ORGANIZATIONAL BEHAVIOR AND HUMAN DECISION PROCESSES
Vol. 75, No. 1, July, pp. 23–55, 1998
ARTICLE NO. OB982781

The Influence of Framing on Risky Decisions: A Meta-analysis

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In framing studies, logically equivalent choice situations are differently described and the resulting preferences are studied. A meta-analysis of framing effects is presented for risky choice problems which are framed either as gains or as losses. This evaluates the finding that highlighting the positive aspects of formally identical problems does lead to risk aversion and that highlighting their equivalent negative aspects does lead to risk seeking. Based on a data pool of 136 empirical papers that reported framing experiments with nearly 30,000 participants, we calculated 230 effect sizes. Results show that the overall framing effect between conditions is of small to moderate size and that profound differences exist between research designs. Potentially relevant characteristics were coded for each study. The most important characteristics were whether framing is manipulated by changing reference points or by manipulating outcome salience, and response mode (choice vs. rating/judgment). Further important characteristics were whether options differ qualitatively or quantitatively in risk, whether there is one or multiple risky events, whether framing is manipulated by gain/loss or by task-responsive wording, whether dependent variables are measured between- or within- subjects, and problem domains. Sample (students vs. target populations) and unit of analysis (individual vs. group) was not influential. It is concluded that framing is a reliable phenomenon, but that outcome salience manipulations, which constitute a considerable amount of work, have to be distinguished from reference point manipulations and that procedural features of experimental settings have a considerable effect on effect sizes in framing experiments.

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0749-5978/98 $25.00

This article is intended to give an overview over about 15 years of research on the framing phenomenon in the judgment and decision making literature. Following Tversky and Kahneman (1981), the term framing was used to indicate the fact that simple and unspectacular changes in the wording of decision problems can lead to preference reversals. Much empirical work was done on framing, and the question of this paper is whether, overall, there is a framing effect and what are the conditions that are apt to produce such an effect.

THE FRAMING PHENOMENON

What Is Framing?

Its inventors use the term decision frame in a relatively broad sense. Tversky and Kahneman (1981) define a decision frame as referring "to the decision maker's conception of acts, outcomes, and contingencies associated with a particular choice. The frame that a decision-maker adopts is controlled partly by the formulation of the problem and partly by the norms, habits, and personal characteristics of the decision maker" (p. 453). In decision theory, the term can be used in a "strict" and in a "loose" sense. The strict definition relates to the wording of formally identical problems, i.e., to a semantic manipulation of prospects whereby the exact same situation is simply redescribed. The original demonstration by Tversky and Kahneman (1981, p. 453) in their famous Asian disease problem is of this sort:

> Problem 1:
> Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:
> 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.
> Which of the two programs would you favor?

Now consider this problem with a slightly different verbal description of the outcomes:

> Problem 2:
> 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.
> Which of the two programs would you favor?

The loose definition of framing refers to framing as an internal event that can be induced not only by semantic manipulations but may result also from other contextual features of a situation and from individual factors, provided that problems are equivalent from the perspective of economic theory. Describing equivalent dilemmata as a give-some vs. as a take-some dilemma (e.g., Aquino, Steisel, & Kay, 1992) is an example of this type of framing. The analysis presented here will distinguish between both definitions but will deal with research on both the strict and the loose framing definition.

The Phenomenon

What are the consequences of couching formally identical problems in different frames? In the positively framed version of the Asian disease problem, a clear majority of respondents preferred saving 200 lives for sure (72%), over the option that offered a 1/3 chance of saving 600 lives (28%). In the negatively framed version, however, most people preferred the 1/3 chance of loosing no lives (78%) to the sure loss of 200 lives (22%). From a formal point of view, options A and B in problem 1 are indistinguishable from options C and D in problem 2; all four options yield either 200 lives for sure or an expected value of 200 lives for the risky options. Thus, there should not be any systematic preference. The finding talks otherwise: There seems to be a general tendency of risk aversion for positively framed problems, and a general tendency of risk seeking for negatively framed problems: this tendency is termed a framing effect. As we shall see, there are different framing effects, dependent on method and procedure. We will try to cover these. Thus, the research hypothesis to be evaluated in the present meta-analysis is: Do risk attitudes differ between framing conditions, such that positive framing leads to less risk-seeking/more risk aversion and negative framing leads to more risk seeking/less risk-aversion?

As will be shown, empirical work on the framing effect began to flourish in the mid eighties. Concurrently, theoretical ideas were brought forward that intended to describe and/or explain the findings. Nowadays the theory landscape on the framing phenomenon is very rich and diverse. I will not go into details of theory here; a recent treatment of the theories on framing and their respective merits and shortcomings is given in Kühberger (1997). However, I will be explicit on the strength of the framing effect, as evaluated by a meta-analysis of the relevant data.

DATA COLLECTION

Purpose and Procedure

The purpose of the present analysis is not only to give an overview over 15 years of framing research but also to identify relevant methodical and substantive features that have a considerable influence on the magnitude of the framing effect. With respect to meta-analytic procedure the present analysis follows the Glassian advices of coding of study characteristics (see Bangert-Drowns, 1986, for different methods of meta-analysis); the formal analysis is largely based on Hedges and Olkin (1985). First the relevant studies were collected, then the study outcomes were transformed into a common metric (Cohen's *d*). Then every study was coded on a quantitative dimension and some categorical variables. These variables represent differences in treatment application, methodological differences, differences in publication history, and differences in experimental setting (see below).

Database

It is necessary to make clear distinctions on what to include and what to exclude from the analysis. The data base consists of published journal articles or book chapters (no dissertations) from experiments (nonexperimental research is not included) with human adults (this excludes Reyna and Ellis' (1994) work with children as participants), provided that they deal with risky decision making, and provided that the expected values of the options are formally identical and that gains and losses have identical probabilities and outcomes. That is, the expected values of positive and negative framing conditions can only differ in sign but not in relative size. (Absolute sizes will differ in most cases. This is easily seen with the Asian Disease problem as an example: "If Program A is adopted, 200 people will be saved" is compared to "If Program C is adopted, 400 people will die"—the values in the two programs have to differ to guarantee identical expected values. Similarly for programs B and D.). Furthermore, the work must be related to the gain/loss distinction. This excludes many studies on framing by labeling of action (accept vs. reject, e.g., Kühberger & Huber, in press). Other studies excluded from the analysis are studies on the framing of acts or contingencies (those lots of studies on mental accounting and the endowment effect, for instance, Samuelson & Zeckhauser, 1988).

To locate the relevant studies two abstracting and indexing services were used: *Psychological Abstracts (PA) (PsychLIT* is the computerized version of *PA*) and *Medline*. Keywords were choice; decision making; framing; prospect theory; reflection; Tversky; Kahneman. Further studies were located by the ancestry approach, that is, by tracking the research cited in papers already obtained.

The Quality of the Framing Manipulation

Framing research has used many different research procedures which differ more or less from the original Asian disease-design. I use deviations from the original design to identify potentially relevant methodical and substantive features that may contribute to the framing effect. Such features relate to risk, task, and participant characteristics. Thus, rather than to evaluate the methodical adequacy of manipulations and to exclude studies by this evaluation, the features of the studies are identified and effect sizes are calculated for the different study groups.

Risk characteristics. The risk notion is used variably in framing research. For instance, it can be applied to the outcomes of a proposed intervention. This is to mean that there is some risky event that comes up or does not come up with some probability in the future. This will be termed "Risk manipulation by reference to a risky event." This notion of risk is used in Asian disease like problems: you choose a program and this or that outcome may happen to obtain, depending on some risky event. The notion of risk can be used in another way too, however. It can be applied to the description of currently existing conditions

rather than to refer to a future risky event. For instance, you can learn that the chances to suffer from a particular disease are 10% (negative frame) or, alternatively, that your chances to be healthy are 90% (positive frame). Here risk is related to the current state of affairs without a specified risky event, and framing simply means the different labeling of this current state. Thus, the positive or negative aspects of a given alternative are made differently salient. Such a manipulation will be termed "Risk manipulation by outcome salience." The distinction between these two meanings of risk follows an idea put forward by Sitkin and his collaborators (Sitkin, 1992; Sitkin & Pablo, 1992; Sitkin & Weingart, 1995). They define problem framing as whether a situation is presented to a decision maker ". . . in terms of gains and losses" and define outcome history ". . . as the degree to which the decision maker believes that previous risk-related decisions have resulted in successful or unsuccessful outcomes" (Sitkin & Weingart, 1995, p. 1576). Making different outcomes salient thus is to implicitly talk about outcome history.

Most framing research in risky decision making is done with problems offering two options: one of these options is a sure one, the other is a risky one. Some more recent framing research does not posit a sure option, but only risky options, however, which vary in their degree of risk. Consequently, we distinguished between experiments that present a sure option and experiments that do not present a sure option.

Another distinction relates to the number of risky events. Each alternative may be characterized by a single risky event which may or may not occur. Some more recent designs use multiple risky events, such that it is not clear what exactly constitutes the risk and how high this risk may be. Examples are frequently found in negotiation tasks, when participants have to negotiate repeatedly over different options that differ in risk.

To sum, risk may differ in several respects: These are (i) whether the risk is manipulated by reference to a risky event or by outcome salience (RISK MANIPULATION), (ii) whether there is a sure and a risky option or whether there are only risky options (QUALITY OF RISK), and (iii) whether there is a single risky event or multiple risky events (NUMBER OF RISKY EVENTS).

Task characteristics. Research in decision theory has demonstrated the influence of many different task features. One of the most basic characteristics for framing is the nature of the framing manipulation. There are trickier ways to manipulate framing than just presenting formally identical problems from two different viewpoints. A perspective change may be induced by other factors too. For instance, one can manipulate the framing of a situation by describing it as either a commons-dilemma or as a public-goods situation. This description is meant to point to losses and gains, respectively, but gains and losses are mentioned only implicitly, rather than explicitly. I will use the term 'Task-responsive framing' for all framing manipulations which are not contingent on the use of words that convey positive or negative meanings (e.g., win, gain, asset, refund; loss, payment), but which try to induce gain and loss frames by task manipulations, rather than labeling manipulations. This is another

distinction where papers were coded on: (iv) whether the frame is manipulated by explicit gain/loss wording or by task-responsive wording (FRAMING MANIPULATION).

A further distinction relates to the response mode. Here we distinguished (v) whether participants have to make a choice or whether they have to make a judgment/rating (RESPONSE MODE).

The next task characteristic that we coded is the type of comparison: (vi) between-subjects designs are separated from within-subjects designs (COMPARISON).

Furthermore, the (vii) "Unit of the analysis" is coded. This distinguishes whether the experiment is done on the individual participant level or whether groups are the unit of the analysis (UNIT OF ANALYSIS).

At least we differentiated between (viii) problem domains (PROBLEM DOMAIN) at a crude level. Here we coded as different domains a health domain, a business domain, a gambling domain, and a social domain.

Participant characteristics. Since level of expertise is often thought to be related to framing, we coded (ix) whether participants are from student samples or whether they are from target samples (SAMPLE).

Further participant characteristics (e.g., age, sex) were not coded because such differences are rarely tested systematically in framing experiments and thus the relevant information for a meta-analysis is missing.

Year of publication. A continuous characteristic was noted too. This is (x) "Year of publication" (YEAR).

Further potentially moderating variables such as individual difference dimensions or other more general cognitive dimensions (e.g., memory, emotion, motivation) are studied occasionally in framing experiments. These studies are very heterogeneous and comparison at a formal level is hardly possible. I will therefore not dwell on these here; the interested reader is referred to Kühberger (1997).

Research Designs

Very diverse research designs are used under the heading of framing experiments (for a description see below). Thus we coded these designs (xi—DESIGN).

All experiments were coded on these 11 study characteristics. Table 1 gives an overview over the levels of these codes (excluding xi).

Statistical Significance and Effect Size

Since study characteristics were defined a priori, and study variation is treated mainly by examination of relations between effect sizes and these preestablished categories, this meta-analysis follows mainly the Glassian (1981) tradition. In the formal analysis, however, we follow in essence Hedges and Olkin (1985). At places, reference will be made to other textbooks (Cooper & Hedges, 1994, Rosenthal, 1991).

TABLE 1

Summary of a Priori Coded Study Characteristics

Study characteristic	Features
Risk characteristics	
Risk manipulation	Reference to a risky event vs. Outcome salience
Quality of risk	Riskless/risky options vs. Risky/risky options
Number of risky events	Single risky event vs. Multiple risky events
Task characteristics	
Framing manipulation	Gain/loss vs. Task-responsive
Response mode	Choice vs. Rating/judgment
Comparison	Between-subjects vs. Within-subjects
Unit of analysis	Individual participant vs. Group
Problem domain	Economic vs. Social vs. Health vs. Gambles
Participant characteristic	
Sample	Students vs. Target sample
Other	
Year	Year of publication

Traditionally empirical research reports the results by giving test statistics and their respective levels of significance. Effect sizes are seldom reported. Textbooks on statistics agree, however, "that a test of significance without an effect size estimate fails to tell the whole story" (Rosenthal & Rosnow, 1991, p. 45). However, in most cases the equation: "Test of Significance = Size of Effect × Size of Study" enables the computation of effect sizes from significance tests. Calculation of effect sizes was done with a software tool called *DSTAT: Software for the meta-analytic review of research literatures* (Johnson, 1989). We used DSTAT 1.10 (1993). DSTAT calculates the Glass-g and Cohen's *d* from a large variety of different inputs. In most cases the value of the test statistic together with the number of participants was used to calculate the effect size; sometimes means and *SD*s, sometimes proportions or frequencies were used. Since the g-statistic is known to overestimate the population effect size especially for studies with small samples (Hedges & Olkin, 1985), Cohen's d is used here as the index of the effect size. Cohen's *d* is the difference between the means of the two compared groups divided by an estimate of the population standard deviation. In general, those *d*'s were computed from frequencies in choice experiments and from either test statistics (F, t, . . .) or from means and standard deviations in judgment/rating experiments. The sign of the effect size corresponds to the Prospect theory prediction: it is positive for more risk-aversion with gains and more risk-seeking with losses. Study outcomes are combined by averaging the d's. Homogeneity statistics are calculated to see whether each set of d's shares a common effect size. In the absence of homogeneity, variability in effect sizes is accounted for by relating them to coded study characteristics. Both categorical and continuous models are tested. Categorical models show whether heterogeneous effect sizes are homogeneous within established subgroups. DSTAT calculates the between classes effect Q_B, which is analogous to a main effects analysis-ANOVA, and tests for the homogeneity of

the effect sizes within classes, Q_W. The continuous models are least squares linear regressions.

Independence and Nonindependence

Sometimes a single study may contain multiple tests of the same hypothesis, when, for instance, more than one dependent variable is used. In other cases, a single research report may contain more than just one single study. In these cases, tests may not be independent. A decision must be made, however, about which data will be considered independent. The general rule followed here is to use samples as units, that is, results from different samples of participants are separated from each other. In essence, this means that a report that contains multiple experiments produces multiple effect sizes. In some cases, however, a single experiment is allowed to contribute more than just one result. An example would be an experiment that tests the influence of group discussion on framing effects. Such an experiment would report the framing effect on the individual level before group discussion and the framing effect on the group level after group discussion. If we were to do an analysis on individuals vs. groups, such a report would contribute two measures. Since, besides an overall evaluation of the framing effect, some focused hypotheses are tested (e.g., influence of number of subjects, subject population, study design, response mode, etc.), some studies will be allowed to have multiple contributions. Results for a single experiment will only be separated, if they contribute to the above predefined study qualities, however.

Standards of Comparison

For framing effects different indices are possible. Wang (1996) uses the terms bidirectional and unidirectional framing effects, respectively. Bidirectional framing effects occur when choices are predominantly risk averse for gains and predominantly risk seeking for losses. Unidirectional framing effects involve no preference reversal, but a shift to a more extreme risk preference. A related distinction is made by Maule (1989). Framing effects can be operationally defined as deviances from the 50:50% chance expectation of risk-seeking and risk-averse choices within framing conditions, or as group differences between framing conditions. Imagine, for instance, that in a choice problem, 34% of the participants choose the sure option in the positive framing condition and 10% choose the sure option in the negative framing (Wang, 1996, p. 149). With 33 and 31 participants in the positive and negative framing conditions, respectively, this is a significant unidirectional framing effect (more risk-seeking with losses), but there is no bidirectional effect (no reflection around 50%). To make things worse, treated as deviance from the 50:50 chance expectation, both framing conditions differ significantly from 50%, but the positive framing condition is significantly contrary to the Prospect theory prediction of risk aversion for positive framing. Thus the very same finding can be interpreted either (i) as a significant framing effect as predicted by Prospect theory, (ii) as no framing

effect, or (iii) as a significant framing effect contrary to the predictions of Prospect theory. In the literature the choice of the standard of comparison typically is not justified. Sometimes the 50:50% chance expectation is used, sometimes differences between, more rarely within framing conditions are considered relevant. I use here the difference between conditions as the sole index for a framing effect. In principle, the 50:50% chance expectation would also qualify as a index, but many experiments do report only between group statistics and, at the other hand, the 50:50% chance expectation cannot be applied meaningfully to experiments that use ratings as the response mode. Thus, a framing effect is defined here as a difference between framing conditions.

DESCRIPTIVE ANALYSIS

The descriptive analysis deals with more general aspects of framing research as related to quantity of framing research and experimental methodology.

Areas of Empirical and Theoretical Interest

For getting an impression of the productivity of framing research, I counted the number of theoretical and empirical papers and noted their year of publication (see Fig. 1). Not included in Fig. 1 are the early formal papers that led the way to framing by positing different utility functions for gains and losses (e.g., Fishburn, 1977; Fishburn, & Kochenberger, 1979; Friedman & Savage, 1948; Markowitz, 1952).

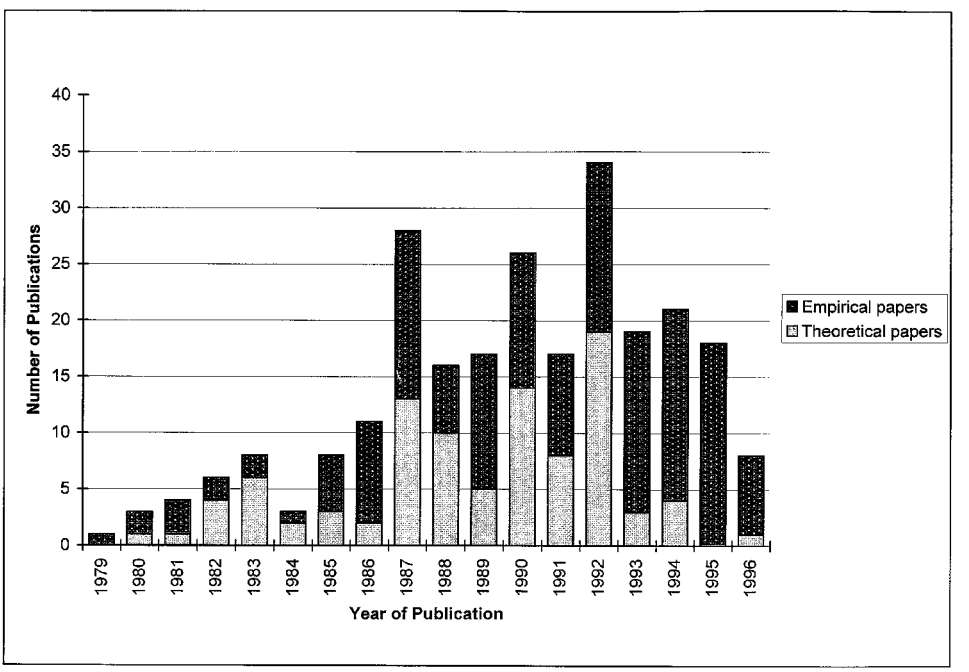

FIG. 1. Number of empirical and theoretical papers on framing.

Ninety-six published theoretical and 152 published empirical papers, in sum 248, on framing in risky decisions were located by 1997. These came from very diverse research areas and were located in 66 different scholary journals from experimental, social, and applied psychology, medicine, management, business, and other applied areas.

Experimental Research Designs

Close scrutiny of the literature shows that experimental framing research comes under different operational definitions. Nine such designs were identified and the general features of these designs are described below.

The Asian disease design (ADP; e.g., Tversky & Kahneman, 1981). This is the standard design. Participants have to choose between two options, one option offering a sure, the other offering a risky outcome. Frames are manipulated by changing the salience of reference points, so that participants perceive formally identical outcomes either as gains or as losses.

The gambling design (e.g., Kahneman & Tversky, 1979, problem 11). This is similar to the ADP. The experimental problems however are gambles or lotteries. Nearly exclusively, students' hypothetical money is at stake.

The tax evasion design (e.g., Chang, Nichols, & Schultz, 1987). Depending on the reference point, tax payments may be perceived as a reduced gain or as a loss. A refund withholding position may represent a gain, whereas a tax payment represents a loss. It is tested whether taxpayer attitudes toward tax audit risk vary as a consequence of such vantage-point-framing.

The clinical reasoning design (e.g., McNeil et al., 1982). Clinical problems are presented that offer the choice between two alternative therapies. These therapies are risky to different degrees, in that they yield different patterns of survival (positive frame) or mortality (negative frame) risks. Often the choice is between a more conservative therapy like irradiation and a more invasive therapy like surgery and short- and long-term probabilities for living and dying are manipulated.

The bargaining design (e.g., Neale & Bazerman, 1985). Bargainers have to agree on the price of a commodity described on different issues. Positive frames are induced by bargaining schedules that give positive possible settlement levels for the issues (coded as gains from a status quo). Negative frames are induced by outcomes that are given as losses from a reference value of total assets. This reference value is chosen so to make the different framing conditions equivalent with respect to final asset positions. Risk is not manipulated directly but is considered relevant as represented by the probability of failure to reach a settlement. Dependent variables include amount and distribution of payoffs and number of settlements.

The message compliance design (e.g., Meyerowitz & Chaiken, 1987). It is tested whether persuasive arguments that stress the positive consequences of

doing something, rather than to stress the negative consequences of failing to do something, will be more effective with respect to compliance. For instance, participants receive pamphlets stressing either the negative consequences of not performing (negative framing) or the positive consequences of performing (positive framing) some recommended health-care behaviors. Compliance is measured in multiple ways with respect to attitudes, intentions, and behaviors.

The escalation of commitment design (e.g., Arkes & Blumer, 1985). Financial data are presented which reveal that an option which was chosen in an earlier decision had failed to produce the expected return. Participants then are told that additional funds are available for augmenting the original investment and are asked whether or not they would invest the additional amount. This is considered a loss situation. The control group is presented with a situation where no prior investment has been made and participants are asked whether or not they would invest the whole investment (this makes the expected values equivalent).

The evaluation of objects design (e.g., Levin, Johnson, & Davis, 1987). Participants are given differently framed information and have to evaluate objects accordingly. For instance, gambles may be described by amount won and probability of winning (positive frame) or, alternatively, by amount lost and probability of loosing (negative frame). It is tested whether different frames lead to different evaluations.

The game-theory design (e.g., Brewer & Kramer, 1986). Choice dilemmas are presented, usually in the form of social dilemmas, where the consequences of individually reasonable decisions result in collective disaster. Two types of dilemma situations are distinguished: take-some and give-some dilemmas. In take-some dilemmas individuals have to decide how much of a shared resource to take for themselves. Give-some dilemmas relate to the provision of public goods and individuals have to decide how much they should give to maintain a collective resource. These two types of dilemmas can be presented with the same underlying payoff structure. Take-some dilemmas are conceptualized as positively framed situations since taking means a gain. Give-some dilemmas, at the other hand, are considered negatively framed, since giving a contribution means incurring a loss. It is tested whether dilemma type is related to risk attitude, measured as the amount of cooperation.

In Table 2 the features of these designs are presented in terms of the characteristics that were coded for each research report. Table 2 lists the predominant features. Features are treated as predominant when significantly more than 50% of the studies are operationally defined with the respective feature.

EVALUATIVE ANALYSIS

Framing Effect

Overall 136 research reports were identified from which 230 single effect sizes could be calculated. Overall, nearly 30,000 single subjects are included

TABLE 2

Characteristic Features of Experimental Designs

Design	Risk manipulation	Quality of risk	*N* of risky events	Framing manipulation	Response mode	Comparison	Unit of analysis	Sample
Asian disease	Ref. point	Riskless/risky	Single	Gain/loss	Choice	Between	Individual	Students
Gambling	Ref. point	Riskless/risky	Single	Gain/loss	Choice		Individual	Students
Tax evasion	Ref. point	Riskless/risky	Single			Between	Individual	
Clinical reasoning	Outcome	Risky/risky	Single	Gain/loss	Choice	Between	Individual	
Bargaining	Ref. point	Risky/risky	Multiple	Gain/loss	Rating	Between	Individual	Students
Message compliance	Outcome	Risky/risky		Gain/loss		Between	Individual	
Escalation of commitment		Risky/risky				Between	Individual	
Evaluation of objects		Risky/risky					Individual	Students
Game theory	Ref. point	Risky/risky	Multiple	Task resp.		Between		Students

Note. Ref. point, reference point manipulation; Task resp., task-responsive.

in the meta-analysis, with a mean sample size of approximately 130 participants per effect size. The findings for the overall framing effect are presented in Table 3. Table 3 shows that the difference between framing conditions in terms of *d* is not overly impressive.

Mean unweighted $d = 0.329$, weighted $d = 0.308$ (each effect size weighted by the reciprocal of its variance, which is approximated by $1/n_i$ where n_i is the *i*th sample size; see Hedges & Olkin, 1985) this represents small to moderate differences between framing conditions. In other words, the average effect size is about a third of a standard deviation on whatever outcome measure was used. Seventy-two percent of the effect sizes are positive; 7% of the *d*s were (assumed to be) zero. These were cases where no value of the test statistic was reported. Twenty-one percent of the effect sizes were negative. Even with the conservative strategy of assuming a *d* of zero for the cases where no value of the statistic is reported, which tends to underestimate the true effect size, the combined effect size confidence interval do clearly exclude the null value. The variability of the effect sizes is considerable and the relevant test statistic shows clear heterogeneity of the effect sizes.

Moderator Variables

Risk characteristics. The results for the risk characteristics are presented in Table 4. Reported is the number of effect sizes *k* within each class, the mean weighted effect size *d*, the 95% confidence interval, the within classes homogeneity Q_W and the between classes homogeneity Q_B (see Hedges & Olkin, 1985). Q_W is essentially the weighted sum of squares of the *d*s from the mean d of the respective class and measures the homogeneity within classes. Q_W is found to be significant in all classes in Table 4. This indicates lack of homogeneity. Q_B is analogous to the *F* test in an ANOVA and tests whether class means

TABLE 3

Statistical Summary of Framing Effect Size (Cohen's *d*)

Central tendency	
k	230
Mean *d* (unweighted)	+.329
Mean *d* (weighted by reciprocal of variance)	+.308
Proportion $d < 0$	.21
Proportion $d = 0$	.07
Proportion $d > 0$	.72
95% Cl	[.29, .33]
Significance test	
Combined Stouffer $Z = 28.0$, $p < .0001$	
Variability	
Maximum *d*	2.709
Minimum *d*	−1.315
S	0.531
SE	0.004
Q (229) = 1827.4, $p < .001$	

TABLE 4

Risk Characteristics

Characteristic	*k*	*d*	95% Cl	Q_W
Risk manipulation				
Reference point	157	+.50	[+.48, +.53]	845.0***
Outcome salience	072	−.11	[−.15, −.07]	310.7***
$Q_B(1) = 667.3$***				
Quality of risk				
Riskless/risky options	122	+.46	[+.43, +.49]	830.4***
Risky/risky options	108	+.12	[+.09, +.15]	761.0***
$Q_B(1) = 235.4$***				
Number of risky events				
Single risky event	176	+.34	[+.32, +.37]	1488.9***
Multiple risky events	054	+.17	[+.29, +.33]	299.5***
$Q_B(1) = 39.0$***				

Note. Q_W, homogeneity within classes; Q_B, homogeneity between classes.
***$p < .001$.

are different. This statistic is essentially a weighted sum of the squares of the ds about the grand mean. All three risk characteristics discriminate between subclasses. The Risk manipulation shows the most impressive class difference: manipulation of the reference point is clearly effective in framing, whereas manipulation of framing by outcome salience is ineffective. Presenting risky versus riskless options results in bigger framing effects than presenting options varying in risk, and experiments with a clearly stated single risky event produce stronger framing effects that experiments that are less explicit on what constitutes the risky event(s).

Task characteristics. The results of the task characteristics are presented in Table 5. The framing manipulation is done much more frequently by gains/losses-wording and is stronger there as compared to task-responsive wording. The results for the Response modes are clear-cut: the responses are mainly choices and these elicit framing effects roughly five times bigger than the framing effect sizes for ratings or judgments. Evaluated a priori, this difference is highly significant ($\chi^2(1) = 146.6$, $p < .001$). A somewhat surprising finding is the next: stronger framing effects in the less frequently used within-subjects comparisons and smaller effects in between-subjects comparisons. Individual and group analyses produced comparable effect sizes. Problem domains produced different effect sizes, post-hoc tests (the domain other/mixed excluded) showed that the Business domain and the Gambling domain both produced bigger effect sizes than the Social domain ($p < .05$).

Participant characteristics. The results for the different samples are presented in Table 6. Student samples dominate framing research, but, according to the results, are not misleading. Student and target populations do not differ in their receptivity to the framing effect ($\chi^2(1) = 1.6$, $p = .20$).

TABLE 5

Task Characteristics

Characteristic	*k*	*d*	95% Cl	Q_W
Framing manipulation				
Gain/loss	191	+.33	[+.30, +.35]	1514.6***
Task-responsive	038	+.21	[+.15, +.26]	297.8***
Q_B (1) = 14.4***				
Response mode				
Choice	150	+.40	[+.38, +.43]	1253.8***
Rating/Judgment	061	+.08	[+.03, +.12]	330.9***
Other/Mixed	019	+.14	[+.07, +.21]	73.9***
Q_B (2) = 168.7***				
Comparison				
Between-subjects	178	+.27	[+.24, +.30]	1286.9***
Within-subjects	052	+.41	[+.37, +.46]	506.9***
Q_B (1) = 33.6***				
Unit of analysis				
Individual	215	+.31	[+.29, +.33]	1775.6***
Group	015	+.27	[+.18, +.36]	51.1***
Q_B (1) = 0.7, p = .41				
Problem domain				
Business	66	+.34	[+.30, +.38]	348.9***
Gambling	57	+.32	[+.28, +.36]	679.6***
Health	75	+.26	[+.23, +.30]	647.9***
Social	16	+.16	[+.06, +.26]	83.3***
Other/mixed	16	+.45	[+.38, +.53]	36.6**
Q_B (4) = 31.0***				

Note. Q_W, homogeneity within classes; Q_B, homogeneity between classes.
**$p > .01$; ***$p < .001$.

Year of publication. Year of publication was used in a least squares linear regression as a predictor of the framing effect. Rosenthal and Rubins' (1982) focused comparison was run and produced a $Z = -2.46$, $p < .05$. This shows that, over the years, the framing effect size has decreased significantly.

Experimental Designs

The results for the different Experimental designs are presented in Table 7.

The results are nonequivocal: some designs are effective, and some are ineffective in reliably producing a framing effect. Effective designs are the Asian disease, Gambling and Tax evasion designs; these produce effect sizes of approximately $d = 0.5$. The Bargaining and Escalation of commitment designs produce small effect sizes of approximately $d = 0.15$, their confidence limits do exclude the null, however. The Game theory, Message compliance, Clinical reasoning, and Evaluation of objects designs are ineffective; they do not produce a framing effect.

In Table 2 the predominant features of the designs are listed. By simply counting the similarities and differences in features, one can get a rough picture of the differences between designs. To form a crude index, we take the Asian

TABLE 6

Participant Characteristics

Characteristics	*k*	*d*	95% Cl	Q_W
Sample				
Student samples	187	+.34	[+.31, +.36]	1479.0***
Target samples	035	+.38	[+.32, +.43]	145.7***
Mixed samples	008	−.19	[−.28, −.11]	57.4***
Q_B (2) = 145.3***				

Note. Q_W, homogeneity within classes; Q_B, homogeneity between classes.
***$p < .001$.

disease design as the reference design and add the similar, dissimilar, and not discriminative features. If a design shares a predominant feature with the Asian disease design, it gets +1 for the respective characteristic. If a design is dominated by the opposite feature, it gets −1. If no predominant feature can be coded, the design gets a 0 for the respective characteristic. Calculated this way, the Asian disease gets the value +8 (8 features were coded), and the other designs get values between +8 (all predominant features equal to the Asian disease) and −8 (all predominant features dissimilar to the Asian disease). These values were regressed to the mean effect sizes of the respective designs. We found an excellent linear relationship between the index of of similar/dissimilar features and the mean effect size (F (1,7) = 26.8, p = .001) and an impressive goodness of fit (R = 0.89, adjusted R^2 = 0.76). The index of similar/dissimilar features between research designs thus explains more than 75% of the variance of the mean effect sizes of designs.

Predicting the Framing Effect from Coded Categories

Which category or combination of categories is most valuable in predicting the framing effect size? This question can be answered at a crude level by

TABLE 7

Experimental Designs

Design	*k*	*d*	95% Cl	Q_W
Asian disease	80	+.57	[+.53, +.61]	261.4***
Gambling	32	+.43	[+.38, +.48]	430.1***
Tax evasion	09	+.42	[+.32, +.53]	42.3***
Bargaining	14	+.17	[+.07, +.27]	50.2***
Escalation of commitment	09	+.17	[+.03, +.30]	140.0***
Game theory	11	+.04	[−.07, +.15]	63.9***
Message compliance	13	+.04	[−.05, +.13]	12.4
Clinical reasoning	25	−.02	[−.08, +.04]	183.8***
Evaluation of objects	07	−.08	[−.22, +.06]	59.9***
Other	30	+.21	[+.15, +.27]	143.3***
Q_B (9) = 440.1***				

Note. Q_W, homogeneity within classes; Q_B, homogeneity between classes.
***$p < .001$.

inspecting the results for the different categories (Tables 4, 5, and 6). To test this more formally, we ran a multiple linear regression with Risk manipulation, Quality of risk, Number of risky events, Framing manipulation, Response mode, Comparison, Unit of analysis, Sample, and Year of publication as predictors and effect size as dependent variable. We used the forward procedure of SPSS with probability of F-to-enter = .05. This produced a regression equation with only two predictors, namely Risk manipulation and Response mode. The linear relationship was clearly discernible ($F(2,198) = 38.8$, $p < .001$) and the goodness of fit was $R = 0.53$, R^2 (adjusted) = 0.27. This corroborates the first impression: Risk manipulation and Response mode are the most important characteristics for predicting the size of the framing effect. Quality of risk, which is very important as a single variable, does not survive the stepwise procedure because Quality of risk is negatively correlated with Risk manipulation ($r = -.27$, $k = 227$, $p > .001$). Reference point manipulations are mainly of the riskless/risky type, while Outcome salience manipulations are mainly risky/risky.

Outlier Analysis

An integral part of meta-analysis is the analysis of outliers. Since the heterogeneity in our data is considerable, identification of outliers may be helpful. According to Hedges and Olkin (1985) we define outliers as those cases that result in the largest reduction to the homogeneity statistic. We excluded the largest 10% of the outliers. This reduced the database from 230 to 207 (i.e., 23 outliers excluded) effect sizes. Mean weighted effect size for the remaining 207 cases was $d = +.300$, mean unweighted effect size was $d = +.316$. No big changes resulted for the risk characteristics. For the task characteristics the Framing manipulation (gains/losses versus task-responsive) was not longer influential ($d = +.304$, k = 171, and $d = +.277$, $k = 35$, for gains/losses and task-responsive framing, respectively; $Q_B(1) = 0.8$, $p = .38$).

Problem domains showed differences: Excluding one outlier from the social domain resulted in a doubling of the mean effect size for this domain ($d = +.304$, $k = 15$). With respect to the coded participant characteristic, we got an interesting result. Now students showed bigger effect sizes ($d = +.320$, $k = 169$) that target populations ($d = +.207$, $k = 32$; $\chi^2(1) = 9.1$, $p < .01$).

The experimental designs showed some changes: excluding one effect size from the Game theory design resulted in a much higher and now clearly positive mean effect size for this design ($d = +.200$, $k = 10$). For the Tax evasion design, exclusion of a single effect size resulted in a considerable decrease of the mean effect size ($d = +.273$, $k = 8$), these remaining 8 effect sizes were homogeneous, however. For the Escalation of commitment design, exclusion of one datapoint led to a dramatic decrease of the mean effect size ($d = .007$, $k = 8$). All other designs were more or less similar to the overall analysis.

Reference Point Effects vs. Labeling Effects

Studies that manipulate reference points have considerable effect sizes, while studies that manipulate labels have, if at all, negative effect sizes. Since these

two manipulations are crucial, we will give a short analysis for each group. The results are presented in Table 8, 9, and 10. From these tables the difference between framing by reference point manipulation and framing by outcome salience manipulation is clearly visible. Reference point studies produce an effect size of around $d = .5$, while labeling studies produce negative effects ($d = -.1$). The results for the coded characteristics are presented in Table 9. We do not give homogeneity statistics, since, generally, effect sizes are heterogeneous within feature classes.

In general, the mean effect sizes for feature classes are about 0.2 points higher in reference point studies than overall. Labeling effects are in general about 0.4 points lower than overall. The interpretation of reference point effects is largely similar to the overall interpretation: higher effect sizes for riskless/risky studies as compared to risky/risky one; higher effect sizes for single as compared to multiple risky events; higher effects for gain/loss than for task-responsive manipulations; more than double the effect size for choices as compared to ratings; no difference between students and target samples. Here, however, between-subjects comparisons and within-subjects comparisons produced similar effect sizes; individual subjects produced higher effect sizes than groups, and problem domains had a different order of magnitude of effect. The effect sizes of some of the experimental designs (see Table 10) were considerably higher now (Escalation of commitment, Clinical reasoning, Evaluation of objects).

The relation between year of publication and effect size was not significant for reference point studies ($Z = -1.0$; $p = .30$), but was clearly significant for labeling effect studies ($Z = 3.3$; $p < .01$).

TABLE 8

Statistical Summary of Reference Point Effect and Labeling Effect

	Reference point effect	Labeling effect
k	157	72
Central tendency		
Mean *d* (unweighted)	+.510	−.076
Mean *d* (weighted)	+.504	−.107
Proportion $d < 0$	.07	.53
Proportion $d = 0$	.04	.19
Proportion $d > 0$	.89	.28
95% Cl	[+.48, +.53]	[−.15, −.07]
Significance test		
Combined Stouffer $Z =$	+37.6, $p < .001$	−5.5, $p < .001$
Variability		
Maximum *d*	+2.71	+1.12
Minimum *d*	−1.31	−1.17
S	0.49	0.39
SE	0.04	0.05
	Q (156) = 845.0***	Q (71)= 310.7***

TABLE 9

Results of Reference Point Effect and Labeling Effect

Characteristic	Reference point effect			Labeling effect		
	k	*d*	95% CI	*k*	*d*	95% CI
Quality of risk						
Riskless/risky options	99	+.55	[+.51, +.58]	23	+.03	[−.04, +.10]
Risky/risky options	59	+.41	[+.37, +.46]	49	−.16	[−.21, −.12]
Q_B (1) =	21.2***			19.5***		
Number of risky events						
Single risky event	118	+.57	[+.54, +.59]	58	−.12	[−.16, −.07]
Multiple risky events	040	+.27	[+.22, +.33]	14	−.07	[−.16, +.02]
Q_B (1) =	79.0***			0.9, p = .33		
Framing manipulation						
Gain/loss	127	+.54	[+.51, +.56]	64	−.09	[−.13, −.05]
Task-responsive	030	+.34	[+.28, +.41]	08	−.21	[−.32, −.10]
Q_B (1) =	28.1***			3.5, p = .06		
Response mode						
Choice	111	+.58	[+.55, +.61]	39	−.10	[−.15, −.05]
Rating/judgment	041	+.23	[+.18, +.29]	20	−.20	[−.28, −.13]
Other/Mixed	006	+.49	[+.35, +.63]	13	.00	[−.09, +.08]
Q_B (2) =	111.0***			11.6**		
Comparison						
Between-subjects	113	+.50	[+.46, +.53]	65	−.08	[−.12, −.04]
Within-subjects	045	+.52	[+.47, +.56]	07	−.32	[−.44, −.20]
Q_B (1) =	0.5, p = .44			14.1***		
Unit of analysis						
Individual	146	+.51	[+.49, +.54]	69	−.12	[−.16, −.08]
Group	012	+.37	[+.26, +.48]	03	+.08	[−.07, +.24]
Q_B (1) =	6.2*			6.0*		
Problem domain						
Business	55	+.38	[+.34, +.43]	11	+.01	[−.11, +.14]
Gambling	42	+.56	[+.51, +.61]	15	−.16	[−.23, −.08]
Health	38	+.64	[+.58, +.69]	37	−.13	[−.19, −.08]
Social	09	+.43	[+.27, +.60]	07	−.01	[−.14, +.12]
Other/mixed	14	+.46	[+.39, +.54]	02	+.30	[+.02, +.58]
Q_B (4) =	59.5***			16.5**		
Sample						
Student populations	135	+.51	[+.48, +.54]	52	−.08	[−.13, −.04]
Target populations	018	+.51	[+.45, +.58]	17	+.06	[−.04, +.16]
Mixed populations	005	+.33	[+.17, +.50]	03	−.38	[−.47, −.28]
Q_B (2) =	4.4, p = .11			40.5***		

Note. Q_B, homogeneity between classes.
*$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 10

Results of Reference Point Effect and Labeling Effect for Experimental Designs

Design	Reference point effect			Labeling effect		
	k	*d*	95% Cl	*k*	*d*	95% Cl
Asian disease	69	+ .60	[+.56, + .64]	11	+.19	[+.05, +.33]
Gambling	26	+ .61	[+.55, + .67]	06	−.09	[−.20, +.01]
Tax evasion	09	+ .42	[+.32, + .53]	00	—	— —
Bargaining	14	+ .17	[+.07, + .27]	00	—	— —
Escalation of commitment	03	+ .82	[+.61, +1.04]	06	−.24	[−.41, −.07]
Game theory	09	+ .25	[+.11, + .38]	02	−.33	[−.51, −.15]
Message compliance	00	—	— —	13	+.04	[−.05, +.12]
Clinical reasoning	03	+ .62	[+.49, + .75]	22	−.18	[−.24, −.11]
Evaluation of objects	02	+1.10	[+.72, +1.47]	05	−.25	[−.40, −.11]
Other	23	+ .28	[+.21, + .34]	07	−.09	[−.22, +.04]
	Q_B (8) = 159.4***			Q_B (7) = 44.6***		

Note. Q_B, Homogeneity between classes.
***$p < .001$.

DISCUSSION

The Framing Effect: Fact or Fiction?

Framing research has produced a massive body of evidence in the eighties and nineties and research is still flourishing since about 15 empirical papers are published each year. The present meta-analysis demonstrated a framing effect, but this effect is of only small to moderate size. Framing research is relatively young, however, and one could argue that only studies that succeed in replicating an effect (and thus showing Type I error, if the effect does not exist in fact) tend to get published. This "file drawer problem" (Rosenthal, 1979) would lead to an overestimation of the true size of the effect. Following Rosenthal (1991), we can calculate that 66,388 studies finding null results would have to exist somewhere before the overall results could reasonably be ascribed to sampling bias. This is not plausible. Furthermore, we used a conservative estimation since we estimated the effect size to be d = 0 for cases where the framing manipulation did not show significant group differences. Framing research is not a homogeneous endeavor, however. Diverse operational, methodical and task-specific features make the body of data heterogeneous to a degree that makes it impossible to speak of "the framing effect." Framing appears in different clothes, some effective in producing an effect and some ineffective.

Framing without reference points. Risk manipulation, Quality of risk, as well as Number of risky events have their influences on the framing effect. The most important characteristic of these is Risk manipulation: framing effects are strong with reference point manipulations and are not present or even negative with outcome salience manipulations. This distinction is basic. For situations where the salience of outcomes is manipulated, the threat-rigidity hypothesis

(Staw, Sandelands, & Dutton, 1981) may be applied. This hypothesis suggests that the presence of threats may result in processing strategies which are more consistent with conservative behavior (e.g., reliance upon prior expectations, attention to dominant cues, or a tendency to emit well-learned responses). Take an example: Why should the possibility to lose something with, say 20% probability, make people be inclined to gamble (this would be the Prospect theory prediction—risk seeking with losses)? If losses are made salient, they should probably be avoided, as compared to making gains salient. However, models that offer predictions opposite to Prospect theory tend to be generally overlooked in framing research (Sitkin & Pablo, 1992). Thus, one conclusion is that much research has been done with an inappropriate (informal) operational definition of the phenomenon (72 out of 230 effect sizes relate to outcome salience manipulation). We suggest that these two different operational meanings of framing should be conceptually separated in future research.

The prospects of risk. The two remaining risk characteristics, Quality of risk and Number of risky options were shown to be influential for framing too. The point to be stressed here is that these can be seen as measures of the appropriateness of the original Prospect theory formulation. Prospect theory was formulated for situations presenting a sure and a risky option and where a focal risky event is clearly discernible. Thus, the lesson learned is: be careful with generalizations from the riskless/risky case to the case where the options differ in risk. My impression is that researchers often are too optimistic with respect to the applicability of the framing concept to risky/risky cases. The problem with risky/risky cases is that it is often to a degree arbitrary, which option to consider the more risky option and which to consider the less risky one. A typical example is found in the Message compliance design: What is the more risky behavior? Is it more risky to do breast self-examination and to be able to detect potential cancer early or is it more risky to fail to do breast self-examination and not to detect cancer? With respect to the final outcome (life or death earlier or later), doing the examination is the less risky option, but with respect to the immediate outcome, doing the examination is the more risky option. If we do not know which outcome is relevant for a given individual, the question of what constitutes the more or less risky option cannot be answered. Or to give an example from the Escalation of commitment design: Is it more risky to throw good money after the bad or is it more risky to invest it in another—risky—activity? The answer again is not straightforward. I think it is not incidental that the Message compliance design and the Escalation of commitment design are not influenced by framing, since in these designs the alternatives often differ only in degree of risk. Similarly for the Number of risky events: if alternatives are described by a multiplicity of risky events, each will probably differ only quantitatively in risk. Which option is more or less risky thus often cannot be exactly specified.

Choice or no choice? The point to be made pertains to the response modes that are used in framing experiments. Choices dominate the research and produce much stronger effects than judgments or ratings. The judgmental or

rating mode, offers many points for evaluation (Westenberg & Koele, 1990), choices offer only two and, furthermore, choices typically are forced choices (indifference is not permitted). This requirement may enlarge the difference between conditions (see Fagley & Miller, 1987). Similar ideas are brought forward in research on other phenomena, e.g., for ambiguity avoidance (Curley et al., 1986). A related factor pertains to the number of alternatives in a decisional or judgmental context. If you have to choose you must be presented with two options to choose from. Ratings or judgments can be provided for a single option, however. That is, problems presenting two options tend to come with choices, and problems presenting one single option tend to require ratings or judgments. With two options the relevant difference between conditions may be more visible and thus may more or less artificially enlarge differences (Pany & Reckers, 1987; Perner et al., in press). Response modes may also be correlated with other characteristics of task and context which may contribute to this difference.

Explicit and implicit gains and losses. Doing the framing manipulation by gains/losses is dominant practice; the ratio between gain/loss manipulations and task-responsive manipulations is approximately 5:1. The overall analysis showed a higher effect size for gain/loss manipulations, however, this difference disappeared when 3 task-responsive effect sizes were excluded in the outlier analysis. Our interpretation is that, for the most part, task-responsive framing manipulations have succeeded in manipulating the framing in the intended way. Only in a few cases the manipulation may have been ineffective. This makes hope that framing must not be seen as an isolated effect which can be demonstrated only in basic research and which has no practical utility. To the contrary, relative indirect manipulations demonstrate the influence of framing. These indirect manipulations are at times very similar to situations encountered in daily life. Thus, framing research may have a lot to say about more practical aspects of judgment and decision in daily life.

Framing groups. Experiments with single participants yield similar or higher effect sizes than experiments that use groups of participants as units. Group analyses are usually done after group discussion, and the question often is whether group discussion leads groups to adopt more extreme reference points. Our conclusion is that this is unlikely. It may depend on group dynamics, on the number of group members, on the rate of positively and negatively framed group members, on the topic under discussion, etc. For instance, group discussion may render a framing manipulation ineffective, when group members learn about other frames for viewing a problem. Experiments at the group level are a very heterogeneous class with respect to experimental procedure, since besides the more formal aspect of framing, many additional social, and procedural features may be differently construed in group experiments.

Domain generality or domain specificity? Research has demonstrated instances of domain specific reasoning (e.g., Gigerenzer & Hug, 1992). We made a rather crude distinction between possible domains. This distinction was made ad-hoc and was not related to any existing distinction (e.g., Carey, 1985). We

simply distinguished four different domains that were present in our database at face validity. A priori, we had not formed any specific hypotheses on differences between these domains. Overall, domain specific thinking is not indicated by the results. To be sure, the effect sizes do differ to a degree between domains, but these differences are not big and give no systematic picture. Admittedly, the definition of what should constitute a domain is crucial here. Since I am not aware of any characterization of different domains that would be appropriate for framing research, I had to rely on more pragmatic considerations for distinguishing different domains. Domains could be distinguished by semantic or other theoretical considerations too, however (for a more thorough discussion of domain specificity see Goldstein & Weber, 1995; Hirschfeld & Gelman, 1994). Maybe domains cannot be discriminated at such a fine level than was done here.

Are experts immune? An argument against the generalizability of findings in decision research is often that these findings are based on students as participants. Motivational and/or cognitive differences are assumed to exist between students and target samples and it is argued that these differences would make effects found in the lab to disappear in the real world. The point to stress here is that framing research has stepped outside the lab to a considerable degree. But, although students and experts may differ in a variety of ways, with respect to framing experts are not immune to the reference point effect (overall analysis and reference point analysis) or at least, experts are also influenced by framing, but maybe to a lesser degree than students.

Asian disease problem and variants. The more experiments differ from the original Asian disease problem, the lesser the reference point effect. This is also underscored by the observation that, in the outlier analysis, the original finding of Tversky and Kahneman from 1981 comes at position 7. That is, the original finding is of impressive size ($d = +1.16$) and is an outlier with respect to the magnitude of the overall effect. The findings clearly differentiate between procedural designs that produce a framing effect and designs that fail to do so. It is comforting that the most frequently researched designs are at the same time the most effective. The Asian disease dominates the research and shows the strongest mean effect; gambles are essential designs in judgment and decision making and do also show a big effect. Overall, 4 of 10 procedural designs are ineffective: the Clinical reasoning design is ineffective, and, to make things worse, is used relatively frequently. Further ineffective designs are Escalation of commitment, Message compliance, and Evaluation of objects. Inspection of Table 2 offers an insight here: these four designs are the ones that are not dominated by reference point manipulations but either by outcome salience manipulations or they are not dominated by either manipulation. Stated more provocatively, these designs are not framing designs, since usually no reference point is manipulated in these designs. Table 10 reveals exactly this: if these designs are done with reference point manipulations, the Clinical reasoning, Escalation of commitment, and Evaluation of objects produce strikingly high effect sizes. The empirical basis for these findings is at most three data, however. In the extreme, these may all come from one study. Thus, firm

conclusions on these designs may be to early. It seems, however, that all strict framing designs are effective in producing a reference point effect. The more effective of these use single risky events and choices (Asian disease, Gambling), and the less effective of these use multiple risky events and ratings (Bargaining, Game theory). In between is the Tax evasion design with a single risky event but no dominance of either response mode. To summarize, the analysis demonstrates that the designs differ in frequency of application as well as in effect size. The Asian disease, Gambling, and the Tax evasion designs seem to be beyond reasonable doubt with respect to the reference point effect. These three designs produce the effect. For the Asian disease and Gambling designs this conclusion rests on much empirical work, for the Tax evasion design it rests on unequivocal findings. For the Bargaining and Game-theory designs the issue is not yet settled. The biggest problem with the Game theory design is that the relation to risk is relatively loose and that it is often difficult to clarify which choice constitutes the more and less risky option. The Clinical reasoning, Message compliance, Escalation of commitment and Evaluation of objects designs are the losers (or winners?) of our analysis: for all these an effect cannot be found. These are to a big degree labeling experiments, however.

Heterogeneity. Our analysis shows that there is no uniform framing effect. The effect sizes in the data-base are very heterogeneous. Some of the factors that contribute to this heterogeneity have been identified, others may have gone unnoticed. For one point, the features of experimental designs tend to come clustered. The risk characteristics, for instance, are correlated with each other and with response modes. Thus singling out one characteristic and analyzing its features is only part of the truth. One additional point of caution in interpreting these results must be stressed. In evaluating framing research, one has to bear in mind that the framing effect can interact, may be dampened, or even may be made disappear, by some characteristics other than those studied here. These may be individual difference dimensions relating to age, gender, culture, or language. These may also be more general cognitive dimensions like motivation, emotion, knowledge, perception, memory, and cognition. For instance, I think it is entirely possible that the reference point effect is a consequence of some specific mixture of perceptual features of framing tasks that are—unbeknownst to researchers—ever and ever the same. For instance, the sequence of alternatives may be relevant. This is plausible, since the adoption of reference points may easily be influenced by the sequence of information. But when reading the procedures section of framing experiments, one seldom learns that the sequence of options was varied. My impression is that the reviewed research does not vary the sequence of options systematically. Quite to the contrary, the sequence seems to be identical for most experiments (at least in the Asian disease and Gambling designs): the first option that is presented is the sure alternative and the second option is the risky one. It may easily be that this methodical shortcoming may contribute to the reference point effect. Cognitive processes are another stepchild of framing research. Taken the effect for granted (what can safely be assumed), we would be well

advised to probe for the cognitive processes and structures that are responsible for it. To accomplish this, research technologies are called for that offer richer data. Measurement of response latencies (e.g., Svenson & Benson, 1993) is a promising technique. Another promising technique is the collection and analysis of verbal protocols (e.g., Maule, 1989; 1994).

To be fair, though we have identified many relevant characteristics, some important ones may have gone unnoticed. A potentially relevant distinction that has not been made in the present analysis is the distinction between threat and opportunity which has recently been put forward by Highhouse an his collaborators (Highhouse & Paese, 1996; Highhouse, Paese, & Leatherberry, 1996; Highhouse & Yuce, 1996; Jackson & Dutton, 1988). This research shows that the perception of threat and opportunity is confounded with framing conditions and indicates that threat and opportunity may be basic concepts in predicting the conditions under which gains will tend to produce risk-aversion and losses will produce risk seeking. We did not make this distinction in the present analysis, because threat/opportunity could not be excerpted from the research reports. Maybe some of the heterogeneity in our data, which is not entirely explained by the present analysis, could be accounted for by the threat/opportunity distinction.

SUMMARY AND CONCLUSIONS

Framing in risky decision making is a phenomenon now in its teen-age years. After having been born in 1981 in the seminal article of Amos Tversky and Daniel Kahneman, it has attracted a lot of empirical and theoretical interest. A meta-analysis of 136 research reports yielded 230 single effect sizes, which, overall, corroborated the framing effect. Between conditions, the mean effect size of $d = .31$ is, according to Rosenthal and Rosnow (1991) between a small ($d = .20$) and a medium ($d = .50$) effect size.

Two characteristics of framing research seem to be especially relevant for the effect. These are Risk manipulation and Response mode. Risk manipulation relates to the fact that framing experiments can try to change reference points and thus produce framing effects, or they can manipulate outcome salience. Only reference point manipulations were shown to produce a framing effect. Outcome salience manipulations did produce null results. The second important characteristic relates to Response mode. Choices dominate framing research and produce strong reference point effects while ratings and judgments were shown to be less influenced by manipulated reference points. Ten different experimental designs were identified and characterized by their relevant features. Some of them were shown to be effective (Asian disease, Gambling, Tax evasion), the status of some had to be left undecided (Bargaining, Game theory), and some were shown to be ineffective (Escalation of commitment, Message compliance, Clinical reasoning, Evaluation of objects).

At the time being, the present analysis is a first attempt to systematically identify the features that may be relevant for framing. I think, most of the relevant features are identified, though some may still be missing. Further

important features of framing tasks that await research are perceptual and cognitive in nature. The reference point effect can be taken for granted by now, however, and further research should not try to demonstrate that the effect is there but should try to clarify when and why it is there.

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Received: July 5, 1997