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Prospect Theory, Rational Choice, and International Relations

Jack S. Levy

Rutgers University

A half-decade after the first systematic applications of prospect theory to international relations, scholars continue to debate its potential utility as a theoretical framework. Key questions include the validity of the experimental findings themselves, their relevance for real-world international behavior that involves high-stakes decisions by collective actors in interactive settings, and the conceptual status of prospect theory with respect to rational choice. In this essay I assess theoretical and methodological debates over these issues. I review work in social psychology and experimental economics and conclude that challenges to the external validity of prospect theory–based hypotheses for international behavior are much more serious than challenges to their internal validity. I emphasize the similarities between prospect theory and expected-utility theory, argue that hypotheses regarding loss aversion and the reflection effect are easily subsumed within the latter, and that evidence of framing effects and nonlinear responses to probabilities are more problematic for the theory. I conclude that priorities for future research include the construction of hypotheses on the framing of foreign policy decisions and research designs for testing them; the incorporation of framing, loss aversion, and the reflection effect into theories of collective and interactive decision making; and experimental research that is sensitive to the political and strategic context of foreign policy decision making.

It is ironic that just as rational choice has become the most influential paradigm in international relations and political science over the last decade, expected-utility theory has come under increasing attack by experimental and empirical evidence of systematic violations of the expected-utility principle in individual-choice behavior. Experimental evidence suggests that people tend to evaluate choices with respect to a reference point, overweight losses relative to comparable gains, engage in risk-averse behavior in choices among gains but risk-acceptant behavior in choices among losses, and respond to probabilities in a nonlinear manner. Many of these patterns have been confirmed by field studies of consumer, investment, and insurance behavior. This challenge to expected-utility theory has been reinforced by the development of prospect theory (Kahneman and Tversky, 1979), which integrates these descriptive patterns into an alternative theory of risky choice.

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Applications of prospect theory suggest some novel and theoretically interesting hypotheses about foreign policy and international relations, but attempts to test these hypotheses in the complex arena of world politics face serious conceptual and methodological problems.[1] Although some of these problems were noted previously (Jervis, 1992; Levy, 1992b; Shafir, 1992), recent applications of the theory and its core hypotheses to international relations frequently fail to come to terms with these problems. Moreover, there is an ongoing debate about the conceptual status of prospect theory with respect to rational choice. Some rational choice theorists question the validity of the experimental evidence upon which prospect theory is based and conclude that the theory is wrong. Other rational choice theorists concede that the findings may be valid but insist that they can be subsumed within expected-utility theory or rational choice more broadly. Given these concerns, this is a good time to take stock, assess the potential utility of prospect theory for explaining international behavior, evaluate the debate between prospect theory and rational choice, and suggest some potentially useful directions for future research.

I begin with a brief review of the experimental and empirical anomalies in the expected-utility theory of individual choice and a summary of how prospect theory was constructed to explain these anomalies. I then consider some of the methodological problems confronting prospect theory and its application to international relations, including problems of internal validity (can we be confident that observed behavior in the laboratory derives from the hypothesized effects of prospect theory rather than from other factors?) and problems of external validity (can we generalize from the experimental findings to real-world behavior?). I then turn to some of the theoretical considerations that currently limit prospect theory's utility for the understanding of international relations: prospect theory lacks a theory of the framing, and as a theory of individual choice it does not provide a theory of collective decision making of state actors or a theory of the strategic interaction between states. I end with a discussion of the relationship between prospect theory and rational choice and suggestions as to the most promising directions for future research.[2]

A Brief Review of Prospect Theory and the Experimental Evidence

The expected-utility principle posits that actors try to maximize their expected utility by weighting the utility of each possible outcome of a given course of action by the probability of its occurrence, summing over all possible outcomes for each strategy, and selecting that strategy with the highest expected utility. Expected-utility theory assumes that an actor's utility for a particular good is a function of net asset levels of that good and that preferences over outcomes do not depend upon current assets. Current assets affect marginal utilities and preferences over strategies, not preferences over outcomes or terminal states.

I will save for later a discussion of the relationship between prospect theory and rational choice, but I must clarify a few things here. Most applications of expected-utility theory in the social sciences add the auxiliary assumption that individuals have diminishing marginal utility for most goods, which is reflected by a concave utility function.[3] This assumption is descriptively accurate for many types of behavior

[1] For empirical applications of prospect theory in international relations see Farnham (1992), McDermott (1992), McInerney (1992), Richardson (1992), Taliaferro (1994), Weyland (1996), Berejikian (1995), and Mintz and Geva (n.d.). For experimental studies see Geva and Mintz (1994) and Kowert and Hermann (1994).

[2] This study develops some of the arguments in Levy (1997). The following section builds on Levy (1992a, 1996a).

[3] Auxiliary assumptions include substantive assumptions about the specific preferences, motivations, and aims of actors in various social and political contexts (Simon, 1986; Kavka, 1991:373). They help give empirical content to a theory by linking abstract elements in the logical structure of the model with the empirical reality that the model purports to explain.

and enhances the analytical power of rational choice theories. But diminishing marginal utility is not an essential component of expected-utility theory, and violations of the former are not necessarily inconsistent with the latter.[4]

Moreover, violations of expected utility are not necessarily violations of rational choice. Expected-utility theory is based on a set of axioms that allows us to construct a Von Neumann–Morgenstern (1944) utility function from ordinal preferences (Morrow, 1994:29–32). Rational choice, defined more broadly to require a consistent and transitive preference order and the selection from available alternatives so as to maximize satisfaction (Riker, 1990:172; Young, 1975:364–5), makes no further axiomatic assumptions. A nonlinear combination of probabilities and utilities, for example, violates expected-utility theory (particularly the reduction of compound lotteries) but is consistent with many other versions of rational choice theory.

The experimental evidence suggests that there are a number of respects in which people do not behave according to the assumptions and predictions of expected-utility theory. There is substantial evidence, first of all, that people are more sensitive to changes in assets than to net asset levels, to *gains* and *losses* from a *reference point* rather than to levels of wealth and welfare (Kahneman and Tversky, 1979:277). This *reference dependence* (Tversky and Kahneman, 1991:1039) is the central analytic assumption of prospect theory. It runs contrary to the expected-utility postulate of an individual utility function that is defined over levels of assets.[5]

Reference dependence is particularly important because people treat gains and losses differently—they overvalue losses relative to comparable gains. This asymmetry of gains and losses is reflected in the fact that the value function is steeper on the loss side than on the gain side. People rarely accept symmetric gambles that involve a 50 percent probability of winning x and a 50 percent probability of losing x. The evidence for this phenomenon of *loss aversion* is quite robust and persuasive (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986, 1991; Kahneman, Knetsch, and Thaler, 1991).

One implication of loss aversion is that people tend to value what they have more than comparable things they do not have, and that the disutility of relinquishing a good is greater than the utility of acquiring it. People who acquire an item often refuse to sell it at a price they would not even consider paying for it in the first place, so that selling prices tend to exceed buying prices. This overevaluation of current possessions is the *endowment effect* (Thaler, 1980:43–7), and it has been repeatedly substantiated in a variety of laboratory tests.[6] The effect is not a trivial one, with the typical ratio of selling prices to buying prices being about two to one (Knetsch and Sinden, 1984, 1987; Knetsch, 1989; Kahneman, Knetsch, and Thaler, 1990:1336, 1991; Tversky and Kahneman, 1991; Camerer, 1995:665–70).[7]

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[4] In one of the first applications of subjective expected utility to economics, for example, Friedman and Savage (1948) posit a utility function that includes regions of both convexity (reflecting increasing marginal returns) and concavity to explain insurance and gambling behavior. Dacey (1992) uses an S-shaped utility function in a model of deterrence and insurrection and applies it to the Palestinian intifada.

[5] Although there is some direct evidence that individual behavior is more sensitive to changes or differences in wealth than to absolute levels of wealth (van de Stadt, Kapteyn, and van de Geer, 1985), most evidence of reference dependence is indirect and derives from tests of loss aversion, the reflection effect, and other testable implications of reference dependence. A more accurate but less parsimonious model of choice would specify utility as a function of both net assets and deviations from a reference point.

[6] Evidence of a divergence between willingness-to-pay and willingness-to-accept applies both to relatively trivial items such as school coffee mugs and to more highly valued goods. Thaler (1987:110), for example, finds a substantial discrepancy between the amount that people would be willing to pay to reduce their risk of death by .001 and the amount that they would be willing to accept to increase their risk of death by .001.

[7] The endowment effect does not apply to normal commercial transactions. Money expended on an item is not treated as a loss, and goods purchased for eventual sale or barter generally do not generate an endowment effect (Kahneman, Knetsch, and Thaler, 1991:200). This finding has important implications for the role of bargaining chips in negotiations.

Further evidence in support of the hypotheses of loss aversion and the endowment effect can be found in the observed tendency toward status quo choices. Because people treat the costs of moving away from the status quo as losses and the benefits of moving away from the status quo as gains, and then overweight the former relative to the latter, people stay at the status quo more frequently than expected-utility theory would predict. This *status quo bias* is demonstrated in a number of experimental and field studies of consumer and investment behavior (Knetsch and Sinden, 1984; Samuelson and Zeckhauser, 1988; Knetsch, 1989; Hartman, Doane, and Woo, 1991).

The asymmetry between losses and gains is manifested not only in loss aversion and the endowment effect but also in *risk orientation*. People tend to be risk-averse with respect to gains and risk-acceptant with respect to losses.[8] This means that individual value functions are usually concave in the domain of gains and convex in the domain of losses, with a *reflection effect* around the reference point (Kahneman and Tversky, 1979:268). This pattern of risk orientations is repeatedly found for a variety of individuals and situations, but it may break down for very small probabilities or for catastrophic losses (Slovic, Fischhoff, Lichtenstein, Corrigan, and Combs, 1977; Fishburn and Kochenberger, 1979; Kahneman and Tversky, 1979:282–3; Slovic and Lichtenstein, 1983; Tversky and Kahneman, 1986; Quattrone and Tversky, 1988).[9]

Because of the asymmetry of gains and losses and the role of the reference point in defining these distinct domains, the identification, or *framing*, of the reference point can have a critical effect on choice. A change in frame can result in a change in preferences (*preference reversal*) even if the values and probabilities associated with outcomes remain the same. This has repeatedly been demonstrated in laboratory experiments (Grether and Plott, 1979; Kahneman and Tversky, 1979; Slovic and Lichtenstein, 1983; Tversky and Kahneman, 1986; Tversky, Slovic, and Kahneman, 1990; Camerer, 1995:652–65; Roth, 1995:68–75). In choices between alternative medical treatment procedures, for example, it makes a difference whether a particular treatment has a 90 percent survival rate or a 10 percent mortality rate.[10]

In many simple choice problems the framing of the reference point is largely predetermined by the situation (or the experimental design). In a static situation

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[8] Loss aversion and risk orientation are analytically distinct. Loss aversion is reflected in the steepness of the value function on the loss side, whereas risk orientation is reflected in the curvature of the value function. The concepts of loss aversion, the endowment effect, and the status quo bias can all be applied to choice behavior under conditions of certainty where there are no risky gambles as well as to choices under risk. Tversky and Kahneman (1991), for example, develop a model of loss aversion in riskless choice that has nothing to do with lotteries.

[9] There is a potential levels-of-analysis problem that requires further exploration. Experimental tests on risk propensities in the domains of losses and gains generally utilize "between-subjects" designs, so that distinct sets of subjects are tested for choices in each domain. The concern is that single subjects in a "within-subjects" design might more easily recognize the equivalence of choice problems and therefore behave more consistently in repeated choices. Consequently, aggregate results from between-subjects designs do not logically imply a reflection effect in individuals, and we do not know how many of the 70 percent who are risk averse for gains belong to the 70 percent who are risk acceptant for losses. Experiments based on an individual-level analysis show that tendencies toward reflectivity still exist but that they are weaker (Hershey and Schoemaker, 1980; Camerer, 1995:633).

[10] The preference reversal phenomenon also creates a potentially serious methodological problem for utility theory because it raises the question of "elicitation biases": different methods of eliciting preferences generate different responses and thus different preference orders (Camerer, 1995:625–6). This is evident from the following experiment: Consider two gambles that are mathematically equivalent in terms of expected value: one involves a high probability of winning a modest amount of money (the P lottery) and the other involves a low probability of winning a larger amount of money (the $ lottery). Experimental studies (by economists as well as psychologists) repeatedly demonstrate that if asked to choose between the two, most people prefer the P lottery. However, if they are asked to give the lowest price at which they would sell each lottery if they owned both, most people put a higher price or reservation level on the $ lottery (Grether and Plott, 1979; Slovic and Lichtenstein, 1983; Tversky, Slovic, and Kahneman, 1990; Tversky and Thaler, 1990; Camerer, 1995:657–65). Apparently choices are correlated with probabilities while prices are correlated

that involves a well-defined status quo, for example, actors usually frame choice problems around the status quo. Thus, Tversky and Kahneman (1991:1046–7) argue that "the reference state usually corresponds to the decision maker's current position," but they concede that this is not always the case. Expectations, aspirations, social norms, and social comparisons can also influence the framing of the reference point.

Dynamic situations are particularly likely to induce variations in the way people select reference points because of the absence of a stable status quo that might serve as an obvious focal point. In a situation that involves a sequence of successive choices rather than a single choice, for example, does an actor define her reference point in terms of her asset position at the beginning of the series of choices or with respect to her current asset position after a series of actions? Is this affected by whether the outcomes of each decision involve gains or losses? Are people more likely to shift to the current frame after a succession of gains than after a succession of losses?

The experimental evidence suggests that people *accommodate* to gains more rapidly than to losses, and, in fact, do so immediately. This *instant endowment effect* (Kahneman, Knetsch, and Thaler, 1990:1342; Jervis, 1992) suggests that after a series of gains an individual will treat the possibility of a subsequent setback as a loss rather than as a foregone gain, overweight it, and engage in risk-seeking behavior to maintain her cumulative gains against that loss. After a series of losses, however, an individual will not accommodate as quickly but instead adopt the cumulative frame and engage in risk-seeking behavior to eliminate those losses. This phenomenon raises interesting questions as to how different people accommodate to change, in what direction, how quickly, and under what conditions. The literature provides few answers to this question—other than to say that framing is highly subjective, poorly understood, and basically unexplored.

The fact that people sometimes frame around expectation or aspiration levels rather than the status quo suggests that the widely used concept of the status quo bias is misspecified. The bias is really a *reference point bias*, a greater tendency to move toward the reference point than expected-utility theory predicts. The reference point bias subsumes the status quo bias whenever the reference point is defined as the status quo, and under those conditions it will be stabilizing and reinforce the status quo. If the reference point is not congruent with the status quo, however, the reference point bias is destabilizing and reinforces movement away from the status quo.

Experimental studies also show that individual choice behavior demonstrates a *nonlinear response to probabilities*, in contrast to the linear combination of utilities and probabilities in expected-utility theory. First of all, studies beginning with Allais (1953) have shown that individuals overweight outcomes that are certain relative to outcomes that are merely probable. Because of this *certainty effect* (Kahneman and Tversky, 1979:265) people attach greater value to the complete elimination of risk than to the reduction of risk by a comparable amount.

People also tend to overweight small probabilities and to underweight moderate and high probabilities (Kahneman and Tversky, 1979; Camerer, 1995:620–2). This means that except for small probabilities people tend to give more weight to the utility of a possible outcome than to its probability of occurrence, whereas

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with payoffs. (Economists often use the term preference reversal to refer to this behavior regarding P lotteries and $ lotteries, whereas psychologists use the term to refer to a broader category of framing effects.)

The preference reversal phenomenon violates nearly all theories of preference, including expected-utility theory, because it suggests that different elicitation procedures generate different responses and therefore different preference orders, in violation of what Camerer (1995:625–6, 657–65) calls "procedure invariance." The fact that an individual prices A higher than B does not necessarily imply that the individual prefers A over B. This raises questions about the ability to order preferences and about exactly how one constructs a Von Neumann-Morgenstern utility function.

expected-utility theory posits that utilities and probabilities are given equal weight. Although small probabilities are overweighted, extremely small probabilities generate unpredictable behavior.[11] Extremely unlikely events sometimes are treated as if they were impossible and at other times are overweighted in actors' decision calculations (Kahneman and Tversky, 1979:282–3), as illustrated by the unpredictability of insurance behavior with respect to rare catastrophes.

Kahneman and Tversky (1979) developed prospect theory to integrate these observed patterns into an alternative theory of risky choice. They distinguish two phases in the choice process. In the *editing phase* the actor identifies the reference point, the available options, the possible outcomes, and the value and probability of each of these outcomes. In the *evaluation phase* she combines the values of possible outcomes (as reflected in an S-shaped *value function*) with their weighted probabilities (as reflected in the *probability weighting function*) and then maximizes over the product (the "prospective utility").[12]

Note that attitudes toward risk are determined by the combination of the S-shaped value function and the probability weighting function and not by the value function alone. Although this combination usually generates risk aversion for gains and risk acceptance for losses, the overweighting of small probabilities can trigger a reversal of risk propensities under certain conditions, depending on the precise shapes of the two functions (Kahneman and Tversky, 1979; Levy, 1992a:183–4). Thus, the existence of small probabilities is a necessary but not sufficient condition for risk aversion in the domain of losses and risk acceptance in the domain of gains.

In terms of debates between prospect theory and expected-utility theory, reference dependence and framing effects are critical. If people always framed around the status quo it would be possible to subsume loss aversion and the reflection effect within expected-utility theory by positing an S-shaped utility function with a steeper slope on the loss side. But preference reversals induced by changes in frames rather than by changes in subjective utilities or probabilities are much more difficult to reconcile with expected-utility theory or with rational choice theories more generally. Evidence that behavior varies depending on whether the glass is seen as half-empty or half-full does not easily lend itself to a rational choice explanation.

Reference dependence is inconsistent with the Coase theorem, which suggests that if transaction costs are negligible the valuation of a property right is independent of who owns that right, so that initial entitlements do not affect final allocations (Kahneman, Knetsch, and Thaler, 1990; Camerer, 1995:670). But evidence suggests that initial entitlements do make a difference and that rates of exchange are affected by whether one is giving up a good or acquiring it. An individual may prefer good x to good y when x is currently a part of her endowment but prefer good y to good x when y is part of her endowment, so that preferences are reference-dependent (Tversky and Kahneman, 1991:1039; Tversky and Simonson, 1993).[13] More generally, there is evidence that one's preference between x and y may depend on the presence or absence of a third option z (Tversky and Kahneman, 1991; Tversky and Simonson, 1993).

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[11] Although there is no conclusive evidence as to the specific point at which overweighting shifts to underweighting or whether this point varies significantly across individuals or conditions, preliminary evidence suggests that it falls in the .10–.15 range (Hershey and Schoemaker, 1980).

[12] It should be clear that prospect theory belongs to the general class of utility maximization theories, which involve the combination of probabilities and utilities and some form of maximization of value. Whereas expected-utility theory posits a linear combination of utilities and probabilities, prospect theory posits that utilities are weighted by a function that is nonlinear in probabilities.

[13] One theoretical implication is that it is not always possible to construct indifference curves that are reversible and nonintersecting (Knetsch, 1989).

These reference-dependent, or framing, effects violate the assumption of consistent and transitive preferences that is essential not only to expected-utility theory but also to nearly all rational choice theories as well.[14] Framing effects cannot be reconciled with the principle of the "independence of irrelevant alternatives" (Luce and Raiffa, 1957:27; Tversky and Simonson, 1993:1179) or the related invariance assumption, which requires that logically identical choice problems should yield identical results (Tversky and Kahneman, 1986:S252–7). Although invariance is not a formal axiom of expected-utility theory, it is an "invisible background assumption" of the theory (Camerer, 1995:652). Arrow (1982:6) refers to invariance as "extensionality" and describes it as a "fundamental element of rationality." Ferejohn and Satz (1995:80) concede that cases in which "choices are based on preferences but preferences can depend on the situation," do not fit "classical" conceptions of rationality, but suggest "weaker forms of rationality" that do not satisfy the independence hypothesis, such as regret models (Bell, 1982; Loomes and Sugden, 1982).[15]

In summary, framing effects are not consistent with expected-utility theory and probably not consistent with most conventional conceptions of rational choice, but theorists have constructed weaker forms of rational choice theory that are compatible with framing effects.

Implications for International Relations

Prospect theory and the descriptive findings upon which it is based generate a rich set of hypotheses about international behavior. I have discussed these at greater length elsewhere (1992b, 1996a, 1996b), but let me mention a few here for those less familiar with the theory. (1) State leaders take more risks to maintain their international positions, reputations, and domestic political support than they do to enhance those positions. (2) After suffering losses (in territory, reputation, domestic political support, etc.), political leaders have a tendency not to accommodate to those losses but instead to take excessive risks to recover them (where "excessive" is defined with respect to predictions based on expected value). After making gains political leaders have a tendency to accommodate to those gains and take excessive risks to defend them against subsequent losses. (3) Because accommodation to losses tends to be slow, sunk costs frequently influence decision makers' calculations and state behavior.

With respect to strategic interaction, (4) it is easier to deter an adversary from taking an action than to compel him to terminate an action or to undo what he has already done, and easier to deter an adversary from making gains than to deter her from recovering losses. (5) It is easier for states to cooperate in the distribution of gains than in the distribution of losses. (6) Cooperation among states or other actors in social dilemmas (in which individual incentives to defect theoretically lead to socially suboptimal outcomes, such as a prisoner's dilemma) is more likely if the issue involves cooperation in not taking from the commons than if it involves contributing to a public good, for the former involves foregone gains whereas the

[14] Some versions of rational choice theory are broad enough to allow for intransitivities. Fishburn (1982, 1984), for example, has developed axiomatic models that relax the transitivity assumption. Note also that in their defense of rational choice Ferejohn and Satz (1995:77–8) reject the "universalist" assumption that individuals act to maximize utility across all circumstances, and adopt a version of "partial universalism" in which "agents act as utility maximizers in some settings but not in others."

[15] Although standard utility-based game theory does not currently allow for reference dependence, Brams's (1994) theory of moves generates equilibria that are sensitive to the position from which one begins and thus incorporates a form of reference dependence.

latter involves actual losses, at least in the short term (Brewer and Kramer, 1986; Levy, 1996b).

These and related hypotheses provide intuitively plausible explanations for some important patterns of international behavior that do not appear to follow directly from standard rational choice explanations,[16] but there are some serious conceptual and methodological problems that must be overcome before we can utilize prospect theory as a reliable framework for explanation in international politics. In the next section I look at problems of the internal validity of the laboratory experiments themselves, and in the following section I turn to problems of generalizing from highly structured laboratory experiments to the "ill-structured" world of international relations.

Methodological Problems: Questions of Internal Validity

Although social psychologists have repeatedly demonstrated that individual choice behavior in the laboratory systemically deviates from the predictions of expected-utility theory, economists have been more skeptical. They argue that observed anomalies are the artifacts of experimental procedure and can be explained by standard economic theory. Subjects are faced with hypothetical rather than real choices and consequently have few incentives to expend the mental effort to make optimum decisions in complex choice problems. They are confronted with unfamiliar problems in one-shot experiments and have no opportunity to learn through the discipline and incentives of market institutions. Finally, in bargaining experiments subjects have an incentive (or at least a habitual tendency) to misrepresent buying and selling prices. With real choices that involve ample financial incentives and opportunities for learning, economists argue, the anomalous behavior should disappear (Cox and Isaac, 1986:648–9; Camerer, 1995).

These concerns led Grether and Plott (1979) to construct "a series of experiments designed to discredit the psychologists' works as applied to economics" (p. 623), particularly with respect to the preference reversal phenomenon (see footnote 10 earlier). They used monetary incentive systems to heighten motivation, and they controlled for income, order of repetitive choices, and strategic bargaining effects.[17] They concluded that although their research design "controlled for all of the economic-theoretic explanations of the phenomenon which we could find . . . the preference reversal phenomenon . . . remains" (p. 634). This study was influential in bringing the preference reversal phenomenon to the attention of economists, but doubts about the adequacy of the Grether/Plott experimental design persisted, and other economists conducted further experimental tests of preference reversals and other observed anomalies in expected-utility theory.

The question of incentives has attracted special attention, but the evidence is mixed.[18] Grether and Plott (1979) found no incentive effects in their study of the preference reversal phenomenon.[19] Pommerehne, Schneider, and Zweifel (1982:572–3) found that, "Even when the subjects are exposed to strong incentives for making motivated, rational decisions, the phenomenon of preference reversal does not vanish," though the rate of preference reversal was lower than Grether and

[16] This is not to imply that these patterns are logically inconsistent with a rational choice framework.

[17] The standard procedure for eliciting preferences is the Becker, DeGroot, and Marschak (1964) procedure, in which rational subjects have strong incentives to state their true reservation prices for selling lotteries with which they have been endowed. For a brief description see Roth (1995:19–20).

[18] Economists generally use monetary amounts that are comparable (when cumulated) to wage rates of employed members of the subject pools—typically $8–$20 per hour.

[19] Plott (1987:120) suggests that there is more evidence for incentive effects in group as opposed to individual behavior.

Plott (1979) found. Reilly (1982) used a within-subjects design and found that increased payoffs do reduce the rate of reversals but that a substantial percentage of reversals remains. Further work using a wide variety of procedures led to similar conclusions (Slovic and Lichtenstein, 1983; Tversky and Kahneman, 1986:S273–4; Camerer, 1989; Tversky, Slovic, and Kahneman, 1990). Tversky and Kahneman (1992:315), for example, conclude that "all major violations of expected utility theory . . . were obtained both with and without monetary incentives."[20]

One could always argue, of course, that the incentives used by these experimenters are inadequate to elicit optimizing behavior and that consequently these experimental findings cannot be generalized to the high-stakes world of international relations. This raises the practical problem that limited research budgets make it impossible to provide large real monetary rewards for all subjects. One procedure designed to get around this problem involves a "random lottery incentive system," in which subjects are informed that they will receive the actual payoff for one (and only one) of their choices, which will be randomly selected from all of the choice problems that they play. Evidence suggests that this procedure elicits approximately the same preferences as one in which subjects make one choice and receive the actual payoff for that choice (Camerer, 1989:82, 1995:634; Starmer and Sugden, 1991).

Another approach to the problem of creating meaningful monetary incentives involves conducting the research in poorer societies where the ratio of monetary reward to normal income is relatively high.[21] Kachelmeier and Shehata (1992) examined the impact of probabilities and monetary incentives on revealed risk preferences of Chinese students, where subjects could earn three times their normal monthly income in one experimental session. The authors find that the hypothesized overweighting of small probabilities, confirmed repeatedly in the literature for low monetary incentives, holds for high monetary incentives. They also find that although subject risk behavior changes little if choice problems include low monetary incentives (relative to the absence of incentives), larger monetary incentives, if real, do have some impact on risk orientation. Kachelmeier and Shehata (1992:1137) conclude that the effects of monetary payments are real but somewhat complex and that further research should explore the impact of monetary incentives in combination with alternative payment structures, alternative elicitation methods (to deal with the preference-reversal phenomenon), and alternative decision contexts. This complexity is reflected in Binswanger's (1980) study of village farmers in India. Risk behavior was influenced by an increase in payoffs but not by the wealth of the subjects.[22]

These and other studies of incentive effects lead Roth (1995:76) to conclude that "anomalous choice behavior . . . survived both the change from hypothetical to real choices and increases in the payoff level. . . . The debate has now shifted to the underlying causes of the phenomena and . . . [to the question of whether] market environments will moderate the observed effects." Critics of existing experimental work argue that the endowment effect, disparities between willingness-to-pay and willingness-to-accept, preference reversals, and other observed deviations from expected utility can be traced to transaction costs, task unfamiliarity, the absence of

[20] There may be a slight tendency for playing gambles with real payoffs to generate more risk aversion than do purely hypothetical choices (Battalio, Kagel, and Jiranyakul, 1990; Hogarth and Einhorn, 1990; Schoemaker, 1990; Camerer, 1995:634).

[21] One danger that may not be adequately addressed in existing experimental studies is that income effects and cultural effects may be confounded. This suggests a research strategy that involves comparisons across different cultures while holding the ratio of money incentives to income relatively constant.

[22] The last point supports the prospect theory assumption that utility is defined over changes in wealth rather than absolute levels of wealth.

opportunities for learning, or strategic incentives (or habitual tendencies) to overstate selling prices and understate buying prices (Coursey, Hovis, and Schulze, 1987; Brookshire and Coursey, 1987).

Other studies have controlled for these possible effects and have demonstrated that the observed anomalies, though lower in magnitude under certain conditions, do not disappear. In one early study, Reilly (1982), concerned that subjects might not fully understand the nature of the task or the logic of optimization, conducted experiments in small groups, provided greater opportunities of interaction with the experimenter, and systematically instructed subjects in the meaning of the expected value concept; but preference reversals remained, though at a somewhat reduced rate. Kahneman, Knetsch, and Thaler (1990) conducted repeated market experiments with full feedback after each trial to control for learning. They also used induced-value tokens (as opposed to real goods) to control for transaction costs, but found no evidence that buying prices and selling prices converged over repeated market trials.

There is some danger that the terms "buyer" and "seller" might inadvertently induce strategic behavior and overstate the gap between buying prices and selling prices. This led Grether and Plott (1979) and then Franciosi, Kujal, Michelitsch, and Smith (1993; cited in Camerer, 1995:666) to eliminate the terms "buyer" and "seller" from the instructions to subjects. Franciosi et al. found somewhat lower selling prices but still a large gap between buying prices and selling prices. Discrepancies between buying prices and selling prices narrowed but did not disappear in within-subjects experimental designs, which elicit both buying and selling prices in the same individual (Harless, 1989; Kachelmeier and Shehata, 1992). Camerer (1995:667) concludes that, "Overall, the data suggest that competition or learning in markets reduces the buying-selling price gap somewhat, in some settings, but does not eliminate it. The gap is large for environmental and consumer goods (like wetlands and mugs) and small for lottery tickets."

The argument that the observed anomalies in expected-utility theory are not primarily an artifact of lack of incentives or learning opportunities in experiments gains more support from field studies of consumer, insurance, and financial market behavior, where presumably the ratio of monetary incentives to mental effort is high.[23] Studies of consumer behavior, for example, show that models that incorporate estimates of reference prices perform better than standard demand models that utilize only current prices (Winer, 1986; Hardie, Johnson, and Fader, 1993). Putler (1988; noted in Tversky and Kahneman, 1991:1055) estimated separate demand elasticities for increases and decreases in prices relative to a reference point and found that elasticities for price increases were twice those for price decreases.[24]

There is also evidence that the volume for stocks that have declined in price is lower than the volume for stocks that have increased in value, though tax considerations would predict the opposite (Shefrin and Statman, 1985; Kahneman, Knetsch, and Thaler, 1990:1345). This supports the endowment hypothesis and the corollary hypothesis that people tend to hold losers too long. Finally, Benartzi and Thaler (1993) use hypotheses of loss aversion and mental accounting to explain the "equity premium puzzle," the fact that the discrepancy between the returns on stocks and fixed-income securities is too large to be explained by reasonable estimates of investor risk aversion.

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[23] Findings of systematic anomalies in expected-utility theory gain some further support from laboratory studies of animal behavior, where similar patterns of choice under conditions of risk are observed (Battalio, Kagel, and McDonald, 1985; Kagel, 1987). Needless to say, questions of cross-species generalizability is highly contested territory.

[24] This is consistent with experimental studies of the endowment effect, which generally find that selling prices exceed buying prices by two to one.

It is fair to conclude that findings of reference dependence, the endowment effect, the reflection effect, framing effects and preference reversals, and nonlinear responses to probabilities in individual choice have held up quite well in the face of substantial critical scrutiny. Numerous and varied attempts to demonstrate that these anomalies can be explained by absence of financial incentives or opportunities for learning, by transaction costs, or other economic variables have failed. Camerer (1995:674), for example, concludes that "not a single major recent (post-1970) anomaly has been 'destroyed' by hostile replication." It is true that the proper controls reduce the magnitude of observed anomalies to a certain extent, which suggests the need for additional research to determine the conditions under which this is most likely to occur, but the bottom line is that the anomalies persist.

The theoretical implications of these descriptive findings are less clear. If we were to adopt a Popperian criterion and evaluate theories by direct tests against the evidence (Popper, 1959), then we might have to reject expected-utility theory as a positive theory of individual choice. As the economist Plott (1987:117) concludes, "If the only question posed is Rational choice, true or false? then the answer is clearly false. . . . The weakest forms of the classical preference hypothesis are systematically at odds with the facts."

But "True or false?," in terms of direct tests of a theory or its hypotheses against the empirical evidence, is not the only question, and social scientists have increasingly shifted to a Lakatosian conception of scientific progress and a demand that theories be tested against alternative theories (Lakatos, 1970). Prospect theory is one of a number of alternative theories of individual choice that behavioral decision theorists have constructed in an attempt to integrate observed anomalies in expected-utility theory into a more descriptively accurate theory of choice.[25]

Experimental social psychologists and economists have conducted endless tests of these theories against each other and against expected-utility theory (Camerer, 1989, 1995; Harless and Camerer, 1994). The results are mixed. The general conclusion is that "choice under uncertainty is a field in flux" (Machina, 1987:121), that there is "no consensus as to whether any of the many alternative theories are better than expected utility theory in explaining behavior under uncertainty" (Sopher and Gigliotti, 1993:75), and that "none of the alternatives to expected utility theory . . . consistently organize the data, so we have a long way to go before having a complete descriptive model of choice under uncertainty" (Battalio, Kagel, and Jiranyakul, 1990:46).

There is another sense in which the question "True or false?" is misleading. As social scientists our aim is not to test expected-utility theory per se (which taken alone is empirically empty and nontestable) but *models* of social behavior that are built on the microfoundations of expected-utility theory (or prospect theory or some alternative). We must also be careful to specify exactly what it is that we want to explain. Although expected-utility theory models of individual choice behavior are descriptively problematic, there is a fair amount of evidence from experimental studies of asset markets and auctions that utility maximization models do fairly well in accounting for many aspects of aggregate market behavior (Friedman, Harrison, and Salmon, 1984; Plott, 1987; Smith, 1991; Wittman, 1991; Sunder, 1995; Roth, 1995:49–60; Kagel, 1995). Experience, learning, incentive, informational efficiencies,

[25] Each of these alternative theories relaxes one or more of the axioms of expected-utility theory. Other theories include weighted utility theory (Chew, 1983), generalized expected-utility theory (Machina, 1982), regret theory (Bell, 1982; Loomes and Sugden, 1982), expected utility with rank-dependent probability weights (Quiggan, 1982; Yaari, 1987), and lottery-dependent utility theory (Becker and Sarin, 1987), to name a few. Prospect theory has itself been significantly revised in the form of cumulative prospect theory (Tversky and Kahneman, 1992). See Machina (1987), Payne, Bettman, and Johnson (1992), and Camerer (1995:626–33) for recent reviews.

and discipline in market settings may create stable preferences and optimizing behavior which are well-approximated by rational economic models.[26]

These findings suggest that rational choice models of economic behavior may be useful in spite of the descriptive inaccuracy of rational models of individual choice. Psychologists and economists may both be right. They get different answers because they are asking different questions: psychologists want to explain the psychology of individual choice (Cox and Isaac, 1986:648–9), whereas economists want to explain aggregate behavior in repetitive market transactions. For these and other purposes, Plott (1987:120) argues, rational choice theory is retained in spite of its limitations "because neither an alternative theory nor an alternative general principle accomplishes so much."

To conclude, the internal validity of laboratory studies of individual choice behavior does not appear to be the major issue confronting applications of prospect theory hypotheses to international relations. The major methodological challenge relates to the external validity of those findings for the behavior of states in the complex and high-stakes world of international relations. The major theoretical challenge is to move away from the individual level and construct prospect theory–based models of state foreign policy and international interactions. I now turn to these issues.

Problems of External Validity: Generalizing from Laboratory Experiments[27]

The main problem is that the descriptive generalizations upon which prospect theory is based emerge from experimental research in highly structured laboratory settings which are very unlikely to be replicated in the complex empirical world of international relations. In the laboratory subjects are usually given a choice between a certain outcome and a lottery that involves two or more possible outcomes with known values and probabilities and therefore with expected values that are known and easily compared. The framing of the reference point is inherent in the way the analyst sets up the choice problem. The empirical analysis is facilitated by the use of monetary outcomes or in some cases mortality rates or inflation and unemployment rates, which are measurable on an interval scale and which can be roughly scaled into utilities. The experiments control for the possible effects of extraneous variables or attempt to randomize them over a large number of subjects. The subjects are given a one-time choice and receive a payoff that depends on their choice alone and not on choices by an adversary. The research design is set up in such a way that expected-utility theory and prospect theory predict different choices, so that interpretation of the results of most of these experiments is relatively straightforward.

These conditions are rarely satisfied in the ill-structured choice problems foreign policy leaders typically face. How individual political leaders frame their reference point is highly subjective and difficult for the analyst to identify. The probabilities and utilities of outcomes—and, in fact, the prior identification of possible options and their consequences—are not given but instead are judgments and values of political leaders about which we have very little information.[28] Actors usually

[26] There are some important exceptions in this observed gap between individual and market rationality (Plott, 1987:40), and further research is necessary to specify the conditions under which this gap occurs.

[27] See also Jervis (1992), Levy (1992b), Shafir (1992), and Stein (1992).

[28] From a prospect theory perspective, there is another problem with the measurement of the probabilities. Even if we could identify the subjective probability estimates of decision makers, it is not clear whether these estimates would be the subjective probabilities themselves or the transformed values after the application of the probability weighting function. For a good discussion of problems involved in interpreting verbal statements of probabilities see Boettcher (1995).

confront two risky options rather than one, for doing nothing or selecting the status quo or a negotiated agreement also involves risks. These risks are compounded by the fact that each option has future consequences which require a balancing of present and future risks,[29] and by the fact that these consequences are a function of others' choices as well as one's own. Thus, which of the options is more risky is often difficult to define conceptually or measure empirically.[30]

Consequently, whereas laboratory studies focus on the evaluation of given options under static conditions of current risk in noninteractive settings, foreign policy decision making involves the critical tasks of defining the situation, editing the choice problem, and then evaluating options under dynamic and interactive conditions of present and future uncertainties. Consequently, it is extremely difficult for the analyst to determine whether an actor selects a particular option because of framing, loss aversion, the reflection effect, and probability overweighting, or simply because it is more highly valued in terms of a standard cost-benefit calculus based on expected value. Thus, it is difficult to distinguish empirically between a prospect theory explanation and an expected-utility or expected-value explanation.

The difficulty of determining empirically how an actor defines her reference point is particularly troubling. If we cannot identify the reference point independently of the behavior we are trying to explain, then prospect theory and its key hypotheses cannot be tested and have no explanatory power. After Saddam invaded Kuwait, for example, did he stand firm against U.S. and U.N. threats because he had accommodated to his gains and defined his reference point around the new status quo, categorized withdrawal from Kuwait as a loss, and consequently adopted a risk-seeking strategy of standing firm against U.S. threats? Or did Saddam continue to define his reference point around the prewar status quo but choose to stand firm rather than accept a return to that status quo precisely because he perceived the status quo as unacceptable and risks of war with the U.S. as tolerable? In the absence of independent evidence about how Saddam framed the problem, it is difficult to differentiate empirically between these two different explanations.[31]

The question of the relevance of experimental laboratory findings to the complex world raises another question, one that takes us back to the point that the experimental evidence suggests that expected-utility models appear to provide a better description of aggregate market behavior than of individual behavior. Although this evidence regarding the effects of market institutions is not conclusive, and although additional research is necessary, this finding does raise the question of whether other types of institutions, including political institutions, may also work to limit the range of errors in individual choice behavior,[32] or whether, to the contrary, nonrational tendencies in individual behavior are actually exacerbated in some collective decision-making settings.[33]

The questions facing the international relations scholar are not exactly congruent with those of either the psychologist or the economist. Our primary units of analysis are neither the individual nor the market, but states, organizations, corporations,

[29] Compounding this is the fact that standard economic models of how actors discount future payoffs are not always consistent with observed behavior in the laboratory or field studies (Loewenstein and Elster, 1992).

[30] Note that expected-utility theory confronts nearly all the same problems, save those related to the identification of the reference point.

[31] There are, of course, alternative psychological explanations based on Saddam's personality and/or his emotional responses to the domestic and international crises.

[32] Theories of the rationality-inducing tendencies of bureaucracies go back to Weber (1947). Farkas (1996) explains this gap between the nonrationality of individuals and the rationality of collective decision-making bodies by an evolutionary model.

[33] This is suggested by group polarization and groupthink theories, among others (Myers and Lamm, 1976; Janis, 1982; 't Hart, 1990).

and other collective political units. Many political goods are essentially public goods, for which many conventional economic theories break down (Monroe, 1991:7). Although theoretical insights from other fields may have enormous heuristic value for international relations scholars, we must be very careful in the way we apply those ideas and in the way we use evidence from other fields to support them. The problem of the external validity of laboratory experiments and, indeed, of the validity of theoretical propositions across disciplines, levels of analysis, and contexts is indeed a serious one.

Theoretical Limitations of Prospect Theory

The Limited Scope of the Theory

It is important, first of all, to be clear about what prospect theory does and does not purport to explain. It is a theory of choice under conditions of risk. It is not a complete theory of decision making because it focuses only on explaining choices given the basic parameters of the decision problem—the available options, their possible outcomes and the values and probabilities associated with each, and the framing of the reference point. These basic parameters themselves are exogenous in the theory. Thus, Kahneman and Tversky (1979:275) restrict themselves to choice problems "where it is reasonable to assume either that the original formulation of the prospects leaves no room for further editing, or that the edited prospects can be specified without ambiguity." In its current form prospect theory is a theory of the evaluation of prospects, not a theory of the editing of choices (Levy, 1992a:190). It is a reference-dependent theory without a theory of the reference point.[34]

The S-shaped value function and its greater steepness on the loss side were each generated inductively from the experimental evidence, without an elaborate theoretical explanation for why these patterns characterize choice behavior. Tversky and Kahneman (1990:1057) do suggest, however, that the value function reflects "three basic facts: organisms habituate to steady states, the marginal response to changes is diminishing, and pain is more urgent than pleasure." The habituation to steady states generates reference dependence, the diminishing marginal response to change in both directions generates the S-shaped value function and the reflection effect, and "the asymmetry of pleasure and pain is the ultimate justification of loss aversion in choice" (Tversky and Kahneman, 1991:1057). Although these arguments are in need of greater theoretical development, they are certainly plausible, and probably more descriptively accurate than the axioms of expected-utility theory.[35]

Although prospect theory would be more complete if it provided a more thorough explanation for why regularities of loss aversion and the reflection effect occur, the fact that these and other regularities do occur contributes to our ability to explain and predict behavior. A similar argument applies to rational choice theories. Although these theories would be more complete if they incorporated a theory of preferences and explained how people defined and structured a choice problem, they still make a critical contribution to our understanding of social behavior by providing contingent explanations of choice given structure, preference, and information.

Still, in the complex and ill-structured world of international politics one can make the plausible case that much of the explanatory power lies in the identification

[34] Some applications of prospect theory to international relations have explored the possible impact on framing of affect (Farnham, 1992) and of historical learning or analogical reasoning (McDermott, 1992; Taliaferro, 1994).

[35] For a discussion of the psychophysical underpinnings of prospect theory see McDermott (n.d.:ch. 2).

of the problem, the options, the values and probabilities of possible outcomes, and in the framing of the reference point. How these are specified by the analyst involves auxiliary assumptions that comprise a necessary component of any theory of choice. Simon (1986:28) undoubtedly goes too far in arguing that, "Almost all the action, all the ability to reach nontrivial conclusions, comes from the factual assumptions and very little from the assumptions of optimization" that constitute the core of formal decision theory, but it is conceivable that the editing of the choice problem (including the identification of the reference point and the value of key parameters) explains more of the variance in outcomes than does the evaluation of options once the choice problem has been specified (see also Kavka, 1991:373). This is ultimately an empirical question, of course, and it is clear that international relations scholars need to devote as much attention to these auxiliary assumptions as they do to the formal decision model itself.

The focus on auxiliary assumptions refers to assumptions about both the basic parameters of the choice problem and the processes through which those parameters were generated by the actors. Although expected-utility theory and rational choice theories more generally have been criticized by some for excessive reliance on the "as if" assumption (M. Friedman, 1953; Moe, 1979)—for their focus on behavioral outcomes but not on the question of the processes through which those outcomes are generated—the same criticism can be made of prospect theory, or at least of the evaluation phase of prospect theory. Both theories take the structure of the choice problem, preferences, constraints, and information as given and attempt to explain choices or outcomes but not the intervening processes through which those choices are made.[36]

In Simon's (1976) terms, both expected-utility theory and prospect theory are concerned with "substantive rationality" rather than "procedural rationality." Substantive rationality refers to the optimization of given goals under given conditions and constraints, and is a function of goals and situational constraints but not intervening reasoning processes. Procedural rationality, on the other hand, depends on the appropriateness of the intervening reasoning processes (Simon, 1976:130–1). Thus, the question of whether or not people actually engage in the hypothesized intervening calculations is essential for the validity of hypotheses on procedural rationality but not for the validity of hypotheses on substantive rationality. Whereas expected-utility theory is concerned primarily with substantive rationality, most theories of judgment and choice in social psychology are primarily process-oriented.

In an important sense, therefore, prospect theory does not fit neatly into the "cognitive-rational debate." The evaluation phase of prospect theory—which includes a well-developed and formalized theory that incorporates loss aversion, an S-shaped value function, and a probability weighting function, and which has captured most of the attention in applications of prospect theory to international relations—has more in common with rational economic theories than it does with process-oriented cognitive theories. It is the theory of editing and framing, once it is developed, that will have more in common with cognitive process theories than with rational economic theory.

This is becoming more and more clear in the work of Tversky and his colleagues.Tversky and Thaler (1990:210–1), for example, conclude that people do

[36] In truth, there is a debate between those rational choice theorists who adopt the instrumentalist "as if" assumption and focus on the predictive power of rational choice theories, and "realists" who insist that the rationality assumption is a descriptively accurate law of behavior. Since M. Friedman (1953), most formal decision and game theorists, particularly in international relations, adopt the instrumentalist view, and I shall assume that perspective here; but for a brief summary of the debate see J. Friedman (1996).

not possess a set of predefined preferences for every contingency, that people construct preferences in the process of making a choice or judgment, and that these preferences are influenced by the context of choice and also by the procedures involved in making choices (Tversky and Simonson, 1993). This view of "preference as a constructive, context-dependent process" raises some very fundamental questions about any form of utility theory based on preference.

To conclude, the failure to endogenize all of the relevant variables at this stage of the prospect theory research program is a limitation of the theory but not a fatal flaw. We should see it as an opportunity to improve the theory rather than as a reason to reject it.

There are other aspects of prospect theory that create more serious limitations in its ability to help us understand international behavior. Two of these relate to levels-of-analysis. Whereas prospect theory is a theory of individual decision making, international relations involves strategic interaction between collective state actors. Prospect theory provides no explanation for how individual preferences get translated into foreign policy decisions of states or how the choices of two or more states interact to generate dyadic and international outcomes.

The Aggregation Problem

Most of what we want to explain in international politics involves the actions and interactions of states (and perhaps international organizations or corporations), each of which is, in principle, a collective decision-making body. The concepts of loss aversion, the reflection of risk orientations, and framing were developed for individual decision making and tested on individuals, not on groups, and we cannot automatically assume that these concepts and hypotheses apply equally well at the collective level.

There is a substantial class of cases, of course, in which a single individual plays such a dominant role in decision making, either in making decisions for the state or in blocking choices that are not congruent with his or her own preferences, that the application of a unitary actor assumption and prospect theory hypotheses provides a reasonably good explanation for state decisions. Saddam's Iraq, Hitler's Germany, Stalin's Soviet Union, and other centralized regimes are the most obvious examples, but crisis decision making in less personalist regimes can also sometimes be explained reasonably well by a unitary actor model under certain conditions.

Although the individual-level focus of prospect theory need not be a problem in applications to individual cases as long as the validity of the unitary actor assumption is empirically demonstrated, and although the unitary actor assumption has been useful for some modeling purposes, it is less satisfactory as a general assumption about foreign policy decision making. A theoretical solution to the aggregation problem is clearly desirable. Rational choice theory has a similar aggregation problem, of course; and although rational choice has not yet satisfactorily solved the problem, it has made some progress toward that end. Prospect theory lacks anything comparable to rational theories of bureaucratic politics to explain how individual preferences, political power, and private information get translated through the political process into choices for the state or organization (Allison, 1971; Bendor and Hammond, 1992). Nor does prospect theory offer anything comparable to rational theories of coalition formation to explain how preferences get aggregated. There is nothing in principle that excludes us from developing prospect theory into a theory of collective choice, although the roles of framing and of the nonlinear probability weighting function introduce additional layers of conceptual and mathematical complexity.

One problem is that the behavior of groups with respect to risky choices is not necessarily congruent with the aggregation of the risk orientations of individual

members, as demonstrated by the substantial body of literature in group dynamics on "choice shifts." Early work emphasized the "risky shift" phenomenon, the tendency for groups to favor riskier choices than do the individual members of the group (Pruitt, 1971; Janis, 1982). More recent work tends to support a more balanced "group polarization" hypothesis, in which groups tend to move either toward riskier or more cautious policy orientations, depending on the circumstances (Myers and Lamm, 1976; Minix, 1982; 't Hart, 1991:264–6). One important avenue for future research is to explore the extent to which the loss aversion and the reflection effect apply to group decisions as well as it does to individual decisions, how the reflection effect interacts with choice shift hypotheses, and the extent to which these apply to foreign policy behavior.

Loss aversion and risk orientation both depend on framing, of course, and this presents another difficult set of analytical issues for group decision making. In individual cases where the application of a unitary actor assumption is reasonable we can focus on the frame and decision calculus of the dominant decision maker. For the purposes of a general theory of foreign policy, however, the concept of a collective frame around which a collective value function and collective probability weighting function are constructed to generate a collective risk orientation involves an unacceptable reification of individual-level concepts. It is more useful to focus on the individual level and talk about how individual frames influence individual evaluations of outcomes and orientations toward risk to generate (along with probability weighting) individual policy preferences. If a particular outcome is especially costly because it is seen as a loss relative to a reference point, there is no reason why that cannot be incorporated into an actor's utility function.

It would also be useful to explore how the framing of individuals' reference points is influenced by the reference points, preferences, and behavior of other members of the group (de Dreu, Carnevale, Emans, and van de Vliert, 1994). There might be several causal mechanisms here, but one of the most intriguing involves strategic manipulation within the group. At the same time individuals are framing and reframing the decisions they face, they may simultaneously be trying to manipulate how others frame their choice problems. In fact, part of the political bargaining may take place not directly over policy preferences or even over cost-benefit calculations, but over the reference point that others select to frame their problems (Maoz, 1990). One key hypothesis is that actors aim to influence the other to frame a particular outcome as a foregone gain rather than as a loss in order to minimize the costs to others of accepting that outcome.[37]

This raises the interesting problem that the relationship between framing (or at least the frame that is articulated) and the evaluation of outcomes in collective decision making may occasionally be reversed. Instead of the reference point determining whether outcomes are defined as gains or losses, one's preexisting policy preferences may lead one to frame the problem around a particular reference point that is most likely to influence the preferences of others. This creates a problem for the analyst in specifying causality and in distinguishing real frames from strategic frames. Shafir (1992:314) argues that "it may not be trivial to disentangle the choice of a frame from a choice of the alternative which that particular frame supports." The relationship between frames and preferences may

[37] This strategic aspect of framing applies to domestic politics as well as to bureaucratic politics, and part of leaders' efforts to gain the support of domestic publics lies in attempting to influence the way these publics frame the issue.

also be spurious, if another variable simultaneously influences an actor's preferences over outcomes and her selection of a reference point (Jervis, 1992).[38]

This discussion makes it clear that one critically important task for future research involves the theoretical development and empirical validation of linkages between loss aversion, the reflection effect, and framing effects at the individual level and decision making at the collective level. Most useful would be the development of a formal theory of collective choice based on the microfoundations of prospect theory. This is an ambitious theoretical task, but there are other things that can be done short of this that would add to the utility of prospect theory for international relations.

One approach would be to incorporate framing, loss aversion, the reflection effect, and the certainty effect into standard models of bureaucratic politics. These hypotheses could help to explain the sources of the policy preferences of individual actors in the decision-making process, while conventional hypotheses about the nature of the bureaucratic process explain how these preferences of different individuals in different roles and different degrees of political influence get aggregated to produce collective policy choices. Heads of organizations may be more concerned about maintaining their organizational power and budgets than in increasing them, for example, and they may treat temporary budgetary increases as a permanent part of the organization's endowment.

The same can be done for alternative models of the foreign policy process. Domestic publics, for example, may be more influenced by policies that hurt their standard of living than those that improve it, more by policies that harm the national interest than those that enhance it, and consequently they may be more likely to punish political leaders for failures than to reward them for successes. In this "two-level game" (Putnam, 1988) with loss-averse publics even political leaders who were not themselves influenced by loss aversion or framing would find it in their interest to behave as if they were.

In these ways the loss aversion hypothesis and the reflection effect can make an important contribution to rational theories of politics by specifying both the shape of the utility function and the other parameters that are exogenous in those models. An alternative approach to the aggregation problem would focus on group dynamics. One hypothesis might be that group settings lead to "compromised frames," including "mixed frames" that involve both gains and losses, that are not as extreme as individual frames (Shafir, 1992:314).[39] One implication is that frame changes—and consequently framing-induced preference reversals—will be lower in frequency and magnitude in group settings as opposed to individual decision making, but this needs to be developed theoretically and explored empirically.

However it is done, some form of integration of prospect theory hypotheses into broader models of the foreign policy process is a critical task for future research, for prospect theory as a theory of individual choice does not in itself constitute a general theory of foreign policy.

The Strategic Interaction Problem

Just as it is necessary to move from a theory of individual choice to a theory of collective choice in order to provide a logically complete theory of foreign policy, it

[38] It is conceivable, for example, that a recent military defeat might lead to the identification of the pre-defeat status quo as the reference point and independently create strong incentives to pursue a hard-line, risk-acceptant foreign policy to recover one's losses and/or minimize the reputational costs of that defeat. The inference that the shift toward a more risk-acceptant foreign policy followed from a change in frame might be spurious.

[39] Recall that framing-induced preference reversals are weaker for mixed lotteries than for pure lotteries.

is also necessary to move from a theory of foreign policy to a theory of interactive choice to provide a logically complete theory of international behavior. Even more here than for the aggregation problem, prospect theory lags behind rational choice theory, which has supplemented expected utility as a theory of choice with game theory and bargaining theory as theories of strategic interaction (Roth, 1985; Bueno de Mesquita and Lalman, 1992; Morgan, 1994).

A major theoretical task for prospect theory is to build a theory of strategic interaction on the assumptions of reference dependence, loss aversion, the reflection effect, and nonlinear response to probabilities. Such a "behavioral game theory" (Camerer, 1990), not yet developed, would be to behavioral decision theory what game theory is to formal decision theory. This is a technically difficult project that most international relations theorists will prefer to leave to economists or economic psychologists, but there are other ways that prospect theory can be put in a more strategic context.

Prospect theory hypotheses can also be used to shape middle-range theories about bargaining behavior. The experimental and behavioral literature on negotiation and bargaining theory (Rubin and Brown, 1975; Pruitt, 1981; Roth, 1995) contains a rich set of hypotheses with important implications for international relations. The impact of framing on bargaining (Bazerman, 1983; Neale and Bazerman, 1985; Neale, Huber, and Northcraft, 1987) is particularly important and needs to be explored further in the context of international politics. One important hypothesis that could be further developed relates to the concept of "concession aversion"—if bargainers treat their concessions to the adversary as losses and what they get in return as gains, they will overvalue the former relative to the latter and be less inclined to make concessions or reach negotiated settlements than predicted by rational choice theories of bargaining (Neale and Bazerman, 1985; de Dreu et al., 1994).

The framing of the reference point may affect the bargaining process in other ways. Are actors actually aware of framing effects, and if so how much of the bargaining process involves attempts to influence the adversary's frame and also the adversary's perception of one's own frame? Do political leaders attempt to make it easier for the adversary to make concessions by encouraging it to view those concessions as foregone gains rather than losses? Do they try to reinforce their own bargaining positions by trying to convince the adversary that they define their own possible concessions as losses, thus increasing the sense of loss and presumably leaving one less inclined to make further concessions and, in fact, more deserving of additional compensation? What particular tactics are used in attempting to manipulate the adversary's reference point, and how successful are they? Does the framing of gains and losses influence perceptions of fairness and justice, and how important are these considerations in the bargaining process?

More generally, can we construct a behavioral and framing equivalent to "signaling games" in game theory (Powell, 1990; Fearon, 1994), in which actors attempt not only to discover the adversary's preferences while manipulating the adversary's assumptions about their own preferences, but also to identify the adversary's reference point while manipulating the adversary's perception of their own reference point?

Conclusions

The fact that prospect theory is a leading alternative to expected-utility theory undoubtedly accounts for much of the interest in prospect theory in international relations and in political science more generally. Prospect theory, and, in fact, all of behavioral decision theory, is defined in terms of behavioral deviations from expected-utility theory, and each of these theories is explicitly tested against

expected-utility theory in experimental and field research. This leads naturally to the view of a paradigmatic debate between prospect theory and rational choice.

In the section on external validity I have emphasized the methodological problems involved in empirically differentiating a prospect theory explanation from a rational choice explanation based on expected-value maximization, and this raises the question of the criteria by which we evaluate competing theories. Elsewhere I have argued that expected-utility theory is more parsimonious than prospect theory because it is axiomatically based and because it requires fewer parameters for full specification. Expected-utility theory is also based on a normatively appealing set of axioms, whereas prospect theory makes no normative claims (Tversky and Kahneman, 1986:S272).[40] On these grounds I argued that in case study applications of prospect theory the burden of proof should be on the proponent of prospect theory to test her theory or explanation against a rival rational choice explanation and to show not only that the evidence is consistent with a prospect theory explanation, but also that the theory provides a better explanation of that behavior than does a rational choice explanation based on a straightforward expected-value calculation (Levy, 1992b:296–7).

Although I continue to believe that in the end empirical applications of prospect theory in international relations and political science more generally will have to demonstrate that the theory provides a better explanation of a set of phenomena than does an alternative rational choice theory, I believe that many international relations analysts have gone too far in defining their task in terms of a paradigmatic debate between prospect theory and rational choice. I also believe that given the early stages in the development and application of prospect theory in international relations, it is premature to focus primarily on empirical tests between the two paradigms.

First of all, too much scholarship in the international relations field has focused primarily on interparadigmatic debates at the highest level rather than on the construction and testing of falsifiable models of behavior. The rational choice paradigm[41] subsumes a number of rather different theories of international politics (deriving in part from the incorporation of different auxiliary assumptions about preferences), and a focus on the paradigmatic debate between prospect theory and rational choice obscures these significant theoretical differences. In the same way, paradigmatic debates between realism and liberalism obscure significant theoretical variations within each (Levy, 1994), and the further conceptual development of the prospect theory research program is likely to generate different theories of international politics. Interparadigmatic debates deflect attention away from the important tasks of empirically testing between alternative theories within the same paradigm and of considering how insights from different theoretical perspectives might be combined to generate more powerful theories of behavior.

Another reason why international relations scholars should not focus primarily on the paradigmatic question of whether prospect theory provides a better explanation of international political behavior than does rational choice/expected-utility theory is methodological: it is extremely unlikely that empirical data in international politics will provide a convincing test of these competing theories of choice. It is simply too difficult to operationalize and measure the key variables and to control

[40] That is, actors who were aware that they were behaving according to the dictates of expected-utility theory would have no incentives to alter their behavior, whereas actors who were aware that their behavior matched prospect theory might want to alter their behavior.

[41] It is more useful to conceptualize rational choice as a paradigm or a research program—or perhaps as a "family of theories" or a "field of endeavor" (Green and Shapiro, 1994:28–30; Ferejohn and Satz, 1995:81)—than as a "theory" of behavior.

for confounding variables. It is better to leave that task to the experimentalists, where rigorous measurement and control are possible, and to empirical investigators in fields such as consumer economics or investment or insurance behavior, where the key theoretical concepts are more easily scaled into something that approximates a utility function.

In fact, there is no reason why international relations theorists should not explore prospect theory–related hypotheses through experimental methods. Existing experimental work by psychologists focuses on individual choice outside of a political or strategic context, which limits its utility for an understanding of international behavior. Experiments on group behavior and on interactive strategic behavior would be particularly useful.[42] Of course, the question of the "realism" of the experiments and whether the penalties for suboptimal behavior regarding issues of peace and war can be adequately simulated in the experimental laboratory will remain an important topic for future debate.

It is also premature on theoretical grounds to focus too much on designing critical empirical tests of prospect theory before theories of international behavior based on the microfoundations of prospect theory are more fully developed. The power of the rational choice paradigm does not rest primarily on the extent of its empirical collaboration, certainly not at the individual level, but rather in its analytical power to generate an elaborate system of interconnected theories and testable hypotheses about a wide range of human behavior, to specify the causal mechanism at the core of these hypotheses, and to generate new research questions.[43] The rational choice program has generated social choice theory, spatial theory, and game theory, and these have been applied to a variety of more specific substantive domains in international relations, including, among others, alliance formation, deterrence, bargaining, and crisis decision making.

Prospect theory, at this point, has not generated a comparable set of theories or hypotheses about social behavior in general or international behavior in particular. The heuristic potential of the theory for generating an interconnected set of propositions about international politics is there, but it has yet to be fully developed. A central task for future research on prospect theory is to go beyond the hypotheses of loss aversion, reference dependence, and the reflection effect to develop a broader theoretical structure, an expanded set of testable hypotheses about international relations. The specification of how the individual-level patterns can be integrated into theories of foreign policy and strategic interaction is particularly important. We need to construct prospect theory–based theories of scapegoating, bureaucratic politics, deterrence, bargaining, and numerous other phenomena. Once these theories are constructed we can then test some of their theoretical implications (rather than their prior assumptions) against the evidence and against alternative theories.

Still another reason not to focus primarily on the paradigmatic debate between prospect theory and rational choice relates to the above-mentioned similarities between expected-utility theory and rational choice. I have emphasized that some of the behavioral patterns upon which prospect theory is based are not necessarily inconsistent with expected-utility theory or rational choice. An important task for future research would be to explore how loss aversion, the reflection effect, and perhaps nonlinear response to probabilities and reference dependence might be

[42] One example might be the Morgan and Wilson (1989) experimental test of a spatial bargaining model of international conflict.

[43] This parallels the criticisms of Green and Shapiro's (1994) *Pathologies of Rational Choice Theory* on the grounds that it gives too much emphasis to the criterion of empirical confirmation or explanatory success and not enough to the specification of causal mechanisms that explain behavior (Ferejohn and Satz, 1995; Chong, 1996).

incorporated into rational choice theories or other theories of foreign policy and international politics. Can we build better theories of bureaucratic politics by using loss aversion to help specify the preferences of individual actors? Can we incorporate loss aversion and the reflection effect into theories of bargaining—and thus give greater empirical content to the shape of the utility function—in a way that enhances the descriptive accuracy of those theories without undermining their axiomatic base?[44] In other words, we might shift some of our attention away from prospect *theory* as a whole and toward some of the *hypotheses* or empirical regularities associated with it, and ask how these hypotheses might be incorporated into our existing theories of international relations.

Prospect theory and the descriptive findings upon which it is based have led us to ask some novel and important questions about political behavior, questions that are often ignored by rational choice approaches. We may ultimately find that prospect theory is more useful than rational choice theories for many theoretical purposes in international relations. Or, we may find that rational choice theories provide more analytically powerful explanations of phenomena that involve loss aversion, the reflection effect, and related patterns. Regardless of the outcome, prospect theory and its associated experimental findings have already made a significant contribution to the international relations literature by putting a new set of questions on the agenda and forcing all theoretical approaches to deal with them.

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[44] It would also be useful to explore whether the intractable phenomenon of reference dependence and framing can be reconciled with rational approach theories. To what extent, for example, can the theory of rational expectations explain framing effects?

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