to Anderson's model alone.

MODELS OF REWARD ALLOCATION

According to information integration theory (Anderson, 1976; Anderson & Farkas, 1975), equity in social exchange between two persons exists if

$$O_B / (O_A + O_B) = I_B / (I_A + I_B), \qquad (1)$$

where O_A and I_A are the outcome and input of Person A and O_B and I_B those of Person B. If this definition of equity is correct, then reward (R) for Person B would be

$$R_B = [I_B / (I_A + I_B)] T, \quad (2)$$

where $T = R_A + R_B$. This ratio model makes a simple prediction: The graphic plot of the $I_A \times I_B$ data should yield a slanted barrel-shape, wider in middle than at either end (Anderson, 1976; Farkas & Anderson, 1979).

When information about more than one input of each claimant is made available, the ratio model may take one of the two forms. For example, if the two claimants are described by their effort (E), or how hard they tried, and performance (P), or how much they actually accomplished, and the two inputs are first converted into a single value of input or deservingness, then the ratio model would be extended as follows:

$$R_B = [(E_B + P_B) / (E_A + P_A + E_B + P_B)] T. \quad (3)$$

This model assumes that the two inputs are first summed together to get an index of unitary input and then Equation 2 is employed in reward allocation. Accordingly, this model is called model of input integration (Anderson, 1976, Farkas & Anderson, 1979). This process of input summation has been assumed by Adams (1965), Leventhal (1976a) and Walster, Berscheid, and Walster (1973).

An alternative to the input integration model has been proposed by Anderson (1976, p. 296) and by Farkas and Anderson (1979). They advocate that qualitatively different inputs, for example, E and P, are first compared separately to derive the equity ratios and then the two ratios, one for E and one for P, are averaged. More specifically,

$$R_B = \underline{w}_E \left[E_B / (E_A + E_B) \right] T + \underline{w}_P \left(P_B / (P_A + P_B) \right] T, \quad (4)$$

where E_A and P_A are effort and performance of Person A and E_B and P_B those of Person B, $\underline{w}_E$ and $\underline{w}_P$ are relative weights of the two equity ratios, and T is the total amount to be distributed between Persons A and B.

Both the input integration and equity integration models have the basic ratio structure, but they imply a different flow of information processing. Naturally, therefore, they predict quite different data patterns. The former predicts a converging family of curves for plots of A's Effort x A's Performance effect and B's Effort x B's Performance effect but very weak barrel-shape, almost closer to parallelism, for the remaining four two-way graphs. In contrast, the latter predicts slanted barrel-shape for A's Effort x B's Effort and A's Performance x B's Performance effects but parallelism for the remaining four two-way graphs. The patterns of two-way graphs thus help diagnose which of the two models underlies the allocation of reward based on multidimensional inputs.

RELEVANT LITERATURE

Farkas and Anderson (1979) performed two experiments to examine the plausibility of the input integration and equity integration models.

In the experiment, the claimants were described by their E and P, and subjects distributed money between them. As predicted, the results conformed precisely to the requirements of the equity integration model.

In the second experiment, there were two designs. One had effort and performance as inputs just as in the first experiment; other had information about performance over two days as inputs. It was expected that the equity integration and input integration models would apply to the first and second designs, respectively.

Although the effort-performance design yielded results supportive of the equity integration model, many of the interactions which are required to be absent were actually present. This led the authors to propose a configural-weight equity integration model: "Each input dimension seemed to have greater influence on the equity division when the inputs of the two parties were unequal than when they were equal (p. 888)". Evidence for this configural-weight equity integration model was also noted in a study of young children who allocated rewards on the basis of need and deed of claimants (Anderson & Butzin, 1978). Taken together, these three experiments provide clear support for the equity integration model.

Results from the performance-performance design did not conform to the prescriptions of the input integration model. The two critical graphs, A's Performance_1 x A's Performance_2 and B's Performance_1 x B's Performance_2, had divergence instead of the predicted convergence pattern. The other four two-way graphs had much stronger barreling than actually predicted. Farkas and Anderson (1979), therefore, concluded that discrepancies from predicted patterns suggest underlying cognitive algebra to be different than assumed in the input integration model. It should be added that an earlier test (Anderson, 1976) had also failed to yield support for the input integration model.

COMMENTS

The literature just reviewed suggests that common assumption that different inputs are converted into a unitary measure of input (Adams, 1965; Leventhal, 1976a; Walster et al, 1973) does not account for allocations based on even similar inputs. With heterogeneous inputs, the equity integration model provides a reasonably good account of the data. Accordingly, equity integration model may be considered as a powerful conceptualization of reward allocations based on multidimensional, heterogeneous inputs.

Much of the evidence for equity integration model and against the input integration model presented by Anderson and his associates is based on samples of college students as subjects. This fact raises the question of generalizability. As Schultz (1969) notes,

If college students were truly representative samples of the population at large, there would be no problem in generalizing from the results of our studies. But (fortunately or unfortunately) they do differ in highly significant ways from the general population, and we cannot have a truly meaningful science of human behavior by studying such a restricted sample (p. 217).

Can the models of reward allocation then be expected to apply to nonstudent allocators? Are they models of cognitive processes of American students? Or are they generalizable to students with non-western foundation? Do monetary and nonmonetary rewards follow the same model? These questions and the failure of the input integration model in case of homogeneous inputs led the writer to undertake several experimental tests of the models of input integration and equity integration. The details of the experiments and their results are presented in this report.

EXPERIMENT 1

The main purpose of this initial experiment was to provide an exact test of the equity integration model with a group of Indian college students. The effort-performance allocation task used by Farkas and Anderson (1979) was therefore adapted for the purpose.

METHOD

Stimuli and Design. Eight-one two-person groups were formed from a 3 x 3 x 3 x 3 (A's Effort x A's Performance x B's Effort x B's Performance) factorial design. The three levels of each factor were very much below average, average, and very much above average. The input information for each group was typed on an index card.

There were nine practice examples. They contained information about input from a 7-step verbal scale: _Extremely poor_, _very much below average_, _below average_, _average_, _above average_, _very much above average_, and _excellent_. Four examples had levels more extreme than the regular levels used in the construction of the main 81 stimulus groups. The other five were drawn from the set of main stimuli itself.

Subjects. The subjects were 16 fourth-year engineering students enrolled in an introductory social psychology course at the Indian Institute of Technology, Kanpur, India. They participated in the experiment for approximately 2 hours over two successive evenings. Participation fulfilled their course requirement.

Procedure. Two subjects were run at a time. Upon arrival, each subject received a typed sheet of instructions which described the nature of the task and his role as allocator. The task was introduced as one dealing with distribution of money between two workers of several groups. It was emphasized that distribution would be on the basis of effort (how hard they tried) and performance (how much they actually accomplished) of the two workers in the previous year, and that the groups to be judged were a random sample from a large population of two-worker groups in an industry.

The subject read the instruction sheet twice and worked on nine practice examples. Based upon information pertaining to effort and performance of the two workers of each group, the subject decided how much he would pay to worker B out of Rupees twenty-four (Rs. 24/-) available to the group. He was clearly told that the remainder would go automatically to Worker A, for the money available to each group had to be distributed between the two workers. To facilitate allocation, a 25-point graphic scale labeled 0 (Nothing to B) and 24 (All to B) at the ends was placed in front of each subject.

After practice session, the main points of the instructions were summarized to the subjects by the experimenter. All queries about the task were answered. To familiarize themselves with the nature of the groups, the subjects also read the entire set of 81 cards. Finally, they shuffled the cards thoroughly and decided on the appropriate reward for Worker B of each of the 81 groups. The cards were rated twice in different shuffled orders.

The experiment was conducted over two successive evenings. In one condition, distribution was made in a way the subject thought it to be fair, in other condition the distribution was made in a way which the subject thought could minimize interpersonal conflict and hostility between the two members. The order of the two instructions were balanced over half of the subjects in each evening.

RESULTS AND DISCUSSION

Graphic Analyses. Figure 1 plots six two-way graphs. The upper set of graphs pertain to condition of fair distribution; the lower set of graphs pertain to minimize conflict condition. The graphs have remarkably similar shape across the two instruction conditions.

Figure 1 about here

According to the equity integration model, the plots of A's Effort x B's Effort and A's Performance x B's Performance effects should exhibit slanted barrel-shape but the other four two-way graphs should be parallel. These specifications of the equity integration model are clearly satisfied. The two graphs on the left have the shape of a slanted barrel; the remaining four graphs have neat parallelism. These patterns of graphs thus confirm the predictions of the equity integration model.

The input integration model requires that the two graphs on the left should show near-parallelism. But both graphs have strong barrel-shape. The plots of A's Effort x A's Performance and B's Effort x B's Performance should display divergence and convergence, respectively, according to the input integration model. These requirements are not satisfied either: Both graphs are parallel. The input integration model cannot, therefore, account for the results of Figure 1.

Statistical Analyses. Analysis of variance provides direct statistical tests of the equity integration model. If the model is correct, then the two-way interaction for the two graphs on the left of Figure 1 would be statistically significant but for the other four graphs would be nonsignificant. Also, all the higher-order interactions would be nonsignificant.

Table 1 presents relevant results from analyses of variance for the two instruction conditions. The predicted interactions are highly significant, whereas all other interactions are nonsignificant. These statistical tests confirm the interpretation of barrel-shape and parallelism in the graphs of Figure 1 convincingly. In addition, they provide strong quantitative support for the equity integration model. It should be noted that present results are clearer than even those of Farkas and Anderson (1979).

Table 1 here

The instructions to divide fairly and to minimize conflict did not alter the graphic patterns of data at all as already noted. Instead, they affected the valuation operation: The performance input had greater effect under divide fairly than under minimize conflict condition. A comparison of the second graph for the two conditions clearly shows this trends for performance input of both Worker A, $F(2,30) = 11.06$, $p < .01$, and Worker B, $F(2,30) = 11.09$, $p < .01$. It appears that instructions affected valuation of input and not rule of reward distribution. Thus, the equity integration model held across the two instruction conditions equally well.

Discussion. The principal result of the present experiment is that qualitatively dissimilar inputs, namely, effort and performance, were handled according to the equity integration model. The allocators processed different inputs separately in the calculation of equity, and allocated reward by averaging the two equity ratios. The commonly held belief that inputs are reduced to a common currency is thus untenable.

Success of the equity integration model shows (a) that the results reported by Farkas and Anderson (1979) are reliable and replicable, (b) that the model is generalizable across allocators of different cultures, and (c) that motivations behind distribution do not alter the structure of the model. These results are encouraging for the equity integration model. They suggest that the model may be considered as a powerful conceptualization of reward allocations based on multidimensional inputs.

It should be noted that money is not the only reward in organizations. Work facilities, verbal praise, encouragement from boss, responsibility etc., are all considered as important outcomes of a job. In fact, feelings of inequity and unfairness arise more often from the distribution of these qualitative factors than money. Would the model, then, be expected to apply to distribution of monetary as well as nonmonetary rewards?

EXPERIMENT 2

The main intent of Experiment 2 was to seek generality of the equity integration model to the distribution of money, work facilities, time on verbal praise, and time on encouragement.

METHOD

The stimuli and design of Experiment 2 were identical to those of Experiment 1. The subjects were also from the same population of fourth year engineering students. Each subject earned Rupees sixteen for his participation in the experiment.

As the experiment required the subjects to distribute from types of reward, the sixteen subjects were randomly divided into four groups with four persons per group, and were asked to distribute rewards over four successive evenings. The orders of presentation of the four rewards were balanced over four evenings according to a 4 x 4 Latin square.

The general procedure was identical to that of Experiment 1. However, the response measure was a 200-mm graphic scale with end points defined as "Zero to B" and "All to B". Subjects made a vertical mark to indicate their decision. For data analyses, the vertical lines on the scale were converted to their nearest whole number. Therefore, the scores ranged from 0 to 200.

RESULTS AND DISCUSSION

Graphic Analyses. Figure 2 presents two-way graphs for distribution of money. The two graphs on the left have clear barrel-shape. The other four graphs have a nice pattern of parallelism. All the six graphs are thus consistent with the prescriptions of the equity integration model. This result confirms the previous results obtained in

Experiment 1, and shows that distribution of money indeed obeys the equity integration model.

Figure 2 here

Quite similar picture is present in Figure 3 which exhibits results from distribution of work facilities. The two graphs on the left are of barrel-shape as they should have been. The remaining four graphs are parallel as predicted. All the six graphs are similar to those in Figures 1-2. This means that work facilities were allocated in a manner similar to monetary reward.

Figure 3 here

Results pertaining to distribution of praise time are shown in Figure 4. Five of the six graphs are as predicted. The two graphs on the left have strong barrel-shape; the three on the right have near-parallelism. Only the third graph from the left is discrepant from the prediction. This discrepant trend is consistent with neither equity integration nor input integration model. The overall picture that emerges from the six graphs may also be considered as supportive of the equity integration model.

Figure 4 here

Figure 5 presents null results for distribution of encouragement time. There is no evidence of any main effect or any interaction effect, as though subjects did not consider encouragement time as reward. This null result is methodoligically important, for it shows that subjects did follow the instructions, and that the similarity in results across the distribution of other three rewards is indeed attributable to their similar properties.

Figure 5 here

Statistical Analyses. Table 2 presents F ratios from analyses of variance performed on data obtained with the distribution of four types of rewards. According to the equity integration model, only six terms -- four main effects and two two-way interaction effects -- should be statistically significant. Examination of Table 2 discloses that the results pertaining to distribution of money, work facilities, and praise time are in general consistent with the prescriptions of the equity integration model. All the four main effects are highly significant, so are the two two-way interactions. A few other interactions are also present but they are scattered. In addition, they did not display any interpretable trend as already noted. It can, therefore, be said that analyses of variance for distribution of money, work facilities, and praise time provide good quantitative support for the equity integration model.

Table 2 about here

As anticipated, all the sources of variance yielded nonsignificant F ratios for the distribution of encouragement time. To uncover the reasons behind the null results, data of each of the sixteen subjects were analyzed separately (Singh, Gupta, & Dalal, 1979), and the marginal means for the four factors of each subject were examined. In general, most of the subjects had all the four main effects as significant. They however differed widely in their interpretation of input-encouragement relationship.

Of the sixteen subjects, only three had allocated encouragement time to Worker B as a positive function of his two inputs just as in case of distribution of money, work facilities, and praise time. Seven subjects encouraged Worker B as an inverse function of his effort and performance contrary to the trend noted in Figures 2-4. Four subjects interpreted encouragement as reward for one input but not for the other. Of these four subjects, two distributed encouragement time as an inverse function of B's effort but a positive function of his performance; the other two did just the reverse. Results from the remaining two subjects were uninterpretable. These trends suggest that the subjects have not developed any clear idea about the input-encouragement relationship. Accordingly, the null result with distribution of encouragement time does not reflect any fault in the equity integration model.

Discussion. Results of Experiment 2 provide an independent replication of the results obtained in Experiment 1. Furthermore, they show that distribution of work facilities and praise time also obey the equity integration model. Thus, the equity integration model appears to be generalizable to the allocation of other organizational rewards.

Both experiments 1 and 2 employed college students as allocators. They also used only one allocation task. One may, therefore, argue that the equity integration model is restricted only to college students and to effort-performance allocation task. To claim generality of the model, it is necessary that different subject populations and allocation tasks be used. Experiments 3 and 4 were thus conducted with professional managers.

EXPERIMENTS 3 AND 4

METHOD

Experiment 3 used the effort-performance task with a group of eighteen professional managers. They were volunteers from the Management Education Program of the Indian Institute of Management, Ahmedabad, India.

Experiment 4 had allocation task based on behavior toward administration and performance. The levels of performance factor were identical to those used in Experiments 1-2. The three levels of behavior toward administration were opposed, neutral, and supportive. Twelve branch managers who were attending a workshop on research methods at the Bank of Baroda Staff Training College, Ahmedabad, India volunteered as subjects.

Both Experiments 3 and 4 had procedures identical to those of Experiment 1. However, these experiments required the allocators to come for only one session, and the instructions asked them to divide Rupees twenty-four between A and B in a way they thought it to be fair.

RESULTS AND DISCUSSION

Effort-Performance Task. The lower part of Figure 6 presents six two-way graphs for the effort-performance allocation task. The two graphs on the left display a pattern of barrel-shape, whereas the other four graphs evince parallelism. These visual impressions were checked by analysis of variance also. Only the graph on the right, B's Performance x B's Effort effect showed significant departure from the predicted parallelism, F (4,68) = 2.78, $p < .05$. This discrepancy seems to be attributable to the two end-points of the graph and not to any fault in the model. Accordingly, allocations made by professional managers are also congruent with the prescriptions of the equity integration model.

Figure 6 here

Behavior-Performance Task. The upper part of Figure 6 presents results from twelve branch managers who allocated money on the basis of the behavior and performance of the claimants. All the six sets of curves conform precisely to the predictions of the equity integration model.

In analysis of variance, only the two two-way interactions shown on the left of Figure 6 were statistically significant. The other four yielded nonsignificant F ratios which supports the model. Two three-way interactions, A's Behavior x B's Behavior x B's Performance, F (8,88) = 2.31, $p < .05$, and A's Behavior x A's Performance x B's Performance,

$\underline{F}$ (8,88) = 2.25, $\underline{p} < .05$, were however significant, and they reflected a configural-weight equity integration as in the study by Farkas and Anderson (1979). In any case, the allocations based on behavioral and performance inputs followed the equity integration model.

Discussion. Results from Experiments 3 and 4 converge to make a single point: Rewards allocated on the basis of multidimensional, heterogeneous inputs obey the equity integration model. The model provides precise description of decisions made by not only naive college students but also professional managers. Similar results across effort-performance, behavior-performance, and need-deed tasks enhances the generality of the model considerably. The equity integration model may, therefore, be regarded as a general model of reward allocation.

One possible objection against the generality of the equity integration model would be that it cannot account for the results obtained with qualitatively similar multiple inputs. Originally, Farkas and Anderson (1979) thought that allocations based on homogeneous inputs may obey input integration model. But the results they obtained conformed with neither input integration nor equity integration model. So they suggested that a linear model based on simple adding and subtracting of the four performance inputs could also account for the data. A linear model would however raise doubt about the basic ratio model itself. Experiment 5 was thus conducted to examine the plausibility of input integration and equity integration models in allocations based on two performance inputs.

EXPERIMENT 5

The main purpose of this experiment was to test plausibility of input integration and equity integration models in allocations based on qualitatively similar inputs. The experimental task was thus patterned after the performance-performance design of Experiment 2 of Farkas and Anderson (1979).

METHOD

Sixteen engineering students, drawn from the same population as in Experiments 1-2, looked at the performance of Workers A and B in two proceding years, 1976 and 1977, and distributed Rupees twenty-four between them as in Experiment 1. Subjects were asked to consider the information supplied about both claimants, and then to divide money between them. Both the _divide fairly_ and _minimize conflict_ instructions were used, and the two conditions were separated by a day.

RESULTS AND DISCUSSION

Graphic Analyses. Figure 7 shows six two-way graphs for allocations made according to 1976 and 1977 performance of Workers A and B. The upper and lower sets of curves pertain to the divide fairly and minimize conflict conditions, respectively.

Figure 7 here

The principal point of interest centers around the shape of the six graphs of each condition. The input integration model requires that the fourth and the sixth graph from the left should yield a pattern of divergence and convergence, respectively, whereas the other four graphs should yield weak barrel-shape, almost closer to parallelism. Examination of the graphs of the upper part of Figure 7 discloses that the fourth and sixth graphs do show a pattern of divergence and convergence, respectively. The other graphs show near-parallelism. These results are similar to the requirements of the input integration model.

The six graphs of the lower part of Figure 7 present a similar picture. But 1976 performance seems to have been ignored which reduces the power of the graphic tests considerably.

Statistical Analyses. If the input integration model applies, then all the sources of variance should be nonzero in theory and statistically significant in practice. Among the two-way interactions, the two interactions having two-year performance of Worker A as well as Worker B s should be stronger than other four. Furthermore, all the four three-way interactions should be significant. Table 3 presents relevant results for the two instruction conditions.

Table 3 here

The divergence trend in the fourth graph, $F(4,60) = 3.86$, $p < .01$, and convergence in the sixth graph, $F(4,60) = 2.61$, $p < .05$, of Figure 7 are indeed reliable. While the first three graphs do not depart from parallelism, the fifth one does, $F(4,60) = 2.76$, $p < .05$.

Since the predicted departure from parallelism is very mild, the nonsignificant _F_ ratios actually support the model. So, these statistical tests of two-way interactions provide strong support for the input integration model.

Of the four three-way interactions, only one interaction is statistically significant. According to the model, all the four terms should be significant. Thus, the pattern of significant and nonsignificant three-way interactions casts some doubt on the plausibility of the input integration model.

Under the condition of minimize conflict, 1976 performance for both Workers A and B were ignored, for the two main effects are nonsignificant. This discounting of one year performance decreased the power to detect interactions. The nonsignificant interactions of the minimize conflict condition are thus of little diagnostic value for model tests.

It should also be added that 1976 performance seems to have gotten lower weight than 1977 performance even in the divide fairly condition. In fact, mean proportion of total variance explained by 1977 performance ($M = .28$) was twice more than that by 1976 performance ($M = .13$), $F(1,15) = 15.76$, $p < .01$, and the two instruction conditions had similar trend, $F(1,15) = 1.01$.

Discussion. Experiment 5 yielded two important results. First, allocations made with instructions to act fair produced data patterns which met the requirements of the input integration model. Although the three-way interactions did not display similar picture, the results may in general be treated as supportive of the input integration model. Second, there is a recency bias in allocations based on qualitatively similar inputs. Both divide fairly and minimize conflict conditions yielded evidence that the most recent input is weighted twice more than the preceding year performance. Both results require discussion.

While the present results favor the input integration model, the results of Farkas and Anderson (1979) do not. What could be the reasons? Is it attributable to cultural difference of the allocators in this task or to the methodological differences in the two experiments? The cultural-difference hypothesis seems to be unlikely, because Experiments 1-4 obtained results similar to the American findings.

Perhaps the methodological differences are the crucial factors. One notable difference is that subjects of this experiment made allocations on the basis of just performance-performance inputs, while subjects of Farkas and Anderson (1979) made decisions for both effort-performance and performance-performance designs in a counterbalanced manner. It is likely that the carry-over of strategy affected performance on both tasks. One indication of this possibility is that the results pertaining to effort-performance design of Experiment 2 did not completely resemble those of Experiment 1.

RESULTS AND DISCUSSION

Graphic Analyses. Figure 8 presents results from Experiment 6. In the upper part, the fourth and the sixth graphs have clear divergence and convergence pattern as is required by the input integration model. The first, second, and fifth graphs show barrel-shape which is also consistent with the model. Only the third graph is discrepant from barrel-shape. However, it shows near-parallelism. The overall picture that stands from these six graphs is one of support for the input integration model.

Figure 8 here

The graphs of the lower part also display similar features. Although separation between the curves is markedly reduced under minimize conflict condition, the pattern of results are comparable to those in the upper part.

Statistical Analyses. Table 4 presents F ratios for the two instruction conditions. In the divide fairly condition, the divergence and convergence trends of the fourth, $F(4,76) = 4.73$, $p < .01$, and the sixth, $F(4,76) = 6.88$, $p < .01$, graphs are quite reliable. The second graph, which depicts B's 1980 x A's 1980 performance profile, has strong barrel-shape, but the remaining three are near-parallel. All the six graphs thus provide strong support for the input integration model.

Table 4 here

The tendency to assign very high importance to the most recent performance poses difficulty for model analysis. The data patterns predicted by the input integration model are based on the assumption that all inputs are of equal importance. If the assumption is violated in a serious way, then no test of input integration model would yield clear support.

It should be noted that the equity integration model does not apply to reward allocations made from qualitatively homogeneous inputs. Instead, the input integration model appears to be more appropriate, as Farkas and Anderson (1979) had anticipated. To put this possibility on a firm ground, a replication experiment was necessary.

EXPERIMENT 6

PURPOSE AND METHOD

The purpose of this experiment was simply to check that the results of Experiment 5 are reliable. The performance-performance task used in Experiment 5 was thus given to a new group of twenty fourth-year engineering students. They all were enrolled in a sociology course. Each subject received Rupees ten for his participation in the experiment.

All the methodological aspects were identical to those of Experiment 5, except that years 1976 and 1977 were replaced by 1979 and 1980. This change was necessitated by the fact that replication was tried in 1981.

In the minimize conflict condition, the fourth graph does not have statistically significant divergence, but the sixth one does have convergence. The second graph exhibits barrel-shape quite similar to the one in the divide fairly condition. Thus, the results from the minimize conflict condition may also be considered as supportive of the input integration model.

The 1980 performance has again received greater importance than the 1979 performance. The mean proportion of variance explained by 1980 performance (M = .26) is again twice more than 1979 performance (M = .11), F (1,19) = 43.73, $p < .01$, and this tendency is true in both conditions, F (1,19) = 0.00.

The effect of instructions to divide fairly and minimize conflict was on valuation of the performance input. The two performance inputs had stronger influence in the divide fairly that in the minimize conflict condition. This trend was statistically reliable for A's 1979, F (2,38) = 5.60, $p < .01$, A's 1980, F (2,38) = 6.15, $p < .01$, and B's 1980, F (2,38) = 10.98, $p < .01$, performance. Although the trend is clear with B's 1979 performance also, it was not statistically significant, F (2,38) = 2.61. These results confirm the earlier finding that instructions alter input valuation and not rule of reward allocation.

Discussion. Results of Experiment 6 verify the results of Experiment 5 and show that input integration model could very well account for the allocations based on multiple homogeneous inputs. The recency bias in performance appraisal has reappeared which means that temporal weighting has to be incorporated in the model. Otherwise it may not always be easy to yield results congruent with the model in its present form.

From the findings of Experiments 5-6, it is quite evident that rewards distributed on the basis of homogeneous inputs also follow the ratio model. No subtractive model can account for the barrel-shape of the second graph in Figure 8. The equity integration model cannot account for the divergence and convergence in the fourth and sixth graphs. It is only the input integration model which can account for barrel-shape and divergence and convergence patterns. Accordingly, it can be said that commonly held assumption of input summation (Adams, 1965; Leventhal, 1976a, Walster et al, 1973) holds true with qualitatively similar inputs.

If the input integration model reflects the normal mode of handling homogeneous inputs, as the findings from the two experiments suggest, then it should apply to decisions of those who are directly concerned with allocation decisions. Experiment 7 sought generality of the input integration model to managerial population.

EXPERIMENT 7

PURPOSE AND METHOD

The purpose of this experiment was to seek generality of the input integration model to subjects from a managerial population. As managers are often involved in allocation of rewards and resources and they also face the consequences of their allocation decisions, it was felt necessary to test the input integration model with them.

Eight prospective managers from the second and final year of the two-year post-graduate program in management and eight professional managers from the management development program of the Indian Institute of Management, Ahmedabad, India served as subjects. The stimuli, design, and general procedures were identical to those in Experiment 6. In general, four subjects were run at a time.

RESULTS AND DISCUSSION

Graphic Analyses. Figure 9 presents six graphs for the two-way interactions. The graphs of the upper part are from the condition of divide fairly instruction. All the six graphs are of the form predicted by the input integration model. The fourth and the sixth graphs have clear divergence and convergence, whereas the remaining four graphs have barrel-shape. So they provide clear support for the input integration model, and extend the model to the managerial population.

Figure 9 here

Although the graphs of the lower part are not so clear, they are in general supportive of the input integration model. The fourth and the sixth graphs exhibit very small degree of divergence and convergence patterns; the other four graphs have weak barrel-shape, almost equivalent to near-parallelism. Since minimize conflict reduces the separation of curves and so decreases the nonparallelism appreciably, those weak patterns in the six graphs may be taken as evidence for the input integration model.

At the first glance, however, the second and the third graphs which have A's 1980 performance on the horizontal axis appear to converge toward right. Closer examination of these graphs discloses that the difference between average and very much above average levels of 1980 performance is much smaller than that between average and very much below average performance. Perhaps managers did not make much distinction between average and very much above average levels of the most recent performance when minimization of interpersonal conflict was of utmost importance to them. The seemingly convergence tendency in the second and the third graphs is thus attributable to the change in value of the most recent input and not to any fault in the model of input integration. It should be noted that the prediction of barrel-shape in a symmetric design is based on the assumption that the negative and positive levels of input are equidistant from the middle average level.

Statistical Analyses. Analyses of variance for the data of the two instruction conditions yielded results which coincided largely with the visual interpretations of the graphs. In the divide fairly condition, the divergence and convergence trends present in the fourth, $F\ (4,56) = 4.62$, $p < .01$, and the sixth, $F\ (4,56) = 2.53$, $p < .05$, graphs were statistically reliable; so were the barrel-shape patterns in the second,

F (4,56) = 5.73, $p < .01$, and the third, F (4,56) = 3.58, $p < .05$, graphs. Although the first, F (4,56) = 2.26, $p < .10$, and the fifth, F (4,56) = 2.35, $p < .10$, graphs also have the predicted barrel-shape, their deviations from parallelism are significant only at .10 level of confidence. Since the deviations from parallelism predicted by the model are small, results from these six statistical tests of the two-way interactions indeed support the model of input integration.

To the above it should be added that all the four three-way interactions were highly significant. The four-way interaction was also substantial and reliable. As these tests did not yield consistent results in Experiments 5 and 6, the present results provide quantitative support to the input integration model in a rather clear way.

In the condition of minimize cnflict, the first four graphs had statistically significant deviations from parallelism. The higher-order interactions were all statistically significant. These results from the condition of minimize conflict also give good quantitative support to the input integration model.

To ensure that data of the two conditions really conformed to the requirements of the input integration model, an analysis of variance with instructions as the additional factor to the design was run. This analysis obtained highly significant F ratios for all the two-way interactions shown in Figure 9. Also, all the higher order interactions between the factors of the main design were highly significant. These results support the interpretation that the input integration model applied to the condition of divide fairly as well as of minimize conflict.

The factor of instructions interacted with the 1980 performance of both Worker A, F (2,30) = 6.35, $p < .01$, and Worker B, F (2,30) = 14.39, $p < .01$. These interactions arose mainly from the lower effectiveness of 1980 performance in the minimize conflict condition than in divide fairly condition. This result agains suggests that instructions affect input valuation and not the rule of reward distribution. The nature of input valuation was, however, not identical to that of students as noted below.

The possibility that managers do not make much distinction between average and very much above average levels of the recent performance when minimization of conflict is the dominant motive was further examined statistically. Separate analysis of variance was run on the data of each subject (Singh et al, 1979), and differences between average and very much below average and between very much above average and average levels of 1980 performance factor were calculated for Workers A and B under the two instruction conditions. The resulting difference scores were subjected to an analysis of variance. This analysis indicated that the difference between very much above average and average levels of 1980 performance (M = 1.48) was smaller than that between average and very much below average levels (M = 2.10) in the condition of minimize conflict, $F(1,15) = 12.64$, $p < .01$. However, there was no such difference in the condition of divide fairly. These statistical tests confirm the interpretations made from graphs earlier and show that managers did not make much distinction between average and very much above average levels of 1980 performance when they were asked to reduce interpersonal conflict between the two coworkers.

One more result also deserves mention. In both instruction conditions, the 1980 performance had produced stronger impact than the 1979 performance. The mean proportion of total variance accounted for by the 1980 performance ($M = .22$) was significantly higher than that by the 1979 performance ($M = .15$), $F(1,14) = 15.68$, $p < .01$; and the same trend was true across both instruction conditions, $F(1,14) = 0.29$. This suggests that the recency bias noted with students is present in managers as well. It should however be noted that the difference in the importance assigned to the 1979 and 1980 performance is not as high as was the case with students. Perhaps this small difference allowed the data to satisfy the requirements of the input integration model in clear way.

Discussion. There are three main findings of Experiment 7. First, the input integration model applies to reward allocation by managers. This extends generality of the model beyond the college students, and indicates that qualitatively similar inputs are, in fact, handled in a way different than qualitatively different ones. Second, managers assign higher importance to the most recent performance than the preceding year performance just as do students. The recency effect is also robust and generalizable. Third, the motivations behind allocations do not alter the structure of model. They affect the valuation of inputs as findings of Experiment 1 and 6 had shown. It is, however, interesting to note that the subjects of this experiment processed the input in a novel way. Instead of reducing the length of the entire input scale in the minimize conflict condition as did students, the managers reduced the difference between average and very much above average levels of the most recent performance. This result will be taken up in the general discussion section.

No matter how carefully are rewards and resources distributed in groups, recipients always feel that they are being treated unfairly. One reason of this feeling is that equity exists in the eyes of the beholders (Walster et al., 1973). But would these same people define equity differently if they are asked to serve as the third-party allocator? To answer this question, Experiment 8 was conducted on the members and leaders of trade unions, a subject group which often complains that rewards and resources are not distributed fairly in organizations.

EXPERIMENT 8

The objective of the present experiment was two-fold. One objective was to seek generality of the input integration model to members and leaders of trade unions. Another objective was to find out the ways in which union people try to minimize interpersonal conflict between claimants.

METHOD

The stimuli, design, and general procedure of this experiment were identical to those in Experiment 7. Eight stenographers who were members of one employees' union of the Indian Institute of Management, Ahmedabad and eight leaders (president, vice president, or general secretary) from trade unions of the state of Gujarat served as subjects. All these sixteen subjects were available on the campus of the Indian Institute of Management, Ahmedabad, India.

RESULTS AND DISCUSSION

Graphic Analyses. Figure 10 presents results for the two instruction conditions. In the upper part, the first two graphs have strong pattern of barrel-shape and the third and the fith graphs have mild barrel-shape. The fourth graph exhibits slight tendency to diverge. On the basis of their patterns, these five graphs imply that the input integration model was employed in reward allocation. But the pattern of the sixth graph is just opposite of the prediction of the input integration model. The model requires that it be of converging type, but it is of diverging type similar to what Farkas and Anderson (1979) obtained.

Figure 10 here

It deserves emphasis that the barrel-shape of the first two graphs of the upper part of Figure 10 is much stronger than actually predicted by the input integration model. The divergence tendency in the fourth graph is much weaker than what the model predicts, and the sixth graph has pattern just the opposite of the prediction. Because of the strong barrel-shape in the first two graphs and the prevailing pattern of near-parallelism in the remaining four graphs, it appears that the model underlying the data is equity integration and not input integration.

The six graphs of the lower part of Figure 10 display results from the minimize conflict condition. These graphs have patterns quite contrary to the requirements of the input integration model. The first two graphs have clear barrel-shape, whereas the other four have neat parallelism. Such a pattern across the six graphs is predicted by the equity integration model. So the graphs of the minimize conflict condition clearly support the equity integration model.

Statistical Analyses. Analysis of variance of the data of the condition of divide fairly yielded significant deviations from parallelism in the first, $F(4,56) = 3.23$, $p < .05$, and the second, $F(4,56) = 6.59$, $p < .01$, graphs. The other four graphs did not depart from parallelism pattern. These results from the statistical tests of the two-way interactions provide quantitative support for the equity integration model but rejects the input integration model.

However, the results from the tests of higher-order interactions were not so clear. One of the four three-way interactions was statistically significant. The four-way interaction was also significant. *According to the equity integration model, all the higher-order interactions* should be nonsignificant under the condition of constant weighting of two inputs. Under the condition of configural weighting of inputs, on the contrary, all the higher-order interactions should be significant. The obtained results do not conform to either prescription. Therefore, no support for either equity integration or input integration model can be claimed.

But both the versions of the equity integration model predict the same data patterns in two-way graphs. As already noted, the six graphs of the divide fairly condition, in fact, fulfilled the requirements of the equity integration model. On this basis, it can be said that the union people did follow the equity integration model.

Analysis of variance of the data of the condition of minimize conflict confirmed the visual interpretations of the graphs made earlier. The $\underline{F}$ rations for the six graphs were 3.38, 8.11, 1.94, 0.56, 1.96, and 0.56 in order. Only the first two $\underline{F}$ ratios are statistically significant as equity integration model requires.

All the four three-factor interactions were highly significant; so was the four-factor interaction. The three-way interactions are shown in Figure 11.

Figure 11 here

Examination of Figure 11 shows that the three graphs of each three-factor have three notable properties. First, three graphs of each of the four three-factor interaction have a slanted barrel-shape. The middle curve is always of the steepest slope as the ratio model requires. Second, the center graph of each interaction effect is of clear barrel-shape. Third, the graphs on the left and on the right sides have complimentary patterns. The barrel-shape of the top two curves of the left graph is present in the bottom two curves of the right graph. Similarly, the divergence toward center graph in the lower two curves of the left graph is present in the upper two curves of the right graph. All these three properties are consistent with the predictions of the configural-weight equity integration model (Farkas & Anderson, 1979). It can, therefore, be said that reward allocations in the condition of minimize conflict obeyed the equity integration model rather well.

An analysis of variance with instruction as the additional factor to the design did not yield any result which required any modification in the interpretation. This means that union members and leaders followed equity integration model in both instruction conditions. The most marked impact of instructions was again on input valuation and not on rule of reward distribution. The 1980 performance of Worker A, $F(2,30) = 5.82$, $p < .01$, and Worker B, $F(2,30) = 4.08$, $p < .05$, were more effective in the divide fairly condition than in the minimize conflict condition. This result was attributable to the reduction of the entire 1980 performance scale as did students in Experiments 5 and 6.

The tendency to assign greater importance to the 1980 than 1979 performance was characteristic of allocations by union people also. The mean proportion of total variance accounted for by the 1980 performance (M = .20) was significantly higher than by the 1979 performance (M = .15), $F(1,14) = 5.68, p < .05$, and this trend was present under both instruction conditions. Thus, the recency effect seems to be robust with the different instruction conditions as well as subject populations.

Discussion. The most striking finding of Experiment 8 is that union leaders and members follow equity integration model even when the inputs are qualitatively similar. They considered performance in 1979 and in 1980 separately for calculation of equity ratio and then average the two ratios. The alternative input integration model, which received good support in the previous three experiments with students and managers, did not hold true with union people. This means that input integration model cannot be expected to apply to all subject populations. Furthermore, the equity integration model is not restricted to only heterogeneous inputs as was argued on the basis of Experiments 1-4 and the extant literature.

Two more results deserve mention. First, the tendency to give greater importance to the performance in the most recent year than in the preceding year is prevalent in the members and leaders of trade unions as well. Second, motivations behind distribution affected the perception of input and not the rule of money distribution. Both results are similar to those obtained in experiments with students and managers.

GENERAL DISCUSSION

INPUT INTEGRATION AND EQUITY INTEGRATION MODELS

The main goal of the present series of eight experiments was to examine the plausibility of input integration and equity integration models in allocations of rewards. Farkas and Anderson (1979), who suggested the two models, obtained clear support for the equity integration model but not for the input integration model. So, they suggested that the model of equity integration is perhaps superior and also closer to reality than the model of input integration.

Results from the present set of eight experiments performed on allocators of nonwestern foundation show that their operation is linked with the nature of inputs entering into the allocation task as well as with the subject populations. When the allocation task consists of heterogeneous inputs, for example, effort and performance, behavior and performance, or need and deed, then rewards are apportioned according to the equity integration model. This model holds with students as well as professional managers. This indicates that the equity integration model is generalizable not only across student and nonstudent allocators but also across allocators of different cultures.

In contrast, allocation tasks having qualitatively similar inputs such as performance over two periods invoke the input integration model. Although this was not true with American students due to a methodological problem as already noted, both Indian students and managers obeyed the input integration model. But union people employed the equity integration model even when the allocation task consisted of homogeneous inputs. These findings suggest that the input integration model is viable model, but its operation is rather limited.

Why should the model of input integration be of so restricted use? One major reason is its basic structure itself. It requires that all the inputs, no matter how different they are, be reduced to a common currency before the equity calculation is made. In practice, this may not be easy to do with qualitatively dissimilar inputs such as seniority, productivity, motivation, ability etc., for they will have different scales. In order to combine different inputs together, it is essential that the inputs have a uniform scale. The finding that input integration holds with performance-performance design attests the requirement of a common scale.

Another reason may be the prevalence of the equity integration process in daily life. As inputs of claimants are often heterogeneous, perhaps people are used to the equity integration operation. And this process is called in whenever allocations are to be made on the basis of more than one input. This may possibly account for the usage of equity integration by union people in a task for which input integration could have been the natural model. In any case, the limited success of the input integration model indicates that Farkas and Anderson (1979) are perhaps correct in claiming superiority of equity integration model over the input integration model.

It should be noted that the constant-weight equity integration model received good support in Experiment 1,2, and 3. The configural-weight equity integration was supported in Experiments 4 and 8. This means that both versions of the equity integration model received support in the present research. It is, however, difficult to specify when constant-weight and configural-weight versions will hold true.

The finding that monetary and nonmonetary rewards obey the same equity integration model implies that various organizational rewards are treated alike. This supports the traditional theory of job satisfaction which considers various job factors as qualitatively similar (Dalal, 1978; Graen, 1966, 1968; Singh, 1975), but rejects the two-factor theory (Herzberg, Mausner, & Snyderman, 1959). It should, however, be noted that generality of the equity integration model across distribution of monetary and nonmonetary rewards reflects a positivity bias: Those who are good are entitled for all the organizational rewards, whereas those who are bad are unfit for each reward. This can hardly be conducive to a just society.

Success of the two models of reward allocation extends the conception of cognitive algebra considerably. It is pleasant to see that allocations by Indian students, professional managers, and union leaders obey algebra of thought and judgment just as American students do. Accordingly, information integration theory may be considered as general theory of human judgment and decision.

EFFECTS OF INSTRUCTIONS

Leventhal, Michaels, and Sanford (1972) asked their subjects to distribute rewards between two claimants under the conditions of divide fairly and minimize conflict. They found that the amount of difference in reward for the best and the worst performers was smaller in the condition of minimize conflict than in the condition of divide fairly. Leventhal (1976b) interpreted this decrease in difference of reward as consistent with the equality or parity rule of reward allocation.

Results of the present set of experiments confirm the tendency to lower the difference in rewards of the best and the worst performers when motivation is to prevent interpersonal hostility and conflict. In addition, they show that this tendency is robust with various stimulus conditions and subject groups. However, the results argue against the interpretation of the reduced difference as reflecting a rule of reward distribution other than equity.

Much of the literature on the equity and parity rules of reward allocation in developmental and social psychology relies on physical counts of inputs and outcomes (Leventhal & Lane, 1970; Leventhal, Popp,

& Sawyer, 1973). It is also commonly assumed that psychological value is proportional to physical value (Lerner, 1974). This assumption is arbitrary and uncertain. Anderson and Butzin (1978) and Farkas and Anderson (1979) have, therefore, questioned the equity and parity interpretations on the basis of physical counts of inputs and outcomes, arguing that tests of equity models be made with subjective values with which equity theory actually deals.

The present integration-theoretical analysis of reward allocation bears upon the concern expressed above. The finding that the divide fairly and minimize conflict instructions produced a common data pattern in Experiments 1,5,6,7, and 8 indicates that the underlying rule of reward distribution remained the same across the two instruction conditions. The separation between curves was reduced in the minimize conflict condition due to the differential valuation of the input. Perhaps the instructions to give importance to minimization of conflict enabled the allocators to shorten the scale of performance input. According to this interpretation, the reduced difference is attributable to differential valuation of input and not to a different rule of reward distribution as Leventhal (1976b) assumes.

There are at least two indications of the validity of the present interpretation. First, changes in scale were not made for all the inputs entering into the allocation task. In Experiment 1, for example, the performance scale was shorten but not the effort scale. Similarly, the recent performance had shorter scale in Experiments 7 and 8 but not the preceding year performance. Clearly, some inputs are perceived differently under the two instruction conditions. Second, the reduction in scale was not always of the same type. For example, students reduced the entire scale, whereas managers reduced difference between very much above average and average levels of performance. A strict parity rule would require reduction in difference between average and very much below average levels of performance also. This did not happen; hence the parity rule interpretation cannot account for the results obtained with managers. Considered together, these results indicate that motivations behind allocation affected the valuation of input and not the rule of reward allocation.

It should be emphasized that comparison between situations, stimuli, groups, responses, etc., with respect to integration rule has an obvious advantage (Gupta & Singh, 1981; Singh, 1981; Singh et al., 1979). An integration rule deals with the pattern of responses, not the numerical value of single responses. This aspect is vital for comparison between situations, responses, groups, stimuli and so on. No a priori knowledge of value of stimuli or origin and unit of response scale is required. As long as stimuli are constructed from factorial designs, pattern in responses can serve as the base and frame for meaningful comparison between groups, responses, situations and even individuals. In addition, integration rule permits comparison between situations with respects to information utilization and information valuation. The result that behavior toward administration and effort on job are considered as viable inputs for reward reflects the process of information utilization. The tendency to weight the most recent performance more than the preceding year performance and to restrict the performance scale to minimize conflict between claimants illustrate the process of input valuation.

It deserves mention that the integration-theoretical analysis requires that the complete stimulus design be run on each subject. Use of between subject design and only a few levels of stimulus factors such as in the experiments of Kayser and Lamm (1980), Lerner (1974), Leventhal and Lane (1970), and Leventhal et al. (1972) cannot take any theoretical analysis very far. Instead, they would generate interpretations whose meaning and validity will remain uncertain as Farkas and Anderson (1979) rightly noted about the extant literature on equity.

IMPLICATIONS FOR ORGANIZATIONS

Findings of the present research have three major implications for administration of rewards in Indian organizations. First, allocation of rewards should be made according to the equity integration model. The traditional practice of assigning weights to various inputs and then coming up with a unitary measure of claim for reward is not the appropriate way of apportioning rewards. In fact, union people determine appropriate reward in accord with the equity integration model even when the inputs are qualitatively similar. This means that there is a need to change the existing method of distribution of rewards and resources in organizations.

Second, there is a heavy bias toward the most recent performance. This was present in all the four experiments which had performance over two years as inputs. In most organizations, it is required that an employee spend some years before he is promoted to the next cadre. If the performance of the most recent year would play the crucial role, then a dangerous message will be communicated to the employees: Work hard only at the time your case is to be taken up! A certain period of service in a cadre is presumably required to enable the employee grow well. Accordingly, he should be evaluated for his performance during the entire period. A system of performance appraisal based on this proposition is required.

Third, the managerial way of reducing conflict between two claimants is to decrease the difference in rewards for those who are average and very much above average in their performance. This is not the way union people react. To make union people happier, therefore, it is necessary that the difference between very much above average and very much below average levels of performance be reduced. As middle and top management levels, however, the managerial way of reducing conflict may be tried.

The above recommendations are admittedly based on judgmental data and not the actual behavior of Indian managers and union leaders. Nevertheless, they bear upon their conceptions of justice and fairness in social exchange. If their models of reward allocation reflect upon their true cognitive processes, the models can be useful even in administration of rewards and resources in actual organizations. The author thus hopes that the present integration-theoretical analysis of allocation decisions would help manage organizational rewards in a more scientific and objective way than what exists today.

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Table 1

F Ratios for Main Effects, Two-, Three-, and Four-way Interaction Effects under Two Instruction Conditions (Data from Experiment 1)

Source	df	Divide fairly	Minimize Conflict
A: A's Effort	2, 30	29.64**	22.44**
B: A's Performance	2, 30	43.23**	41.99**
C: B's Effort	2, 30	30.43**	16.69**
D: B's Performance	2, 30	47.67**	39.57**
A x B	4, 60	1.22	2.21
A x C	4, 60	14.27**	8.96**
A x D	4, 60	1.38	0.49
B x C	4, 60	0.64	0.49
B x D	4, 60	4.13**	12.63**
C x D	4, 60	0.84	1.83
A x B x C	8,120	1.52	1.04
A x B x D	8,120	0.69	0.56
A x C x D	8,120	1.61	1.19
B x C x D	8,120	1.03	1.76
A x B x C x D	16,240	1.01	1.55

** $p < .01$

Table 2

F Ratios for Distribution of Money, Work Facilities, Praise Time, and Encouragement Time in A's Effort x A's Performance, x B's Effort x B's Performance Analyses of Variance

(Data from Experiment 2)

Source	df	Money	Work Facilities	Praise	Encouragement
A: A's Effort	(2, 30)	10.43**	8.31**	9.38**	0.09
B: A's Performance	(2, 30)	32.42**	27.78**	49.52**	1.56
C: B's Effort	(2, 30)	12.38**	10.18**	8.17**	0.05
D: B's Performance	(2, 30)	51.47**	37.03**	79.64**	2.84
A x B	(4, 60)	0.35	3.02*	1.47	1.54
A x C	(4, 60)	8.06**	4.26**	3.12*	0.17
A x D	(4, 60)	1.17	0.13	0.24	0.84
B x C	(4, 60)	1.61	0.73	2.80*	0.47
B x D	(4, 60)	8.19**	5.92**	11.07**	1.12
C x D	(4, 60)	1.19	1.21	0.48	0.65
A x B x C	(8,120)	0.77	0.67	1.69	1.19
A x B x D	(8,120)	2.27*	1.24	3.24**	1.67
A x C x D	(8,120)	0.98	1.35	1.97	0.82
B x C x D	(8,120)	1.25	2.45*	2.23*	1.46
A x B x C x D	(16,240)	1.94*	0.84	1.49	1.02

* $p < .05$

** $p < .01$

Table 3

F Ratios for Main Effects, Two-, Three-, and Four-way interaction Effects under Two Instruction Conditions (Data from Experiment 5)

Source	df	Divide Fairly	Minimize Conflict
A: A's 1976 Performance	2, 30	7.78**	2.81
B: A's 1977 Performance	2, 30	97.51**	38.53**
C: B's 1976 Performance	2, 30	8.71**	3.06
D: B's 1977 Performance	2, 30	152.72**	47.02**
A x B	4, 60	3.86**	1.08
A x C	4, 60	2.19	1.48
A x D	4, 60	2.76*	2.48
B x C	4, 60	0.36	1.55
B x D	4, 60	1.99	1.26
C x D	4, 60	2.61*	1.39
A x B x C	8,120	1.44	1.72
A x B x D	8,120	1.79	1.67
A x C x D	8,120	2.08*	1.22
B x C x D	8,120	1.13	0.80
A x B x C x D	16,240	3.76**	2.34**

* $p < .05$
** $p < .01$

Table 4

F Ratios for Main Effects, Two-, Three-, and Four-way Interaction Effects under Two Instruction Conditions (Data from Experiment 6)

Source	df	Divide Fairly	Minimize Conflict
A: A's 1979 Performance	2, 38	24.14**	12.62**
B: A's 1980 Performance	2, 38	103.47**	68.85**
C: B's 1979 Performance	2, 38	13.87**	7.54**
D: B's 1980 Performance	2, 38	102.59**	66.53**
A x B	4, 76	4.73**	1.32
A x C	4, 76	1.00	0.82
A x D	4, 76	2.06	1.52
B x C	4, 76	2.07	1.11
B x D	4, 76	7.46**	5.56**
C x D	4, 76	6.88**	3.45*
A x B x C	8,152	2.36*	2.23*
A x B x D	8,152	1.10	0.98
A x C x D	8,152	0.69	0.57
B x C x D	8,152	3.24**	1.95
A x B x C x D	16,304	3.39**	1.63

* $p < .05$
** $p < .01$

Figure Captions

Fig. 1. Mean reward for Worker B as a function of his effort and performance and those of his Coworker A. Data from Experiment 1. VBA = Very much below average; A = Average, VAA = Very much above average.

Fig. 2. Mean money for Worker B as a function of his effort and performance and those of his Coworker A. Data from Experiment 2.

Fig. 3. Mean work facilities for Worker B as a function of his effort and performance and those of his Coworker A. Data from Experiment 2.

Fig. 4. Mean praise time for Worker B as a function of his effort and performance and those of his Coworker A. Data from Experiment 2.

Fig. 5. Mean encouragement time for Worker B as a function of his effort and performance and those of his Coworker A. Data from Experiment 2.

Fig. 6. Mean reward for Worker B as a function of his effort and performance and those of his Coworker A. Data from Experiment 3 in the lower part. Mean Reward for B as a function of his behavior and performance and those of his Coworker A. Data from Experiment 4 in the upper part.

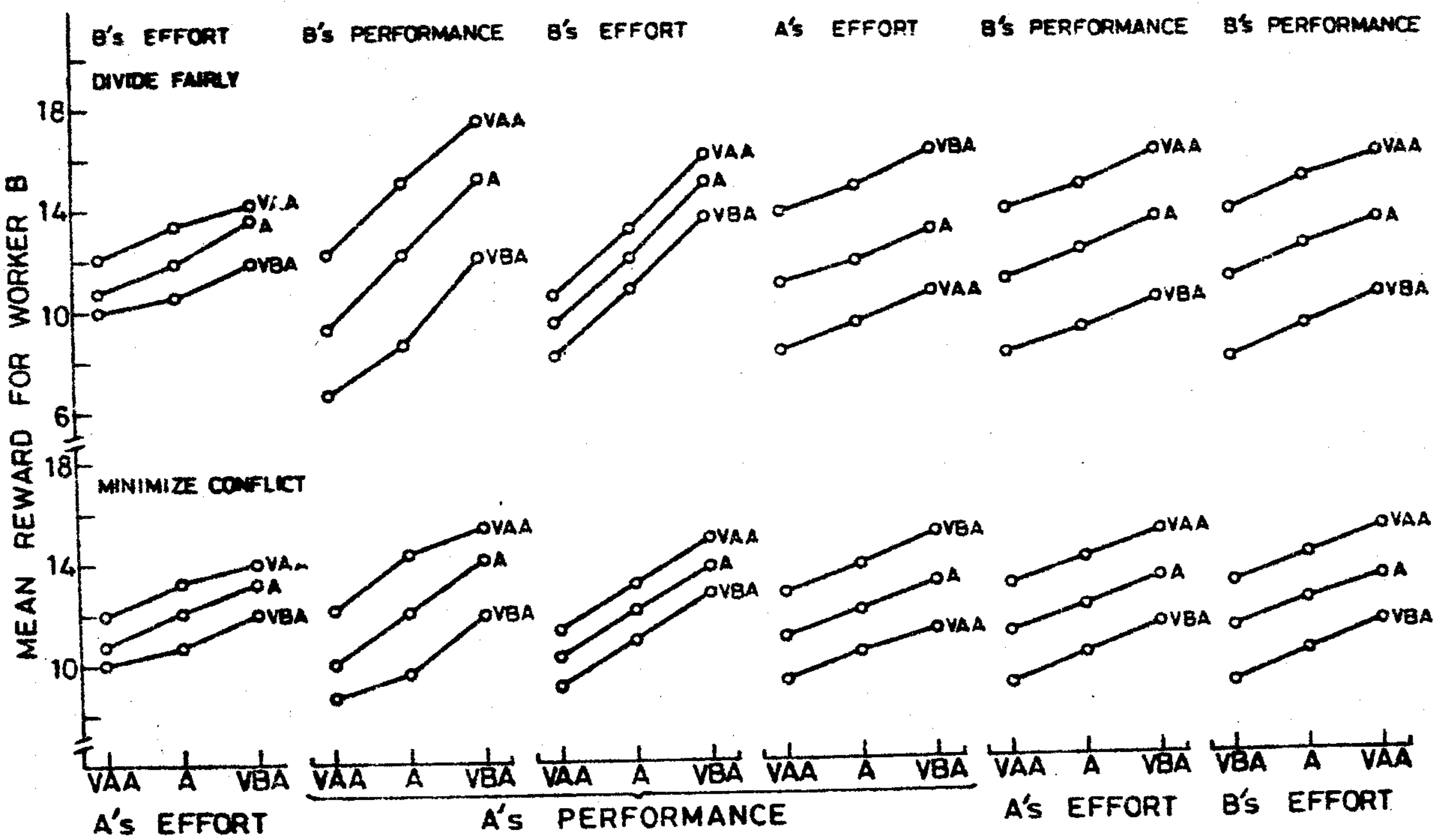
Fig. 7. Mean reward for Worker B as a function of his 1976 and 1977 performance and those of his Coworker A. Data from Experiment 5.

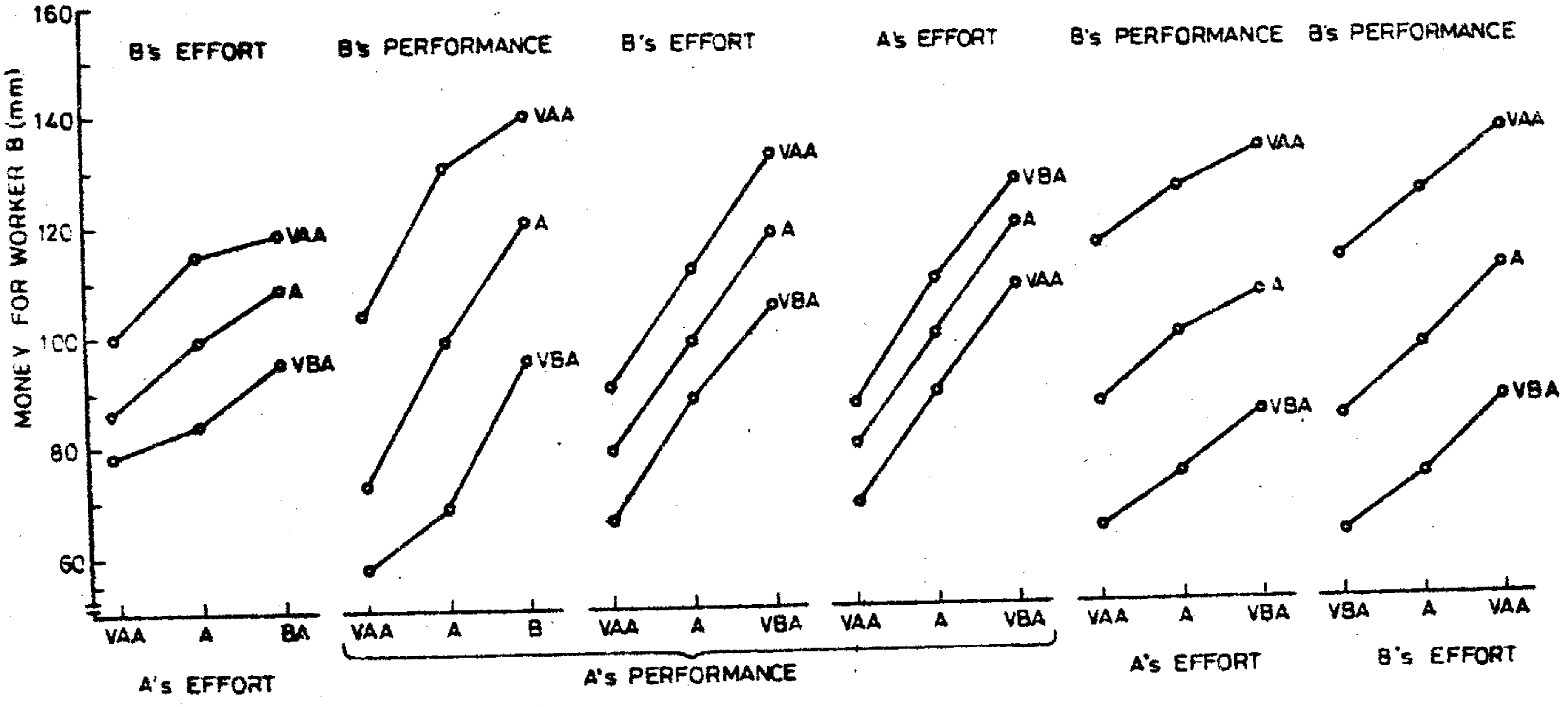
Fig. 8. Mean reward for Worker B as a function of his performance in 1979 and 1980 and those of his Coworker A. Data from Experiment 6.

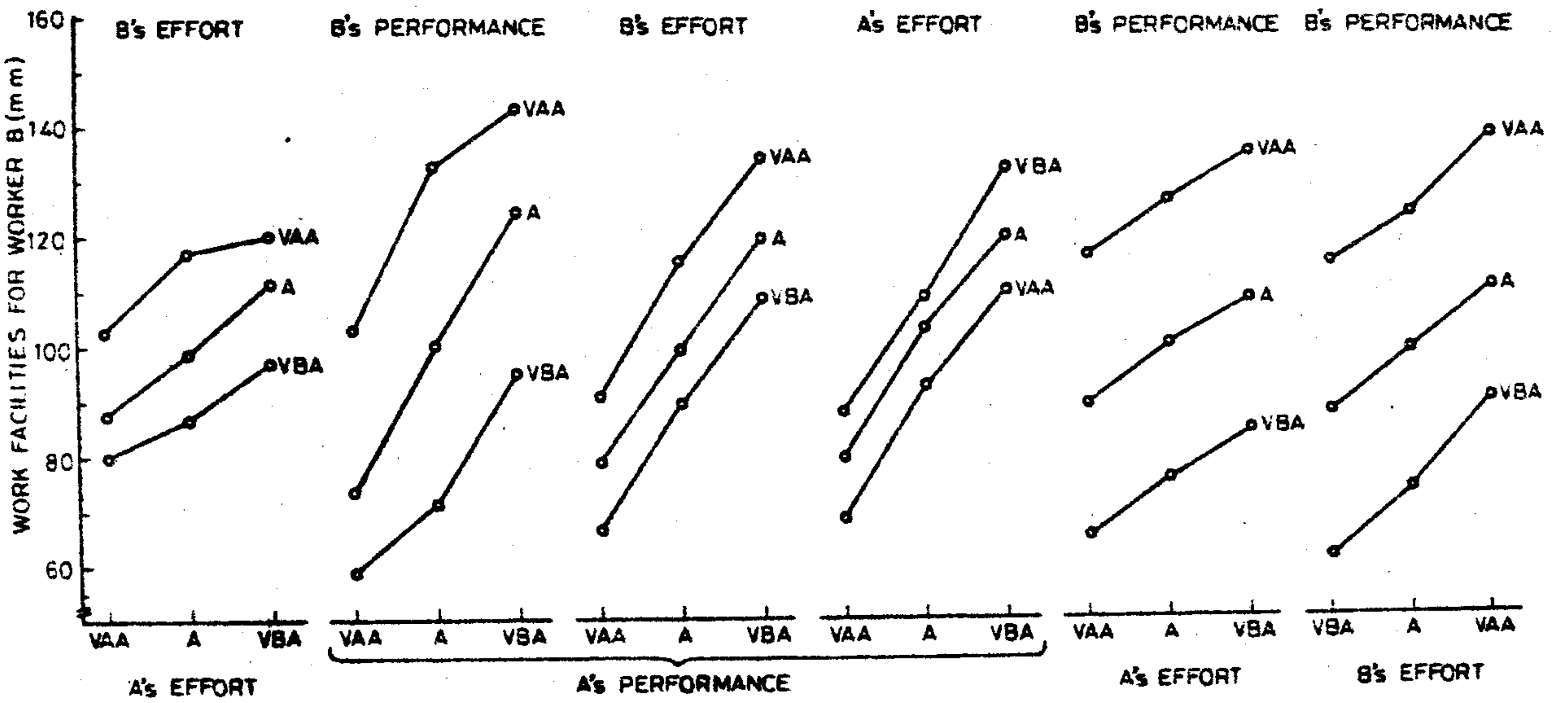
Fig. 9. Mean reward for Worker B as a function of his performance in 1979 and 1980 and those of his Coworker A. Data from Experiment 7.

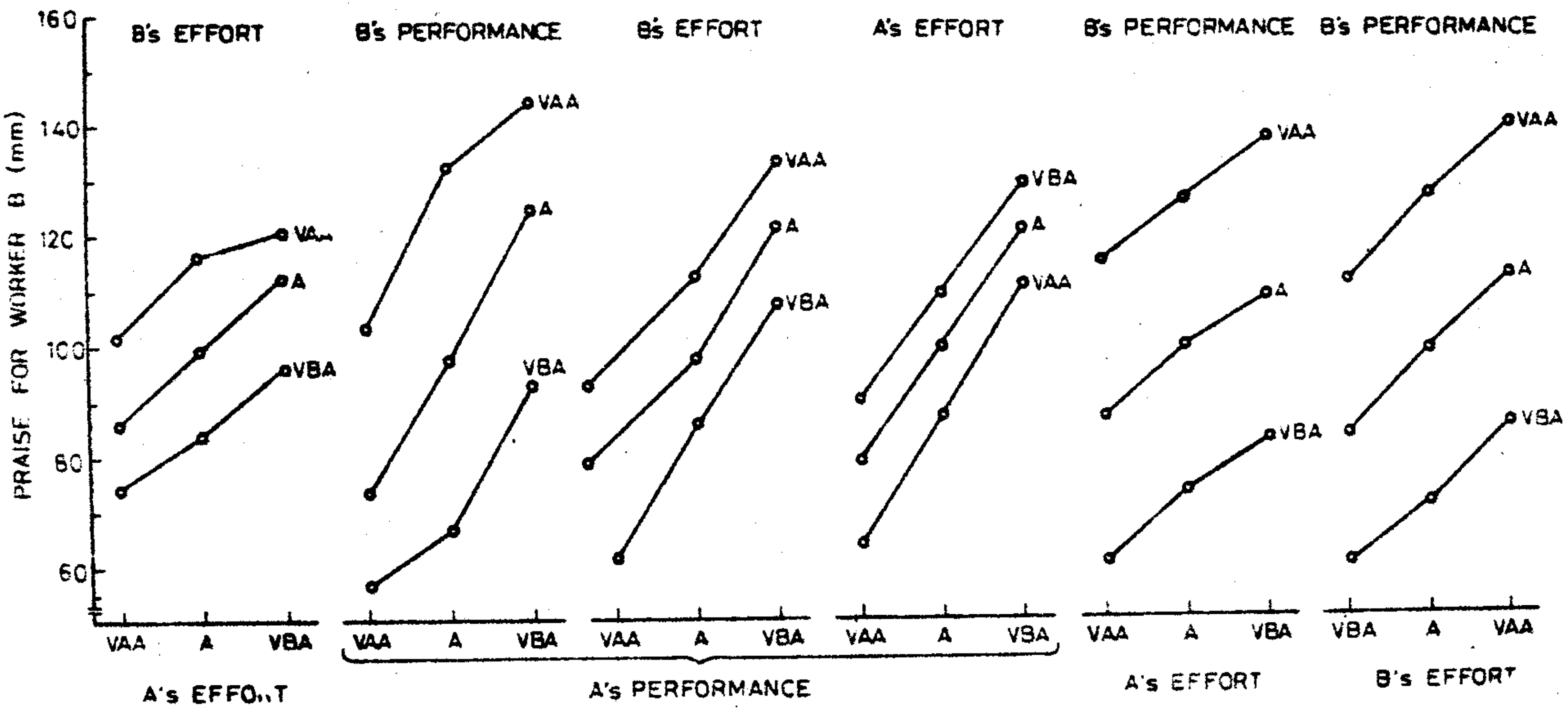
Fig. 10. Mean reward for Worker B as a function of his performance in 1979 and 1980 and those of his Coworker A. Data from Experiment 8.

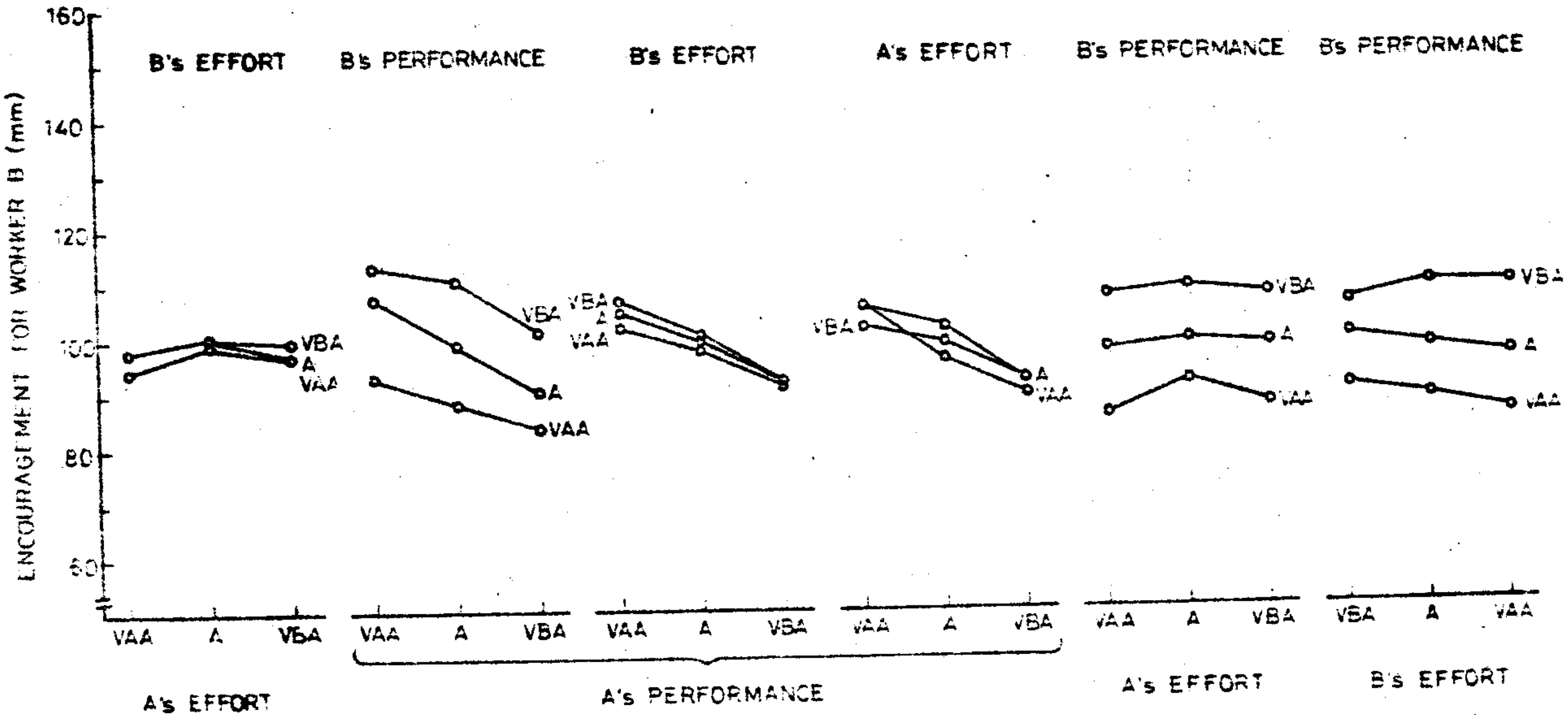
Fig. 11. Profiles of three-way interactions from minimize conflict condition of Experiment 8.


B's EFFORT
B's PERFORMANCE
B's EFFORT
A's EFFORT
B's PERFORMANCE
B's PERFORMANCE
DIVIDE FAIRLY
MINIMIZE CONFLICT
MEAN REWARD FOR WORKER B
18
14
10
6
18
14
10
VAA
A
VBA
VAA
A
VBA
VAA
A
VBA
VAA
A
VBA
VAA
A
VBA
VBA
A
VAA
A's EFFORT
A's PERFORMANCE
A's EFFORT
B's EFFORT

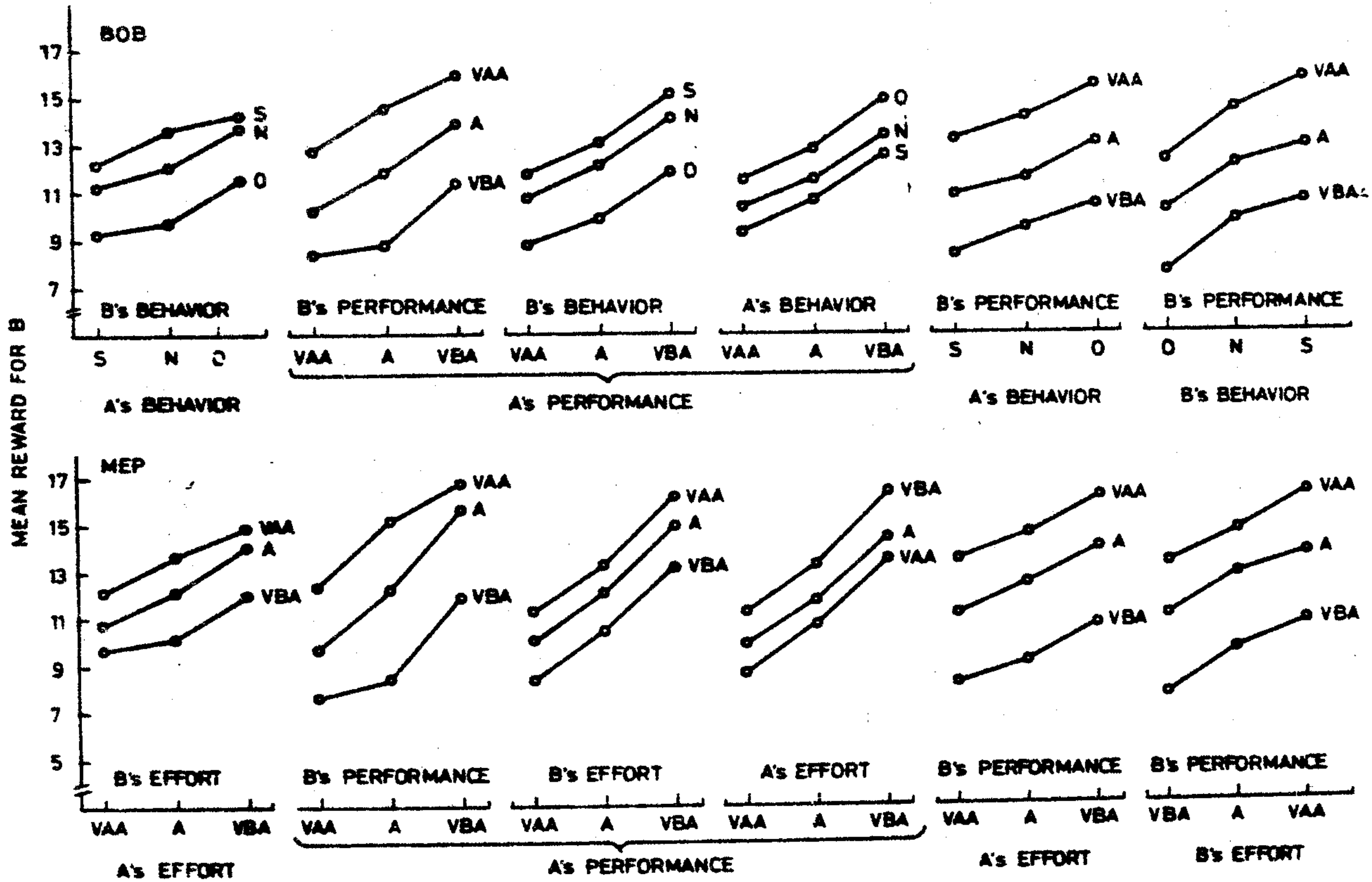

MONEY FOR WORKER B (mm)
160
140
120
100
80
60
B's EFFORT
B's PERFORMANCE
B's EFFORT
A's EFFORT
B's PERFORMANCE
B's PERFORMANCE
VAA
A
VBA
VAA
A
BA
A's EFFORT
VAA
A
B
VAA
A
VBA
VAA
A
VBA
A's PERFORMANCE
VAA
A
VBA
A's EFFORT
VBA
A
VAA
B's EFFORT

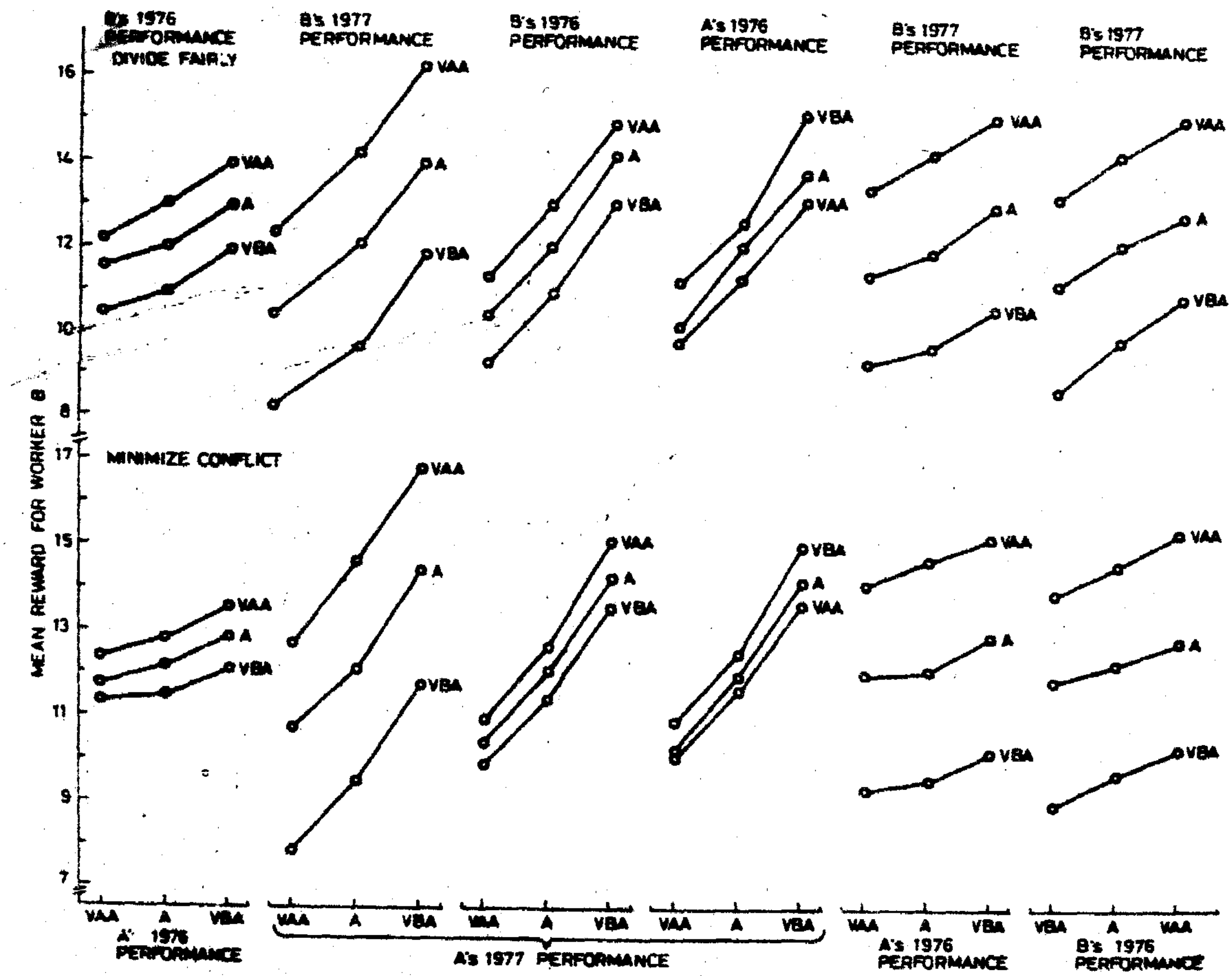

WORK FACILITIES FOR WORKER B (m m)
160
140
120
100
80
60
B's EFFORT
VAA
A
VBA
A's EFFORT
B's PERFORMANCE
B's EFFORT
A's EFFORT
A's PERFORMANCE
B's PERFORMANCE
A's EFFORT
B's PERFORMANCE
B's EFFORT


PRAISE FOR WORKER B (mm)
160
140
120
100
80
60
B's EFFORT
B's PERFORMANCE
B's EFFORT
A's EFFORT
B's PERFORMANCE
B's PERFORMANCE
VAA
A
VBA
A's EFFORT
A's PERFORMANCE
A's EFFORT
B's EFFORT

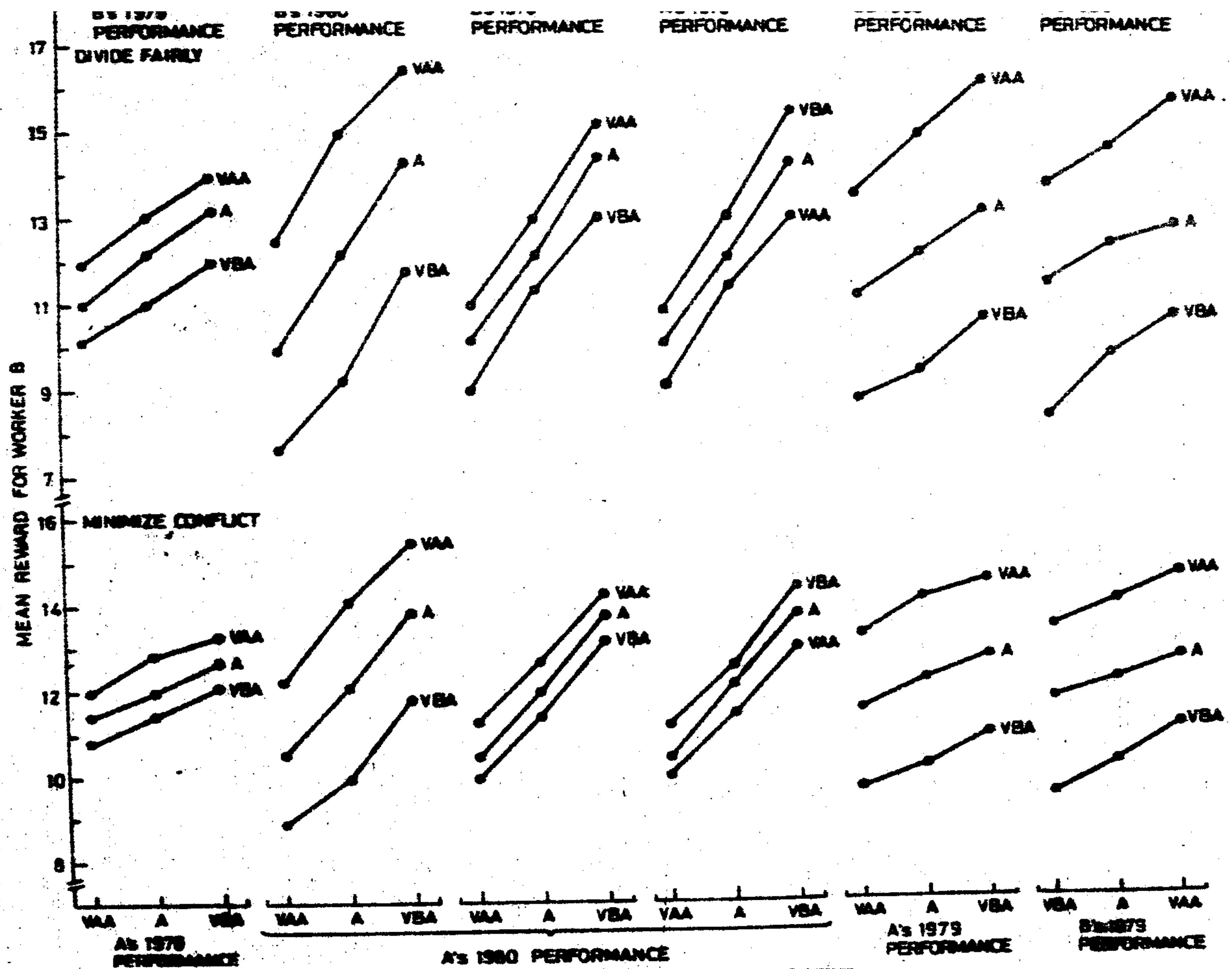


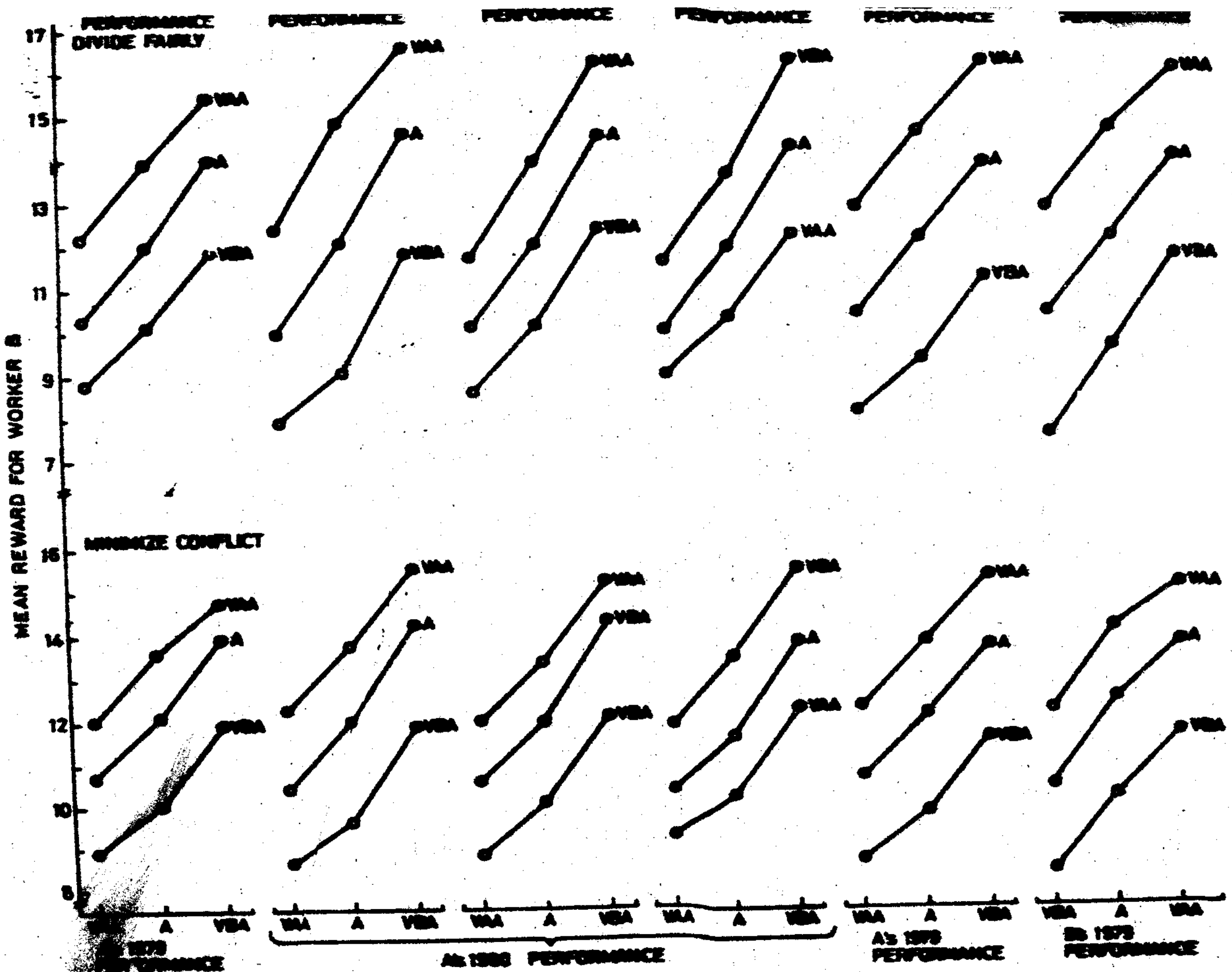
ENCOURAGEMENT FOR WORKER B (mm)
160
140
120
100
80
60
B's EFFORT
B's PERFORMANCE
B's EFFORT
A's EFFORT
B's PERFORMANCE
B's PERFORMANCE
VBA
A
VAA
A's EFFORT
A's PERFORMANCE
A's EFFORT
B's EFFORT

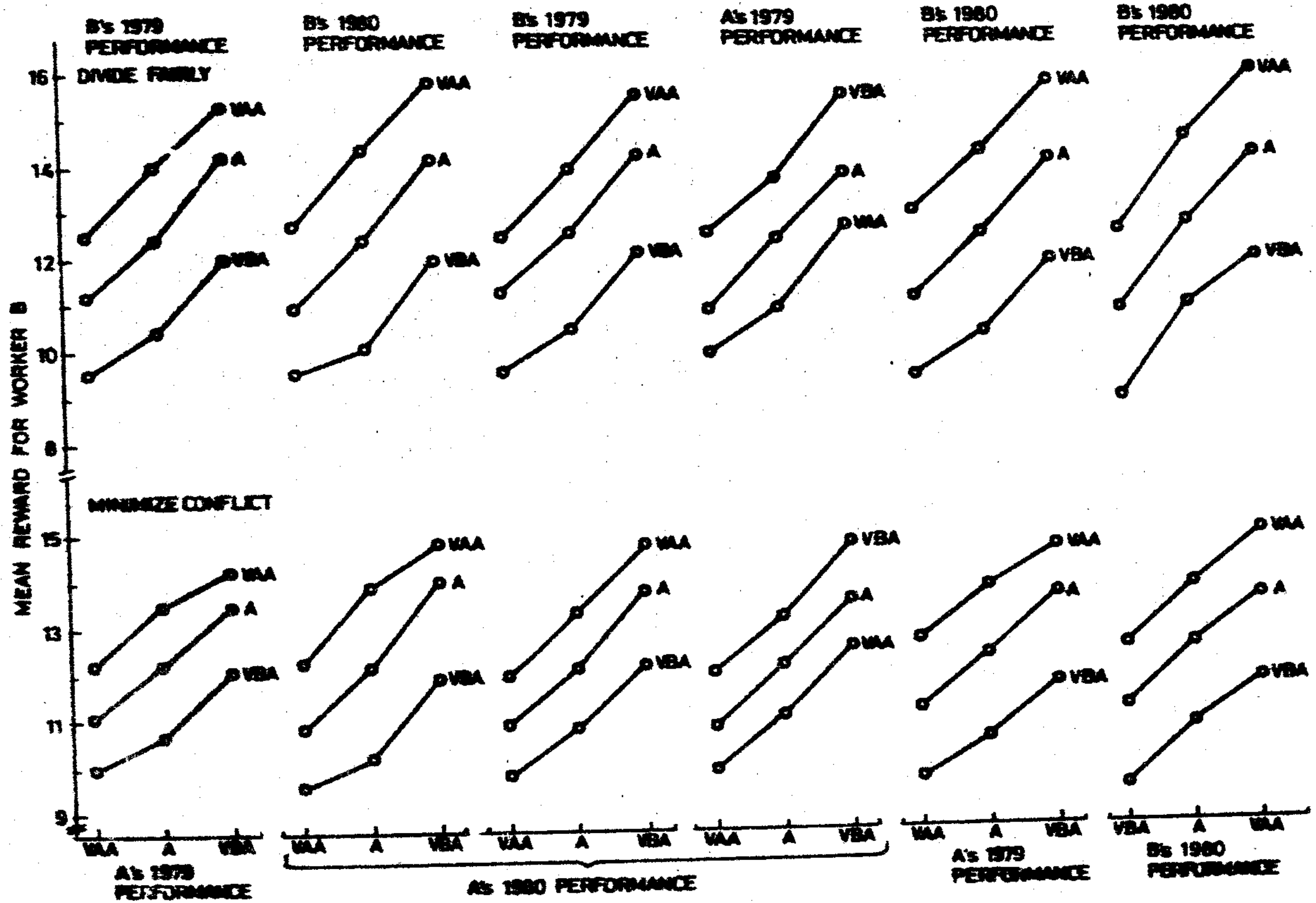

BOB
MEAN REWARD FOR B
17
15
13
11
9
7
B's BEHAVIOR
S
N
O
A's BEHAVIOR
B's PERFORMANCE
VAA
A
VBA
B's BEHAVIOR
S
N
O
A's BEHAVIOR
VAA
A
VBA
A's PERFORMANCE
B's PERFORMANCE
S
N
O
A's BEHAVIOR
B's PERFORMANCE
O
N
S
B's BEHAVIOR
MEP
5
B's EFFORT
VAA
A
VBA
A's EFFORT
B's PERFORMANCE
B's EFFORT
A's EFFORT
A's PERFORMANCE
B's PERFORMANCE
A's EFFORT
B's PERFORMANCE
B's EFFORT



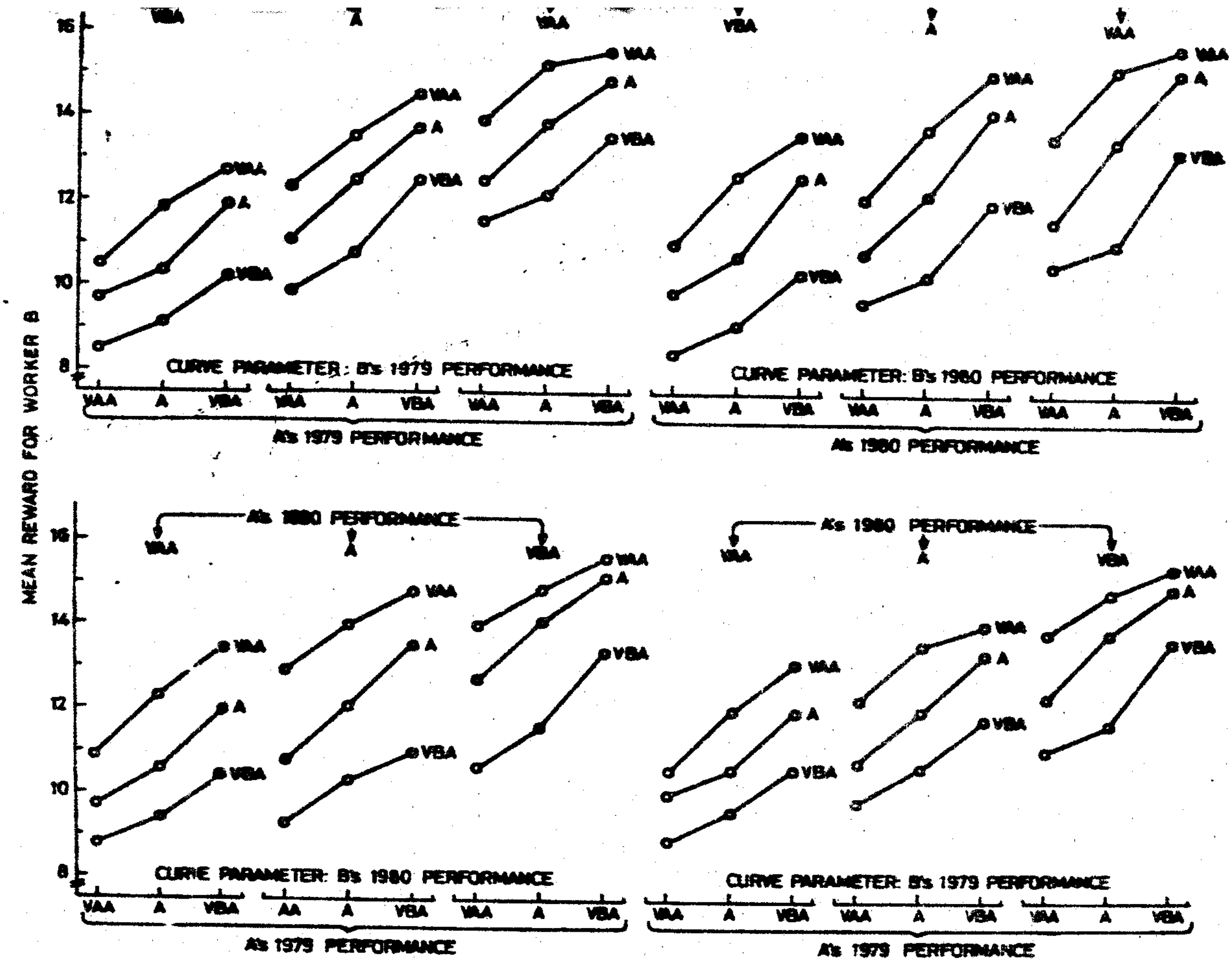
B's 1976 PERFORMANCE
DIVIDE FAIRLY
B's 1977 PERFORMANCE
B's 1976 PERFORMANCE
A's 1976 PERFORMANCE
B's 1977 PERFORMANCE
B's 1977 PERFORMANCE
MINIMIZE CONFLICT
MEAN REWARD FOR WORKER B
16
14
12
10
8
17
15
13
11
9
7
VAA
A
VBA
A's 1976 PERFORMANCE
A's 1977 PERFORMANCE
A's 1976 PERFORMANCE
B's 1976 PERFORMANCE


PERFORMANCE
DIVIDE FAIRLY
MINIMIZE CONFLICT
MEAN REWARD FOR WORKER B
17
15
13
11
9
7
16
14
12
10
8
VAA
A
VBA
A's 1979 PERFORMANCE
A's 1980 PERFORMANCE


MEAN REWARD FOR WORKER B
PERFORMANCE
DIVIDE FAIRLY
MINIMIZE CONFLICT
VAA
A
VBA
A's 1986 PERFORMANCE
A's 1978 PERFORMANCE
B's 1978 PERFORMANCE



MEAN REWARD FOR WORKER B
DIVIDE FAIRLY
MINIMIZE CONFLICT
B's 1979 PERFORMANCE
B's 1980 PERFORMANCE
B's 1979 PERFORMANCE
A's 1979 PERFORMANCE
B's 1980 PERFORMANCE
B's 1980 PERFORMANCE
VAA
A
VBA
A's 1979 PERFORMANCE
A's 1980 PERFORMANCE
A's 1979 PERFORMANCE
B's 1980 PERFORMANCE
16
14
12
10
8
15
13
11
9


MEAN REWARD FOR WORKER B
CURVE PARAMETER: B's 1979 PERFORMANCE
A's 1979 PERFORMANCE
CURVE PARAMETER: B's 1980 PERFORMANCE
A's 1980 PERFORMANCE
VAA
A
VBA
16
14
12
10
8