Frames of Reference, Judgment and Preference

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Chapter 3

Frames of Reference, Judgment and Preference

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INTRODUCTION

The way in which information is framed has been shown to influence a wide variety of judgments and decisions, including the choice between two alternative courses of action varying in riskiness (Kahneman and Tversky, 1979; Neale and Bazerman, 1985; Tversky and Kahneman, 1981) and the evaluation of individual-choice options in social and personal decisions (Levin, Schnittjer and Thee, 1988). Dimensions shown to be susceptible to framing effects include consumer product attributes, attributes of gambles, and contracts for labour negotiations. Framing effects have been obtained in situations such as negotiation and bargaining strategies (Neale, Huber and Northcraft, 1987; Schurr, 1987) and (hypothetical) medical decision-making tasks (Wilson, Kaplan and Schneiderman, 1987). This chapter attempts to investigate these issues and is related to theoretical work on framing effects in the elicitation of preferences and decision-making (e.g. Kahneman and Tversky, 1984).

Since the time of Bernoulli, economists have noted that most people prefer a certain outcome to a gamble of equal expected value. This phenomenon is known as risk aversion. Bernoulli suggested that the subjective value, or utility, of money is a marginally decreasing function of objective value. Because such a function is concave, a person maximizing expected utility will generally prefer

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a sure thing to a risky option of equal expected value (Schneider and Lopes, 1986).

The major theory of decision-making under risk is the expected utility model. This model is based on a set of axioms, for example transitivity of preferences, which provides criteria for the rationality of choices. The choices of an individual who conforms to the axioms can be described in terms of the utilities of various outcomes, obtained by weighting the utility of each possible outcome by its probability. When faced with a choice, a rational decision-maker will prefer the prospect that offers the highest expected utility. Although the expected utility model is the cornerstone of many current theories of risky decision-making, recent evidence (Kahneman and Tversky, 1979; Laughhunn, Payne and Crum, 1980) has suggested that when potential losses are involved, most people prefer a risky option to a certain outcome of equal expected value: that is, they are *risk-seeking* in the domain of losses. Kahneman and Tversky labelled this switch from risk-averse preferences for gains to risk-seeking preferences for losses the *reflection effect*. Because expected utility theory fails to account for such reflection effects, Kahneman and Tversky developed a more descriptive and comprehensive model of risky decision-making. This model is part of their *prospect theory* and describes individual decision-making under risk as consisting of two separate stages. First, prospects are psychologically edited in order to simplify their representation, and second, the edited prospects are evaluated in terms of subjective value and probability-weighting functions.

In this chapter we will focus on the reflection effect. First, we will present an outline of the essential features of prospect theory. Next, we will put forward some empirical evidence concerning the generalizability of the reflection effect. More specifically, we will look at the effects of perceived importance of the things at stake, and whether the effect can also be obtained in more everyday decisions.

PROSPECT THEORY

Kahneman and Tversky's (1979) prospect theory attempts to provide a more general theory of decision-making under uncertainty. Two important assumptions of prospect theory are:

1. Decisions are made not with regard to the desirability of consequences or end-states as such, but with regard to how such end-states relate to some reference point (such as the present). In other words, outcomes are not evaluated as *absolute* costs or benefits, but as *relative* losses or gains.
2. Expected losses and gains influence decisions in direct *but not exact* proportion to their (subjective) probability. The probability terms in the calculation of SEU are therefore replaced by 'decision weights' reflecting the importance of each possible consequence.

Like subjective expected utility theory, prospect theory assumes that the value V of an option is calculated as a sum of products over its specified outcomes x, each product consisting of a utility $v(x)$ and a weight $\pi(p)$ attached to the objective probability p of obtaining x, or

$$V = \sum_i \pi(p_i)v(x_i) \qquad 3.1$$

Prospect theory is unique in the set of assumptions made about the functions v and π and about contextual effects on preference and choice.

The Probability-weighting Function

The function $\pi(p)$ is not given in closed mathematical form but, on the basis of inference from a number of choice problems, seems to have a shape like that indicated in Figure 3.1.

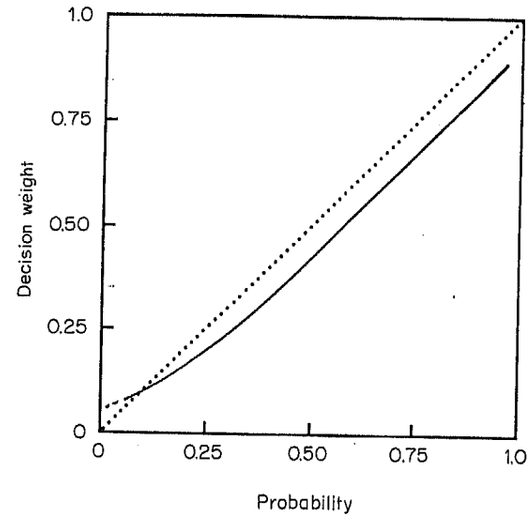

Figure 3.1 Prospect theory: hypothetical probability-weighting function

One of the noteworthy features of this function is that it changes near the endpoints, where $\pi(0) = 0$ and $\pi(1) = 1$, such that small probabilities are overweighted and large probabilities are generally underweighted ('objective' weighting would require $\pi(p) = p$).

The theory presumes a sharp increase in π in moving from high probability to certainty, i.e. certain outcomes receive considerably more weight than highly probable outcomes. This contributes to the so-called certainty effect. An exam-

ple is given by the following task used by Kahneman and Tversky. A group of subjects was asked to choose between options A and B, where A was a win of $4000 with a probability of 0.8, otherwise nothing, and B was $3000 for sure. Only a small minority (20%) chose the gamble (A), with the larger prize, over the sure option (B). Another group of subjects was asked to choose between options C and D, where C was $4000 with a probability of 0.2, otherwise nothing, and D was $3000 with a probability of 0.25, otherwise nothing. In this case a clear majority (65%) chose to gamble on C, with the larger prize, over D, with a smaller but somewhat more likely prize. This violates the expected utility principle, which requires consistency in the A *versus* B and C *versus* D choices. In the A *versus* B and C *versus* D choices, the ratio of the probabilities of getting the prizes is the same ($0.8/1 = 0.20/0.25$), yet the preference tends to reverse.

Evidently, the weight given a probability of 0.8 as a proportion of the weight given a sure thing is psychologically smaller than the weight given a probability of 0.20 as a proportion of the weight given a probability of 0.25. In other words, the reduction of probability from certainty to some degree of uncertainty produces a more pronounced loss of attractiveness than does a corresponding reduction from one level of uncertainty to another. Prospect theory attempts to deal with these differences. The previous example can be traced to Figure 3.1; inspection of the probability-weighting function will show that $\pi(0.20)/\pi(0.25) > \pi(0.8)/\pi(1)$.

Another important aspect of the probability-weighting function concerns low probabilities. The overweighting of small probabilities potentially explains the attractiveness of long-shot gambling (as in lotteries) and the tendency to insure against relatively rare potential catastrophes (as in fire insurance). In both cases the rare events—the lottery success or the disastrous property loss—seem to loom larger in the decisions (i.e. gambling or buying insurance) than the objective probabilities would seem to warrant. However, there is also empirical evidence that people tend to ignore extremely low probability events. As a consequence, Kahneman and Tversky (1979) concluded that 'the π-function is not well-behaved near its endpoints'. This could be due to people's difficulties in comprehending and evaluating extreme probabilities. Thus, highly unlikely events are either ignored or overweighted, and the difference between high probability and certainty is either neglected or exaggerated.

The Value Function

The other major component of prospect theory is the value function, $v(x)$ in Equation 3.1. As discussed before, v is defined in terms of gains and losses of wealth or welfare from some reference point or adaptation level. Figure 3.2 presents the shape of the value function.

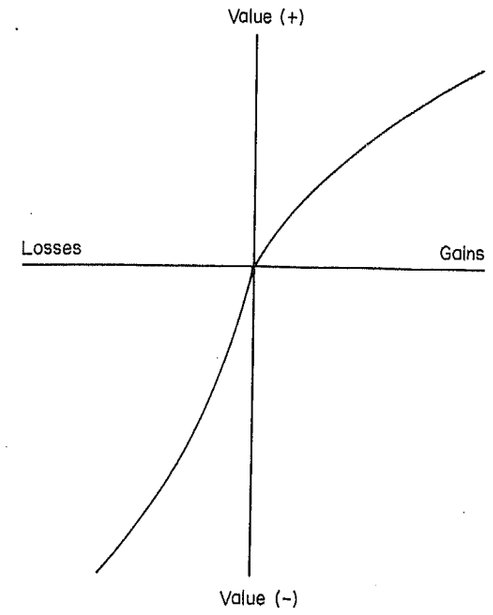

Figure 3.2 Prospect theory: hypothetical value function

The region of gains above the reference point is characterized by a concave value function. In other words, each unit increase in gain of wealth has less and less value as gain increases. This type of function disposes towards risk aversion. For instance, one would expect a preference for a sure $200 over a 50–50 chance for $400 or nothing. As we have seen before, the subcertainty of the probability-weighting function also leads to a prediction of risk aversion in the above example. Thus risk aversion in such choices does not provide evidence for either function without some assumption about the other. For instance, with prospects in which there is a small chance of sizeable gain, the probability-weighting function works in favour of the seeking of risk as opposed to the risk aversion due to the concavity of the value function.

In the region of losses (the area below the reference point), each unit increase in potential losses has a decreasing impact on overall (negative) value. Thus, the marginal value of both losses and gains generally decreases with their magnitude. The convexity of the value function below the reference point predicts risk-seeking. A 50–50 chance of losing $400 or losing nothing would be preferred to a sure loss of $200. Here, too, the effects of subcertainty are in the same direction as the effects due to the convexity of the value function, i.e. in the direction of risk-seeking. Again, these converging tendencies may be in opposite directions when small probabilities are involved. For instance, if a

decision contains a small-probability loss, subjects may prefer risk aversion due to their tendency to overweight low probabilities.

Another important aspect of the value function is that it is steeper for losses than for gains. This difference in steepness is related to a salient characteristic of attitudes to changes in welfare, i.e. losses loom larger than gains. Generally, the aggrevation that one experiences in losing a sum of money appears to be greater than the pleasure associated with gaining the same amount. In other words, losing $200 is more aversive than a gain of $200 is attractive.

THE REFLECTION EFFECT

The conjunction of risk aversion for gains and risk-seeking for losses leads to what Kahneman and Tversky (1979) call the *reflection effect*. Reflection of the signs of the possible outcomes of each of two prospects typically reverses the preference order between these prospects. This can produce paradoxical effects when the same problem is presented in terms of losses or in terms of gains. These effects will be due to changes in reference point. One of the ways to shift the reference point is by the 'framing' of the choice options. Work by Tversky and Kahneman (1981), Fischhoff (1983), Schneider and Lopes (1986) and Puto (1987) provides further insight into the relationships between preference and the 'framing' of a decision problem. Since prospect theory deals with gains and losses relative to a reference point, rather than with absolute outcomes, the same outcomes can be represented as gains or losses, depending on the reference point. One of the hypothetical problems reported by Tversky and Kahneman (1981, p. 453) asks subjects to imagine that the US is threatened with an unusual (Asian) disease, expected to kill 600 people. A choice has to be made between two alternative interventions, concerning which subjects have to assume the following estimates to be accepted scientific estimates of the consequences of the programs:

> If Program A is adopted, 200 people will be saved
>
> If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved

When presented with the choice in this form, 72% of subjects opted for 'Program A'. However, a second group was presented with the same problem in the following terms:

> If Program C is adopted, 400 people will die
>
> If Program D is adopted, there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die

In this second group, the majority (78%) chose 'Program D'. Thus, when the choice was framed in terms of gains (lives saved), most people opted for the certain outcome, but when the identical choice was framed in terms of losses (lives lost), most people avoided the option of the certain loss. In the first problem the expected 600 deaths have been presupposed, whereas in the second problem they have not. In other words, the reference point is 600 people lower in problem 1 than in problem 2. Thus, the first programme is described as 200 lives saved, rather than 400 lives lost. Similarly, the second programme is described in terms of the chances to save 600 lives, rather than chances to lose 600 lives. This confirms the principle that people tend to be risk-averse for gains and risk-seeking for losses, i.e. sure gains are popular but sure losses are unpopular. Preference, therefore, seems not deterministically constrained by the prescriptive 'rationality' of SEU theory, but can be strongly influenced (at least in examples of the kind described) by the *frame of reference* in terms of which a problem is defined.

EXPERIMENTAL TESTS OF THE REFLECTION EFFECT

Initially Kahneman and Tversky (1979) tested the reflection effect with pairs of lotteries and decision problems such as the Asian disease problem dealing with gains or losses of human lives. In these cases the reflection effect for any pair of options is a reversal in preference induced by a change in the sign of all the outcomes. In most cases Tversky and Kahneman (Kahneman and Tversky, 1979; Tversky and Kahneman, 1981) obtained pronounced shifts from risk aversion to risk-taking. They observed this reversal in several groups of respondents. Hershey and Schoemaker (1980) conducted a thorough examination of the reflection effect. Their findings suggested that the effect is less robust than assumed by Kahneman and Tversky. Furthermore, Hershey and Schoemaker (1980) argued that most studies use between-subjects designs which do not allow firm conclusions about individual-preference reversal. This conclusion was later criticized by Keren and Raaijmakers (1988). The latter argue that between-subjects designs are often more desirable to test the reflection effect. Hershey and Schoemaker (1980) looked for reflection in terms of both individual and group preferences, using alternatives consisting of a two-outcome prospect and a certain prospect of equal expected value. The probabilities and amounts of the alternatives were systematically varied across problems. In two experiments, reversal of preferences for the risk-seeking *versus* the risk-taking alternative failed to occur regularly at either the group level or the individual level. In a third experiment, Hershey and Schoemaker collected preferences for three pairs of alternatives from over 200 subjects. Significant preference reversal was found in only one of the problems for more than 50% of the subjects. Looking at individual reversals across all three experiments, Hershey and Schoemaker

concluded that the most prevalent form of preference reversal consists of risk-averse preferences for gains and risk-seeking preferences for losses. Although this appears to be consistent with prospect theory, these reversals were as likely to occur for prospects where probabilities were presumably overweighted as they were for prospects where probabilities were presumably underweighted. As a consequence, Hershey and Schoemaker question the generalizability of the reflection effect, pointing out that it seems most likely to occur with small amounts, extreme probabilities, and extremely large amounts.

In a more recent study, Payne, Laughhunn and Crum (1982) asked 128 experienced managers to choose between risky and certain (monetary) options. Payne *et al.* found that 62% of the managers' preferences were risk-averse for gains and 59% were risk-seeking for losses. They also found that 33% of the managers reversed preferences from the risk-averse choice for gains to the risk-seeking choice for losses. Schneider and Lopes (1986) presented subjects with a set of multi-outcome lotteries. Their findings supported the reflection effect but only if the choice pairs included a lottery with a certain outcome. Subjects generally agreed that lotteries with a riskless component were highly desirable for gains and most often undesirable for losses. Subjects also generally agreed that the sure thing was undesirable for losses.

Schneider and Lopes (1986) also asked subjects to describe briefly how they had made their choices. Both within the gain and the loss domain, the vast majority of responses indicated two basic points of view. For gains, subjects generally reported that (1) they had tried to make sure that they would win something, or (2) they tried to choose the alternative with the best chance to win some large amount. For losses, subjects generally reported that (1) they wanted to make sure that they would not lose the largest amount, or (2) they tried to choose the alternative with the best chance of losing nothing or a small amount. In both the loss and the gain domain, viewpoint (1) would lead to risk-averse choices and viewpoint (2) would generally lead to risk-seeking preferences.

On the basis of their results, Schneider and Lopes (1986) propose a two-factor theory of risky choice. First, they introduce a dispositional variable corresponding to the way a person usually evaluates risks. The poles of this motivational factor (security/potential) map onto the earlier mentioned viewpoints (1) and (2) respectively. The second factor is a situational variable that is sensitive to the particular choice at hand, i.e. one's more immediate aspiration level. In the two-factor theory, the aspiration level underlies individual differences in willingness to trade off between risk and outcome *and* helps to actively organize the choice process by relating external demands to current opportunities. In prospect theory, aspiration level may provide the reference point for the value function, in the two-factor theory the aspiration level plays a more adaptive role (similar to Simon's (1955) process of satisficing). All in all, Schneider and Lopes (1986) argue that prospect theory fails to adequately explain the basic pattern of preferences for either risk-averse or risk-seeking subjects. In their view, increased attention to goals and strategies that people bring to risky-choice situations as well as increased emphasis on individual differences in risk style are necessary to improve our understanding of the process of risky choice.

ADDITIONAL TESTS OF THE REFLECTION EFFECT

In a series of studies we attempted to provide additional demonstrations of framing effects. In order to test the generalizability of some of the findings of prospect theory, we constructed more 'everyday' decision problems. Outcomes of these studies will be compared with those obtained with the 'typical' problem used in this line of research. Finally, we looked at the role of perceived importance of the issues at stake.

We will present selected illustrations of preference reversal, with data obtained from students at the University of Exeter, the Free University at Amsterdam, and the University of Amsterdam who answered brief questionnaires in a classroom setting. The total number of students that participated in these studies was 575. A number of everyday problems were also presented to samples from the general population in Southwest England. A total of 464 subjects participated in these studies.

In all studies we first presented subjects with a problem dealing with the loss of human lives in order to compare these outcomes with the outcomes obtained by Kahneman and Tversky with a similar problem (the 'Asian disease' problem). In the studies conducted in Exeter we used a problem based on Fischhoff's (1983) study. The problem is summarized below.

Problem 1
Imagine a local council meeting discussing contingency plans in the event of various emergencies. One emergency under discussion is the following. 'A serious accident occurs at a nuclear power station and the storage tanks begin to leak. The threat of radioactive pollution is imminent.' The accident is expected to kill 200 people. Two possible actions were considered by the committee. The outcome of these are described below. Please read them and indicate your opinion about the relative merits of each.

Option A.
Carries with it a 50% chance of containing the threat with a loss of 100 lives and 50% chance of losing 200 lives. It is like taking the gamble:
50% chance of losing 100 lives
50% chance of losing 200 lives

Option B.
Would result in the sure loss of 150 lives, in other words: 100% certainty that 150 lives will be lost.

Which option would you select?

A second group of respondents was given the cover story of problem 1 with a different formulation of the alternative programs, as follows:

Problem 2
Option A.
50% chance of saving 100 lives
50% chance of saving no lives

Option B.
100% certainty that 50 lives will be saved.

Which option would you select?

It is easy to see that the two problems are effectively identical. The only difference between them is that the outcomes are described in problem 1 by the number of lives lost and in problem 2 by the number of lives saved. In the studies both the probabilities of the outcomes and the number of lives lost/saved were varied. Results are presented in Table 3.1. This table also briefly summarizes the options. The two examples just given are presented in the first two lines of the table. As can be inferred from these results, respondents generally have a strong preference for the gamble when the alternative options are presented in terms of losses. In these circumstances only 20–30% of the subjects opted for certainty. When the problem is presented in terms of gains, choices are relatively risk-averse. Overall, the shifts from risk-taking to risk aversion are less pronounced than those obtained by Tversky and Kahneman. In the loss condition respondents show a significant preference for the risk-taking alternative, while in the gain condition respondents show no clear preference.

As mentioned before, we also attempted to look at the role of value *within* a decision domain. Table 3.2 presents an overview of the results obtained for problems framed in terms of losses. Potential losses varied from 40 to 4000

Table 3.1 Effects of frames upon preferences: losses *vs* gains (nuclear waste accident)

Frame	Options A		B	% choosing certain option
Losses	100/200	*vs*	150	25 (*N*=104)*
Gains	100/0	*vs*	50	43 (*N*=110)*
Losses	40/90	*vs*	70	27 (*N*=70)*
Gains	50/0	*vs*	20	50 (*N*=69)*
Losses	150/300	*vs*	240	22 (*N*=176)†
Gains	150/0	*vs*	60	51 (*N*=144)†

*Sample general population SW England.
† Students University of Amsterdam.

human lives. The assumption was that for higher values (i.e. higher number of victims) risk-taking would increase (see also Hershey and Schoemaker, 1980). It is clear that this prediction is not confirmed by our data. Overall, the results provide a clear confirmation of prospect theory, i.e. a significant preference for risk-taking when confronted with losses. This preference was not affected by the number of lives lost.

Table 3.2 Risk-seeking preference for various outcomes

	Options A		B	% choosing sure loss
Nuclear waste accident (loss of human lives)				
	200/400	*vs*	320	15 (*N* = 58)*
	2000/4000	*vs*	3200	14 (*N* = 59)*
	100/90	*vs*	150	25 (*N* = 104)†
	40/90	*vs*	70	27 (*N* = 110)†
	150/300	*vs*	240	25 (*N* = 107)‡
	150/300	*vs*	240	22 (*N* = 176)§
Chemical waste accident (loss of human lives)				
	40/60	*vs*	50	17 (*N* = 58)*
	40/60	*vs*	50	17 (*N* = 59)*

*Students Exeter University.
† Sample general population SW England.
‡ Students free University of Amsterdam. § Students University of Amsterdam.

NOTE: *p*-values of alternatives of option A were either 0.4 and 0.6 or 0.5 and 0.5.

In a series of similar studies we attempted to look at a variety of other decision domains. In some of these studies we tried to construct decision problems that would be related to everyday life. In these problems we tried to relate to actual and/or easy-to-imagine situations. Furthermore, we decided not to introduce many variations in the probabilities associated with the various possible outcomes. Our main interest concerned certainty *vs* uncertainty. The latter was usually operationalized as a 50–50 or 40–60 chance between two possible outcomes. For instance, we presented students with a risk-taking and a risk-averse option in the context of selecting a course, and a decision problem related to an actual train strike. In this way we attempted to investigate the effect of qualitatively different value domains on risk preference.

Two examples of these decision problems are summarized below.

Problem 3
Suppose the University introduced a 'research training scheme' for all second-year students which meant that you had to do an additional project by acting

as a kind of research assistant for one of the lecturers. Assume that this is an extra requirement. Unfortunately, you do not have a completely free choice about what project to do. There are only a limited number of places, and when you decide to sign up for a project you realize that your favourite lecturers are fully booked, and that you are left with two options only. Both options concern topics you are not really interested in, and to make it worse, the lecturers responsible for these two remaining options are definitely not your favourites. Your overall impression is that your project is going to be a waste of time. Two options are described below. Read them and indicate your opinion about the relative merits of each.

Option A. Lecturer A is rather unpredictable and can be both demanding and easy-going. The option carried with it a 0.4 probability of wasting 20 hours of your time and a 0.6 probability of wasting 40 hours of your time. It is like taking the gamble:
0.4 probability of wasting 20 hours
0.6 probability of wasting 40 hours

Option B. Lecturer B is very predictable in his demands and you can be sure that the project will take 32 hours of your time, i.e. a sure waste of 32 hours.

Which option do you prefer?

Another example also concerns the loss of time.

Problem 4
Suppose you intend to spend the half-term holiday at home. Usually you travel by train and the trip takes two hours. Unfortunately, intercity services are being disrupted by a national strike, and you have to make a choice between two alternative routes by non-intercity trains. The two alternatives are equally expensive. Please read the two options below and indicate your opinion about the relative merits of each.

Option A. You will have to change trains once, and have only two minutes to catch your connection. In other words, a slight delay could result in missing the connecting train. This option carries with it a 0.5 probability of making it in time and adding one hour to your usual (intercity) travel time, and a 0.5 probability of missing the connection and adding three hours to your usual travel time. It is like taking the gamble:
0.5 probability of losing an extra hour
0.5 probability of losing an extra three hours

Option B. This alternative involves a slightly longer route. Again, you will have to change once, but the connection is less risky than the one mentioned under option A and you will definitely catch your connecting train. This alternative will add two hours to your usual journey time, i.e. a sure loss of an extra two hours.

Which option would you select?

As argued before, we developed a series of more everyday decisions dealing with less important things than human lives. As we have seen in the previous section, value variations within a specific domain do not affect preference. On the basis of the literature on perceived control and predictability (e.g. Heider, 1958; Langer, 1983; Pervin, 1963), it was assumed that the uncertainty that accompanies risk-seeking alternatives is a motivationally unpleasant state. Prevention of uncertainty is expected to be more prevalent when decisions deal with less important stakes and one is personally affected by the consequences. In other words, we expected increased preference for certain options, even when the problem is framed in terms of losses. Table 3.3 summarizes the findings for a number of problems dealing with the loss of time. The first problem deals with boring lecturers, the remaining two with train strikes in Britain and Spain.

Table 3.3 Risk-seeking when confronted with the loss of time

Problem	Options A		B	% choosing certain loss
Boring lecturer	20/40	*vs*	32 hr	43 (N = 117)*
British Rail	1/3	*vs*	2 hr	51 (N = 59)*
Spanish Rail	5/10	*vs*	7.5 hr	56 (N = 107)†
Spanish Rail	1/2	*vs*	1.5 hr	47 (N = 107)†

*Students Exeter University.
† Students University of Amsterdam.

Note: p-values of alternatives of option A were either 0.4 and 0.6 or 0.5 and 0.5.

As can be inferred from Table 3.3, respondents did not show a clear preference for the risk-taking alternative even when the problem was cast in terms of losses. Next we presented various groups of respondents with a variety of problems dealing with issues that were considered to be of less importance than the traditional 'human lives' problems. These were:

(a) certain *vs* risk-seeking solutions for a cross-Channel ferry trip during a strike (this question was asked during a ferry strike in the UK).
(b) certain *vs* risk-seeking solutions for the renewal of the water supply system in SW England with financial consequences for consumers (i.e. water rates). This issue received considerable attention in the local media when the study was conducted.
(c) an economic problem concerning the number of jobs saved/lost in industry with a risk-seeking and a risk-averse option (redundancy problem).
(d) certain *vs* risk-seeking solutions to reach your holiday destination in the face of a railway strike in Spain.

Table 3.4 presents a summary of these findings and shows that, on average, people are more risk-averse than when confronted with major issues such as the loss of human lives. Overall, the effects of framing are far less pronounced than those obtained with the standard task. Subjects still show a tendency to be more risk-averse when confronted with possible gains. In most cases this tendency is significant. However, the findings fail to confirm the tendency to be risk-seeking when confronted with losses. As suggested earlier, one possible reason for this tendency to be relatively risk-averse irrespective of the way the decision problem is framed is the perceived importance of the things at stake. In order to investigate this we developed a series of tasks explicitly dealing with the role of perceived importance.

Table 3.4 Losses *vs* gains in more 'everyday' situations

Decision problem	Options A		B	%Choosing certain option
Ferry Strike				
Losses	5/30	*vs*	20	53 (N = 110)*
Gains	25/0	*vs*	10	60 (N = 104)*
Losses	4/8	*vs*	6	56 (N = 69)*
Gains	4/0	*vs*	2	76 (N = 70)*
Water Rates				
Losses	10/20	*vs*	25	64 (N = 104)*
Gains	10/0	*vs*	5	73 (N = 110)*
Losses	20/40	*vs*	32	69 (N = 70)*
Gains	20/0	*vs*	8	80 (N = 69)*
Holiday				
Losses	5/10	*vs*	7.5	53 (N = 178)†
Gains	5/0	*vs*	2.5	53 (N = 174)†
Redundancy problem				
Losses	400/800	*vs*	640	62 (N = 110)*
Gains	400/0	*vs*	160	67 (N = 104)*
Losses	200/400	*vs*	300	57 (N = 69)*
Gains	200/0	*vs*	100	70 (N = 70)*

*Sample general population SW England.
† Students University of Amsterdam.

THE ROLE OF PERCEIVED IMPORTANCE

The assumption that increased importance would enhance the tendency to prefer risk-seeking alternatives was first tested with a sample of the general population of Southwest England. Again, we attempted to present respondents with

an issue that would affect their daily life. In this case the issue concerned the development of an oil field in Dorset. The local press paid considerable attention to the development of this oil field and the economic and environmental consequences. It was assumed that the local population would attach greater importance to the environmental aspects than to the economic impact of the proposed development, and that this would affect their preference for risk-seeking and risk-averse alternatives. The reason for this differential weighting was expected to be the perceived inequity: local costs *versus* national benefits (see for example van der Pligt and de Boer, 1989). We presented subjects with the following problem:

> *Problem 1*
> Imagine a board meeting of British Petroleum discussing the development of the Sherwood Reservoir in Dorset. Due to objections from the planning authorities they will not be able to draw the maximum 40,000 barrels a day. Two possible plans with acceptable environmental impact are considered by the board. The outcomes of the plans are described below. Please read them carefully and indicate your opinion about the relative merits of each.
>
> *Option A.* If this plan is adopted there is a 50% chance that production will be 10,000 barrels a day less than the initial estimate, and a 50% chance that the production loss will be 20,000 barrels. It is like taking the gamble:
> 50% chance of losing 10,000 barrels
> 50% chance of losing 20,000 barrels
>
> *Option B.* If this plan is adopted the production loss will be exactly 15,000 barrels a day. In other words, 100% certainty of losing 15,000 barrels.

We also presented subjects with a similar problem dealing with the loss of heathland due to the development of the local oilfield. In this case subjects had to choose between a certain option (the loss of 220 acres) and a risky alternative (40% chance of losing 100 acres, 60% chance of losing 300 acres).

Results (Table 3.5) indicate that respondents attached greater importance to environmental than to economic impacts of the proposed development. On a group level, respondents showed *less* preference for certain options when dealing with *more* valued issues. Overall, respondents were more risk-averse when the problem was framed in terms of gains: respondents showed a significant preference for the risk-averse option (B). Subjects were less risk-averse when the problem was framed in terms of losses. The loss conditions, however, did not show a significant risk-seeking preference (43% and 59% respectively). It should be noted that the predicted relationship between preference and perceived importance was confirmed at the group level only, i.e. our group of subjects attached greater value to environmental impacts (6.2 *vs* 4.2) and displayed a more risk-seeking preference for the environmental problem as compared to the economic impact problem.

Table 3.5 The role of perceived importance: losses *vs* gains and acres *vs* oil

Decision problem	Options A	Options B	% choosing certain option
Acres			
Losses	100/300 *vs*	220	43 (N = 51)*
Gains	200/0 *vs*	80	75 (N = 60)*
Importance: 6.2†			
Oil			
Losses	10K/20K *vs*	15K	59 (N = 51)*
Gains	20K/30K *vs*	25K	85 (N = 60)*
Importance: 4.2 †			

*Sample general population SW England (Dorset).
† Scores range from 1 (not important at all) to 7 (very important).

The role of perceived importance can be further illustrated by a problem we presented to Dorset farmers. Two samples (N = 60 and 51, respectively) received a problem related to the 'Asian disease' issue concerning the threat of a disease affecting their dairy cattle. In one condition the introduction of the problem contained the line, 'fortunately the farmer is covered by insurance'. The remaining subjects received exactly the same problem concerning the loss of cattle, the only difference being the line 'unfortunately the farmer is *not* covered by insurance'. We expected the respondents to be more risk-seeking in the latter case since more was at stake (both animal lives and money). Results confirmed this prediction, as can be seen in Table 3.6. In this problem subjects had to choose between a risky option (losing 60 (40%) or 120 (60%) cows) and a certain outcome (the loss of 96 cows). Overall, subjects showed more preference for the risk-seeking alternative (A) if they were not insured and would lose both cattle *and* money.

One of the problems presented earlier could also be of relevance to the possible role of perceived importance. In a within-subjects design we presented people with two versions of the 'Spanish Rail' problem. In one version the possible time delays were set in the context of a two-week holiday. The other version concerned the same options but in the context of a long-weekend trip to Spain. It was assumed that risk-seeking preference would be greater in the latter case since considerable delays would more seriously affect the quality of the weekend trip than that of a longer holiday. As expected, subjects became more risk-seeking in the long-weekend context (43% opted for a certain delay of 7.5 hours as compared to 56% in the other condition).

Table 3.6 The role of perceived importance (cows and insurance)

Decision problem	Options A	Options B	% choosing certain loss
Loss of dairy cows	60/120 *vs*	96	
	With insurance cover		53 (N = 60)*
	Without insurance cover		38 (N = 51)*

*Sample general population SW England (Dorset).

Finally we presented two groups of subjects (students from the University of Amsterdam) with problems concerning the loss of human lives and problems concerning the loss of animal lives (seals). Seals were expected to be perceived as a valuable form of animal life but of less importance than human life. The human-life problem concerned a nuclear disaster framed in terms of lives lost (150/300 *vs* 240) or lives saved (150/0 *vs* 60). The seal problem concerned a serious contagious disease framed in terms of lives lost (400/0 *vs* 120) or lives saved (300/700 *vs* 580). Results confirmed the reflection effect but also showed far more risk preference in the human-lives problem than in the seal problem. Table 3.7 summarizes the findings.

Table 3.7 Effects of frames upon preferences: seals *vs* human lives

Frame	Options A	Options B	% choosing certain loss
Human lives			
Losses	150/300 *vs*	240	22 (N = 176)
Gains	150/0 *vs*	60	51 (N = 174)
Seals			
Losses	400/0 *vs*	120	47 (N = 174)
Gains	300/700 *vs*	580	70 (N = 176)

All in all, these findings suggest a relationship between perceived importance of what is at stake and preference for risk-seeking options. Respondents tend to be more cautious when the things at stake are less important, both in the gain frame and the loss frame.

CONCLUSIONS

The present results provide qualified support for one of prospect theory's strongest predictions. According to the theory, people should prefer the gamble to the sure loss when the problem is framed in terms of losses and the sure gain to the gamble when the problem is framed in terms of gains. This reflection effect runs contrary to the predictions of expected utility theory.

Taken together, our data suggest that although reflection does occur reliably for problems involving human lives, the effect is less pronounced than that obtained by Tversky and Kahneman. We do find a significant risk-seeking preference when the problem is framed in terms of losses and this preference differs significantly from the preference obtained in the gain-frame problems. However, in the latter conditions we did not obtain an overall preference for risk aversion. Respondents' preferences in these conditions did not differ from chance. In other words, results confirmed a weaker, relative version of the reflection effect.

A further finding of the present studies is that the value within a decision domain does not significantly affect option preference. The predicted risk-seeking preference for loss frames seemed quite regular irrespective of the number of lives at stake.

Another major result of the present studies is that people are generally more risk-averse when presented with more everyday decision problems. Fischhoff (1983) also obtained a greater preference for certainty in dollar problems as compared to problems involving human lives. Our findings confirm this and also show that when less important things are at stake the reflection effect still occurs but in these circumstances the loss frame results in no clear preference for either risk-seeking or risk-averse options. When the problem is framed in terms of gains, subjects generally show a clear preference for the certain option. In other words, these findings again confirm a relative version of the reflection effect; in this case only the gain frames result in the predicted (risk-averse) preference pattern.

The 'everyday' problems we included all concerned the loss or gain of time. These problems (boring lecturer, train and ferry strikes) revealed hardly any reflection effects whatsoever, suggesting that the manipulation of the frame of reference is far more complicated when people have already thought about or dealt with similar cases. In this light the present studies can be viewed as having established that the reference point people tend to adopt in everyday problems is hardly influenced by the way the decision problem is framed.

The final conclusion of the studies is that perceived importance of the things at stake plays an important role in decision preference. Less important things generally result in reduced risk-seeking preferences, suggesting that different decision domains should be represented by different value functions. Why should people be less risk-seeking when confronted with less important issues? The answer must be related to the fact that we often fear uncertainty (see also Dawes, 1988). A common way of dealing with our knowledge of uncertainty is to ignore it completely, or to invent some 'higher rationale' to explain it. There are many systems (ranging from traditional religion to tarot cards and scientology) helping people to 'make sense' of life's uncertainties. The tendency to deny uncertainty also shows in research on perceived control. Langer (1975, 1983) showed that people treat chance events as if they involve skill and are hence controllable. In other words, we even tend to deny the random components in relatively trivial events that we know to be the result of chance. Present findings suggest that people are more prepared to accept uncertainty when the stakes are very high (e.g. loss of human life, loss of cattle *and* livelihood). When decisions concern moderately 'important' issues (e.g. the loss of modest sums of money, wasting or gaining time) people are more risk-averse and less prepared to accept uncertainty.

Recent evidence suggests that relatively simple framing manipulations such as emphasizing gains or losses, success or failure, do influence individual-choice patterns (e.g. Puto, 1987; Levin, Schnittjer and Thee, 1988). Our data suggest that prospect theory does apply to a wide variety of decision domains and that it can explain a basic pattern of *relative* preference for risk-averse or risk-seeking options when one of the options is riskless. This confirms the conclusion of Schneider and Lopes (1986). The latter argue that more attention should be paid to individual strategies and goals. Our findings suggest that more attention should be paid to specific domain characteristics (importance of what is at stake) and the individual's experience with the type of problem he or she is asked to deal with.

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