

**Laboratory Project 1**  
**Mental Representation and Framing in Individual and Group Decisions**  
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In their classic demonstration of the effect of framing, Tversky and Kahneman made use of an outcome that could be described in two quite different, but logically equivalent ways: in the face of a disease threat,

- aL) 400 (out of 600) people die; or
- aG) 200 (out of 600) people are saved.

According to their analysis, these two descriptions differ in the underlying reference point that is assumed: in aL, the reference point is being alive, and each death constitutes a loss, therefore aL is very unattractive; but in aG, the reference point is dying, and each person saved constitutes a gain, so aG seems less bad. To demonstrate the difference in people's thinking about aL and aG, each is compared with a risky extreme:

- bL) with probability 1/3, nobody dies, otherwise all 600 die; or
- bG) with probability 1/3, all 600 are saved, otherwise nobody is saved.

A large majority of people choose bL over aL, i.e., they are risk seeking when thinking about losses, but a large majority also choose aG over bG, i.e., they are risk-averse when thinking about gains. If those who choose aG over bG are making a correct or sensible choice ("avoid risk when many lives are at stake; save what you can"), then a large majority must be acting incorrectly in the loss frame. If one were to argue that the majority choice of bL over bG was socially desirable ("try to save everyone if you can; let no one die"), a similar argument applies for choices in the gain frame.

Despite the passage of 25 years since this demonstration, there are still many questions to be raised about this and related findings. Prospect theory offers multiple explanations for the phenomenon. The most important relates to the shape of the utility or value function, which is assumed to be concave for perceived gains, but convex for perceived losses. By manipulating decision makers' reference point, focusing attention either on the sure loss in the L scenarios or the sure gain in the G scenarios), the three outcomes are being evaluated on differently shaped utility or value functions. Augmenting the effect are two other phenomena: the certainty effect (i.e., people's tendency to put more weight on outcomes that occur (or do not occur) for sure), in combination with loss aversion (i.e., the fact that a loss of a given magnitude [600 lives] hurts more than a gain of the same magnitude [600 lives] feels good). Loss aversion, operationalized by a value function for losses that has a steeper slope than the value function for gains, augments the differences in the evaluation of the three outcomes (losing 0, 400, or 600 lives). The certainty effect in the loss domain magnifies a more negative event (the loss of 400 lives) than the certainty effect in the gain domain, which only magnifies a moderate good event (saving 200 lives).

Regardless of the relative contribution of these different explanations to the effect, all three hinge on the effectiveness of the reference point manipulation. This raises the question of

whether there are circumstances that make reference point manipulations more or less effective or lead to the choice of different reference points in those situations where decision makers can spontaneously frame choice alternatives in one or more different ways, by choosing to focus on different reference points. Laboratory Project 3, for example, will investigate the role of regulatory focus (promotion vs. prevention orientation) in this process (see Lab Project 3, and Levine et al, 2000). Is the effect of a loss vs. gain reference point framing manipulation independent of the regulatory focus of an individual or a group or does it matter whether the decision maker is seeking primarily to protect against untoward events (prevention focus) or seeking primarily to achieve desired goals (promotion focus)? In Lab Project 1, we will investigate the role of other variables in this process, which include the presence of more than one decision maker (dyads or small groups) as a main effect (two, three, or four minds may be more likely than a single mind to generate one more alternative frames for any decision presented in a particular reference point frame, rendering groups less susceptible to framing manipulations.

For some framing questions, it seems necessary to move outside of Prospect Theory. That theory assumes an ordered continuum, with goals defined in terms of reference points (seeking gains, avoiding losses). However, framing can also affect what goals are active in a given choice situation, and the tradeoff between them. This may be especially true when, depending on the choice alternatives available and their framing, private goals as well as group and social goals may be activated, or, similarly, long-term as well as short-term goals may be activated, or again, promotion as well as protective goals may be activated, in each case with labile tradeoffs. Krantz and Kunreuther (2004) focus on labile tradeoffs between promotion and protective goals. Comparison of individual and group decision making in these types of situations is similarly motivated.

It is interesting to note that the original Tversky and Kahneman problem involved a societal, not an individual goal, and that the choices involved (adopting one or another public health program) are ones that would ordinarily be made at least in part through discussion by groups of experts. Their original problem can be adapted to investigate reference-point and other framing effects in group decision making and for a variety of different goal types. We have three major reasons for doing so.

First, many important climate-related decisions, including those related to human health, livestock health, wild game and fish stocks, water allocation and reservoir management, and local, national, regional or global investment programs for dealing with climate effects are made in part through group processes. It seems important to understand the extent to which various framing effects are reduced or enhanced by group processes. Consideration of this question leads us bring the extensive literature on group problem- solving to bear on decision making.

Second, the quantitative success of Tversky and Kahneman's Prospect Theory, which incorporates reference-point effects, is really limited to purely monetary gambles, although the theory has been applied metaphorically much more broadly. Climate-related decisions involve a wide mix of goals related to nuclear families, extended families, villages or neighborhoods, religious groups, national goals, and international governance. It seems important to

understand framing effects in groups where different people have different priorities; and to start with, one must ask some simple questions about the invariance of framing effects for different types of goals.

Third, many decisions are made by mixed groups with several different kinds of experts, including stakeholders whose expertise lies mainly in understanding their own interests clearly. The exchanges in such groups are partly educational. In any case, it seems crucial to understand the ways in which various sorts of instructions and specialized arguments or decision tools reduce (or in the worst case, exacerbate) maladaptive decisions.

Investigations in this segment of lab studies will examine apparent risk attitudes, as well as certainty effects, and degree of loss aversion observed. Loss aversion has recently been explained by both cognitive and affective processes (Johnson, Haeuble, & ?, 2004; Loewenstein & Lerner, 2003), which reflect different, though related ways of analyzing the phenomenon. We will investigate what happens to both types of processes in a group context. (See Lab Project 2 for more detail on affective processes related to loss aversion.) Cognitive processes are related to something labeled “query theory” by Johnson and Weber (2004), which refers to the theory that a particular task framed in a particular way induces people to generate internal queries in a particular order. For the example above, the gain frame for the sure options induces decision makers to first consider the (good) consequences of saving 200 people, which may be followed by consideration of the (negative) consequences of letting 400 people die. The opposite query order would be generated for the loss frame. Given that the order of such queries matters (first queries tend to result in more pieces of supporting evidence than later queries), framing would have an effect *even if* the decision maker considered both the presented frame and the implicit alternative frame, because the presented frame gets processing (query) priority. Studies in this lab project will look for evidence for this phenomenon at the group level. I.e., does the explicit framing of a decision problem influence the order in which group members generate (positive and negative) reasons for different choice options? Does the order in which such reasons are generated (query order) influence the number and strength of generated reasons and the impact of those reasons on the final decision? It is possible that existing transcripts of group deliberation processes (e.g., Field Project 1) might be useful in developing a coding scheme that will be able to answer such questions and even provide preliminary answers. Another set of questions (to be answered in some of the field projects) will evolve around group design factors (involving both the composition of groups, stipulated group norms and/or processes, and presentation format of group instructions and other informational material) that will influence spontaneous coding and recoding of information, query order, and other cognitive and affective processes known to influence the outcome of decisions under risk and uncertainty.

In addition to reference point framing, we will investigate other framing phenomena, including percentage framing (Markowitz, 1959; Thaler, 1985) where a discrepancy of a particular magnitude is compared to one or more comparison standards, typically by ratio operation. Is a saving of \$100 big or small (worth driving across town for, or not)? The answer to this question depends on the standard of comparison used, which is typically the purchase price of the commodity on which the saving is realized. It is seen as large (and worth the 20 minute trip to the other store) when you save \$100 on a \$200 coffee maker, but small (and not worth

the 20 minute trip across town) when you save \$100 on a \$2000 computer. Do what extent and how does group discussion prevent decision makers from such inconsistencies in action that violate basic economic rationality?

The basic research paradigm for this project follows readily from these considerations. We will select a variety of contextual factors that are known to or seem likely to affect decision making; for each one, we will devise contrasting versions of decision problems, which vary sharply on that particular contextual factor. We discuss below the detailed selection of factors to study and of experimental decision problems to use; but a paradigmatic case would be that of a climate-related human health risk, such as malaria, with a choice of alternative plans, one ambitious and risky, the other more limited in range of likely outcomes.

One series of experiments for a given problem will be conducted without any specialized educational materials or decision tools. We will obtain decision data under the following four conditions:

- (i) individuals are presented with the problem and asked for a decision (with some followup questions after the decision);
- (ii) 3- or 4-person groups are presented with the problem and asked to arrive at a consensus group decision;
- (iii) individuals listen to (but do not participate in) a group discussion, and are then asked (privately) for their decisions;
- (iv) individuals are induced to analyze the problem in an extended fashion before arriving at a decision.

Condition (i) is more or less the standard in most laboratory work and will bridge between our results and what is in the literature. Condition (iv), with more extended individual involvement, is needed as a comparison with (ii) and (iii), which are likely to lead people at least to more extended consideration of decision problems. In condition (ii), we will most likely also ask group members privately for their current individual decisions, following the group consensus. Three- or four-person groups, especially comprised of students, are probably much simpler than the large and heterogeneous decision-making groups that will be seen in our field studies, but we believe progress can be made more rapidly by engaging in studies with a large number of groups, which is much more feasible with small size groups. We also think that the natural heterogeneity even within small student groups will be considerable.

It may be desirable to repeat (ii) with small groups of mature adults, but we are not sure at this point.

For each of (i)-(iv), we have a measure of the size of the context or framing effect, namely the difference in the distributions of choices for the contrasting versions of the decision problem. This will be measured primarily "between subjects", i.e., by subdividing each condition (i)-(iv) into individuals and groups who encounter different versions.

Our predictions about these measured context effects depend on the detailed theoretical analysis of various decision problems. For example, in a decision problem that has an "insight" choice -- i.e., a choice that is arrived at by a minority of individuals, but for which there is an argument that most individuals find convincing, once they hear it -- there is likely to be a large shift toward this choice in conditions (ii) and (iii). In a four-person group, it is likely that someone in the group will voice the argument, and that the others will then accept it. An individual listening to the group might in principle shift even farther toward this choice. Insofar as the argument involves reframing -- viewing a decision problem in a frame different from that presented -- this will lead to smaller framing effects in conditions (ii) and (iii).

A central aspect of this research will be the various pairs of contrasting decision problems used to measure framing effects. For example, we can formulate a problem to convey two distinct reference points simultaneously: one might choose between a more or less certain plan (such as aL or aG above) and a risky plan b that involves strong possibilities of both gain (results above the upper reference point) and loss (results below the lower reference point). This permits us to examine factors that affect whether individuals focus on the lower or the upper reference point, and to see what happens when individuals within a group clash over the choice of reference point. Many other current theoretical issues can be examined in similar fashion through systematic modifications of decision problems.

This same paradigm allows us to examine the effects of specialized educational materials or the use of decision tools of various sorts. Educational materials can explicitly address the anomalies produced by reference points and provide models in which both gain and loss frames are deliberately introduced by the decision maker. By using decision problems in which information must be sought actively (e.g., concerning magnitudes or probabilities of benefits) we can test different sorts of aids for seeking such information. It is also of great interest to see how educational materials and decision aids are utilized by groups, and how this depends on the heterogeneity of exposure within the group.

In addition to changes in reference points, several other aspects of the mental representation of a decision problem can be studied. Status quo bias is quite similar to reference-point bias, and produces huge effects of great practical importance. For example, people regularly choose defaults in insurance or investment plans, regardless of what those defaults are (Johnson et al., 1993). Decision defaults and status quo bias has also been shown to strongly affect individually and societally important decisions such as organ donations in the event of one's death (Johnson & Goldstein, 2003). These effects may not be completely or even well accounted for by loss aversion. For example, if desire to avoid the complications and justifications of active departure from default is an important factor, we can demonstrate this readily by framing problems so as to control the perceived level of active management on the part of the decision maker. As for query theory, an investigation of decision making phenomena in group settings may provide important additional information in the form of tests between competing causal explanations, since processes that have to be assumed to be internal in the case of individual decisions become externalized (and thus more easily observable) in a group deliberation context. We will investigate how the various factors affecting status quo bias play out in group decisions, and whether this bias can be affected by instructions and decision aids, for individuals and in groups.

A similar series of studies can be centered on mental accounting. We know that people accept costs or losses more readily when they can be offset by perceived large gains in the same "mental account." It is important to examine this effect in a group setting, because for groups, accounting probably has to be made more explicit, and the difference between "mental accounts" and legislated budgets practically disappear. The problem of mental accounting for an individual becomes the problem of organizing goals and budgets for a group.

Mental representation of decision outcomes has been shown to play a role in intertemporal inconsistencies in people's decisions. Thus people frequently commit to a course of action (e.g., agree to give a talk at a conference) well ahead of time, and live to regret their decision as the event gets closer in time (and oftentimes revert back to their original preference once they experience the consequences of the action to which they initially committed.) Trope and Liberman (2000) provide some explanation for such dynamic inconsistency by the fact that people represent distant events in very abstract terms and events closer in time in more concrete terms, which we will examine in a group context.

Finally, another instance of decision inconsistencies that arise as the result of representation have to do with choice bracketing (). That is, how inclusive is the decision maker in his or her integration of an imminent single risky decision with other, similar risky decisions that may have occurred in the past or will occur in the future? Given that people's choices differ between single and repeated "plays" of the same or similar lotteries (with often large impact on choices), decision bracketing is another phenomenon that will be examined in studies with individuals and groups.

For this and all previously discussed phenomena, examination in a group context will provide additional validation for the postulated mechanisms as well as information about the phenomena's prevalence in such group contexts. The results of these studies will be used as inputs to a better understanding of the effects of group composition, group task instructions, and the presentation of information for group decisions. We will use these insights to make recommendations for optimal allocation of decisions between individual and group settings, for the design of optimal individual and group process, including the design of decision aids. The results will help us identify those components of the individual or group decision process that can (and should) be affected by thoughtful task design and those components that should be considered as givens or constraints in this design process.

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