RISK TAKING IN LOTTERY TASKS AND IN NATURALISTIC SCENARIOS

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ABSTRACT

Three studies whose goal was to investigate similarities and differences in people's choices in well-defined lottery tasks and vaguely described naturalistic scenarios are presented. Study 1 showed that in naturalistic scenarios participants revealed little interest in obtaining information about outcomes and probabilities. Study 2 demonstrated that in naturalistic scenarios subjects were sensitive to the content domain, but not to basic risk parameters. In Study 3, where a standard lottery task together with a standard experimental procedure were used, it was found that subjects were sensitive to basic risk parameters, but not to the content domain. The findings are discussed from the perspective of decision theory and reason-based choice approach.

Keywords: risk taking, lottery, naturalistic decision making

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1. INTRODUCTION

Standard decision theory requires that before making a choice the decision maker should carefully analyze the information about the values of outcomes and probabilities. This way of thinking about risky decision making has captured the minds of economists and psychologists so strongly that both in theoretical and experimental studies they typically disregard the content of the decision problem and consider it on the level of the abstract risk parameters, outcomes and probabilities, which determine the lottery. Thus, a simple monetary gamble has become the standard model of a risky decision.

Recently, however, more and more authors have criticized this predominant paradigm of risky decision making (cf. Goldstein & Weber, 1995; Huber, 1997). There are two points to this criticism. One concerns the numerical structure of lottery tasks. It is emphasized that in naturalistic decision situations people have very little and rather vague information about probabilities and outcomes, therefore their choices must be based on arguments other than quantitative characteristics (Hogarth & Kunreuther, 1995; Huber, 1997). Shapira (1994) demonstrated in his research on managerial decision making that executives do not consider probability as an important dimension of risk. They also tend not to

calculate the riskiness of choice alternatives in terms of expected value. On the contrary, managers evaluate risk with respect to the possibility of controlling a risky situation.

Another criticism of the lottery paradigm maintains that it completely disregards content-specific information. The typical stimulus material used in most studies on risky decision making is a content-free monetary gamble (Goldstein & Weber, 1995).

The central question of this paper is how people take risk when confronted with vaguely described naturalistic scenarios such as one described below:

The VELVET company, a producer of soft drinks, employs a large and renowned advertising agency, SUPERMEDIA. So far the campaigns have been prepared perfectly, but with time they have become rather static and not very aggressive. Now VELVET has received an offer of a new contract with a new advertising agency, NOVA, whose proposal seems very attractive and would have a chance to hit the market. The greatest doubts are caused by the fact that the new agency has very little experience and the contract with VELVET would be one of their first contracts. The management of VELVET has to decide whether they should break the existing contract and start working with the new advertising agency. [The following estimations have been made: If NOVA really proves efficient, VELVET can make a profit of up to $500,000, if they turn out

not to be so good, VELVET may lose $100,000. The chance that NOVA will prove an efficient agency are estimated at 20%.]

The standard decision theory requires that before making a decision such as the one presented above we should find, if possible, the information put in brackets, i.e. the values of outcomes and probabilities. Thereby, the problem of the *VELVET* company could be reduced to the choice between two options: lottery: <$500,000, 0.5; $-100,000, 0.5> and status quo.

However, studies in which naturalistic scenarios instead of lottery tasks were used showed that people's judgments and choices can seriously differ in these two kinds of situations (see Lipshitz, Klein, Orasanu & Salas, 2000 and Zsambok & Klein, 1994 for a review).

For example, Hogarth and Kunreuther (1995) found that people made different decisions concerning purchasing warranties for consumer durables in two variants of a situation: when the information about probabilities and outcomes (costs of breakdowns) was either given or not given to them. Similarly, individuals differed in what kinds of arguments they were giving to justify choices made in these two situations. When there was no information about probabilities and outcomes subjects tended to focus on nonquantifiable reasons. Goldstein and Weber (1995) quote various content effects in research on risk judgments and choices.

The present research examined in more detail subjects' sensitivity to risk parameters in choice dilemmas. The first question addressed was what kind of information people search for when confronted with vaguely described naturalistic scenarios. The research focused, in particular, on the problem of whether people are interested in the values of basic risk parameters: outcomes and probabilities. This was the purpose of Study 1.

The goal of Study 2 was to test whether in naturalistic situations the information about the values of outcomes and probabilities has any effect on people's choices and their certainty. Finally, in Study 3 the authors examined under what specific conditions people become sensitive to risk parameters.

2. STUDY 1: ARE PEOPLE INTERESTED IN THE VALUES OF BASIC RISK PARAMETERS?

Study 1 focused on the problem of whether people are interested in the values of basic risk parameters (outcomes and probabilities) when making choices. In fact, the research intended to replicate Huber's (1997) study showing that people, when faced with a choice in a naturalistic risky scenario, neither require nor seek quantitative information about probabilities and outcomes. If this result occurred also in different scenarios, it would mean that in naturalistic risky situations people reach their decisions using other

arguments from probabilities and outcomes connected with the choice alternatives.

2. 1. Method

2.1.1. Participants

137 undergraduates in business administration at Wroclaw University of Technology participated in this study. Their average age was 22. They completed the tasks in groups of ca. 30 persons each during classes in behavioral decision making. The subjects were told that the goal of the research was to determine people’s behavior in risky managerial scenarios.

2.1.2. Experimental design

Fourteen risky managerial scenarios were constructed. similar to the VELVET company scenario described in the introduction. As can be seen in column one of Table 2, the scenarios addressed various managerial problems.

Two groups of participants (n = 68 in the first group; n = 69 in the second group) were presented with half of these scenarios (seven different scenarios in each group) and asked to make a choice between two alternatives in each scenario. Afterwards they rated their certainty of each choice. Finally, they were encouraged to ask questions about the scenarios, questions they considered important in order to be more certain of their choices.

2.2. Results

In this section, the results’ presentation will be limited to analysis of the questions posed by the participants in the

fourteen scenarios. The choices and their certainties will be described together with the results of Study 2. In order to examine the questions asked by the participants a coding system was constructed. A list of the main coding categories is presented in Table 1. For each category one question is given as an example.

Insert Table 1 about here

Two independent judges coded a sample of the protocols from ten randomly selected subjects and the inter-judge agreement was checked. It was reasonably high (75%). The same independent judges also coded the remaining part of the protocols and the disagreements were settled through discussion. The percentages of subjects asking different kinds of questions are shown in Table 2.

Insert Table 2 about here

As can be seen in Table 2, very few participants showed interest in the values of probabilities. This result confirms one of Huber's (1997) findings: when faced with a choice in a naturalistic risky scenario, people rarely require information on the probabilities of critical events. On the other hand, participants of this study were much more interested in the magnitudes of consequences. Moreover, most subjects asked

questions that concerned framing of the decision problem. They included detailed circumstances that could influence the decision, the possibility adding another (typically dominant) alternative that would reduce the decisional conflict, or even reframing consequences of the described scenarios.

When analyzing the data presented in Table 2 one can also notice that some scenarios elicited more questions from certain categories than others. Some of these peculiarities are obvious. For example, the tendency to reframe non-economic into economic consequences was observed in scenarios dealing with non-economic consequences (as in the case of the dilemmas describing an increased accident rate in the workplace or layoffs).

However, some less obvious effects were found as well. As shown in Table 2, questions concerning probabilities were, in some scenarios, much more frequent than in others. For example, a relatively high percentage of probability questions occurred in such scenarios as whether to pay a dividend to the stockholders, whether to continue an economically dubious business and whether to admit to misconduct (testing cosmetics on animals). On the other hand, questions about probabilities were completely absent in such scenarios as whether to reduce employment in the factory, whether to make a contract with a firm of a dubious reputation, or whether to introduce new (risky) technology. For some reason, the participants saw a point in asking about the probability that the stockholders

will decide to withdraw or that the continuation of a business will be successful, but saw no point in asking about the probabilities that workers will decide to go on strike, or that the information about the firm's bad reputation will be confirmed, etc.

3. STUDY 2: CHOICES UNDER IGNORANCE OF BASIC PARAMETERS OF RISK

The purpose of Study 2 was to test whether in naturalistic situations people are more sensitive to risk parameters or to the content domain. More exactly, the question addressed in this study was whether in naturalistic situations the information about the values of outcomes and probabilities has any effect on people's choices and their certainty.

This research was inspired by Shafir, Simonson and Tversky's (1993) reason-based choice approach. According to this approach, when making decisions, people try to come up with convincing reasons to choose one alternative over another. They seek and construct reasons that justify their choices to themselves and to others. From this perspective, in a pure lottery task, where only numerical descriptions of choice alternatives are available, those quantities serve as reasons to choose one alternative over another. On the other hand, when decision makers do not have quantitative information (as in a typical naturalistic scenario), their choice should be based on domain-specific reasons. The present research tried to explore which of the two kinds of reasons -

numerical descriptions or domain-specific aspects - will prevail when both kinds of information are available. For the sake of this comparison the study focused on naturalistic tasks containing both kinds of information, domain-specific content and (at the same time) numerical description of choice alternatives.

3.1. Method

3.1.1. Participants

133 subjects participated in Study 2. They were, similarly to the previous experiment, undergraduates in business administration at Wroclaw University of Technology. Their average age was 22. They completed the tasks in groups of ca. 30 persons each during the classes in behavioral decision making. The subjects were told that the goal of the research was to determine people’s behavior in risky managerial scenarios.

3.1.2. Experimental design

In this study eight out of fourteen of the scenarios used in Study 1 were employed, namely those in which numerical outcomes of the choice alternatives could easily be introduced. Seven groups of subjects (n = 19 in each group) were presented with the same eight risky scenarios, but each group with different information conditions. Participants from groups 1 and 2 received the eight scenarios with full information about consequences and probabilities. Two versions of the completely described (with respect to outcomes and

probabilities) scenarios were used. The two versions differed in probability distributions and in the magnitudes of outcomes, but had more or less the same expected value for the corresponding risky alternatives. Table 3 displays quantitative values for consequences and probabilities of both versions in all eight scenarios. As can be seen, in all scenarios one of the two alternatives was more risky and the other less risky (with respect to variance).

Participants from the next two groups (groups 3 and 4) were given only the information about the values of outcomes, but not about probabilities.

Subjects from group 5 and group 6 received exclusively numerical descriptions of probabilities.

Finally, individuals from group 7 did not receive any quantitative descriptions of choice options at all.

The participants were asked to make choices between the two alternatives and to indicate the level of certainty with which they were making their choices (however, this time they were not allowed to ask questions concerning the risky scenarios).

Insert Table 3 about here

3.2. Results

3.2.1. Choices in seven information conditions

Fig. 1 shows the distributions of choices between the more and less risky alternatives made by the participants from seven different groups. The riskiness of each alternative was measured by its variance.

Insert Fig. 1 about here

As can be seen on Fig. 1, in almost all scenarios a clear majority of participants who preferred one alternative to another cold be found. In some scenarios a more risky option was more often chosen, and in other scenarios a less risky one. One can also observe that this overwhelming preference for one of the two options did not change with the information conditions about probabilities and/or outcomes (from a complete lack of any information to full information).

The influence of information conditions and the kind of situation on choices was evaluated using 7 x 8 ANOVA, with the information condition as the between-participants factor and the kind of situation as the within-participant factor. Only the effect of the scenarios was found to be statistically significant, $F(7,882) = 35.79$; $P < 0.00001$. Neither the effect of information conditions, nor post-hoc comparisons, using a Scheffe test in pairs of different conditions, were found to be statistically significant.

Thus, independent of the kind of information given to the participants, they tended to prefer one of the two

alternatives. On the other hand, they were very sensitive to the content of the choice dilemma. Such results seem to suggest that participants of this study followed some rules of thumb, specific to each scenario:

Scenario 1 (Whether or not to take out a new loan):

- It is always better to take one out than not to take one out; it is better to have more money than less;

Scenario 2 (Whether or not to sign a contract with a new advertising agency):

- It is good to try new possibilities, especially if the status quo is not satisfactory;

Scenario 3 (Whether or not to pay a risky advance):

- It is better not to pay the money in advance if the outcome of the business is uncertain;

etc.

3.2.2. Certainty of choices in seven information conditions

Fig. 2 displays the certainty of choices in different kinds of scenarios and various information conditions.

Insert Fig. 2 about here

Fig. 2 shows clearly that in all seven groups people made choices with surprisingly high certainty irrespective of the information they were given in the descriptions of all the scenarios. All certainty levels were higher than 60% with a mean value of 68.7%.

As in the case of the analysis of choices, the effects of independent variables on certainties were examined using 7 x 8 ANOVA, with the information conditions as the between-participants factor and the kind of situation as the within-participant factor. The ANOVA between various scenarios was found to be statistically significant, $F(7,882) = 7.32$; $P < 0.00001$. No effect of information conditions was found.

This points out that people are generally quite certain of their choices, both when they know all the quantitative parameters (full information conditions) and when they do not know any numbers (no-information condition).

4. STUDY 3: WHEN DOES THE INFORMATION ABOUT THE VALUES OF OUTCOMES AND PROBABILITIES COUNTS?

The purpose of Study 3 was to investigate the conditions in which people become sensitive to information about the basic risk parameters of consequences and probabilities. The hypothesis tested was very simple: subjects are sensitive to basic risk parameters in typical lottery experiments. The conditions are as follows: complete information about the consequences and probabilities of all alternatives is given to the subjects and identical scenarios are presented one by one. Only the lottery parameters are changed. The reappearance of the same scenarios with only the lottery parameters changing should make these parameters salient to the subjects. Obviously, these artificial conditions are far from the natural situations in which people solve their decision

problems. To make these parameters even more salient, the subjects were first asked (which again is typically done in experimental settings) to assess the riskiness of each lottery and only then to make the choice concerning acceptance or rejection of the lottery. However, in contrast to most of the typical research of this kind where pure lottery tasks were used (cf. e.g. Shelley, 1994; Weber, 1988), some cover stories concerning three different domains (profit, unemployment and security) were introduced.

Thus, the hypothesis was tested that when a description of the same scenario is repeated, with only the lottery parameters changing, subjects would be sensitive to the quantitative parameters of alternatives and not to the cover story of the lottery.

4.1. Method

4.1.1. Participants

The participants, as in the previous experiments, were undergraduates in business administration at Wroclaw University of Technology. 194 persons participated in this study altogether. Their average age was 22. The subjects were told that the goal of the research was to determine people’s behavior in risky managerial and social decisions. They completed the tasks in the groups of ca. 30 persons each.

4.1.2. Experimental design

This study utilized a 4 x 2 x 3 factorial design in which the independent variables were (1) the structure of the

lottery (4 levels), (2) the source of information about probability (2 levels) and (3) the content domain (3 levels).

Four lotteries were constructed. They were equal in expected value, but differed in the basic risk parameters:

L1: <+11, .2; -1.5, .8>

L2: <+10, .2; 0, .3; -2, .5>

L3: <+5, .5; -3, .5>

L4: <+3.5, .8; -9, .2>.

Two different interpretations of probabilities were applied: frequencies (previous experience shows that...) vs. expert judgments (experts claim that...). Three cover stories represented three domains of risk: financial profit, unemployment and security. The description of each cover story consisted of the following four elements (descriptions in brackets relate to the unemployment domain and the security domain respectively): (a) assuming the role of an adviser to the firm manager (governor of the province; Minister of Internal Affairs); (b) a new contract (policy; law) is contemplated; (c) there is uncertainty whether this contract (policy; law) will increase or decrease the profit (employment; security) and (d) previous experience or opinions of experts are ambiguous.

The combination of the factors' levels [3 (domains) x 2 (interpretations of probabilities) x 4 (lotteries)] resulted in twenty-four scenarios. The numerical values of

probabilities and outcomes used in the scenarios were taken from the four lotteries (L1, L2, L3, L4) presented above.

Two dependent variables were used in the experiment:(1) risk assessment, where undergraduates judged the relative riskiness of the prospects on a seven-point rating scale (ranging from 1-completely safe to 7-completely risky) and (2) choice, where they were choosing between the recommendations to accept or to reject the prospect.

4.2. Results

4.2.1. Risk ratings

Table 4 shows the average risk ratings of the four lotteries for three cover stories and two interpretations of the source of probability information.

Insert Table 4 about here

Differences in risk assessments were analyzed in the two ANOVA designs. The first [2 (interpretation of probability; between-participants) x 4 (lottery; within-participant)] factorial design revealed a statistically significant main effect of the lottery ($F(3,291) = 19.78$; $P < 0.00001$, for profit domain; $F(3,291) = 19.11$; $P < 0.00001$, for unemployment domain; and $F(3,291) = 19.11$; $P < 0.00001$ for security domain). No significant effect of the interpretation of probability was found.

Similarly, the second factorial design [3 (domain; within-participant) x 4 (lottery; within-participant)] revealed a significant main effect of the lottery ($F(3,432) = 25.23$; $P < 0.00001$ for experts as the source of information on probability; $F(3,417) = 16.44$; $P < 0.00001$ for experience as the source of information on probability). No effect of the domains was found.

Thus, the results obtained indicated that in rating the lotteries riskiness the subjects were sensitive to the numerical frame (risk parameters) of the lottery, but insensitive to the interpretation of the probabilities and to the content domain of the cover story.

4.2.2. Acceptance of risk (choices)

Table 5 shows the percentages of accepted risky prospects among the three domains and the two interpretations of probability. In order to explore the differences in the subjects' choices in various levels of three factors (lotteries, domains and information about probabilities), a 4 x 2 (lotteries; within-participant x information about probabilities; between-participants) ANOVA and a 4 x 3 (lotteries; within-participant x domain; within-participant) ANOVA was performed. The subjects' choices were coded as 0 (rejection of a risky prospect) and 1 (acceptance of a risky prospect) scores.

The first ANOVA yielded the main effect of lotteries ($F(3,291) = 3.06$; $P < 0.03$ for the profit domain; $F(3,291) =$

5.84; P < 0.0007 for the unemployment domain; F(3,279) = 2.47; P < 0.06 for the security domain). Again, no effect of probability information was found.

Similar results were found with respect to the second ANOVA. A statistically significant main effect of lotteries was found (F(3,432) = 25.23; P < 0.00001 for experts as the source of information on probability; F(3,417) = 16.44; P < 0.00001 for experience as the source of information on probability). The second ANOVA did not yield a significant main effect of the domain.

These results replicated those obtained for risk ratings. The participants, when making choices concerning a recommendation to accept or to reject a risky prospect, were sensitive to the numerical parameters of the lottery. At the same time, they were insensitive to the interpretation of probability and to the domain of the cover story.

Insert Table 5 about here

To summarize the results of Study 3 it can be concluded that, when confronted with a typical experimental lottery task, people are sensitive mainly to the numerical values defining its parameters. Both risk assessments and choices tend to be determined by numerical parameters of the lottery and are independent of the content, represented in our study by the domain and the interpretation of probabilities. In such

tasks quantitative values of risk parameters seem to obscure the meaning of the domain.

5. GENERAL DISCUSSION

In Study 1 it was established that in vaguely described scenarios participants, when allowed to ask about any additional information, revealed little interest in obtaining any quantitative data on outcomes and probabilities. Two possible explanations of this phenomenon (they are not necessarily mutually exclusive) will be described.

One interpretation argues that people asked a small number of questions about outcomes and, in particular, about probabilities because they did not expect that such information was available[1]. The subjects could have good reason to be convinced that the information on the probabilities of certain events was simply impossible to obtain. How can the probability that workers will decide to go on strike, or that the information about a firm’s bad reputation will be confirmed, etc., be reliably evaluated? It is therefore natural that subjects who did not think these answers were available did not ask about them.

However, another interpretation is also possible. People did not try to inquire about risk parameters because they simply did not base their decisions on principles described by the decision theory. This interpretation seems to be supported by the results obtained in Study 2.

Indeed, Study 2 demonstrated that providing information about outcomes and probabilities had little effect on subjects' choices. Moreover, in most cases the subjects were surprisingly unanimous about what to choose in these vaguely formulated scenarios. Presumably, they shared some common rules of decision making in such scenarios. (Actually, in every domain of human activity certain routine behaviors develop and come to be used as rational rules of conduct in particular scenarios). It was also found that the information about the magnitudes of outcomes and probabilities did not significantly influence the certainty levels of the choices made. Taken together, these results demonstrated that in naturalistic scenarios people generally paid little attention to the basic risk parameters and that their choices depended primarily on the content domain.

Study 3 examined what the typical conditions are in which people become sensitive to information about the basic risk parameters, i.e. consequences and probabilities. It turned out that this happens when a standard lottery task is used together with a standard experimental procedure, i.e., identical scenarios are presented one by one to the subjects, where only the lottery parameters are changed. Such a reappearance of the same scenarios with the lottery parameters changing probably makes these parameters salient to subjects. In effect, these parameters tend to have an effect on subjects' choices.

From this perspective, the difference in the behavior of participants in Study 3 and in the group of Study 2 where complete information about the consequences and probabilities of the alternatives was given can be found to be instructive. Although in both cases the subjects received choice scenarios described in the same way, a considerable difference in their behavior was observed. On the one hand, in Study 3 the choices were dependent on the lottery parameters and independent of the content domain (profit, unemployment, security). On the other hand, in Study 2 the choices were definitely dependent on the content domain and independent of the lottery parameters. This difference must have come from the fact that in Study 3 the use of identical scenarios (where only the lottery parameters were changing) made these parameters salient, unlike in Study 2, where each scenario was presented to the subject in only one version.

The authors are aware of the fact that the results showing people’s ignorance of content domain in repeated lottery tasks and their ignorance of basic risk parameters in naturalistic scenarios have a limited value, as the null hypothesis was not proven. Still, changing the role of the content domain and parameters of risk in choices in Studies 2 and 3 seems to be impressive. This indicates that choices in lottery vs. naturalistic decision tasks are controlled by different factors.

Generally, the findings seem to be in accordance with Shafir, Simonson and Tversky's (1993) reason-based choice approach. When making choices in naturalistic scenarios (Study 2 – partial or complete lack of information conditions), where no quantitative arguments were available, people based their choices on nonquantifiable content-specific reasons; presumably those originating from the rules of thumb quoted above. On the other hand, when numerical descriptions of choice alternatives were available and salient (Study 3) people used them as reasons to choose one alternative over another (and were insensitive to the content of the lotteries). Finally, when both nonquantifiable content-specific reasons and numerical descriptions of choice alternatives were available (but not salient), the content-specific arguments prevailed as reasons for the choices (Study 2 - full information conditions).

It seems that the reason-based choice approach can also be used to explain subjects' interest in those aspects of the decisional scenario that go beyond probabilities and consequences, as observed in Study 2. The interest in such aspects of the decision scenario (e.g., the possibility to find a new alternative or the possibility to control the scenario) can be seen as a rational behavior. For example, finding a new conflict-free alternative can be a very good solution to a difficult decisional problem. Trying to see if the scenario can be controlled gives a chance to reduce the

uncertainty one is confronted with etc. Aspects such as these are wrongly neglected in standard decision theory.

On the other hand, the decision maker's interest in these aspects of problem formulation can be considered as a process of seeking good reasons for the choice. From this perspective, finding a new alternative that reduces conflict or reformulating consequences can provide the decision maker with good reasons to solve a problem. Actually, in one of their experiments, Shafir et al. (1993) observed that decision makers who did not have any good argument for making the choice exhibited a great need for discovering a new alternative that could reduce conflict.

In authors' opinion, the discrepancy of behavior in these two kinds of scenarios poses some challenge for the standard decision theory approach. One can argue that the experimental lottery tasks are so artificial that they have little to do with naturalistic decision making. To put it even more radically, it can be argued that risk judgments and choices between several lottery tasks do not demonstrate any real evaluations or preferences but rather individuals' perceptual abilities in comparing numbers.

Conversely, treating the standard decision theory as a normative approach, the research described in this paper provides a suggestion as to how to make people sensitive to the basic risk parameters. This is a question of making these parameters salient. The saliency increases when an individual

is confronted with identical scenarios, where only the lottery parameters are changing. Thus, the typical experimental procedure may be just a good device for making people in risky situations sensitive to outcomes and probabilities.

FOOTNOTES

1. This explanation was suggested to us by Karl H. Teigen.

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Table 1. Categories of questions (with examples) posed by subjects in vaguely described scenarios.

- Probabilities

What are the chances that the tax evasion will be revealed?

- Consequences (positive or negative)

What will be the profits of opening a new branch?

- Circumstances of a decision not related directly to the consequences or probabilities

What is the market position of the company?

- Adding a new alternative that goes beyond the conflict between alternatives.

Can the fruit not be sold at a reduced price?

- Reframing non-economic into economic consequences

Would the workers (who complain that the new technology has increased the number of accidents) stop protesting if they were given higher wages?

- Reframing decision situation

What are the reasons for the company's financial problems?

- Controllability

(for the problem of selling low-quality fruit:) *Are there any other suppliers?*

Table 2. Percentages of participants asking questions of different categories in the fourteen scenarios.

Descriptions of scenarios	Categories of questions							
	A	B	C	D	E	F	G	H
1 – To take out a new loan	9	53	38	21	3	13	68	12
2 – To pay a dividend to the stockholders	40	41	49	27	7	22	77	13
3 – Signing a contract with a new advertising agency	13	35	28	12	21	32	81	10
4 – Pay the risky advance	18	24	31	77	4	15	94	2
5 – Lay off the workers	0	40	19	29	63	13	90	35
6 – To accept risk of work accidents	19	46	46	13	0	9	65	3
7 – Tax evasion	9	65	22	10	24	10	57	40
8 – To sell low-quality product	9	38	49	10	1	4	67	3
9 – To make a contract with a firm of doubtful reputation	1	17	54	19	28	4	75	1
10 – Introducing risky technology	0	15	32	25	36	6	68	13
11 – Give another loan to a debtor	19	38	17	0	6	1	28	6
12 – Continue dubious business	29	17	32	9	0	3	41	3
13 – To admit testing cosmetics on animals	32	33	28	6	0	0	41	7
14 – To admit polluting environment	10	17	33	7	4	7	48	6

A – Probabilities; B – Consequences; C – Circumstances of the problem; D – Possibility to add a new option; E – Reframing outcomes into economic values; F – Reframing situation; G – Any kind of reframing; H – Controllability

Table 3. Numerical values of consequences and probabilities in two different conditions of full information in eight scenarios.

Descriptions of scenarios	Full information condition (version 1)	Full information condition (version 2)
To take out a new loan	<1000, .5; -200, .5> vs. <100, .5; -20, .5>	<625, .8; -500, .2> vs. <62,5, .8; -50, .2>
Signing a contract with a new advertising agency	status quo vs. <300, .75; -100, .25>	status quo vs. <500, .5; -100, .5>
Pay the risky advance	<1000, .5; -100, .5> vs. status quo	<700, .7; -150, .3> vs. status quo
Lay off the workers	<1500, .2; -200, .8> vs. -150	<600, .5; -300, .5> vs. -150
Tax evasion	-50 vs. <0, .5; -150, .5>	-50 vs. <0, .85; -500, .15>
Sell low-quality produce	<0, .75; -500, .25> vs. -100	<0, . 5; -250, .5> vs. -100
Give another loan to a debtor	<0, .5; -650, .5> vs. -200	<0, .7; -950, .3> vs. -200
Continue dubious business	<0, .3; -800, .7> vs. -300	<0, .5; -1000, .5> vs. -300

Table 4. Average risk ratings (between 1–very low risk and 9–very high risk) of four lotteries in three content domains and two interpretations of probability.

Lotteries	Interpretation of probability	Domains		
		Profit	Unemployment	Security
Lottery 1	Experts	6.13	5.90	5.86
	Experience	5.38	5.58	6.23
Lottery 2	Experts	4.71	5.21	5.04
	Experience	4.61	4.73	4.79
Lottery 3	Experts	4.50	5.06	5.27
	Experience	4.69	5.00	4.90
Lottery 4	Experts	4.10	4.54	4.94
	Experience	4.57	5.18	4.27

Table 5. Percentages of subjects who accepted risky lotteries in three content domains and two interpretations of probability.

Lotteries	Interpretation of probability	Domains		
		Profit	Unemployment	Security
Lottery 1	Experts	44	55	48
	Experience	71	60	50
Lottery 2	Experts	67	54	69
	Experience	78	83	73
Lottery 3	Experts	76	48	55
	Experience	67	65	63
Lottery 4	Experts	75	68	68
	Experience	72	57	78

FIGURE CAPTIONS

Fig. 1. Distribution of choices between more risky and less risky alternatives in eight scenarios made by subjects from seven groups (information conditions).

Fig. 2. Distribution of choice certainties in eight scenarios by subjects from seven groups (information conditions).

Fig. 1. Percentages of more risky choices made by subjects from seven groups (information conditions) in the eight scenarios.

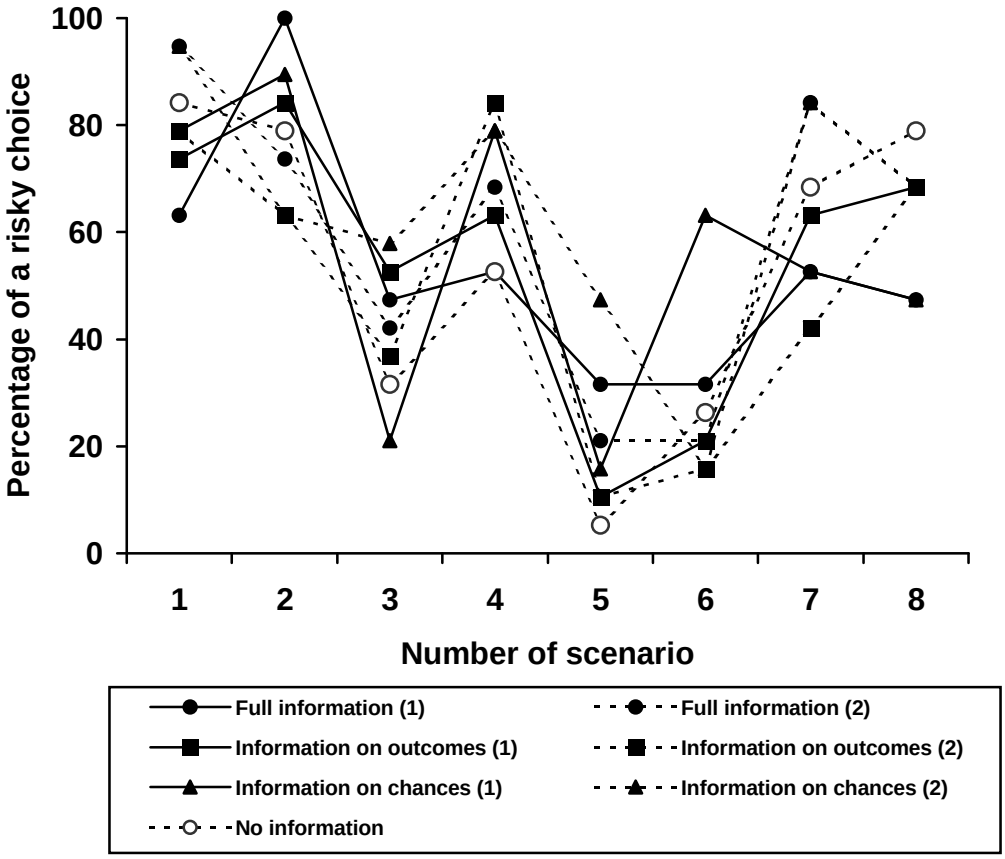

Fig. 2. Distribution of choice certainties in eight scenarios by subjects from seven groups (information conditions).