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DECISION MAKING: NEED FOR ACHIEVEMENT AND PROBABILITY PREFERENCE UNDER CHANCE AND SKILL ORIENTATION

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Among others, EDWARDS (1953; 1954), COOMBS and PRUITT (1960), VAN DER MEER (1963), have established that in a gambling situation there is a consistent preference for either low probability of large gains, or intermediate probability, or high probability of small gains. This is termed 'probability preference'. Probability preference is indicative of someone's utility for risk. Those who prefer low probabilities to gain great sums are considered the gamblers or speculators; those who prefer intermediate probabilities the calculated risk-takers; those who prefer high probabilities for small gains the cautious.

ATKINSON (1957) stimulated much research on the relation between need for achievement and probability preference, especially in situations in which subjects believed they could influence the results by their own efforts. Atkinson's model for predicting risk-taking behavior comprises six variables: the subjective probability of success (P_s), the subjective probability of failure (P_f), the incentive value of success (I_s), the incentive value of failure (I_f), the need for achievement (M_s), and the motive to avoid failure (M_f). The variables are combined multiplicatively in the following equation: resulting motivation=

$$= M_s \times P_s \times I_s + M_f \times P_f \times I_f.$$

This function has a maximum when $P_s = 0.5$ if $M_s > M_f$ and a minimum when $P_s = 0.5$ if $M_f > M_s$.

The motivation is assumed to be strongest when uncertainty regarding the outcome is greatest, that is if $P = 0.5$. Those for whom $M_s > M_f$ will prefer tasks of intermediate difficulty, with a moderate risk of failure. The need for achievement is lowest in very high or very low probabilities. Those for whom $M_f > M_s$ will set either a very high or a very low level of aspiration and thus minimize their fear of failure. Preference for low and preference for high probabilities are

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fentotypically dissimilar reactions, however, genotypically similar: they both function to avoid failure, one by choosing a low level of aspiration, whereby failure is practically ruled out, and the other by choosing a very high level of aspiration at which almost everybody will fail.

ATKINSON (1957; 1958), in agreement with his theoretical model, found that *S*s with a high need for achievement score (n Ach), measured according to the TAT procedure of MCCLELLAND et al. (1953), preferred intermediate probabilities and *S*s with a low n Ach score preferred extreme probabilities. This is not only supposed to hold for tasks in which the *S*s think they can influence the results by their own skill, but also in gambling situations where *S*s have to choose between bets with differing probabilities to gain. The bets Atkinson used had a positive expected value. The variance of the bets was not controlled.

These results were largely confirmed, by CLARK, TEEVAN and RICCIUTI (1956), MCCLELLAND (1958), ATKINSON (1958), ATKINSON, BASTIAN, EARL and LITWIN (1960), MAHONE (1960), in a variety of situations in which the *S*s were motivated to achieve.

ATKINSON and LITWIN (1960) found that *S*s with a high n Ach score and a low score on Test Anxiety, measured according to a procedure of MANDLER and SARASON (1952), showed a preference for intermediate probabilities or had an intermediate level of aspiration. *S*s low on n Ach and high on TA preferred extreme probabilities. *S*s for whom the two conflicting tendencies were both high or both low, preferred moderately low or moderately high probabilities. Contrary to what ATKINSON assumed in 1957 there was no correlation between n Ach and TA. These results are in complete agreement with Atkinson's symmetric model (ATKINSON, 1964).

In situations where the outcome depends entirely on chance the results of various experimenters are less consistent. ATKINSON et al. (1960), using the same bets as ATKINSON in 1957, found that *S*s with high n Ach scores in comparison with *S*s with low n Ach scores had a significantly greater preference for intermediate versus extreme gain probabilities. However, this difference between groups with high and low n Ach scores was merely the result of the avoidance of intermediate probabilities by the group with low n Ach scores. *S*s with high n Ach scores preferred the intermediate probabilities no more than could be predicted by chance.

LITTIG (1963), in a study in which the variances of the bets were kept constant, obtained similar results as ATKINSON et al. (1960).

SCODEL, RATOOSH and MINAS (1959) found that *S*s with a preference for intermediate probabilities had the highest n Ach scores. MEYER, WALKER and LITWIN (1961) found no relation between need for achievement and probability preference.

LITTIG (1962) studied probability preference under skill and chance orientation. He predicted that under skill orientation lower probabilities would be preferred than under chance orientation. He found a non-significant difference in the predicted direction.

Atkinson's model is a logical, not a psychological one. It predicts that *S*s with a high need for achievement will prefer an intermediate level of aspiration which is equal to a subjective probability of success of 0.5. With a probability of 0.5 one will try hardest because the uncertainty about the outcome is the greatest. According to Information Theory this is correct, but is it psychologically correct? Or do people with a high need for achievement choose an intermediate level of aspiration because they reject a low level of aspiration as too easy and consider an extremely high level of aspiration an unrealistic, inachievable task?

The model also predicts that *S*s with a low need for achievement and a relative high fear of failure prefer extreme probabilities or extreme levels of aspiration. Preference for low and preference for high probabilities are considered to be genotypically similar, both being directed towards the avoidance of failure. This is what we are dubious about.* HECKHAUSEN (1963) obtained results by means of a TAT procedure he developed himself, which measured both need for achievement and motivation to avoid failure, which deviate somewhat from the results of Atkinson and other American investigators. Heckhausen found that intermediate levels of aspiration, but more especially, medium high levels of aspiration which are realistic, are chosen by individuals with a predominant need for achievement and a high total motivation (the sum of need for achievement and motive to avoid failure). Medium low levels of aspiration which are fairly certain to be achieved are preferred by *S*s who are largely motivated by the need to avoid failure and who have a low total motivation. Extremely low levels of aspiration are chosen by *S*s with an extremely low total motivation and who have, moreover, a markedly low motive to avoid

* The study reported here was carried out in 1961/'62 by us to test this point. A study of motivation to avoid failure was, on account of the object of our study 'risk-taking behavior', not carried out. This is a posteriori regrettable.

failure. Extremely high levels of aspiration, beyond the limits of possibility, are chosen by *S*s who are predominately motivated to avoid failure, but who have a very high total motivation. Even so, this latter group tried, as Heckhausen's further research showed, to resolve the conflict by a great deal of effort in solving the problem. Thus these results show that *S*s with a preference for low and *S*s with a preference for high levels of aspiration are not genotypically equivalent.

We chose as a starting point for our study the utility for risk or probability preference under chance orientation. We shall study the relation between need for achievement and probability preference under skill orientation – in this case equivalent to level of aspiration – in three groups with a different probability preference or a different utility for risk:

The hypotheses to be tested are:

(1) People considered to be 'gamblers' or 'speculators' in chance situations will have in general a low need for achievement. People with a high need for achievement will, in situations which do not appeal to their need for achievement, i.e. in gambling situations, avoid extreme risks and prefer small or moderate ones.

(2) In a task where *S*s are through instruction skill-directed, people with a high need for achievement will reject extremely low levels of aspiration as too easy and extremely high ones as too unrealistic and will prefer intermediate ones which are realistic and give the satisfaction of effort.

(3) We do not expect any positive correlation between risk under chance and risk under skill orientation in individuals with a high need for achievement. A negative correlation will probably be found in the results under chance and skill orientation.

(4) There will be a positive correlation between risk under chance and risk under skill orientation for people with a low need for achievement.

(5) In general lower probabilities will be preferred under skill orientation than under chance orientation, except in the case of people who prefer extreme risks under chance orientation, for whom the opposite applies.

METHOD

Basis experiment

We began by determining the probability preferences of the *S*s, 66 first and second year psychology students. We determined whether, in a gambling situation, they preferred bets with low probabilities (0.1 and 0.2) of large gains, moderate probabilities (0.4 and 0.6), or high probabilities (0.8 and 0.9) of small gains. The bets are given in table 1. Within each level of variance the bets were exhaustively paired and presented in random sequence.

Instruction. In this experiment you must try to win as much as possible. This means that you have to choose each time between two alternative games. For instance you have to choose between:

a. A chance of 0.1 of winning 10.– G and a chance of 0.9 of losing 0.50 G.

b. A chance of 0.5 of winning 2.– G and a chance of 0.5 of losing 0.50 G.

If you choose *a* we play as follows. We take 10 playing cards: 1 red and 9 black. These cards are shuffled thoroughly and then one card will be drawn. If it is red you win 10.– G, if it is black you lose 0.50 G. If you choose *b* then there are 5 red and 5 black cards. After shuffling the cards thoroughly we draw one card. If it is red you have won 2.– G, if it is black you have lost 2.– G.

Put a circle round the alternative you prefer. Now you must choose a number of times between 2 games and indicate which of the two you want to play. You must try to win as much as possible or to lose as little as possible. This depends on two factors: your luck and the wisdom of your choice.

At the end of the experiment 10 of the games chosen by you will be played. The extent of your gain or loss will be determined on the basis of these 10 games. In every group of 20 students there are two prizes, one of 10.– G and one of 7.50 G for those from the group with the highest gains or, if no-one has won anything, with the smallest loss.

Experiment I

Procedure. This experiment was given in the same session as the basis experiment. This time the *S*s had to choose each time from three games. The bets are given in table 2.

This series was given in order to have comparable material for determining the probability preference in a situation in which the *S*s were under the impression that the result was influenced by their own skill (experiment II).

The games that had been chosen were played at the end of the session. There where two prizes, 10.— G and 5.— G, for the winners in each group of 20 *S*s.

TABLE 1

Bets for determining the probability preference; expected value = 0.

Gain		Loss		Variance
prob.	amount (G)	prob.	amount (G)	
0.1	1.50	0.9	0.17	0.25
0.2	1.00	0.8	0.25	
0.4	0.61	0.6	0.41	
0.6	0.41	0.4	0.61	
0.8	0.25	0.2	1.00	
0.9	0.17	0.1	1.50	
0.1	3.00	0.9	0.33	1
0.2	2.00	0.8	0.50	
0.4	1.23	0.6	0.82	
0.6	0.82	0.4	1.23	
0.8	0.50	0.2	2.00	
0.9	0.33	0.1	3.00	
0.1	6.00	0.9	0.67	4
0.2	4.00	0.8	1.00	
0.4	2.45	0.6	1.63	
0.6	1.63	0.4	2.45	
0.8	1.00	0.2	4.00	
0.9	0.67	0.1	6.00	
0.1	12.00	0.9	1.33	16
0.2	8.00	0.8	2.00	
0.4	4.90	0.6	3.26	
0.6	3.26	0.4	4.90	
0.8	2.00	0.2	8.00	
0.9	1.33	0.1	12.00	
0.1	24.00	0.9	2.67	64
0.2	16.00	0.8	4.00	
0.4	9.80	0.6	6.53	
0.6	6.53	0.4	9.80	
0.8	4.00	0.2	16.00	
0.9	2.67	0.1	24.00	

Subjects. The analysis of the results concerns 60 *S*s: 30 who preferred bets with high probability to gain (*group H*), 20 who preferred moderate probability bets (*group M*) and 10 who preferred bets with low probability to gain (*group L*).

TABLE 2

Bets in experiment I

		Expected value	Variance
I	a. Prob. 0.2 of winning 6 points	1.2	5.76
	b. Prob. 0.6 of winning 3 points	1.8	2.16
	c. Prob. 0.9 of winning 1 point	0.9	0.09
II	a. Prob. 0.1 of winning 8 points	0.8	5.76
	b. Prob. 0.4 of winning 4 points	1.6	3.84
	c. Prob. 0.8 of winning 2 points	1.6	0.64
III	a. Prob. 0.2 of winning 12 points	2.4	23.04
	b. Prob. 0.6 of winning 4 points	2.4	3.84
	c. Prob. 0.9 of winning 2 points	1.8	0.36
IV	a. Prob. 0.1 of winning 24 points	2.4	51.84
	b. Prob. 0.4 of winning 6 points	2.4	8.64
	c. Prob. 0.8 of winning 3 points	2.4	1.44
V	a. Prob. 0.2 of winning 26 points and prob. 0.8 of losing 4 points	2.0	144
	b. Prob. 0.6 of winning 12 points and prob. 0.4 of losing 13 points	2.0	150
	c. Prob. 0.9 of winning 6 points and prob. 0.1 of losing 34 points	2.0	144
VI	a. Prob. 0.1 of winning 38 points and prob. 0.9 of losing 2 points	2.0	144
	b. Prob. 0.4 of winning 17 points and prob. 0.6 of losing 8 points	2.0	150
	c. Prob. 0.8 of winning 8 points and prob. 0.2 of losing 22 points	2.0	144

These groups were formed according to the results of the basis experiment. When a *S* chose one of the three probability levels more often than one of the other two, he was placed in the corresponding group. The groups are thus not clearly discrete: *S*s were included who had no particular preference for a specific probability but merely a predominance of one or two choices.

Experiment II

This experiment consisted of a word-maze test, in which *S*s could choose from 3 possibilities how much quicker they thought they could

solve each word-maze than their average time in a test series. If the *S* reached the criterion he had set, he received the gain points given with the criterion he had chosen. If he failed he got nothing in the first four word-maze tests, in the last two he got penalty points. The points were in accordance with those from experiment I (table 2).

After the experiment, which was given individually with the timing adapted to the achievements in the trial period, the *S* was told how many points he had scored. There were two prizes of 10,— G and 5.— G for the winners in each group of 20 *S*s.

This experiment was carried out about a month after experiment I by an other experimenter, so that no connection between the experiments would be made.

Instruction. 'This is a word-maze test. What you have to do is to make a sentence from these words. Every word-maze consists of 5 columns of 12 words. You have to begin by connecting a word from the first line with another word to form a sentence ending with a word from the last line. You have to connect the words by drawing lines with a pencil. A sentence can only be formed by connecting a word from a certain line diagonally with a word on a higher or lower line in one of the neighboring columns. That is to say you may not go horizontally (stay on the same line) and not vertically (stay in the same column), and you may not skip a column or a line.

Now you have to make a sentence without any mistakes as quickly as possible. You begin with a word in the first line and connect the words with a pencil line. The sentence will always end with a word from the last line

Is this clear? This is the first maze than. To make it easier for you I'll give you the first word of the sentence. It is . . .'

The first three word-mazes were for practice. They were timed. A scheme was drawn up for each *S* on the basis of the time he needed for the solution. This scheme was in reasonable proportion to his achievement.

The instruction continued: 'Those three mazes were for practice. The real test is going to begin now and you have to try to work as quickly as possible without mistakes. Try to do it more quickly this time. Our research has shown that students who had the same average time as you for the first three mazes solve the following maze more quickly:

9 out of 10 students solve it while working . . sec quicker;

6 out of 10 students work . . sec quicker;

2 out of 10 students work . . sec quicker. (The scheme with the three choice possibilities was shown.) How much more quickly do you think you can do it? You can choose between these three possibilities. If you work within the limit which you set, you will get the number of points allotted to the choice you made. If you don't work as quickly as you thought you could, then you don't get any points. (At the fifth and sixth maze they were told that they would be given penalty points if they did not reach the criterion.)

There are two prizes, one of 10.— G and one of 5.— G for the two *S*s who get the highest number of points. You have to solve 6 mazes. After the test I will tell you how many points you have scored."

Subjects. The same people participated in this experiment as in experiment I.

Need for achievement. Need for achievement scores were obtained for the *S*s who participated in experiment I and II according to the TAT procedure described by McCLELLAND et al. (1953).

RESULTS

Table 3 gives the mean gain probabilities for the bets chosen in experiment I (chance orientation) and experiment II (skill orientation) for the three probability preference groups.

TABLE 3

Mean probabilities for the bets chosen in the chance situation (experiment I) and the skill situation (experiment II) for the three probability groups.

Group	*N*	I		II		III		IV		V		VI	
		ch.	sk.	ch.	sk.	ch.	sk.	ch.	sk.	ch.	sk.	ch.	sk.
H	30	.63	.68	.66	.50	.61	.57	.64	.42	.59	.45	.52	.32
M	20	.60	.55	.50	.43	.42	.36	.43	.27	.48	.40	.28	.25
L	10	.60	.55	.38	.43	.20	.48	.22	.39	.28	.36	.19	.32

Influence of the expected value

In the items I, II and III the expected values of the 3 bets from which a choice had to be made were not all alike. In item I bet *b*

has the highest expected value. This is chosen by all *S*s in groups M and L in experiment I (chance orientation) and by 90 % of the *S*s from group H. Thus, of the 60 *S*s there are only three from group H who did not chose *b* but *c*.

For *group H* bet III *c* is also disadvantageous. 8 *S*s preferred the bet with the highest probability and the lowest expected value. If we compare items I and III on the one hand, with items II and IV on the other, then the bet with the highest probability in I and III is preferred by 3 and 8 *S*s respectively, while in II and IV by 20 *S*s.

In *group M* the intermediate probability in item I is chosen by all 20 *S*s; in item III by 11 *S*s, while 9 *S*s preferred the lowest probability. The highest probability with the lowest expected value is not chosen. There are no essential differences between the items II and IV; 2 and 3 *S*s respectively chose option *a*.

Comparing the preferences in *group L* we see that in item I the intermediate probability with the highest expected value is chosen in all cases, but in item III there is a 100 % choice for the lowest probability in spite of the fact that the expected value for the intermediate probability is equal to that of the lowest probability. In II *a* has the lowest expected value and is chosen by 20 % of the *S*s. In IV the expected values of the options are the same and *a* (the lowest gain probability) is chosen by 60 % of the *S*s.

The bets with the highest expected value are clearly preferred.

In experiment II, in which the *S*s are skill-directed, no influence of the expected value is determinable, except perhaps in the first word-maze in which the highest level of aspiration is chosen somewhat less than in the others. This is more likely to be a result of caution in a new situation than of the expected value.

Influence of the variance

The influence of the size of the variances of the bets on the choices of the *S*s in I, II, III and IV is difficult te determine exactly. Although *S*s are influenced in their choice by differences in variance (COOMBS and PRUITT, 1960; VAN DER MEER, 1963), the influence of the variance is, according to EDWARDS (1954) negligibly small, if the probabilities or the expected values are not kept constant. In V and VI the variances were roughly equivalent. If IV and VI are compared, where the probabilities of the bets are equal, then there are 11 *S*s in *group H* who, under chance orientation, prefer in VI a lower probability than

in IV as opposed to 2 *S*s for whom the opposite is the case. The difference is significant ($p = 0.022$). Under skill orientation there are 9 *S*s as opposed to 1 *S* who prefer a lower probability in VI than in IV. The difference is significant ($p = 0.021$).

In *group M* there are 9 *S*s who, under chance orientation, choose a lower probability in VI than in IV. The opposite does not occur. Just as in group H there is a significant shift to lower probabilities ($p = 0.004$). However this does not apply to skill orientation.

In *group L* there is almost no difference between IV and VI either in the chance or the skill orientation.

Difference in probability preference in chance and skill orientation

Table 4 gives the mean number of points for chance and skill orientation for the three groups, calculated according to the number of points *S* would have obtained, if he had always won or had satisfied the chosen level of aspiration.

TABLE 4

Mean number of points under chance and skill orientation for the three groups.

Group	*N*	Chance	Skill	*p*
H	30	46.07	64.10	0.001
M	20	65.55	76.85	0.028
L	10	85.80	69.90	< 0.025

The differences between the three groups under chance orientation tested with the Jonckheere trend-test are highly significant ($p < 0.0001$). Under skill orientation only the difference between group H and group M is significant ($p = 0.0018$), tested by the Mann-Whitney U-test.

Table 5 shows the percentages of the chosen probabilities for the three groups of probability preference in the basis experiment under chance and skill orientation.

Table 5 shows that under the chance orientation the probabilities mostly preferred are at the level of the basis experiment. Under skill orientation the level of probability preference has shifted. In group H the intermediate probabilities are now preferred most, in group M the low probabilities and in group L the intermediate probabilities.

TABLE 5

Percentages of the chosen low, medium and high gain probabilities for the three groups under chance and skill orientation.

Chosen prob.	Group H		Group M		Group L	
	Chance	Skill	Chance	Skill	Chance	Skill
low	.125	.300	.300	.480	.775	.400
medium	.375	.520	.600	.450	.225	.525
high	.500	.180	.100	.070	.000	.075

The differences within the three groups between the preferred probabilities under chance and skill orientation were tested. Because differences in expected value of the bets influenced the choice and interfered with the probability preferences the differences for group H were determined for II, IV, V and VI, for group M for II, III, IV, V and VI and for group L for III, IV, V and VI.

The number of times that under chance orientation compared with skill orientation *S*s chose a lower or a higher level of probability was tested by the Mann-Whitney *U*-test. In *group H* the *S*s chose under skill orientation significantly more a lower probability level than a higher probability level ($p = 0.001$). In *group M* the difference was also significant in the predicted direction ($p = 0.028$). In *group L* under skill orientation compared with chance orientation a higher probability level was chosen significantly more than a lower probability level ($p < 0.025$).

Thus all the differences are in the predicted direction: under skill orientation the level of the preferred probabilities for groups H and M are lower than under chance orientation; for group L the difference is reversed: under chance orientation lower probabilities are preferred than under skill orientation.

Need for achievement

The mean scores for need for achievement, obtained by the TAT procedure of McCLELLAND et al. (1953), of the three probability preference groups from the basis experiment, groups L, M and H, were respectively 0.2, 5.3 and 4.2. The differences between group L and groups M and H, tested by the Mann-Whitney test, are significant ($p < 0.001$). The difference between groups M and H is not significant.

If the 60 *S*s are arranged according to their n Ach scores and are divided into about three equally sized groups, then there are 22 *S*s with n Ach scores < 2 (low need for achievement), 21 *S*s with n Ach scores from 2 up to and including 5 (moderate need for achievement) and 17 *S*s with n Ach scores > 5 (high need for achievement). The distribution of these *S*s over the three probability preference groups is given in table 6.

TABLE 6

Distribution of *S*s according to *n* Ach scores over the three probability preference groups.

	n Achievement			
	< 2	2–5	> 5	*N*
Group L	8	2	0	10
Group M	5	8	7	20
Group H	9	11	10	30

There is a significant relation ($\chi^2 = 10.464$; $p < 0.05$) between probability preference and need for achievement. This must be attributed especially to the low need for achievement of group L. The opposite is also the case: *S*s with a low need for achievement prefer predominantly low probabilities. The results do not show that *S*s with a high need for achievement prefer intermediate probabilities. They avoid low probabilities, but they are about equally distributed in their preference for intermediate and high probabilities.

When the *S*s in *experiment I* are divided into three equally sized groups according to the number of points they would have gained had they always won, and these groups are distributed over the three levels of need for achievement, then we get a distribution as in table 7. A low number of points indicates preference for high probabilities, a high number of points a preference for low probabilities. In this classification in which the probability preference groups are about the same size, the boundaries between the groups have shifted. A part of group H is now classified in the group with a preference for the intermediate probabilities, a part of group M in the group with a preference for the low probabilities.

In this classification $\chi^2 = 8.24$ and is thus not significant. Table 7 shows a tendency for the risk preferred to be greater as the need for

TABLE 7

Distribution of the *S*s according to n Ach in experiment I.

Number of points in experiment I	Group L				Group M				Group H				Total			
	n Ach				n Ach				n Ach				n Ach			
	<2	2–5	>5	T	<2	2–5	>5	T	<2	2–5	>5	T	<2	2–5	>5	T
<40 . . .	0	0	0	0	0	0	0	0	7	5	8	20	7	5	8	20
41–68 . . .	1	0	0	1	4	6	4	14	0	6	0	6	5	12	4	21
>70 . . .	7	2	0	9	1	2	3	6	2	0	2	4	10	4	5	19
Total	8	2	0	10	5	8	7	20	9	11	10	30	22	21	17	60

achievement is lower. There is a significant negative rank-correlation $r = -.20$ ($z = 2.34$; $p < 0.01$) between need for achievement and risk. Of the 10 *S*s with a preference for extremely high probabilities with a mean value of 0.76 and higher, 7 *S*s belong to the group with a high need for achievement. Thus extremely high risks are avoided by *S*s with high need for achievement. They prefer intermediate and also to some extent extremely high probabilities.

In *experiment II* the *S*s are divided into groups of the same size according to the level of aspiration (probability preference under skill orientation). Table 8 gives a survey of the results. A low number of points indicates a low level of aspiration, a high number of points a high level of aspiration.

TABLE 8

Distribution of *S*s according to n Ach and level of aspiration (experiment II)

Number of points in experiment II	Group L				Group M				Group H				Total			
	n Ach				n Ach				n Ach				n Ach			
	<2	2–5	>5	T	<2	2–5	>5	T	<2	2–5	>5	T	<2	2–5	>5	T
<46 . . .	2	1	0	3	1	1	2	4	4	8	1	13	7	10	3	20
46–80 . . .	3	1	0	4	0	1	5	6	1	2	7	10	4	4	12	20
>80 . . .	3	0	0	3	4	6	0	10	4	1	2	7	11	7	2	20
Total	8	2	0	10	5	8	7	20	9	11	10	30	22	21	17	60

There is a significant relation ($\chi^2 = 16.24$; $p < 0.01$) between need for achievement and level of aspiration. *S*s with a high need for achievement prefer intermediate probabilities, thus choose a moderately high level of aspiration. *S*s with a moderate need for achievement prefer high probabilities, thus choose a low level of aspiration. *S*s with a low need for achievement prefer low probabilities and choose a high level of aspiration.

Within the groups with probability preferences as composed from the basis experiment, rank correlations between need for achievement and level of aspiration were calculated. A significant negative correlation was found for group L: $\tau = -.59$ ($N = 10$; $p < 0.025$). Group M too had a significant negative correlation: $\tau = -.37$ ($N = 20$; $p < 0.025$). No significant correlation was found in group H ($\tau = -.13$).

Within groups L and M the higher the need for achievement the lower the level of aspiration. When the *S*s of group M are divided into three groups of approximately equal size with low, moderate and high need for achievement, the differences in level of aspiration between the groups are significant at the level of 0.001, when tested with the Jonckheere trend test: the higher the need for achievement the lower the level of aspiration.

Within group H the relation between need for achievement and level of aspiration is not a linear one. *S*s with a low need for achievement prefer a high level of aspiration, *S*s with an intermediate need for achievement prefer a low level of aspiration and *S*s with a high need for achievement prefer a moderate level of aspiration. The differences between these groups tested with the Kruskal-Wallis test are not significant ($p < 0.10$).

The correlation for risk under chance and skill orientation for the three levels of need for achievement are for the group with a low need for achievement $\tau = +.34$ ($p < 0.025$), for the group with a moderate need for achievement $\tau = +.29$ ($p < 0.05$) and for the group with a high need for achievement $\tau = -.56$ ($p < 0.005$).

Thus in low and moderate need for achievement there is a significant positive correlation between risk or probability preference under chance and skill orientation. This result confirms our expectation. The negative correlation between risk under chance and skill orientation in the group with a high need for achievement also agrees with our expectation.

Discussion

Under chance orientation where the outcome depends entirely on chance, *S*s prefer the bets with the highest expected value whatever their probability preference may be. If the outcome for the *S* is dependent on his skill, differences in expected value play no part whatsoever.

It is difficult to decide accurately to what extent differences in variance influenced the *S*s's choices. According to Edwards (1954) the influence of difference in variance is negligible, when the probabilities or the expected values of the bets are not equal. The only way to discover anything about the influence of the variance is a comparison of the choices in IV and VI (cf. table 2). The *S*s from groups H and M choose in VI significantly more lower probabilities than in IV. Now there is a tendency for *S*s with a preference for high probabilities to prefer smaller variances, while *S*s with a preference for intermediate probabilities also prefer moderate variances (Van der Meer, 1963). If this tendency also operated under the conditions of experiment I, it would result in a stronger preference for high probabilities for group H and for intermediate probabilities for group M in IV but not in VI. However, this explanation is not correct, as there is no relation at all between the choice of lower probabilities in VI than in IV and the variance preference of the *S*s. The latter was determined along with the *S*s's probability preference in the basis experiment, but will not be discussed here.

Neither were there any differences in need for achievement between the *S*s who preferred lower probabilities in VI than in IV and those for whom this was not the case.

Another possible explanation is that *S*s in VI were scared off by the possibility of a big loss and therefore chose a lower probability of gain. Under skill orientation in group H there is the same tendency, but not in group M. This could indicate a tendency to avoid risk or failure. But this explanation is not entirely satisfactory, as the bets in the basis experiment were of the same type as in VI. Perhaps the effect worked here and not in the basis experiment, because of a contrast effect with the first four items in which nothing could be lost.

Littig (1962) predicted that under skill orientation lower probabilities would be preferred than under chance orientation. He found a non-significant difference in the predicted direction. Our findings

show that is it not true to state this in general. We found in confirmation of our hypothesis that under skill orientation *S*s with a preference for high and intermediate probabilities choose significantly more lower probabilities than under chance orientation, while *S*s with a preference for low probabilities preferred under skill orientation significantly more higher probabilities.

The actual starting point of our study was a critical stand agains Atkinson's model. According to this model *S*s with low need for achievement will choose an extreme level of aspiration – high or low –; these fenotypically so dissimilar reactions are then genotypically equivalent. We predicted *S*s with a low need for achievement to show preference under chance orientation for high risks and *S*s with a high need for achievement to avoid large risks. We also expected that for *S*s with a low need for achievement there would be a positive correlation between risk under chance orientation and level of aspiration.

Our findings are as follows:

Relation between utility for risk and need for achievement

A significant negative rank correlation was found for the total group between utility for risk (probability preference under chance orientation) and need for achievement. *S*s with a preference for low probabilities (high risk) had a low need for achievement. *S*s with a low need for achievement predominantly preferred low probabilities. Ss with a high need for achievement avoided high risks and preferred high or intermediate probabilities. Of the latter group of 17 *S*s there were 7 *S*s with an average probability preference > 0.76, that is within the scope of this study with a preference for extremely high probabilities (table 6).

Relation between level of aspiration and need for achievement

Between level of aspiration and need for achievement there is a significant non-linear relation. *S*s with a low need for achievement prefer a high level of aspiration. Of the 10 *S*s with a preference for an extremely high level of aspiration, equal to a mean probability < 0.20, 8 *S*s are in this group. *S*s with a moderate need for achievement prefer a low level of aspiration. Of the 8 *S*s with preference for an extremely low level of aspiration equal to a mean probability > 0.76, 6 fall into the group with a moderate level of aspiration. *S*s with a high need for achievement prefer a moderate level of aspiration.

For the three risk-groups from the basis experiment separate rank

correlations were calculated between level of aspiration and need for achievement. Significant negative correlations were found for groups L and M. There was no significant correlation for group H. Thus for the *S*s who under chance orientation prefer some risk, one can say that the lower their need for achievement the higher their level of aspiration.

Relation between utility for risk and level of aspiration

The above already indicates a relation between utility for risk and the level of aspiration preferred. For the groups with a low and a moderate need for achievement significant positive rank correlations were found, for the group with a high need for achievement there was a significant negative rank correlation.

Our findings are clearly in conflict with Atkinson's model. They also conflict with the findings of Atkinson and his associates. But the latter is probably not really so. If we disregard the division into risk-groups and consider the total group a homogenous one, and if we had, in addition, distributed the *S*s according to their need for achievement into two instead of three groups, then our results would have agreed with those of Atkinson. A more thorough differentiation than the one we applied might possibly lead to more interesting aspects. However our number of *S*s was too small for this.

Without investigation into the motivation to avoid failure it is not possible to say, whether our results agree with those of Heckhausen. For the time being we can only say they do not contradict them.

SUMMARY

A critical stand was taken to Atkinson's model. A study was set-up as to the relation between need for achievement, probability preference under chance orientation (utility for risk) and probability preference under skill orientation (level of aspiration). The following relations were found.

(1) A significant negative rank correlation exists between need for achievement and utility for risk.

*S*s with preference for low probabilities have a low need for achievement. *S*s with a low need for achievement prefer predominantly low probabilities. *S*s with a high need for achievement avoid low probabilities.

(2) A significant non-linear relation exists between need for achievement and level of aspiration. *S*s with low need for achievement prefer a high, in some cases an extremely high level of aspiration; *S*s with a moderate need for achievement prefer a low, in some cases an extremely low level of aspiration; *S*s with a high need for achievement prefer a moderate level of aspiration.

A significant negative rank correlation was found between need for achievement and level of aspiration in the groups which have under chance orientation a preference for low and intermediate probabilities. For the group preferring high probabilities there was no significant correlation.

(3) For the groups with low and moderate need for achievement there was a significant positive correlation, for the group with high need for achievement a significant negative correlation between utility for risk and level of aspiration. Furthermore the study yielded the following results.

(1) *S*s who under chance orientation prefer high and intermediate probabilities preferred under skill orientation significantly more lower probabilities; *S*s who under chance orientation prefer low probabilities prefer under skill orientation significantly more higher probabilities.

(2) Under chance orientation bets with the highest expected value are preferred independent of the probability preference. Under skill orientation differences in expected value play no part.

References

ATKINSON, J. W., 1957. Motivational determinants of risk-taking behavior, Psychol. Rev. **64**, 359–372.

———, (Ed.), 1958. Motives in fantasy, action, and society. Princeton.

———, 1958. Towards experimental analysis of human motivation in terms of motives, expectancies, and incentives. In: J. W. Atkinson (Ed.): Motives in fantasy, action, and society. Princeton.

———, 1964. An introduction to motivation. Princeton, 1964.

———, J. R. BASTIAN, R. W. EARL and G. H. LITWIN, 1960. The achievement motive, goal-setting and probability preferences. J. abnorm. soc. Psychol. **60**, 27–36.

——— and G. H. LITWIN, 1960. Achievement motive and test anxiety conceived as motive to approach success and motive to avoid failure. J. abnorm. soc. Psychol. **60**, 52–63.

CLARK, R. A., R. TEEVAN and H. RICCIUTI, 1956. Hope of success and fear of failure as aspects of need for achievement. J. abnorm. soc. Psychol. **53**, 182–186.

COOMBS, C. H. and D. G. PRUITT, 1960. Components of risk in decision-making: Probability and variance preferences. J. exp. Psychol. **60**, 265–277.

EDWARDS, W., 1953. Probability-preferences in gambling. Amer. J. Psychol. **66**, 349–364.

———, 1954. Probability-preferences among bets with differing expected values. Amer. J. Psychol. **67**, 56–67.

———, 1954. The reliability of probability preferences. Amer. J. Psychol. **67**, 441–452.

———, 1954. Variance preferences in gambling. Amer. J. Psychol. **67**, 68–95.

HANCOCK, J. G. and R. C. TEEVAN, 1964. Fear of failure and risk-taking behavior. J. Pers. **32**, 200–209.

HECKHAUSEN, H., 1963. Hoffnung und Furcht in der Leistungsmotivation. Meisenheim am Glan.

LITTIG, L. W., 1962. Effects of skill and chance orientations on probability preferences. Psychol. Rep. **10**, 67–70.

———, 1963. Effects of motivation on probability preferences. J. Pers. **31**, 417–427.

MAHONE, C. H., 1960. Fear of failure and unrealistic vocational aspiration. J. abnorm. soc. Psychol. **60**, 253–261.

MANDLER, G. and S. B. SARASON, 1952. A study of anxiety and learning. J. abnorm. soc. Psychol. **47**, 166–173.

MCCLELLAND, D. C., 1958. Risk taking in children with high and low need for achievement. In J. W. Atkinson (ed.): Motives in fantasy, action, and society. Princeton.

———, J. W. ATKINSON, R. A. CLARK and E. L. LOWELL, 1953. The achievement motive. New York.

VAN DER MEER, H. C., 1963. Decision-making: The influence of probability preference, variance preference and expected value on strategy in gambling. Acta Psychol. **21**, 231–259.

MEYER, H. H., W. B. WALKER and G. H. LITWIN, 1961. Motive patterns and risk preferences associated with entrepreneurship. J. abnorm. soc. Psychol. **63**, 570–574.

PEIRCE, C. S., 1958. Values in a universe of chance. New York.

SCODEL, A., PH. RATOOSH and J. S. MINAS, 1959. Some personality correlates of decision making under conditions of risk. Behav. Sci. **4**, 19–28.