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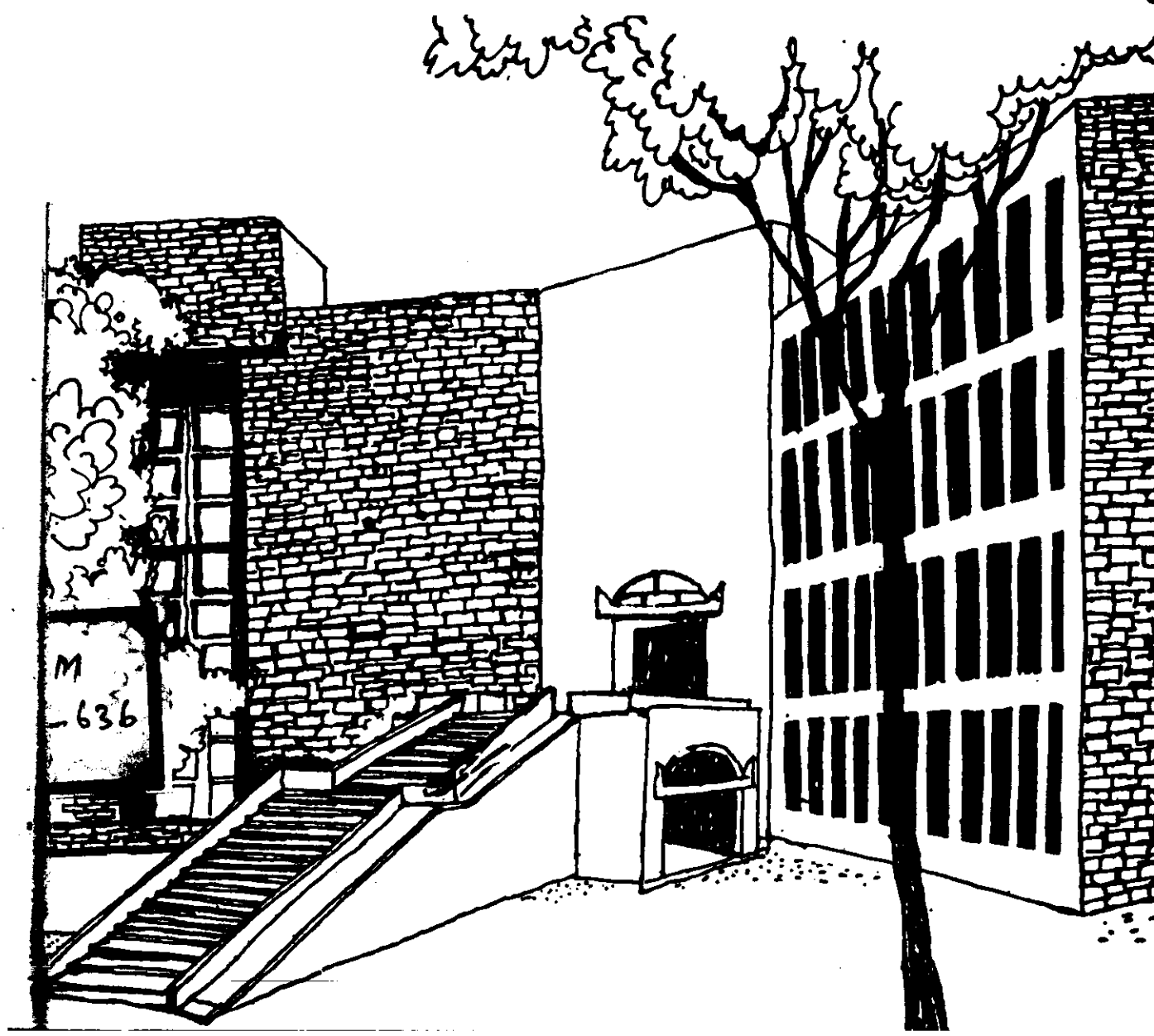

PREDICTION OF SON'S PERFORMANCE IN EASY THROUGH DIFFICULT EXAMS BY INDIAN PARENTS

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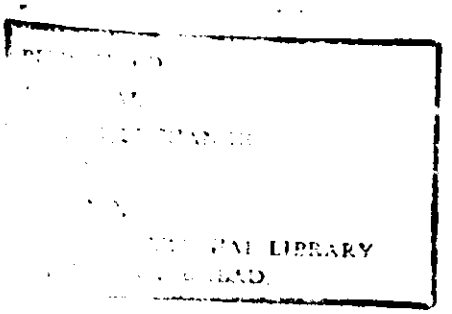
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Prediction of Son's Performance in Easy through Difficult Exams by Indian Parents

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Running Head: SON'S PERFORMANCE

Abstract

Prediction of exam performance from information about motivation and ability of students by Indian subjects always supported an adding-type rule. As this rule implies that motivation is equally effective with persons of low through high ability, it may be regarded as reflective of an idealistic philosophy. The present research tested the hypothesis that a multiplying-type rule which implies that motivation is more effective with persons of high than of low ability may be used by Indian subjects if the situation demands realistic estimates. Twenty-four couples expressed expectations from their only-son in easy through difficult exams to school principal confidentially. Predictions by mothers obeyed the multiplying-type rule; those by fathers obeyed the adding-type rule. Exam difficulty changed pattern in father's judgments but not in mother's judgments. However, parents held a similar belief: Effectiveness of motivation increases with sons of high ability but decreases with sons of low ability as difficulty of exam increases. Of the three possible explanations for the effects of exam difficulty, changes in weight of information seemed to be the most parsimonious.

How do people integrate information about motivation and ability of a student when they predict his or her performance in easy through difficult exams? Research by Kun and Weiner (1973) shows that success at a difficult task is believed to require both high motivation and high ability, whereas success at an easy task is believed to require either high motivation or high ability. In other words, success at the difficult and easy tasks invoke use of the multiple necessary and multiple sufficient causal schemata, respectively.

Surber (1981a) proposed, therefore, that motivation and ability information may be combined by a multiplying rule when the exam is extremely difficult (Anderson, 1981; Anderson & Butzin, 1974) but by an adding-type rule when the exam is easy or OK (Gupta & Singh, 1981; Singh, Gupta, & Dalal, 1979). The multiplying and adding rules require different patterns in the Motivation x Ability effect. The former predicts a linear fan pattern, that is, a systematic divergence toward right; the latter predicts a pattern of parallelism. Consistent with her hypothesis, Surber (1981b) demonstrated that the very easy, moderately difficult, and very difficult exams, in fact, produce convergence, parallelism, and linear fan patterns in the Motivation x Ability effect.

Similar manipulations of exam difficulty with Indian subjects by Singh and Bhargava (1985), however, failed to produce differences in pattern in the Motivation x Ability effect. The difficulty of exams played a subtracting role instead of a moderating role found by Surber (1981b). Since the Motivation x Ability effect had the very pattern of parallelism across very easy, OK, and very difficult exams, Singh and Bhargava claimed support for the

hypothesis of cultural difference between Indians and Americans in their outlook on how motivation and ability determine performance.

Subsequent work in India (Singh, 1986; Singh, Bhargava, & Norman, 1986; Srivastava & Singh, 1986a, 1986b) as well as in the United States (cf. Surber, 1984, 1985a, 1985b) shows that rules for integrating information pertaining to motivation and ability depend upon nature and difficulty of task as well as upon age and culture of subjects. Moreover, the adding-type rule which implies that each person, regardless of native ability, can gain equally by virtue of trying or effort reflects on an idealistic, egalitarian philosophy. But the multiplying rule which implies that motivation is more effective with persons of high than of low ability may be closer to the actual behavior processes, since just such a rule is found in most current theories of motivation, such as those of Hull and Tolman (see Anderson, 1974, p. 29). Thus, the fan pattern in the Motivation x Ability effect and changes in pattern as a function of exam difficulty may also be obtained with Indian subjects if they are enabled to make realistic instead of idealistic predictions.

The main goal of the present study was to get realistic predictions of performance on exams of varying difficulty. To this end, the relationship between stimulus person and subjects was manipulated: Parents predicted exam performance of their only-son instead of hypothetical students studied previously (Gupta & Singh, 1981; Singh & Bhargava, 1985, 1986; Singh et al., 1979; Srivastava & Singh, 1986a). This manipulation was intended to make subjects concerned with actual performance, for Indian mothers wish to have at least one son (Poffenberger & Poffenberger, 1973). In addition, the expectations

of son's performance were supposedly being reported to the school principal confidentially, a manipulation which allows at least women to express their values frankly (Kidder, Bellettirie, & Cohn, 1977).

In the literature on achievement motivation, roles of mothers and fathers in the development of need for achievement in their sons have been described to be different. For example, the mothers of sons with high need for achievement not only expect and demand independent behaviors at an early age but also provide reinforcements in the form of affection when the achievement demands are met (Winterbottom, 1958). In contrast, the more the sons feel loved and accepted by their fathers, the lower their need for achievement (McClelland, Atkinson, Clark, & Lowell, 1953). One speculation from these parental differences in fostering achievement motives in sons could be that mothers and fathers also differ in the degree of realistic expectations from their own sons. Perhaps mothers develop realistic expectations of performance based on capability of sons, whereas fathers continue to be guided by the idealistic, egalitarian philosophy that motivation is equally effective with persons of low and of high ability.

If the above speculation is correct, then predictions of son's exam performance by mothers should be more realistic than those by fathers. In other words, mothers should follow a multiplying-type rule; fathers should follow an adding-type rule. Besides, difficulty of exams should engender different patterns in the Motivation x Ability effect just as Surbor (1981b) found. The purpose of the present experiment was to test this hypothesis within the information integration paradigm (Anderson, 1981, 1982).

Method

Stimuli and Design

Descriptions of middle school (i.e., Standard VII) boys who were to take annual exam after six months were typed on separate index cards. Each card contained information about difficulty of exam as well as motivation and ability (i.e., IQ) of the stimulus student. Exam was described as extremely easy, very easy, easy, OK, difficult, very difficult, or extremely difficult. Motivation was defined by student's willingness and seriousness to do well in the exam, and was described as not at all motivated, low in motivation, below average, average, above average, high in motivation, or very much motivated. Ability was indicated by IQ which ranged from 85 to 140.

Stimulus descriptions were prepared according to a 3 x 3 x 3 (Exam Difficulty x Motivation x Ability) factorial design. The three levels of exam difficulty were very easy (VE), OK, and very difficult (VD); the three levels of motivation were low in motivation (LO), average (AV), and high in motivation (HI); and the three levels of IQ were 90, 112, and 135. Orthogonal combinations of the levels of the three factors generated descriptions of 27 test persons. Four descriptions based on extreme levels of the three factors were also constructed to serve as end anchors (Anderson, 1981, 1982).

There were 10 practice descriptions. They included the four end anchors mentioned above and six new descriptions based on levels other than those used in the preparation of test persons. These practice examples were intended to orient the subjects to use the response scale in a uniform manner and to make the subjects familiar with the judgmental task.

There were two versions of the same set of cards. The first version had information about exam difficulty, motivation, and IQ listed in vertical order; the second version had the same information in just the reversed order. This manipulation of order of presentation of information was intended to balance order effects, if any, in prediction of exam performance.

Subjects

Twenty-four couples, who were residing in the western part of the city of Ahmedabad, India, served as subjects. They were married for 8 to 25 years, and had one to three children. In general, the parents were highly educated. Fathers were professors, teachers, advocates, engineers, social workers, or bank officers; mothers were teachers, social workers, bank officers, or housewives. They belonged to middle class or upper middle class.

Of the 24 couples, 12 were in the age range of 30 to 40 years and 12 were in the age range of 41 to 50 years. The younger group of parents were married for 8 to 15 years and the older group for 16 to 25 years.

Procedure

Parents who had agreed to participate in the study on the first contact were later approached in their home. Data from both parents were collected simultaneously in their living room. No external interference was allowed during the experiment.

Each subject received a written sheet of instructions that described the nature of the task and the subject's role in it. The task was described as dealing with prediction of performance of students studying currently in Standard VII. It was emphasized that prediction of exam performance would be

based on difficulty of test paper as well as motivation and ability of the students. The judgment of difficulty of test paper was supposedly made by a subject teacher who had looked at distributions of scores obtained by a random sample of 10,000 students of the State of Gujarat in a previous exam. Information pertaining to motivation and IQ came from the class teacher who had known the student from quite some time and from an intelligence test, respectively.

Parents were requested to imagine that each stimulus student were their own only-son, and that they were reporting their personal expectation from him in the forthcoming annual exam to the school principal. Parents were also urged to make realistic expectations before the school principal, for their estimates of performance would be kept strictly confidential.

After reading the instruction sheet twice, each subject worked with the practice examples. He (she) read the information about the student and then indicated how that student would perform at the annual exam. Prediction of exam performance was made along a 21-step ladder which had digits 1-21 written on the corresponding steps.

After the practice session, the principal 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 and distribution of the descriptions, the subjects read description of six stimulus students randomly drawn from the set of test persons. Finally, each subject shuffled the main set of 31 cards thoroughly and rated them three times in different shuffled orders. In each case, the subject wrote the code number

and his (her) judgment of student's performance on the response sheet supplied for this purpose. Data from all the three trials of judgments were coded and analyzed.

Immediately after the completion of the third trial of judgments, the general purpose of the research was described by the experimenter. She also thanked the parents for their cooperation in the research.

Results

Motivation x Ability Effect

Results indicated that the patterns in the Motivation x Ability effects on predictions by mothers and fathers were different. Whereas predictions by mothers conformed to the linear fan pattern, those by fathers conformed to the parallelism pattern. This can be seen in Figure 1 which plots mean exam performance as a function of motivation (curve parameter) and ability of sons. The three IQ levels are spaced on the horizontal axis according to the marginal means in the factorial design as prescribed in functional measurement (Anderson, 1981, 1982).

Figure 1 about here

The left graph for mothers shows a systematic increase in the spread between the top and bottom curves across the three levels of IQ. Although the magnitude of fanning may appear small, it is actually substantial. The vertical spread between top and bottom curves increase about 19% and 47% across the second and third levels of IQ. The left- and right-side equal-length vertical bars indicate such a divergence clearly.

On the contrary, the right graph for fathers exhibits a pattern of near-parallelism. The vertical spread between top and bottom curves decrease about 13% and 6% across the second and third levels of IQ. These differences are so small that the right graph could very well be described as having a parallelism pattern.

The foregoing interpretations were also supported by statistical analyses. The Parent x Motivation x Ability effect was highly significant, F (4, 176) = 6.99, $p < .01$, which establishes that patterns displayed by the left and right graphs of Figure 1 are different. Trend analyses further disclosed that predictions by mothers had a statistically significant Linear x Linear trend, F (1, 23) = 6.23, $p < .01$, but those by fathers did not have such a trend at all, F (1, 23) = 0.09. It may be said, therefore, that the Motivation x Ability effect on predictions by mothers and by fathers could be described as having the linear fan and parallelism pattern, respectively.

Effects of Exam Difficulty

Exam difficulty x Motivation x Ability effect. The pattern in the Motivation x Ability effect across the three levels of exam difficulty were different in predictions by mothers and by fathers. The former had the very linear fan pattern across each level of exam difficulty; the latter had three different patterns across the three levels of exam difficulty. This is visible in Figure 2 which plots profiles of the Motivation x Ability effect under the condition of very difficult, OK, and very easy exam from left to right.

Figure 2 about here

An examination of the three left-side graphs for mothers discloses that the effectiveness of motivation information decreased with sons of low ability but increased with sons of high ability as the difficulty of exam increased. Thus, the fan pattern in the predictions by mothers appears sharper as the difficulty of exam increases. Look at the length of three left-side and three right-side vertical bars of the first through the third graph to see this trend. The length of the left-side vertical bars systematically increase but that of the right-side vertical bars systematically decrease from the first to the third graph. In fact, the vertical spread between top and bottom curves from the first to the third level of IQ increase about 63%, 57%, and 27% in the condition of very difficult, OK, and very easy examination, respectively.

An inspection of the three right-side graphs for fathers indicates that the effectiveness of motivation was greatest with sons of low and of high ability when exams were very easy and very difficult, respectively, but was equal with sons of low through high IQ when exam was OK in difficulty. In the condition of very difficult exam, the effectiveness of motivation is greatest with sons of high ability and least with sons of medium ability. So the vertical spread between top and bottom curves increase about 85% from the second to the third level of IQ and about 31% from the first to the third level. The three curves in the condition of exam of moderate (OK) difficulty are essentially parallel which indicates that motivation is believed to be equally effective with sons of low through high ability. With an easy exam, however, the effectiveness of motivation steadily decreases as ability increases. Thus, the vertical spread between top and bottom curves decrease about 69% from the first to the second level of IQ and about 58% from the first to the third level.

In statistical analyses, Exam difficulty x Motivation x Ability effect was statistically significant with both mothers and fathers, F (8, 176) = 3.34 and 6.05, and each interaction effect had significant Linear x Linear x Linear trend, F (1, 23) = 4.48 and 18.39. Moreover, Parent x Exam difficulty x Motivation x Ability effect was also highly significant, F (8, 352) = 4.48, $p < .01$. These tests indicate that the pattern in the Motivation x Ability effect reliably varied not only across the three levels of exam difficulty but also over predictions by mothers and by fathers.

Table 1 presents F ratios for the four trend components in the Motivation x Ability effect at each level of exam difficulty. According to the multiplying rule, only the Linear x Linear trend should be present in the interaction (Anderson, 1982, pp. 72-74). For predictions by mothers, this requirement is clearly satisfied in the conditions of very difficulty and OK exams. However, the Linear x Linear trend is not significant in the condition of very easy exam. Since the magnitude of fan shape is expected to be low in this case and the Linear x Linear trend accounted for 32% of variance in the Motivation x Ability effect, nonsignificant F ratio for Linear x Linear component does not seem to require any serious qualification on the interpretation made earlier.

Table 1 about here

Trends present in predictions by fathers are also consistent with the interpretations made from graphs. In the condition of very easy exam, the entire Motivation x Ability effect resides in just the Linear x Linear trend which confirms the convergence pattern in the sixth graph. As none of the

four trend components is statistically significant at the level of OK exam, the fifth graph could be regarded as showing parallelism pattern. Presence of both Linear x Linear and Linear x Quadratic trends at the level of very difficult exam further support the interpretation that fathers regarded motivation to be most effective with sons of high ability but least effective with sons of moderate ability.

The foregoing results are highly inconsistent with the effects of exam difficulty demonstrated by Surber (1981b). Predictions by mothers showed a consistent fan pattern; those by fathers did not exhibit a fan pattern at the level of very difficult exam. Although the convergence and parallelism pattern at very easy and OK exams with fathers agree with Surber's results, the overall picture that emerges from the results of the present experiment and those of Singh and Bhargava (1985) is not very encouraging for linking integration rule with difficulty of exam.

It should also be mentioned that Surber (1981b) and Mellers and Birnbaum (1983) suggest that the convergence, parallelism, and fan patterns at the level of very easy, OK, and very difficult exams may be attributed to the use of logarithmic, interval, and exponential transformation of the subjective responses along the given judgmental scale. Present results indicate that the effects of exam difficulty on prediction of performance by Indian subjects can not be accounted for by this hypothesis of changes in response reproduction processes either.

It deserves mention that the exam difficulty information did not act as a third multiplier in predictions by mothers. A three-factor multiplying rule

would require a general amplification in the linear fan pattern as difficulty of exam increases (Singh, 1986). But this did not happen as already noted.

Motivation x Exam difficulty effect. Figure 3 displays mean exam performance as a function of motivation of son (curve parameter) and difficulty of exam (listed on horizontal axis) from predictions by young mothers, young fathers, old mothers, and old fathers. Motivation has been perceived to be more effective with an easy exam than with a difficult exam by young fathers. This is evident from the increasing spread between curves from left to right in the second graph from left. The vertical spread between top and bottom curves increase about 45% and 108% with OK and easy exams, respectively. The other three groups of parents considered motivation to be equally effective with easy through difficult exam, for the first, third, and fourth graphs of Figure 3 are essentially parallel.

Figure 3 about here

In analysis of variance, Age x Parent x Motivation x Exam difficulty effect was statistically significant, F (4, 176) = 5.12, $p < .01$, which supports the above interpretation. In separate analyses for each of the four groups of parents, young fathers had highly significant Motivation x Exam difficulty effect, F (4, 44) = 11.56, $p < .01$, with a complete concentration in the Linear x Linear trend, F (1, 11) = 15.15, $p < .01$. This establishes the linear fan pattern at quantitative level. However, predictions by young mothers, old mothers, and old fathers had statistically nonsignificant Motivation x Exam difficulty effect, F (4, 44) = 0.99, 1.16, and 1.85, which supports the interpretation just made that their three graphs are indeed parallel

The finding that older parents integrate information about motivation of son and difficulty of exam in a similar manner but younger mothers and fathers differ reflects effect of length of marriage on information processing. It seems that more than 15 years of marriage are required to bring out similarity in ways of processing information about exam difficulty and motivation. Thus, similarity of attitudes and judgments is both the cause and effect of marriage (Byrne, 1971).

Ability x Exam difficulty effect. The overall Ability x Exam difficulty effect, F (4, 176) = 6.50, $p < .01$, disclosed that the effectiveness of ability factor increased as difficulty of exam decreased. But separate analyses for the data of mothers and fathers revealed that this overall trend was confined to judgments by fathers only. Mothers had paid equal attention to ability information across all the three levels of exam difficulty.

These trends are obvious in Figure 4 which plots mean exam performance as a function of ability of sons (curve parameter) and exam difficulty (listed on the horizontal axis). The vertical spread between top and bottom curves of the left graph for mothers increases only nominally (8%) from the first to the third level of exam difficulty. In fact, the three curves are parallel, F (4, 88) = 1.73. However, the right graph for fathers has an increase of 26% vertical spread, as indicated by the left- and right-side equal-length vertical bars, and the nonparallelism is reliable, F (4, 88) = 3.29, $p < .05$. Moreover, the Linear x Linear trend was present in the second graph, F (1, 23) = 21.77, $p < .01$, but not in the first graph, F (1, 23) = 0.54.

Figure 4 about here

The evidence for the parallelism pattern in at least one of the three two-way interactions has one important methodological implication. Presence of both the fan and parallelism patterns in the same experiment ensures that the parents used the ladder scale as an equal-interval measure (Anderson, 1981, 1982). This finding also questions the applicability of changing response reproduction processes as mechanism behind effects of exam difficulty.

It should be noted that mothers had parallelism pattern in Motivation x Exam difficulty and Ability x Exam difficulty effects but fathers in Motivation x Ability effect. These parallelism patterns also argue against the three-factor multiplying model as already noted. Besides, differences in pattern in the two-way interaction effects indicate that even 25 years of marriage does not necessarily result in similarity of judgment processes by husbands and wives.

Valuation of Ability

If we look at the spacing of the levels of IQ on the horizontal axis of Figures 1 and 2, we find that mothers gave greater importance to ability of their son than did fathers. This difference was statistically significant, for Parents x Ability effect was highly significant, F (2, 88) = 11.42, $p < .01$, in the overall analysis of variance as well as in 20 of the 24 mother-father comparisons, $\chi^2(1) = 10.66$, $p < .01$. It may be stated, therefore, that Indian mothers value ability of their sons much more than do Indian fathers.

Discussion

There are two chief findings of the present study. First, it is possible to obtain evidence for a multiplying-type rule in prediction of exam performance by Indian subjects if the situations require them to make realistic esti-

mates. One such situation seems to be the prediction of son's performance confidentially by mothers. This finding of a multiplying-type rule with mothers is a new addition to the literature, since all previous studies of exam performance uniformly obtained evidence for an adding-type rule (Gupta & Singh; Singh & Bhargava, 1985, 1986; Singh et al., 1979; Srivastava & Singh, 1986a).

Second, exam difficulty moderates the Motivation x Ability effect on prediction of son's exam performance. In case of mothers, difficulty of exam enhanced the effectiveness of motivation with sons of high ability but reduced its effectiveness with sons of low ability even if the pattern was one of linear fan. Fathers had convergence, parallel, and unexpected patterns at the level of very easy, OK, and very difficult exam, respectively. Although exam difficulty produced moderating effects, the effects were not the same as those found with American subjects (Surber, 1981b). This emphasizes the importance of cultural variables in social cognition.

Parental Differences

Why did mothers and fathers differ in their predictions based on motivation and ability of their only-son. One explanation may be in terms of a genuine difference in their causal schema of how motivation and ability determine exam performance. Perhaps fathers share the collectivistic orientation (Hofstede, 1980) and egalitarian belief (Singh, 1981) of Indians in general that motivation, an internal factor directly under the control of the individual, is equally effective with persons of low and of high ability. On the contrary, mothers have come to a realization that motivation is more benefi-

cial to a child of high than of low ability because of their day-to-day experiences with the actual performance of their children in school.

The above explanation rests on an assumption that mothers deal with school performance of their children more often than do fathers. Although there is no empirical evidence for such a difference, the assumption appears to be reasonable. Admission to good public and missionary schools in India nowadays considers mother's education as an important factor, for she is expected to supervise homework of children.

A second explanation may be with respect to the differences between fathers and mothers in their initial opinion of motivation, ability, and exam difficulty. Recent work (Singh, & Bhargava, 1986; Singh et al., 1986) shows that Indian subjects have separate initial opinion of qualitatively different types of information which they average with the corresponding external information before integrating them together. When initial opinion of a particular kind of information would assume a very high weight or importance, it would reduce the effective range of the given information (Singh, 1986). Consequently, the possibility for the emergence of the fan pattern is considerably lowered.

There are two results of this experiment that suggest the plausibility of the above explanation. First, mothers, who assigned greater importance to ability than did fathers, had the linear fan pattern in the Motivation x Ability effect. Second, younger fathers, who had a linear fan pattern in the Motivation x Exam difficulty effect (see second graph from left in Figure 3), had indeed given greater importance to exam difficulty information than had other three groups of subjects.

The available data do not allow a clear discrimination between adequacy of the two explanations offered for the differences between mothers and fathers. Accordingly, future work should take up this issue.

Effects of Exam Difficulty

Surber (1981b) considered two explanations for the effects of exam difficulty on the pattern in the Motivation x Ability effect. One was a change in response reproduction processes. The convergence, parallelism, and fan patterns arise in a two-way factorial plot if subjects render their judgments along the given scale by logarithmic, interval, and exponential transformations, respectively (Mellers & Birnbaum, 1983, see also Surber, 1984, pp. 138-141). She speculated, therefore, that manipulations of very easy, moderately difficult, and very difficult exams engendered use of logarithmic, interval, and exponential judgment functions, respectively.

But the reported assumptions of Surber's (1981b) own subjects about how motivation and ability determine performance were highly inconsistent with this explanation. The very parallelism pattern across each level of exam difficulty found by Singh and Bhargava (1985) also questioned the plausibility of the changes in response reproduction processes.

Results of the present experiment further show the inadequacy of this explanation. The pattern in predictions by mothers and in those by fathers in the condition of very difficult exam do not match with the prescriptions of the hypothesis of changes in response reproduction processes. Besides, at least one of the three two-way factorial plots had evidence for parallelism pattern which indicates that subjects indeed used the response measure as an equal-interval scale (Anderson, 1981, 1982; Singh, in press).

Another explanation for the variations in pattern in the Motivation x Ability effect considered by Surber (1981b) is change in integration rule. As already mentioned, difficult and easy exams are expected to invoke use of multiplying and adding rules, respectively. Since the reported assumptions of the subjects about the way motivation and ability should influence prediction were congruent with the patterns in the Motivation x Ability effect, Surber raised the possibility that exam difficulty affects rule for integrating information about motivation and ability.

This explanation also seems to be at odds with data. Singh and Bhargava (1985) found no change in pattern in the Motivation x Ability effect across levels of exam difficulty. Predictions by mothers show a uniform pattern of linear fan, and predictions by fathers do not exhibit a perfect fan shape. Linking integration rule with the difficulty of exam, thus, does not appear to be a parsimonious explanation.

It should be added that Surber (1981b) had obtained predictions from subjects on the basis of information about motivation alone or ability alone. She found that the effect of motivation or ability information presented alone was greater than that of both motivation and ability information presented together. Since this result agrees with an averaging rule (Gupta & Singh; Singh & Bhargava, 1986; Singh et al., 1979; Srivastava & Singh, 1986a; Surber, 1981a, 1985b), Surber (1981b, p. 576) herself claimed support for an averaging rule for judgments of performance for the exam described as highly difficult.

If it is accepted that information pertaining to motivation and ability are averaged, as the results of a good number of previous studies in fact show

(Gupta & Singh, 1981; Singh & Bhargava, 1986; Singh et al., 1979; Srivastava & Singh, 1986a; Surber, 1980, 1981a, 1981b, 1985b), then it is easier to account for the effects of exam difficulty by changes in the pattern of weights for the motivation and ability information. As it is well known, the linear fan pattern is not unique to the multiplying rule. If lower values of motivation and/or ability take greater weight, then the averaging model with differential weighting also produces an approximate fan pattern (Anderson, 1981, pp. 118-119). It is also well-known that both the averaging rule with constant weighting and the adding rule engender a pattern of parallelism (Anderson, 1981, pp. 12-16, pp. 58-62). Thus, the averaging model could account for the different patterns in the Motivation x Ability effect across different levels of task difficulty by the changes in the pattern of weights for the given information.

From this angle, the results of the present experiment are also consistent with the averaging model which received a good support in several studies cited above. More importantly, the averaging model would provide a unified interpretation for the seemingly different effects of exam difficulty on predictions by mothers and by fathers. Even if their predictions display discrepant patterns, they allow just one qualitative interpretation: Effectiveness of motivation information increases with sons of high IQ but decreases with sons of low IQ as difficulty of exam increases. Such changes in effectiveness of motivation and ability information as a function of exam difficulty fit nicely within the averaging model.

It may be added that Srivastava and Singh (1986b) obtained evidence for development of the parallelism pattern from the linear fan pattern in prediction of performance in a singing contest with Indian children. Individual child analyses also disclosed some cases of patterns other than the parallelism and fan patterns. Those discrepant cases were interpretable within the averaging model with differential weighting. The authors argued, therefore, that the developmental changes in pattern reflected changes in weight of information and not in the integration rule. By accepting the same interpretation for the effects of exam difficulty on predictions by mothers and by fathers, it is possible to organize a seemingly diverse kinds of results in a rather simple way. Future research should profitably examine the plausibility of this interpretation by using unambiguous distinguishing tests between rules (Singh, in press; Singh & Bhargava, 1986).

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Table 1

F Ratios for Four Trend Components in Motivation x Ability Effect at Each Level of Exam Difficulty

	Trend Components							
	Predictions by Mothers				Predictions by Fathers			
Exam	L x L	L x Q	Q x L	Q x Q	L x L	L x Q	Q x L	Q x Q
Very Difficult	6.42*	0.19	1.89	1.41	9.59*	10.69*	3.37	0.56
OK	10.25*	3.89	2.19	0.34	2.14	1.06	1.34	2.87
Very Easy	0.43	0.01	0.51	1.72	14.21*	0.55	4.18	0.61

Note. Each *F* ratio had *df*s of 1 and 23. The L and Q refer to linear and quadratic trends, respectively.

* $p < .01$

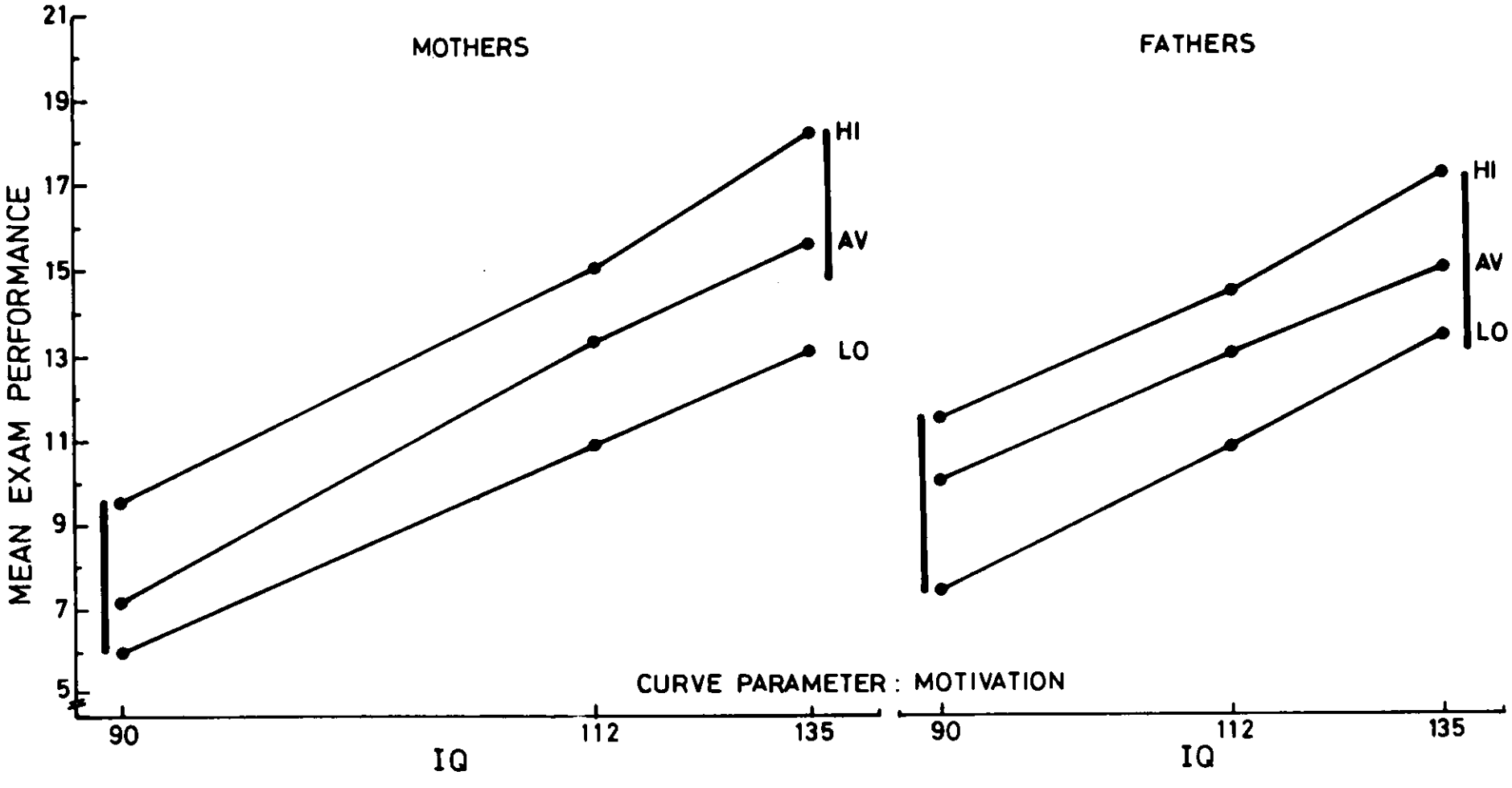
Figure Captions

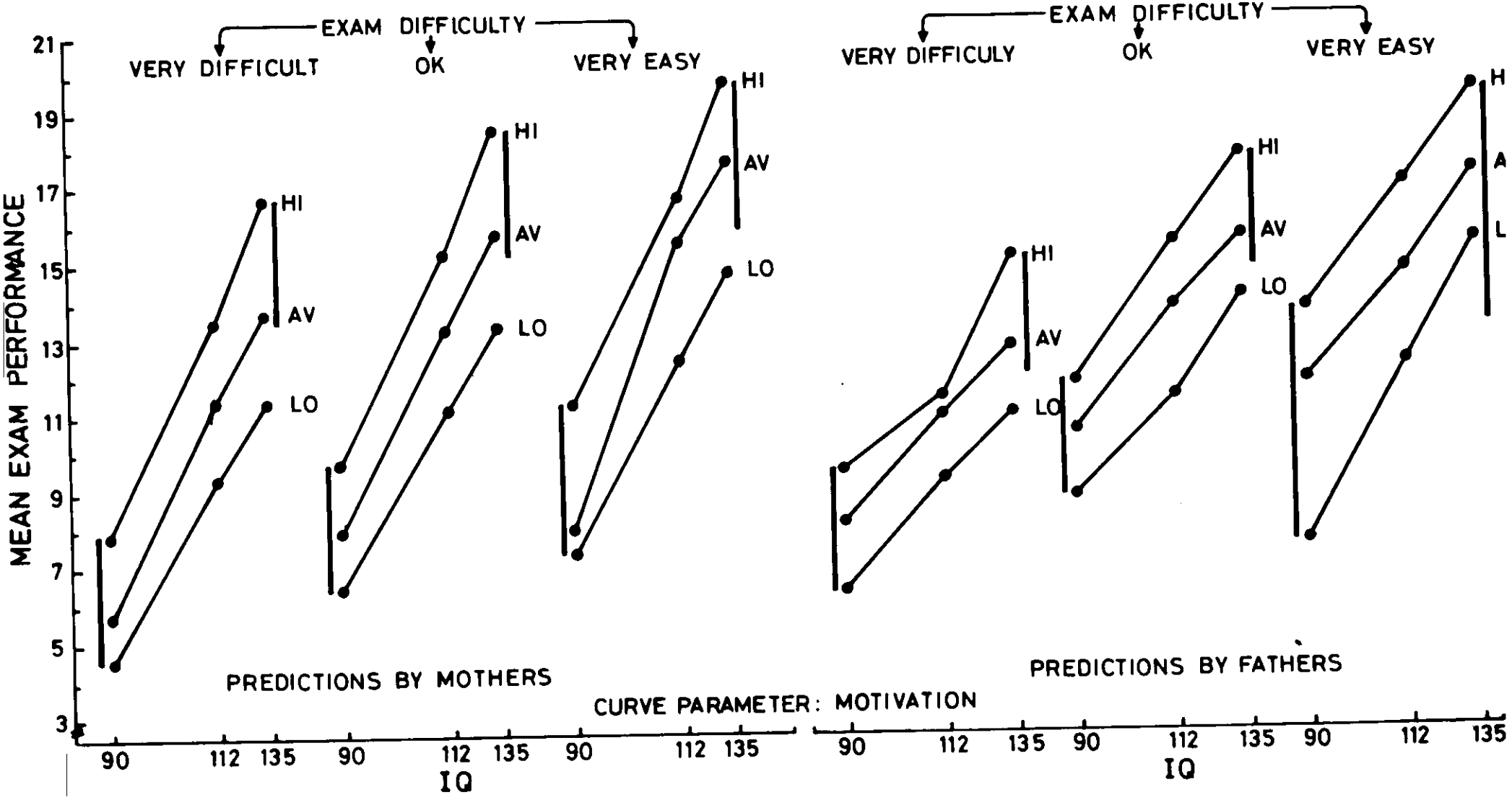
Figure 1. Mean exam performance as a function of motivation and IQ of sons. Predictions by mothers and by fathers are shown on the left and right sides, respectively. The abbreviations LO, AV, and HI refer to low, average, and high motivation, respectively.

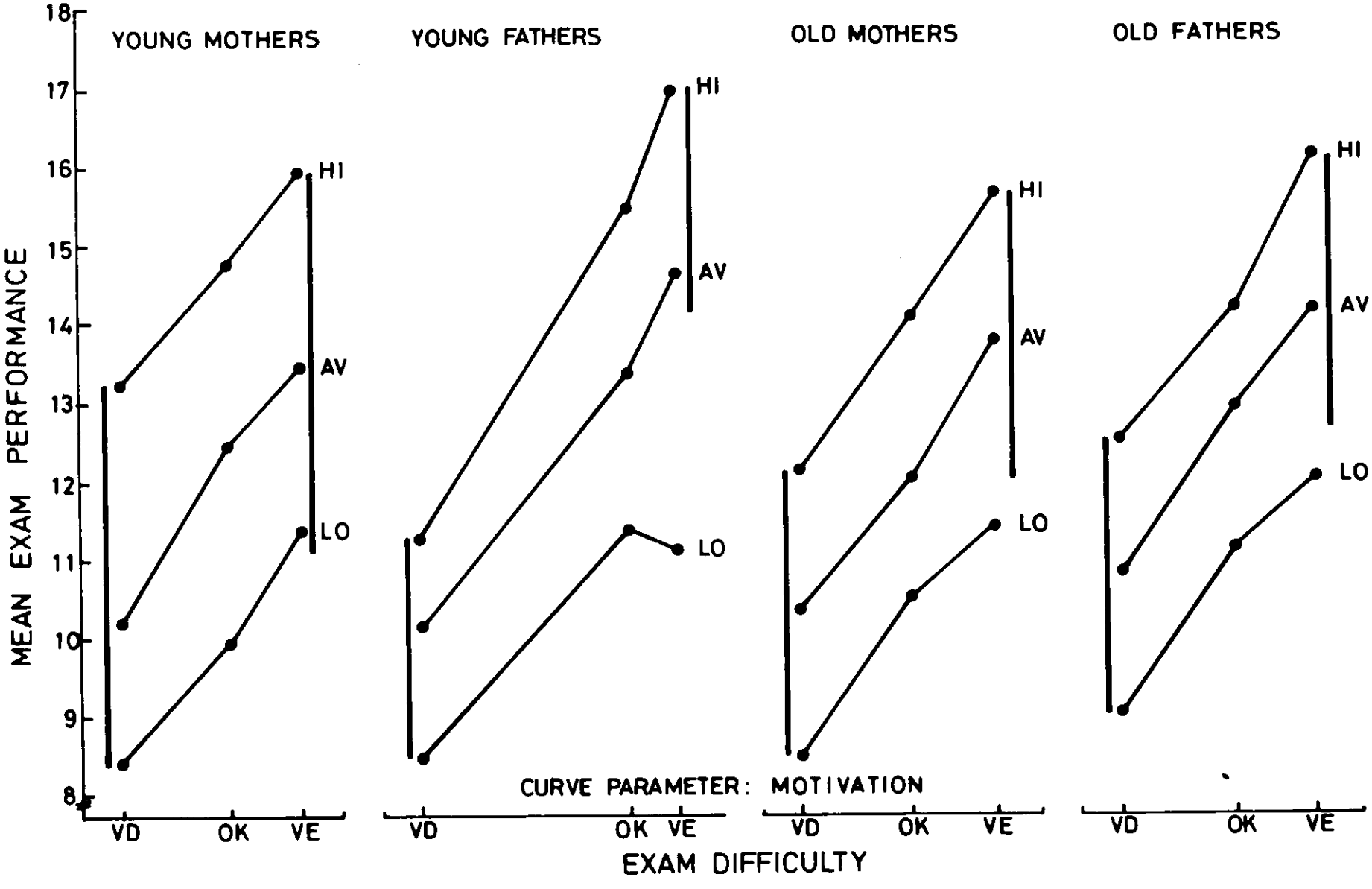
Figure 2. Factorial plots of the Motivation x Ability effect across three levels of exam difficulty. Predictions by mothers and by fathers are displayed on the left and right sides, respectively.

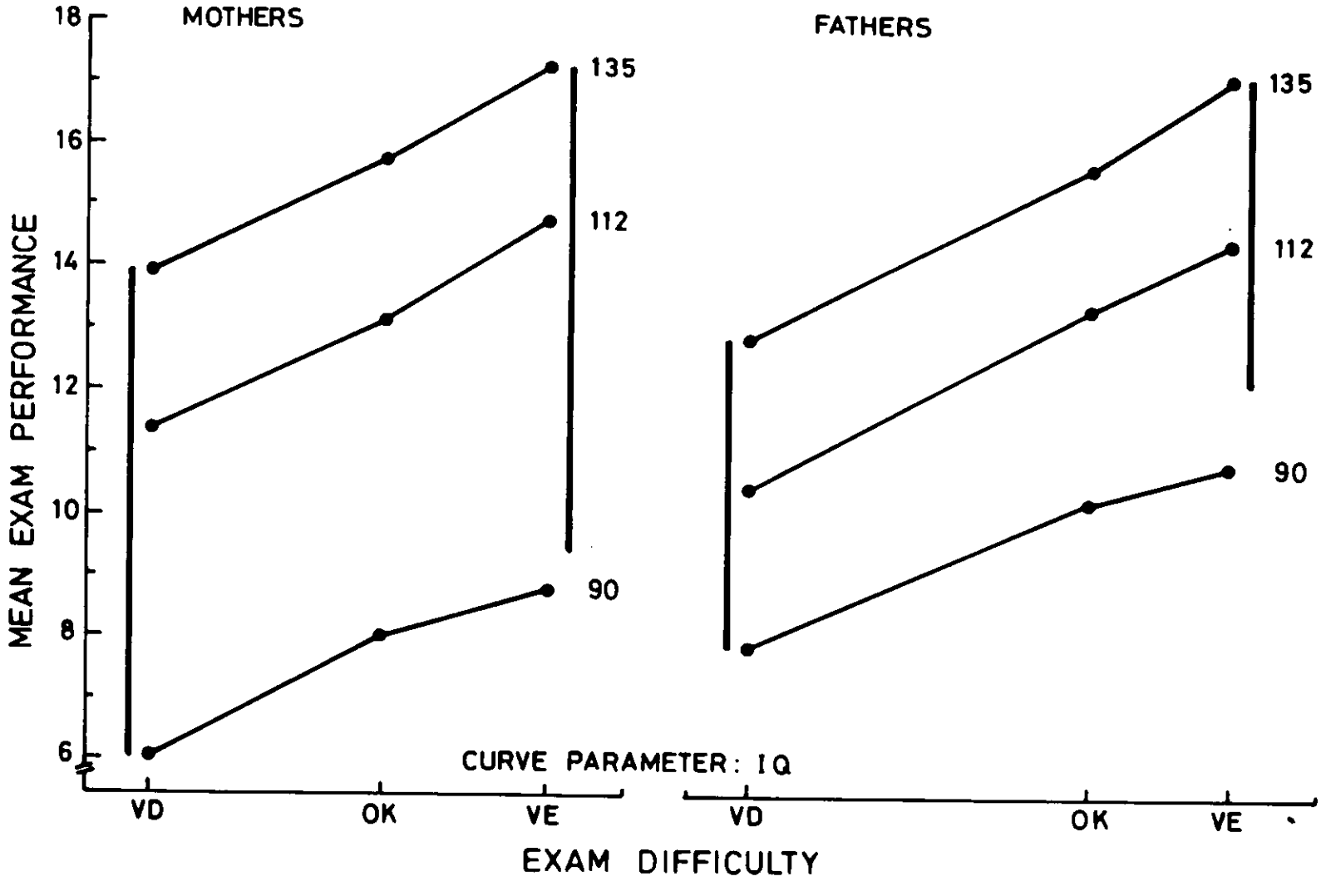
Figure 3. Mean exam performance as a function of motivation of sons and difficulty of exam. Predictions by young mothers, young fathers, old mothers, and old fathers are shown from left to right in order. The abbreviations VD, OK, and VE refer to very difficult, OK, and very easy exam, respectively.

Figure 4. Mean exam performance as a function of IQ of sons and difficulty of exam. Predictions by mothers and by fathers are displayed on the left and right sides, respectively.


MOTHERS
FATHERS
MEAN EXAM PERFORMANCE
21
19
17
15
13
11
9
7
5
HI
AV
LO
HI
AV
LO
CURVE PARAMETER : MOTIVATION
90
112
135
IQ
90
112
135
IQ


EXAM DIFFICULTY
VERY DIFFICULT
OK
VERY EASY
EXAM DIFFICULTY
VERY DIFFICULY
OK
VERY EASY
MEAN EXAM PERFORMANCE
21
19
17
15
13
11
9
7
5
3
HI
AV
LO
PREDICTIONS BY MOTHERS
PREDICTIONS BY FATHERS
CURVE PARAMETER: MOTIVATION
90
112
135
IQ


YOUNG MOTHERS
YOUNG FATHERS
OLD MOTHERS
OLD FATHERS
MEAN EXAM PERFORMANCE
18
17
16
15
14
13
12
11
10
9
8
HI
AV
LO
VD
OK
VE
CURVE PARAMETER: MOTIVATION
EXAM DIFFICULTY


MOTHERS
FATHERS
18
16
14
12
10
8
6
MEAN EXAM PERFORMANCE
135
112
90
135
112
90
CURVE PARAMETER: IQ
VD
OK
VE
VD
OK
VE
EXAM DIFFICULTY