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Framing of Decisions and Selections of Alternatives in Health Care

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ABSTRACT

This paper examines the importance of the context in which medical alternatives are presented to individuals. In a series of experiments, subjects were given information and asked to make choices in hypothetical medical situations. In each experiment, probability information was presented in either a positive or a negative frame. One study demonstrated that the probability that a subject would elect surgery for a terminal liver disease was a function of both the probability of survival and the framing of the probability information. That is, at each probability level the chances of accepting surgery were greater if the information was presented in a positive frame. In a second study the recommendation that a haemophilia carrier would abort a child was more likely if there was a 50 per cent chance of having an 'affected' son than if there was a 50 per cent chance of having a 'normal' son. The third study considered competition for a bed in an intensive care unit. Subjects were more willing to endorse the return of a patient described as their 'father' to the regular floor if his chances of surviving were presented as 90 per cent in comparison to a group that was told his chances of dying were 10 per cent. These findings suggest that individuals are more willing to select risky medical options when probabilistic information is worded positively rather than negatively. Furthermore, when the choice of a medical option involved another individual's health outcome, subjects were still more likely to endorse riskier treatments when outcomes were presented in a positive rather than negative context. However, when the medical decision involved a stranger's health outcome, the context effect did not occur. Implications for health care professionals are discussed.

Over the past decade there has been increasing interest in both the medical and behavioural science literature on miscommunications between doctors and patients. As reviewed by DiMatteo and Dinicola (1982), patients often leave medical encounters without the appropriate information. For example, studies have shown that 50 per cent of patients cannot accurately recall how long they are

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supposed to take their medications (Svarstad, 1976). Surgical patients are usually unaware of what they will experience after surgery, and it has even been reported that they often do not even know why they are having surgery (Brant and Kutner, 1957). Kane and Deuschle (1967) noted that 72 per cent of the patients in a Kentucky medical centre could not accurately identify their medicines, and 26 per cent did not even know why they were taking medicine. In addition, Ley and Spelman (1965) reported that shortly after clinic patients encountered a physician, they forgot one-third of the information that had been transmitted to them.

Our work does not concern errors in memory. Instead, we focus on the interpretation of information presented in an encounter. Misinterpretations of information are relatively common. For example, Mazullo and colleagues (1974) interviewed 67 patients who had been asked to read the label on each of 10 prescriptions for common medications. When asked how they would take the medications, there was variability for each of the 10 prescription types. This misinterpretation of information occurs even with instructions that are considered to be relatively straightforward.

Communication of information in medical encounters is often not straightforward. Frequently, patients are given complex probability information. For example, treatment alternatives are typically associated with probabilities of benefits and probabilities of side effects. In a study by McNeil and associates (1982), cancer patients were presented with alternative treatments. Surgery had a higher probability of immediate death but a lower probability of death over time. Conversely, radiation therapy had a lower probability of short-term death with a higher probability of death over time. These complex decisions characterize contemporary medical care. In addition, movements toward informed consent often require that patients make a continuous series of choices between very complex alternatives. Although patients may be highly motivated to make the right choice, they may not be capable of processing probabilistic information accurately. In one study, Kaplan, Hammel and Schimmel (1986) demonstrated that a logarithmic function relates the probability of accepting a vaccination to the probability of a reaction. Each 10-fold decrease in a risk of a reaction was related to approximately equal unit changes in the estimated probability of taking the vaccine. However, increasing the vividness of side effects reduced the probability that subjects would accept the vaccine.

Health care decisions often involve the integration of probabilistic information with preference or utility. Previous research on medical decision-making has demonstrated that the manner in which probabilistic alternatives are stated does affect treatment choice. McNeil, Pauker, Sox and Tversky (1982) presented patients with hypothetical alternatives about cancer therapies, but stated as the expected outcome either the probability of living or the probability of dying. Patients were more likely to choose higher risk surgery over radiation therapy when the treatment outcomes were worded positively (e.g., as survival) rather than negatively (e.g. as mortality).

In a series of three experiments we examined the effect of positive and negative framing in hypothetical medical situations. In addition, we included scenarios that required making choices about one's own health or about another individual's health. Research on attributional explanations of behaviour has demonstrated that individuals attribute causal explanations differently depending on whether they are

the actor in a given situation or the observer (cf. Fiske and Taylor, 1984). While decisions about medical treatments do not necessarily involve causal attributions, it is common for one person to suggest the appropriate choice of treatment for another.

In short, patient decisions are influenced not only by the type and amount of information presented. The processing of information in a given context must also be understood to fully appreciate information transmission. In the present series of experiments we presented individuals with probabilistic information about hypothetical medical alternatives. We systematically varied the frame of information (positive versus negative) across all three experiments. In addition, we designed the scenarios so that the alternatives were focused on one's own health outcome or on another individual's health outcome. In one experiment a personal involvement factor was also included such that the health outcome involved an individual who was someone known or unknown to the decision-maker. We expected that treatments associated with health outcomes which were framed in terms of survival rather than mortality would more likely be endorsed.

EXPERIMENT 1: THE DECISION TO HAVE SURGERY FOR TERMINAL LIVER DISEASE

The first study evaluated framing of information in relation to the election of risky surgery for hypothetical terminal liver disease. We predicted that subjects would endorse more risky options when presented with information in terms of survival rather than in terms of mortality. This is based on the notion that information presented in terms of dying would make the risks of death more salient than information stated in terms of surviving. Two variables were manipulated in the study: the chances of surviving the surgery, and the framing of information about survival. Subjects were randomly assigned to receive information about survival in a positive or negative frame. For example, if the probability of surviving an illness is .90, the probability of dying is .10. A positive frame for a medical procedure might describe the probability of surviving as .90. Conversely, a negative frame would be expressed as a probability of dying of .10. Further, the chances of surviving surgery were varied as a within-subjects factor in the design (10, 20, 40, 60, and 80 per cent).

Subjects

The subjects for all three experiments were 49 female and 42 male undergraduate students enrolled in Introductory Psychology at San Diego State University. Eighty-five per cent of the participants were between 18 and 21 years of age. In exchange for their participation, the students received credit toward a course requirement.

Design

All subjects were presented with the same hypothetical situation. It read 'Suppose you have a terminal liver disease and your doctor describes two alternatives. The following questions will outline your two options. Although it

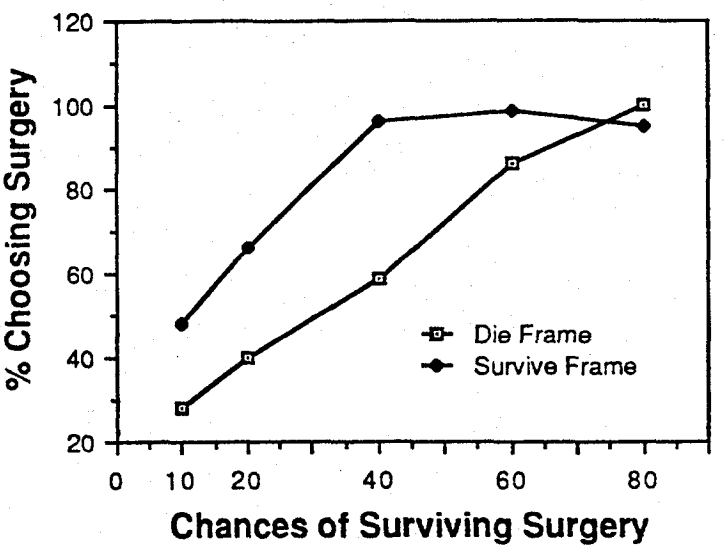
may be difficult to make a decision with this limited information, do your best. There are no right or wrong answers. It is important, however, that you be honest and take the task seriously in order for the data to be meaningful'. Then, they were presented with a series of choices in random order. The first alternative for all items stated that the life expectancy with no treatment would be 1 year. For different items, the second alternative varied the probability of the survival after surgery. For example, one item stated that if surgery was elected, there would be a 20 per cent chance of surviving the operation, and the life expectancy for successful surgery cases would be 5 years. Life expectancy with treatment (assuming survival of surgery) was always stated as 5 years regardless of the chances of dying during surgery.

The subjects were randomly divided into one of two groups. One group received the information framed as the probability of survival, while the other group received the information as the probability of dying. For example, one group was told that the probability of surviving the operation was 20 per cent, while the other group was told the probability of dying during the operation was 80 per cent. Thus the probability of recovering from the operation was the same for the two groups but the framing of the information differed.

In summary, the experiment was 2 × 5 mixed design. Framing was an independent groups factor, while probability and survival was a repeated measure nested within framing groups.

Results

The results of the study are summarized in Figure 1. The figure shows percentage of subjects choosing to have surgery as a function of probability of survival and framing group. The figure reflects the rational choice of electing to have surgery as surgery becomes less risky. The other finding pictured in the figure is the effect of framing. When information was presented as the probability of dying during the procedure, fewer subjects were willing to choose surgery in this hypothetical



situation. For example, only 28 per cent of the subjects reported that they would seek surgery if the probability of dying during the surgery was 90 per cent. In contrast, 46 per cent of the subjects would choose surgery if they were told they had a 10 per cent probability of surviving. In short, subjects were more willing to take the risk of choosing surgery when the information was presented in terms of surviving rather than dying. These differences were statistically significant ($\chi^2 = 6.83, p > .05$).

EXPERIMENT 2: ABORTION FOR HAEMOPHILIA CARRIERS

Experiment 2 considered advice to expectant mothers who were haemophilia carriers. Thus Experiment 2 differed from Experiment 1 in that it involved making decisions for another individual's health outcome rather than one's own outcome. It is possible that actors are more influenced by framing of information than are observers. Two variables were manipulated in the study. The framing of the information about chances of giving birth to a baby with haemophilia, and the sex of the expected baby. Sex was varied because males are affected by expression of the disease, while females do not get the disease but carry the gene. We predicted that the subjects would be more risk-aversive when information was presented in terms of morbidity rather than in terms of 'normal' functioning. Thus subjects should be most likely to favour abortion and *avoid* the risk of having an affected child when the probability is worded as morbidity.

Design

Forty-nine female and 42 male subjects responded to two items embedded in a questionnaire. Both items described a woman who was a haemophilia carrier. The woman wanted to have a baby but consulted a genetic counsellor about the chances of having a problem birth. In addition, the woman had amniocentesis to determine the sex of her baby. For one-half of the subjects, the information was phrased in a positive manner (i.e. the probability of having a 'normal' child was 50 per cent). For the other half the information was framed in a negative manner (i.e. the probability of having an 'affected' child was 50 per cent). For one item the child was described as a boy, while the other case described the child as a girl. Boys would have a 50 per cent chance of getting haemophilia while girls would have a 50 per cent chance of carrying the haemophilia gene. Subjects were asked whether or not the woman should abort the child.

Results

The results of the study are summarized in Table 1. Half of the table demonstrates that there was a substantial effect for framing of information. When the information was presented as the mother having a 50 per cent chance of having an 'affected' child, nearly 42 per cent of the subjects (39 of 92 responses) felt that the baby should be aborted. In contrast, only 26 per cent of the subjects (24 of 90 responses) favored the abortion when the information was presented as a 50 per cent chance of having a 'normal' child. These differences were statistically (significant ($\chi = 4.97, p < .05$). There also was a small effect for sex. As the table

Table 1. Percentages favouring abortion to avert haemophilia by frame and fetus sex

	Sex of baby	
	Boy	*Girl*
Frame		
Positive (50% normal)	24%(11/45)	29%(13/45)
Negative (50% affected)	39%(18/46)	45%(21/46)

Note: Figures are percentages favouring mother to abort fetus; those in parentheses are raw ratios.

shows, there was a greater tendency to favour aborting a female than a male fetus. Although these differences were not statistically significant, they are intriguing since only males actually get the disease. As in Experiment 1, framing had a significant effect with a positive frame producing more risk-seeking.

EXPERIMENT 3: COMPETITION FOR SPACE IN AN INTENSIVE CARE UNIT

Both Experiments 1 and 2 involved choices in which there was a personal interest in avoiding a negative outcome. Often observers must make choices that reflect ethical choices between alternatives. In Experiment 3 we sought to determine the impact of framing when personal interest in a particular outcome is reduced. Experiment 3 evaluated framing of information and preferences with regard to limited space in an intensive care unit (ICU). All subjects were given a choice between two people who were in competition for the only bed left in a special coronary care unit. Two variables were manipulated. First, the description of the first patient was varied. Half of the subjects were told that their father was in competition for the bed, while the other half were told that a 'Mr Williams' was in competition. This experiment differed from the other two experiments in that it manipulated personal involvement by including the emotionally laden variable 'father' as one of the factors. The second variable was the framing of information about the chances of the patient surviving. Half of the subjects were told that the first patient to arrive (their father of Mr Williams) would have a 10 per cent chance of dying if he were placed in a regular ward rather than in a special care unit. The other half were told that the first patient would have a 90 per cent chance of surviving in the regular unit. The scenario also stated that 5 minutes after the first

Table 2. Percentage of subjects favouring first come–first-served principle by framing condition and patient relatedness

	Patient relatedness	
	Father	*Mr Williams*
Frame		
10% chance of dying	45%(10/22)	23%(5/22)
90% chance of surviving	21%(5/24)	26%(6/23)

Note: Raw proportions in parentheses.

patient arrived, a second patient, 'Mr Jones', was admitted to the hospital. The chances of Mr Jones surviving in a regular ward were stated as 50 per cent. Subjects were presented with the hypothetical choice of who should get the bed, their father (or Mr Williams) versus Mr Jones, who had arrived 5 minutes later. In summary, this was 2×2 independent groups design. The dependent variable was the percentage of subjects preferring the first come–first serve allocation of the bed. This strategy was defined as a greater percentage of subjects choosing the bed for their father or 'Mr Williams' instead of for the second more seriously ill patient, 'Mr Jones'.

Results

The results of the study are summarized in Table 2. As the table shows, the results are very similar for three of the four experimental conditions. Twenty nine per cent of the subjects favoured the first come–first serve strategy. However, there was also a significant interaction between the two variables. For the condition in which the first to arrive was described as the subject's father and the framing of the information was stated as '10 per cent chance of dying on the regular ward', 45 per cent of the subjects felt the bed should go to the father. However, only 21 per cent of the subjects felt that the bed should go to the father if the information was stated as a '90 per cent chance of surviving'. Framing had little effect if the patient was described as Mr Williams (23 per cent for negative frame versus 26 per cent for the positive frame $p > .5$). In short, framing had a substantial effect when the patient was described as their father. Specifically, stating that the father might die in the regular ward had a strong impact on subjects' decisions about who should get the bed ($\chi^2 = 4.80, p < .05$).

DISCUSSION

In an often-quoted chapter, McGuire (1969) lamented the arduous history of studies in questionnaire wording. He noted that one scientist's artifact often became another scientist's main effect. The studies reported herein suggest that subtle variations in framing of information can have significant effects upon selection of alternatives in health care. Across all three experiments, subjects consistently responded in a more risk-seeking fashion when information was presented in positive rather than negative terms. However these findings were often imbedded in complex interactions. In the first experiment framing only had an impact when the chances of survival were poor. In Experiment 3 the framing effect was contingent upon the involvement of a family member.

These experiments were limited because they involved hypothetical rather than real choices. However, the results do confirm other observations from cognitive psychology which indicate that framing has a large impact upon choice (Kahneman and Tversky, 1983). In addition, other applications of planned framing have produced similar effects (e.g. McNeil, Pauker, Sox and Tversky, 1982; Meyerowitz and Chaiken, in press). Meyerowitz and Chaiken (in press) found that individuals were more compliant with health care recommendations when qualitative information was presented in terms of what an individual has to lose rather than in terms of what an individual has to gain.

The results of the three experiments have some implications for actor–observer theories in cognitive social psychology. Whether an individual's perspective was as an actor or an observer, positive information produced more risk-seeking than negative information. These results confirm other reports that differences in actor–observer effects are weakened when information about the outcomes involves negative or positive events as opposed to neutral events (Fiske and Taylor, 1984). However, it appears that the framing effect from an observer's perspective is limited to situations in which the decision-maker is personally involved in the decision. Our framing effect only held up when the health outcome concerned an individual's father, but not when it concerned a stranger. These results suggest that personal involvement may be an important element in the framing effect. Framing may have more effect upon personal choices than upon ethical choices.

The results of Experiment 2 are difficult to interpret. In this case the framing effect was found, but the subjects were clearly observers. However, the subjects were asked to state how the woman should make a personal choice. Across the three experiments the only situation in which the subjects were asked to make a distanced ethical choice was the 'Mr Williams' condition in Experiment 3. This was also the only case in which framing had little effect.

The optimal method for eliciting values remains a major challenge (Fischoff, Slovic and Lichtenstein, 1980). Several contextual factors are known to affect judgement. We have learned, for example, that it is difficult for human judges to use either very small or very large numbers (Poulton, 1968). There are also several demonstrations showing that the interpretation of information by a respondent can easily be manipulated by the elicitor (Poulton, 1977). In fact the questions themselves may create the perspective for the respondent. Although the wording of questions in our experiment created variability in responses, the effect was systematic in direction. A positive frame can induce less conservative responses (risk-seeking) than a negative frame. Future research is required to identify the best method for eliciting 'true' values.

These results may have some implications for health care providers. The framing of information about risks and benefits can effect perceived value and choice between competing alternatives. Our findings do suggest that human information-processing abilities are limited when information is presented in terms of probabilities and the decision-maker is involved in the choice. Because of information-processing limitations we cannot be sure that even accurate informed consent procedures will result in informed choice. Therefore health care providers may want to consider the use of props, graphs, or other aids to emphasize clarity in communicating probabilistic information more effectively. The results may also help explain some of the differences between patient and provider perspectives. When individuals make more distanced ethical choices they may be less influenced by the framing of information. However, framing may have a strong effect upon personal choices or personal advice-giving.

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