



Action Bias and Environmental Decisions

ANTHONY PATT*
Boston University

apatt@bu.edu

RICHARD ZECKHAUSER
Harvard University

richard_zeckhauswer@harvard.edu

Abstract

Individuals have a penchant for action, often for good reasons. But *action bias* arises if that penchant is carried over to areas where those reasons do not apply, hence is nonrational. Action bias is explored theoretically, and then empirically, using data from surveys of hypothetical environmental decisions. Quite apart from agency considerations, individuals like to affect outcomes when gains are reaped. Given the ability to help one of two sites, we find that decision makers choose to foster improvement rather than prevent deterioration, despite framing that makes it arbitrary which site is improved, which preserved. *Strong action bias*—individuals choosing to reap gains even though they must impose losses—is also observed. These concepts are related to loss aversion, status quo bias, omission bias for losses, and bright-line behavior.

Key words: action bias, behavioral economics, loss aversion, status quo bias

JEL Classification: Q2, D78, D81

Action is the great business of mankind.

John Locke

People like to take actions that have a positive impact.¹ When one is acting solely for oneself, the more positive the impact, the greater the utility. When one is acting as an agent for others, the more positive the impact, the greater the reward. These are solid, rational reasons why individuals may have a penchant for action.²

But the penchant for action may be a product of nonrational behavior, in which case we label it *action bias* (AB). Decision makers who weight the direct effects of choices above side effects, or who redeploy resources to produce a positive impact in the “action” realm while slighting losses in the realm from which they are taken, display action bias. One potential source of AB is that nature may have equipped us with a desire to do something, a desire that is usually beneficial but sometimes clouds decision making. Recognition of adrenaline charges and fight or flight responses, perhaps even the fact that humans get readily bored and hence seek stimulation through new activities, suggest such possibilities. A second potential

* Corresponding author: Anthony Patt, Center for Energy and Environmental Studies, Boston University, 675 Commonwealth Ave., Boston, MA 02215.

source is that individuals develop general tendencies toward action as a decision heuristic, but also carry the penchant over to inappropriate circumstances.

We explore how the quest to take action can sometimes skew peoples' decisions in the context of environmental choices. For example, we consider a decision maker who has the ability to clean up one of two sites. If the present plan is to clean up site A, might he opt instead to clean up site B? And when site B is the plan, might he instead choose site A? Switching sites demonstrates to the individual that he is having an impact, a critical component of AB. How people frame a problem—that is, what they perceive as the current plan—can influence choice. In this example, if he'd switch in both cases, framing leads to an apparent intransitivity.

Decisions that reflect framing or illustrate intransitivities do not accord with the prescriptions of expected utility theory, which requires that each outcome be valued and that the highest-value outcome be selected. Decisions that reflect a bias toward taking action are at variance with traditional, economically based normative policy analyses that rely on such techniques as cost/benefit analysis. The primary goal of this paper is to explore the magnitude and direction of this variance, as well as the situational factors that promote it.

We posit that AB is often caused by a decision heuristic similar to the availability bias or status quo bias (SQB). While we are comfortable with one common interpretation for such heuristics and biases—that they are reasonable guides to action in many circumstances, and that is why they survive—we also believe that they may lead decision makers astray, at least as judged by the rational decision model, when applied in other important and realistic contexts. We discuss other explanations of AB as well, such as misconstrued causality and overconfidence. Such phenomena are the stuff of behavioral economics.

We believe that the AB phenomenon is general and widespread, and can help explain a range of individual, organizational, and government behaviors that have a whiff of nonrationality. For example, why do so many individuals save too little? The AB theory would cite the clear demonstration of impact that comes with the action of making a \$200 expenditure: a new sportjacket hangs in the closet. By contrast, adding that \$200 to a \$23,648 savings accumulation makes little change. And if the savings are in a volatile stockmarket, that \$200 contribution would be swamped by daily movements. We believe that visual imaging often contributes to AB. Even before purchase, the sportjacket is readily brought to mind, but not the addition to the savings trove. At the decision moment, the sportjacket is quite tangible, the savings addition no more than a deposit slip. And slightly after, the sportjacket would be missed, but hardly the addition.³ In some instances, AB may result from no more than a penchant for action, an end in itself. Wheeler-dealers have such a penchant, as do the many who gamble against the odds, whether in casinos or in life. Some people are more prone to action bias than others; some are particularly prone.

This analysis focuses on policy decisions affecting the environment. Environmental policy decisions frequently have characteristics that encourage AB, making

nonrational behavior more likely. First, the consequences of actions are often uncertain, with long time lags and periods of latency until effects are felt. Second, the impacts often come from others' choices, or from the contributions of many parties. Third, there are no effective markets in which we can see how goods are valued, and no markets for wagers (such as a stock market) to help gauge probabilities. Fourth, bright lines, such as nondegradation and zero risk, facilitate demonstrations of impact. Fifth, our objective functions are rarely clear. Sixth, unlike in many domains, such as business, where resources flow to better decision makers, the environment offers few strong incentives for consistent decision making.

Wes Magat, to whom this volume is dedicated, made significant contributions in helping economists and policymakers understand how to value the environment, a vital ingredient for making environmental decisions. Magat was one of the first economists to embrace behavioral economics, to recognize that the psychological principles now most frequently associated with the names of Kahneman and Tversky could powerfully explain decision making behavior.⁴ Magat himself showed that the problem of valuing risk and the environment is not one for which the conventional tools of economics are completely equipped. Writing with others, he reported on an experiment comparing values for multiple risks. Although a valuation model based on Von Neumann-Morgenstern principles explained much of the story, they concluded: "There are, however, substantial departures from the model's predictions that appear attributable to the influence of cognitive factors lying outside of economists' traditional set of concerns" (Viscusi, Magat, and Huber (1987, p. 478)). He cited Kahneman and Tversky (1979), and their then-recent prospect theory, as offering a potential set of explanations. In another collaborative study, Magat noted that measures of people's risk valuation differed depending on whether they were making risk-risk or risk-dollar tradeoffs (Viscusi, Magat, and Huber (1991)).

Our analysis proceeds as follows. Section 1 considers several models of decision making and whether they promote or inhibit action; these include rational action, status quo bias, omission bias, and action bias. Section 2 presents a series of experiments that elicited choice biases—especially action bias—in environmental decisions. Section 3 discusses the rational and behavioral underpinnings of our experimental results. Section 4 concludes with a brief discussion of the importance of AB, and avenues for further empirical and methodological research.

1. Decisions and actions

Before laying out our action bias model, we first discuss established theories of decision making that describe the penchant for action, or tendencies against it. We begin with rational decision. We then discuss loss aversion and SQB, the leading rival paradigms to rational decision for the types of problems we are considering.

Then we describe action bias, focusing on decisions that can be framed to primarily lead to gains. When outcomes are primarily losses, the forces supporting action bias will lead the decision maker to avoid taking action. Thus, an omission bias for losses, already described in the literature, is the natural complement to action bias for gains. Our final discussion is of strong action bias, a tendency to act even though both gains and losses are involved.

1.1. Rational decision making

Rational decision assumes that utility depends solely on the bundle of goods finally in one's possession. Thus, the utility of 8 apples and 4 pears does not depend on whether one traded for it from a position of 6 apples and 6 pears, or whether one lost or won some fruit in a lottery. Such matters as the dynamic path to get to a bundle, alternatives foregone, and wagers won or lost do not affect the utility of the final bundle. This implies that in choosing among bundles, the order in which they are presented will have no effect. If you are given A and offered B instead, you will take the same bundle as if you were given B and then offered A as a replacement. Contrast this to the competing paradigms we consider, in which the path to the bundle affects both utility and choices.

The principal normative decision making apparatus for environmental problems—cost/benefit analysis and its offshoots—is based firmly in the rational tradition. Its principal mechanism is to attach values to alternative bundles of goods. Rational decision is an extremely powerful normative tool, and in a wide range of circumstances it effectively describes how most decision makers operate. The products of rational action provide the benchmark against which we shall measure action bias and other behavioral tendencies.

Rational decision for one-time choices tilts neither in favor nor against action. One chooses to switch if a superior alternative presents itself; otherwise not. When there are repeated choices, matters are more complex. Often, trying an alternative is the only way to learn. Hence, on a pure expected value basis, it may sometimes be worthwhile to try an alternative that has a lower immediate expected value than the status quo, but offers the decision maker the opportunity to learn whether it is really superior.

In rational decision, a decision maker recognizes when the same option will have different consequences depending on whether it is the status quo or a new action. For example, a change in a policy will often capture the attention of others, when doing nothing would go unnoticed. If such attention is positively valued, rational decision will promote a penchant for action, and vice versa. In any real-world context, it may be difficult to tell without thorough investigation whether a tilt to action was rational or not. That difficulty provides one justification for the survey-based approach taken in this paper, since survey questions can control ancillary issues.

1.2. *Loss aversion and status quo bias*

The most celebrated alternative model to rational utility theory is prospect theory, created by Kahneman and Amos Tversky (1979). Prospect theory and its critical element, loss aversion, suggest that losses usually count more than gains of similar magnitude. A second component of the theory is that reference points for assessing losses and gains shift as individuals receive or give up resources.

Many of the tests of these and other behavioral economics theories have been conducted using laboratory experiments with human subjects, most often college students. In an experiment by Knetsch and Sinden (1984), some participants were given lottery tickets, while others received \$2.00 in cash. Later, the participants had the opportunity to trade the tickets for cash among themselves. Very few trades took place; those who had the lottery tickets did not want to part with them, at least not for the prices that those with the cash were willing to pay. Thaler, Kahneman, and Knetsch (1992) gave half of the students in a Cornell class, chosen at random, their university's coffee mug, while the other half received the cash equivalent. All of the students then participated in a bidding process, in which the cash-endowed students had the opportunity to buy from their mug-endowed peers. Far fewer than half the mugs were traded. For the mug-endowed students, the loss of *their* mug meant more than a few extra dollars.

Samuelson and Zeckhauser (1988) identified status quo bias (SQB)—an excessive tendency to stick with the current option—in a wide range of situations. In some circumstances, such as where a change would entail losses on one attribute but gains on another, loss aversion motivates status quo bias. But other factors motivate it as well. The authors' experimental methodology defined reference points for numerous decision situations, such as having been bequeathed a portfolio of investments, or having selected a new car of a particular color from a limited set. They employed different versions of a questionnaire so as to vary the reference point, and found that choices—to change the portfolio mix or to choose a new car from an expanded set—strongly favored the starting point. They also found SQB in the real world health plan and retirement portfolio choices by employees of Harvard University and Polaroid.

The important features of loss aversion and SQB are that the changes encountered to reach outcomes are important. Rather than employ a utility function that considers solely the terminal bundle of goods, behavioral decision theorists have modeled choice preferences to include changes in the bundle. We represent this as a value function v , which includes both the final bundle and the changes that led to it. We employ a $+$ for positive changes or impacts, and a $-$ for negative changes or impacts. Represent $+I$ as a positive impact measured in real units—e.g., dollars—and let N represent doing nothing. Thus, for any endowment, loss aversion implies:

$$\text{Loss Aversion} \quad v(N) - v(-I) \gg v(+I) - v(N). \quad (1)$$

Loss aversion helps promote SQB, since when a single choice contains both gains and losses, the losses may well dominate the decision for a range of starting points.⁵ For SQB, we can define multiple reference points and changes. Let us say that J represents the presence of some good, while \bar{J} represents its absence, $+J$ represents the change from \bar{J} to J , and $-J$ represents the change from J to \bar{J} .

Consider two goods, J and K , of roughly comparable value. Status quo bias thus implies:

$$\begin{aligned} \text{Status Quo Bias} \quad & v(J, \bar{K}) > v(-J, +K), \quad \text{and} \\ & v(\bar{J}, K) > v(+J, -K). \end{aligned} \tag{2}$$

Starting with J or starting with K , one will prefer to stand pat rather than switch. The predictions of status quo bias are inconsistent with the predictions of the rational decision model. The latter assumes that utility depends solely on the bundle of goods finally in one's possession, not the path taken to produce the bundle. Hence, the $+$'s and $-$'s in expressions such as (2) have no bearing. Thus, in (2) if the first inequality is satisfied, that implies $v(J) > v(K)$, which immediately implies that the second inequality can not be satisfied.

Loss aversion and status quo bias both highlight the importance of reference points or bright lines in affecting human decisions. When there is a well-defined status quo, that becomes the reference point against which people measure outcomes. But there can be other, equally important, reference points, especially with regard to the environment. Viscusi, Magat, and Huber (1987), Hamilton and Viscusi (1999), and Ritov, Baron, and Hershey (1993) show that zero risk is one such reference point.⁶ For example, although completely cleaning up a toxic waste site may be a cost-ineffective way to save lives, both citizens and policymakers may attach great value to achieving this standard, and hence proceed with such clean-ups.

1.3. Action bias for gains

When good things happen, individuals would like to take credit, whether they are acting for themselves or for others. When there is a choice between two roughly comparable good things, they like to choose the one with which they will be most closely associated, especially if they will not be blamed for the absence of a good outcome in the area not chosen. We can say that people have a penchant for taking action. When this penchant has no rational justification, we call it action bias.

AB can arise in a world of certainty or uncertainty. Since we are just beginning to develop this concept, our theory below is presented for certainty situations. We achieve the required tradeoff between something good and something bad by

having two attributes, one of which has a higher value if one action is taken, the other if the alternative action is taken. For example, in our first decision problem one option is to clean up the air over Littleton, New Hampshire, and the other option is to clean up the river in Lincoln, Vermont. We have done our best to create a certainty situation, though there are obviously uncertainties linking the outcome to the action in these and most other environmental choice situations. We expect that decision makers—and so presumably our test subjects—will assign an overall value to this action, whether they do so by ignoring any uncertainties, taking expected values, or using some other heuristic.⁷

Cases under uncertainty could deal with a single attribute, with different states of the world allowing each action to have good and bad outcomes. Indeed, we believe that AB may generally play a greater role in uncertain situations. With uncertainty, misattribution of one's personal contribution becomes easier, and overconfidence becomes a more tempting lure. Consider gambling, which fits rational decision models only if one tortures the utility function. Gamblers looking to roll the dice, and willing to pay the house for the privilege, may be exhibiting AB. This is particularly likely if they think that through blowing and praying they can influence two dotted cubes. Uncertainty introduces a range of additional considerations to AB. Their link will be a separate subject for future study.

Given the power of SQB, it may seem surprising that individuals will sometimes have a bias toward action. We assert that people value positive outcomes more if those outcomes resulted from an action attributable to them. If they are to get full credit for a success, it should be demonstrably their doing. We also assert that people will seek to take actions achieving positive impacts when those positive impacts are easier to show. This happens when the presence of background uncertainty is less, and the opportunity for learning thus greater. We thus distinguish between gains attributable to the actions of the decision maker ($+I_d$) and gains not so attributable ($+I$). We propose that agents value the former more:

$$\textit{Valuing Gains Attributed to Action} \quad v(+I_d) > v(+I). \quad (3)$$

This is the underpinning for AB. In our experimental work, we sought to observe AB through a set of choices that demonstrate that people differentiate between demonstrable and nondemonstrable impacts. An observation that people prefer a combination of demonstrable gains and nondemonstrable losses of roughly comparable magnitude to remaining at the status quo would support AB. This set of observations would be:

$$\begin{aligned} \textit{Action Bias} \quad & v(+J_d, -K) > v(\bar{J}, K), \quad \text{and} \\ & v(-J, +K_d) > v(J, \bar{K}). \end{aligned} \quad (4)$$

This contrasts with rational decision, where utility is based on outcomes. The +’s and –’s do not matter with rational decision processes, and the d subscript would not be relevant.

1.4. Omission bias for losses

Where losses are inevitable, decision makers like to steer clear of involvement. Omission bias is a preference for greater losses arising through errors of omission over smaller losses resulting from a direct act (Baron (1994), Baron and Ritov (1994)). Such omission bias is the natural complement of action bias when the primary consequences of action are negative.

Omission bias for losses relates to the desire to avoid regret in decision making. In risky situations, people prefer not to be the agents of destruction, and would rather lose through inaction than through the deliberate taking of steps so much that they would give up real resources to exercise this option (Thaler (1980)). When losses are likely, omission bias can help explain SQB (Ritov and Baron (1992)). For example, people are unwilling to vaccinate a child when the vaccine causes a small number of fatalities, even when the disease the vaccine prevents causes many more fatalities (Ritov and Baron (1990)). In essence, demonstrable losses count more than nondemonstrable losses.⁸ The parallel equation to (3) is

$$\text{Valuing Inaction for Losses} \quad -v(-I_d) > -v(-I). \quad (5)$$

This is a natural extension of action bias. One seeks credit, whether with oneself or others, for something good. One seeks to avoid blame for losses. The implication is: If something good is happening, attach your imprint; if something bad, avoid involvement. This leads to:

$$\text{Omission Bias for Losses} \quad \begin{aligned} -v(-J_d, K) &> -v(J, -K), \quad \text{and} \\ -v(J, -K_d) &> -v(-J, K). \end{aligned} \quad (6)$$

That is, if a loss of K is about to occur, the individual will not choose instead to lose J ; if a loss of J is pending, the individual will not substitute a loss of K in its stead.

The omission bias for losses relates to a body of work within behavioral economics and social psychology on how people value various kinds of costs or losses. Several researchers (e.g., Neumann and Friedman (1978)) have observed that people treat direct costs and opportunity costs differently. In general, people are more willing to take actions where the costs are hidden in the form of lost opportunities, rather than actions where the costs are direct (Thaler, Kahneman, and Knetsch (1992)).

1.5. Strong action bias: gains and losses

If action entails both gains and demonstrable negative consequences, either probabilistically or on some valued attribute, AB is less likely to make itself known. When losses are looming, AB must overpower both SQB and omission bias, both of which favor inaction. Though we know that AB tilts in the opposite direction from the SQB and omission biases, we do not know the relative strengths of these effects.

Consider a situation where there are elements of loss, and an individual taking action will have a demonstrable impact on losses as well as gains. In one experiment, we proposed a situation where a proposed industrial development in a town will destroy a wetland. The agent could shift the development instead to the town forest, a favorite walking area. Two results would then be attributed to the active agent: saving the wetland (a gain), and losing the forest (a loss). If AB prevails despite demonstrable losses, we say we have “strong AB,” since the action bias is strong enough to overcome an amalgam of loss aversion, SQB, and the omission bias for losses.

The strong AB concept differs from mere AB, which applies when responsibility for losses does not fall to the decision maker. The appearance of strong AB, though perhaps surprising, should not be amazing. Quite possibly, loss aversion, a prime source of SQB, is most powerful when losses are due to the actions of others—that is, when they are nondemonstrable. When individuals look at consequences of actions that are—or at least appear—beyond their control, loss aversion is a salient force.⁹ With demonstrable impacts, the type we are considering, it may play much less of a role. For example, individuals accept physical risks they impose on themselves for much smaller compensation than they would demand from outsiders seeking to impose the same risks on them. In the next section, we look at the cognitive habits that lead to AB. Possibly, the halo of benefits such as uncertainty resolution will be sufficiently bright to outshine the negative values associated with loss outcomes. If so, action will be attractive. Finally, though loss omission bias is a force for sticking with the status quo, we have no theoretical reason to assume it will generally be stronger than AB. If it is weaker, strong AB may emerge.

Supporting strong AB would be an observation that people prefer a combination of both demonstrable gains and losses to remaining at the status quo. Hence:

$$\begin{aligned} \text{Strong AB} \quad & v(+J_d, -K_d) > v(\bar{J}, K), \quad \text{and} \\ & v(-J_d, +K_d) > v(J, \bar{K}). \end{aligned} \quad (7)$$

Except for the proposition that people distinguish demonstrable from nondemonstrable outcomes, both (4) and (7) would be at variance with rational decision, SQB, and omission biases. Of course the line between the demonstrable and the nondemonstrable exists mainly in people’s heads, and is often poorly defined. To

the extent that people do distinguish between demonstrable and nondemonstrable outcomes, and if the quest for favorable association applies more forcefully to gains than to losses, AB becomes stronger.

1.6. The role of bright lines

How a problem is presented can promote action bias. For example, we should expect to find AB where gains will cross a “bright line” that makes them readily verifiable to oneself and to outsiders. Bright lines may be round numbers that serve as focal points, in the spirit of Schelling (1960). They may be a salient threshold of contamination, such as one part per million. In other contexts, last year’s environmental quality, even if that quality is hard to measure, might be the bright line; this helps to explain why so many environmental standards relate to nondegradation. External considerations may enhance the desirability of particular standards. As Thompson and Gonzales (1997, p. 76) state, “one’s position on environmental issues provides a medium for the expression of fundamental values, beliefs, and ethics concerning the world.” Zero contamination of the environment might be one such position; embracing it might be a way for people to express such fundamental values. We should expect AB to prove more important when bright lines are involved in a decision. Similarly, when AB is more likely to be the best explanation for our action, bright lines will be more significant, so policies that move markers across or away from bright lines, such as last year’s emission level or 1 part per million, will tend to get an extra boost.¹⁰

2. Experimental methodology and results

In designing an experimental methodology to test our predictions, we wanted to elicit one course of action that is caused by AB, and is different from what rational action predicts and quite contrary to what SQB suggests would occur. Our ideal would be a randomized controlled experiment that presents two versions, I and II, of a decision problem. In each version, subjects face a decision that will affect two different resources, in our base case water and air. For each resource, there are good outcomes and bad outcomes, but it is difficult to quantify them, which makes it harder still to value the differences between outcomes for the two resources. The intent would be to identify framings that would predispose the decision maker to action.

We designed several survey questionnaires around this class of decision problem. In each survey we presented a choice to be made by a person in a defined role, such as the director of an environmental foundation. We defined a set of options, helping one resource as opposed to another, and framed one of the options as the

status quo. Using pre-testing, we attempted to describe two resources so that they would be of relatively equal value, so that SQB or AB could influence the choices of a greater number of participants. We distributed these surveys to three different groups of people: graduate students of public policy at Harvard University, undergraduate science students at Boston University, and shoppers in downtown Boston. Within each group we distributed the two survey versions at random. Since all findings were similar across groups, we report the results in aggregate. There was no payment, but the respondents appeared to be dedicated to the task. (The students were enrolled in courses to which the questions were relevant.)

2.1. Base AB study: demonstrable gains and nondemonstrable losses, clean-up vs. preservation of water and air

Our first set of surveys involved a choice between a water and an air project in New England. Resource X was a river in the town of Lincoln, Vermont, while resource Y was air quality in the town of Littleton, New Hampshire. Version I, randomly distributed to roughly half of the subjects, describes the river as dirty and the air as clean. The decision is whether to allocate money either to clean up the river or to preserve the air. Version II describes the river as clean and the air as dirty. The decision is whether to allocate money either to preserve the river or to clean up the air. Table 1 shows the two survey versions.

We show the choice problem in diagrammatic form in Fig. 1. The possible quality levels are represented by squares (for water) and ovals (for air). The starting levels are in black. Solid arrows are actions. Dashed arrows are due to omissions (actions not taken). Up and down arrows represent improvement and deterioration, respectively.

In Version I, subjects encounter the water in a poor condition (point *b*) and the air in a good condition (point *c*). They can help water, raising its quality to point *a*. But doing so will allow air to fall from *c* to *d*, an indirect cost. Alternatively, they can choose air, keeping it at *c* rather than falling to *d*, but doing so will mean that water does not improve from *b* to *a*, the loss of an indirect gain. In Version II, the status quo positions are reversed, so that subjects can act either to prevent water from falling from *a* to *b*, or to raise air from *d* to *c*.

Table 2 shows the results from the two versions. These results are consistent with AB. Cleaning up either the water or the air creates a demonstrable positive impact; protecting either from degradation represents the avoidance of a non-demonstrable loss. When the choice is between preserving water quality or cleaning the air, roughly equal numbers of people choose each alternative. When the choice is cleaning the water or preserving air quality, a significant majority choose to clean the water. With equal numbers in each group, nearly three fifths would opt for action, thereby letting the other resource suffer.¹¹ The protect-from-de-

Table 1. Survey versions I and II

Common Introduction	
<p>Imagine that you are on the board of directors of the New England Environmental Foundation (NEEF), a non-profit organization committed to protecting and improving the environment by funding local projects throughout New England. Each year your organization funds one major project, ranging in cost between \$5 million and \$6 million.</p> <p>The executive director has narrowed the choice to two projects, and you must vote for one of them. Both are in northern New England towns; each town has about 1,000 residents. You believe the probability of success for either project is high. Choose which one to support.</p>	
Version I	
<p>The New Haven River flows through Lincoln, Vermont. As long as anyone can remember, the river has been dirty, due to upstream household and agricultural waste. The river is unsuitable for swimming. People swim in the large municipal swimming pool, even though most of them would prefer to swim in the river. There are also claims that due to groundwater contamination from the river, people have suffered intestinal ailments, although a study conducted by the University of Vermont found the evidence for this inconclusive. With a \$5.7 million contribution from NEEF, the town has agreed that it would construct a collection system and treatment plant that will clean up the river.</p> <p>Costs \$5.7 million</p> <p>Benefits River water will become clean and suitable for swimming. Alleged health risk will end.</p>	<p>Littleton, New Hampshire lies in a spectacular valley in the White Mountains. A locally owned firm recently received permits to operate a furniture factory just outside of town. The factory will be in compliance with all state and national environmental laws. However, it will emit coarse particulate matter that will reduce air clarity and visibility significantly. There are also claims that the particulate matter will pose a problem for asthmatics, although a recent article published in the <i>New England Journal of Medicine</i> suggests that this would not occur. With a \$5.1 million contribution towards their cost from NEEF, the factory's owners have agreed that they would install scrubbers that will prevent the coarse particulate matter from escaping. Residents and visitors would continue to enjoy the fresh air and the spectacular scenery.</p> <p>Costs \$5.1 million</p> <p>Benefits Air clarity and visibility will not be degraded. Potential health risk will be avoided.</p>

gradation option suffers because it will be hard to visualize the benefit if it is chosen. It is hard to know what the resource would look like once it was injured.¹²

Rational action would suggest the resource whose benefit was valued the most would be chosen, independent of framing. Thus, if it was preferred to preserve air in I, it would be preferred to restore air in II. If the two resources are roughly balanced in attractiveness, SQB suggests that some people would choose to devote their resources to preserving air in Version I, and to preserving water in Version II.

Table 1. (Continued)

Version II	
<p>The New Haven River flows through Lincoln, Vermont. As long as anyone can remember, the river has been clean. Some people swim in the large municipal swimming pool, but most prefer to swim in the river. With upstream household and agricultural waste increasing, however, the river will be dirty and unsuitable for swimming. There are also claims that due to groundwater contamination from the river, people will suffer intestinal ailments, although a study conducted by the University of Vermont found the evidence for this inconclusive. With a \$5.7 million contribution from NEEF, the town has agreed that it would construct a collection system and treatment plant that will keep the river from becoming dirty.</p> <p>Costs \$5.7 million</p> <p>Benefits River water cleanliness and suitability for swimming will not be degraded. Potential health risk will be avoided.</p>	<p>Littleton, New Hampshire lies in a spectacular valley in the White Mountains. A locally owned firm operates a furniture factory just outside of town. The factory is in compliance with all state and national environmental laws. However, it emits coarse particulate matter that reduces air clarity and visibility significantly. There are also claims that the particulate matter poses a problem for asthmatics, although a recent article published in the New England Journal of Medicine suggests that this does not occur. With a \$5.1 million contribution toward their cost from NEEF, the factory's owners have agreed that they would install scrubbers that will prevent the coarse particulate matter from escaping. Residents and visitors will be able to enjoy the fresh air and the spectacular scenery.</p> <p>Costs \$5.1 million</p> <p>Benefits Air clarity and visibility will become good. Alleged health risk will end.</p>

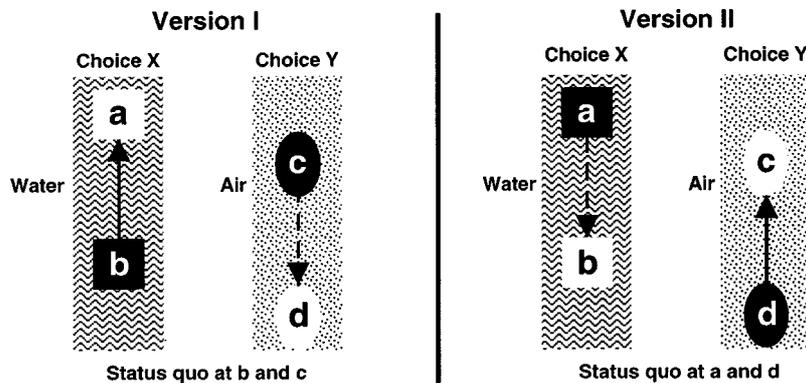


Figure 1. Ideal experiment.

Table 2. Base AB: Demonstrable gains and nondemonstrable losses

Choice	Choice X is to preserve or clean up a local river from water pollution. Choice Y is to preserve or clean up a mountain valley from air particulates.	
	Version I	Version II
Framing	As long as anyone can remember, river quality has been poor. Air quality is currently good.	As long as anyone can remember, air quality has been poor. River quality is currently good.
Proportion choosing X (number of respondents)	.68 (139)	.50 (131)
Difference in outcomes (T statistic)		.18 (3.18)

AB predicts that the resource that will be demonstrably helped will be chosen; the other resource will be allowed to deteriorate. Thus water is helped in I and air in II.

Interpreting the results. We should expect a certain number of participants to care sufficiently deeply about one resource that their choice will be for that resource absolutely, independent of framing. Figure 2 shows the results of a hypothetical experiment. Each of two survey versions was handed out to 100 people, 80 of whom have absolute preferences. That is, however the choice is framed, 50% of the people prefer a good outcome for water, while 30% prefer a good outcome for air. The remaining 20% are reasonably close in preference, and their choice in the example could be guided by AB. In Version I of the survey, the 20 undecided people choose water in addition to the 50 who would have chosen it anyway. In Version II of the survey, the 20 undecided people choose air because of AB; they are in addition to the 30 who choose air regardless of framing.

	Version I	Version II
	Water at b Air at c	Water at a Air at d
Spend on Water	50+20 70 <i>improve</i>	50+0 50 <i>preserve</i>
Spend on Air	30+0 30 <i>preserve</i>	30+20 50 <i>improve</i>

Figure 2. Observing base preferences and AB: number of individuals choosing two courses of action.

Action, improving the resource that is bad, is represented by making a choice in the upper left or lower right box. The fact that the upper left hand box—70—is greater than the upper right hand box—50—reveals that action bias is at work. We can test whether the bias is statistically significant by assuming that each choice follows a binomial distribution, and calculating corresponding standard errors.

Agency not the explanation. In a separate round of surveys, we tried to identify the factor promoting AB. It might be the agency relationship, as the decision-maker is a board member responsible to the general membership to show demonstrable effects. If this were the predominant explanatory factor, and if the tendency for action disappeared when an individual was not acting for others, then it would not be a bias that carried over to inappropriate situations.¹³ In these surveys, then, we kept the choices constant—the river always started clean—but varied the role of the decision maker. One version was similar to before, with the respondents taking the role of an executive director who must make a choice on behalf of an organization. The other version put the respondent in the role of an environmentally concerned citizen, with no control over or obvious association with the final outcome. That citizen was asked what action she hoped the executive director would make. If the agency role were the primary source of AB in our first survey, we would find fewer executive directors than environmentally concerned citizens choosing to preserve the river and foregoing demonstrable change. However, as Table 3 shows, the results of this survey are mildly the reverse of what the agency explanation for AB would predict. A slightly higher but statistically insignificant proportion of the environmentally concerned citizens opted for the demonstrable change. In this experiment, having respondents take the role of an agent did not explain their penchant for action.

Table 3. Agency test for base AB

Choice	Choice X is to clean up a mountain valley from air particulates. Choice Y is to preserve a local river from water pollution.	
	Version I	Version II
Framing	You are the executive director of the New England Environmental Foundation, and must recommend one of two projects to the Board. They are likely to endorse your decision. What do you choose?	You are an environmentally concerned citizen. You read about the choice faced by the executive director of the New England Environmental Foundation. What do you hope the executive director chooses?
Proportion choosing X (number of respondents)	.42 (57)	.49 (68)
Difference in outcomes (T statistic)		-.064 (0.72)

2.2. *Strong AB: demonstrable gains and demonstrable losses, new development in a marsh or forest*

Our second set of surveys also presented a choice between two resources, a marsh and a forest. One of them is currently slated for despoilation from a development project. In this case, X was to place the project in the forest marsh, while Y put it in the forest (a favorite walking area). In Version I the forest is currently slated for the project, but the respondent (an advisor to the mayor) can choose to relocate the development to the marsh. This will save the forest at the expense of the marsh. The other alternative is to let the development proceed in the forest as planned. In Version II the marsh is slated for the development, but the respondent can choose to relocate it to the forest. Version II is shown in Appendix A.

Table 4 shows the results, which imply a bias to action. Here, respondents showed a bias to save one resource—whichever was currently slated for development—even though doing so meant that their action directly led to losing another resource. Hence, we say there was strong AB.¹⁴

2.3. *Showing SQB: nondemonstrable gains and losses, climate change and the Kyoto Protocol*

It is possible that the results from these first two experiments are surprising only because we have misconceptions about status quo bias, at least as it relates to the environment, and that citizens actually like to see policies switch. We ran a choice experiment where we removed the factors that we speculated gave rise to AB: bright lines, the potential for learning, and agency. We selected a situation where the individual could not possibly have an impact on the choice, and had no

Table 4. Strong AB: Demonstrable gains and demonstrable losses

Choice	Choice X is to place a development on a town-owned marsh. Choice Y is to place a development in a town-owned forest.	
	Version I	Version II
Framing	The forest is slated for development. Action now can shift development to the marsh.	The marsh is slated for development. Action now can shift for development to the forest.
Proportion choosing X (number of respondents)	.36 (91)	.21 (80)
Difference in outcomes (T statistic)		.150 (2.21)

responsibility for the issue. He could just indicate which policy he preferred. Moreover, no clear bright lines were evident, and visualizing the policies, much less what impact they would make, was virtually impossible. We predicted that SQB would make itself evident. Version I is shown in Appendix B.

The choice in this survey was between ratifying the Kyoto Protocol—a multinational agreement that proposes mandatory national greenhouse gas emissions targets—or relying instead on voluntary national targets. We were able to present each option as the status quo without doing damage to the reality of current U.S. policy: Since the United States has already signed the treaty, failing to ratify it would constitute a departure from a previous commitment. But the current policy actually in place is a set of voluntary emissions targets, so ratifying and following the treaty would constitute a new direction for policy. In the survey we asked respondents to indicate which way they thought the United States should choose. Importantly, neither option involves a bright line: they are both efforts at emissions reductions, economic costs arise in either case, and no variable was near some salient level. Moreover, our respondents, not being experts on international environmental negotiations, would not be able to visualize the difference in outcomes for the two options, which would tend to dampen any AB.

Table 5 shows the results of this survey. Significantly more people preferred the Kyoto Protocol when it was identified as the current policy. When the framing was not supportive of AB, SQB significantly influenced the results of this environmental decision. This tells us that bright lines and agency relationships might be important contributors to AB. It also reaffirms the importance of framing.

Table 5. Status quo study: Nondemonstrable impacts

Choice	Choice X is to ratify the Kyoto Protocol and a system of international greenhouse gas control. Choice Y is to rely on voluntary national emission reduction targets.	
	Version I	Version II
Framing	Since the Kyoto Protocol is not yet ratified, voluntary emission reductions are the current policy. The Kyoto Protocol is the alternative.	Though not ratified, the Kyoto Protocol is the current policy. Voluntary emission reductions are the alternative.
Proportion choosing X (number of respondents)	.84 (110)	.92 (111)
Difference in outcomes (T statistic)		-.08 (2.00)

2.4. Neutral frame, AB, and SQB: relation to bright lines and salience of losses, a gift of lemurs and pangolins to the zoo

Our final experiment sought to show that the willingness to switch from the status quo is due to AB. Therefore, we sought to manipulate the degree of demonstrated impact. We did this by making a bright line relevant in one decision, but not in another. The choice was between giving the local zoo a pair of lemurs or of pangolins, two relatively exotic animals that pre-testing revealed were of roughly equal attractiveness, both coming from threatened native environments. The animal pairs were assumed to be equally costly.¹⁵

We had three different framings. In the base case, the zoo has one pair of each animal, but 30 years ago it had a second pair of pangolins (or lemurs). The movement from one to two pairs involves no bright line; hence AB should not be powerful. The fact that the second pair departed 30 years ago would dampen SQB, and hence would be a force for neutrality. Version I of the base case survey appears in Appendix C. In the second framing, the zoo does not presently have a pair of either animal, but it had had a pair of one of them 30 years ago. To avoid utilities of novelty, it was said that very few current visitors had seen the earlier animals. The choice was between the first pair of pangolins (or lemurs) in 30 years, or the first ever pair of lemurs (or pangolins).¹⁶ We expected the move from 0 to 1 pairs to be significant due to its bright line nature, which should create an AB in favor of donating the animals the zoo had never had. In the third framing, which was expected to highlight status quo bias, the second pair of animals had died of old age only recently, as opposed to being lost 30 years ago. We expected status quo bias to lead to a contrast with both the first and the second framing.

Table 6 shows the results to be consistent with these predictions. In the base case, we observe a very modest tendency to action, but it is far from statistically significant. In the second round of the experiment, we do in fact observe AB. In the third round, we observe SQB. The latter two effects are significant at the .10 level, but do not quite make .05 significance. A difference in difference test reveals the second and third rounds to be significantly different from each other (.01 level), as was predicted.

3. The penchant for action and action bias

There are at least three rational reasons for seeking to take action. First, the only way to create value in our lives is by taking action. Once this involved prowling for animals and gathering berries. To the active and energetic went the spoils. They still do for the most part. Presumably we have a propensity to action, partly because that is how we are programmed, and partly because we train ourselves that way.

Second, the incentive to action may be greater still when we are agents, acting for others. Since our principals can not observe what we have done, we must do

Table 6. AB vs. SQB: Manipulating loss aversion and bright lines

Choice		Choice X is to give the zoo a pair of lemurs. Choice Y is to give the zoo a pair of pangolins.	
		Version I	Version II
Base Case	Framing	The zoo currently has one pair of each type of animal. Thirty years ago the zoo had a second pair of pangolins.	The zoo currently has one pair of each type of animal. Thirty years ago the zoo had a second pair of lemurs.
	Proportion choosing X (number of respondents)	.69 (32)	.63 (32)
	Difference in outcomes (T statistic)		.063 (0.53)
AB	Framing	This would be the first pair of lemurs the zoo has ever had. This would be the first pair of pangolins the zoo has had in more than 30 years.	This would be the first pair of lemurs the zoo has had in more than 30 years. This would be the first pair of pangolins the zoo has ever had.
	Proportion choosing X (number of respondents)	.60 (43)	.42 (62)
	Difference in outcomes (T statistic)		.185 (1.90)
SQB	Framing	The zoo currently has one pair of each type of animal. Until recently the zoo had a second pair of pangolins, but they died of old age.	The zoo currently has one pair of each type of animal. Until recently the zoo had a second pair of lemurs, but they died of old age.
	Proportion choosing X (number of respondents)	.61 (119)	.74 (69)
	Difference in outcomes (T statistic)		-.134 (1.93)

something to show our impact. From the waiter who stops by the table to ask whether everything is okay, to the politician who files a bill he can report to his constituency even though it is sure to lose, agents are continually trying to make their actions evident, because principals often have difficulty discerning consequences. An agent who stands idly by and lets good things happen will reap much less reward than one who takes action and gets associated with something good. As Aristotle observed in his *Nicomachean Ethics*: “In the arena of human life the honours and rewards fall to those who show their good qualities in action.”

Learning provides a third rational justification for taking action, even an action that at first glance offers negative expected payoffs. When doing the same old thing, we tend to know the outcome or the distribution of outcomes; but trying

something new will inform us about an unknown distribution of outcomes. A classic Chinese saying phrased it: “Action will remove the doubt that theory cannot solve.” Learning through action is important if there is to be a sequence of choices. Some new options are better than others. The clearer the path from actions to consequences, the greater the learning.¹⁷

3.1. Heuristics and biases

While a penchant for action often makes sense as a strategy for achieving desirable results, this penchant might also prevail in cases where it does not lead to a rational course—when it represents action bias. Tversky and Kahneman’s (1974) ground-breaking work showed that a limited set of tools, called heuristics, help us to make good decisions quickly and easily. For example, in everyday circumstances, it may be expensive cognitively to determine how much one is an agent, how great will be learning, or even whether a new action will create value. Alas—and this is the plague of decision making heuristics—we tend to carry over a strategy that has proven valuable in a vast range of other circumstances to some circumstances where they might not apply. Since heuristics usually help us to achieve our objectives, merely observing a decision maker striving (that is, sacrificing value) to have a demonstrable impact does not imply AB. The gains, say in an agency relationship, may be worth it. But if the gains are minimal or nonexistent, yet the decision maker continues to strive to demonstrate an impact, he is being led astray. This can lead to predictable biases in his decisions, consistent departures from outcome-oriented decision rules in a particular direction, and poor expected decisions in some contexts. This is one story of AB. It is “paying” to make a demonstrable impact in cases where the action does not lead to any real improvement.¹⁸

Noncognitive factors may also produce a bias for action, in isolation, or in conjunction with other forces. Much of our lives is governed by physiologic processes, which are beyond immediate cognitive control. We bristle when bumped, partake heavily of food placed in front of us, and run like the devil when danger gives us a shot of adrenaline. Such processes may have long run selective advantage, but they are not fine tuned and can not be easily overridden, even when it would be desirable. When pushed we often fail to turn the other cheek even if it would be advantageous, and overweight people continue to overeat despite mental resolutions not to. Action bias is more likely in some circumstances and for some people than others. We now turn to factors that help to promote AB.

3.2. Causality, optimism, and overconfidence

We offer a metaphorical interpretation of our hypothesis that a rational penchant for action can be entrenched as action bias. It says that decision makers operate

with some mental variant of the before-and-after pictures that are used in the media to dramatize gains, and they want to embrace as their own the “after” pictures that represent improvements. We should expect to observe AB when people are likely to differentiate significantly between demonstrable and non-demonstrable impacts, both positive and negative. We believe that AB arises because individuals employ simple mental models. Think of a situation X , and an individual’s action, A . The time sequence is:

$$X_0 \rightarrow A \rightarrow X_1,$$

If X_1 is an improvement over X_0 , then the individual will tend to associate the improvement with his action. The causal argument, whatever its merits, is easy to make. The ability to visualize the equivalent of before-and-after pictures may be critical if one is to convince oneself that he has had an impact. Yet this impact, to be convincing to the individual, must be temporally close to the action. Thus, projects with long latency periods or effects that are hard to visualize may get short shrift. This may be part of the reason why it is hard to get society to focus on greenhouse gas emissions: global warming is delayed, uncertain, and hard to bring to mind. But when vast stretches of Yellowstone Park burned a decade ago, domestic concern for climate change was vividly visualized and got a jump start. To the extent that people operate as if they visualize before-and-after pictures, policies that improve situations, such as cleaning up toxic waste sites, should be favored over those that prevent degradation, such as controlling greenhouse gas emissions. This is particularly true if, as in this example, the preventive measure involves a time lag before results become visible.

People exhibit a predictable bias in construing causality to their actions. For example, Seligman (1990) notes a distinction between optimists and pessimists. “The optimists believe defeat is not their fault: Circumstances, bad luck, or other people brought it about” (Seligman, 1990, p. 5). But the flip side is also true. “*The optimistic side of explaining good events is the opposite of that used for bad events: It’s internal rather than external.*” People who believe they cause good things tend to like themselves better than people who believe good things come from other people or circumstances” (Seligman, 1990, p. 50, italics in the original). Taking action gives one the opportunity to take credit, however erroneously, and this act of taking credit improves one’s state of mind. Taking action can also allow one to feel more in control of a situation, even if the relationship between action and outcome is weak. Seligman (1975) finds that risk-averse people do not like events to be unpredictable; taking action allows them to think they are more in control, and have therefore managed to make events more predictable.

Overconfidence can also lead people to interpret causality where none exists. Researchers have noted systematic overconfidence in forecasting of energy use (Shlyakhter et al., 1994), economic performance (Gordon and Kammen, 1996), in environmental deterioration (Ludwig, Hilborn, and Waters, 1993), and in predictions of stock price behavior. Odean (1998), for example, notices that people’s

overconfidence about their ability to predict fluctuations in securities prices causes them to trade too frequently for their own good; the more overconfident one is, the more frequently one trades. Hence, Odean finds, men—who tend to be more confident—trade more frequently than women, believing their actions will result in greater gains. But women outperform men in the stock market; the better strategy is to let stocks grow on their own, not trying to predict which will rise and which will fall, thereby incurring the transaction costs of trading.

4. Conclusion

This paper represents an initial and preliminary attempt to understand and explore the penchant for action. The field of application was the environment, with experiments on reducing air and water pollution, resource conservation, and donations of endangered species to a zoo. Future work should develop the methodology underlying AB. For example, what factors—e.g., bright lines, certainty as opposed to uncertainty—magnify a demonstrated impact? Under what circumstances will individuals have a greater or lesser desire to take action?

We drew no distinctions among individuals in this analysis, but from everyday experience we know that some individuals are more prone to action, and hence susceptible to AB, whereas others tilt strongly toward the status quo. What types of individuals have which proclivities, and what are the implications for success in their lives?

This study considered two-attribute problems under certainty. However, AB in the uncertain world merits at least as much attention. The conceptual extension is straightforward, since states of the world could be treated as attributes. One action would be better in some states, and worse in others.

The study of AB should bring benefits to behavioral economics. It provides further evidence for the validity of a behavioral approach to decision making: Gains and losses with and without a personal stamp prove not to be equivalent. The value of an outcome depends on one's involvement, or perceived involvement, in bringing it to bear. Choices are highly context-dependent. Small changes in framing bring about big and predictable changes in choices. These are the lessons of behavioral economics in general, and this paper in particular.

The study of AB will also benefit the policy realm. Many analysts believe that we frequently implement policies that do relatively little for the environment, and leave aside no more costly but much more beneficial policies.¹⁹ The adopted measures with low payoffs frequently result from efforts by some politically salient group to demonstrate an impact; the foregone more valuable ones may be stopped by that group's or other groups' AB maneuvers, such as creative framing to enhance the accomplishments of protest. Politics will never be removed from the environmental policy arena. But a better understanding of action bias may enable us to find lower cost ways to toss bones to politically powerful parties, and to

expose groups narrowly pursuing their agendas to the significant disbenefit of the citizenry and the things that it values. An understanding of AB may also allow governments more effectively to encourage positive behavior, such as mitigation efforts against potential losses. For example, it may be hard for people to imagine the full benefits of wearing seatbelts, but by highlighting the benefits achieved in the event of an accident, rewarding those involved in accidents who “buckled-up” while punishing those who did not, the government could encourage good behavior.

To the extent that policy processes assume that all participants take rational actions, they will miss the mark. On the one hand, these processes should structure choice situations to minimize the negative impacts of AB and other behavioral biases. On the other hand, they should recognize the positive value to people of being associated with success, and being distanced from failure. Giving people the opportunity to participate in processes that lead to good outcomes creates value.

Appendix A—Strong AB Survey, Version II

You, a strong environmentalist, are an advisor to the beloved mayor of Newburyport, a coastal town on a tidal estuary. The town council, always concerned with economic development, recently voted to allow a planning study for locating a switching facility within town for a burgeoning Internet company. The switching facility would employ 30 people. Given the enthusiasm at the council meeting, there is no doubt that the project will be approved.

The posited site is a three acre town-owned marsh. The facility only requires one acre, but the other two acres would have to be filled in so the site would not be vulnerable to the sea. Though insecure footing makes it impossible for people to visit the marsh directly, it can be viewed from a nearby industrial park (across the estuary) or from boats off the coast. The marsh is home to an abundance of life forms, from plants up to a variety of birds, including at least three species of heron.

The mayor could stop the project, and you urge him to do so, pointing out the importance of maintaining this ecosystem. But he is unwilling, given the economic benefits of the switching facility. If you do nothing, the facility will be built, and the marsh will be lost.

There is an alternative. The facility could be located instead in a six acre town-owned forest. The mayor has said to you in private he would go along with the change if you were to recommend it. The forest is one of the favorite walking areas for town residents. At present, there are only walking paths in the forest, which is home to, among other things, numerous small animals such as skunks, raccoons, and squirrels. The facility itself would claim one of the forest’s six acres. One more acre would be lost to new roads to provide access to the facility. If this alternative is selected, the mayor assures you he will not identify you with the decision.

Do you:

_____ *Let everything proceed, which will lead to the facility being built on the marsh.*

_____ *Ask the mayor to redirect the project to the forest. This will lead to the facility being built in the forest, and will save the marsh from development.*

Appendix B—SQB Survey, Version I**Climate Change Science**

- Given current industrial and development trends, the concentration of greenhouse gasses in the atmosphere will roughly double over the next 100 years. This would cause about a 3°C rise in global average surface temperatures.
- There will be many impacts on human society, some good but most bad. For example, places like Canada may see increased harvests. Many low-lying coastal areas will become flooded, and many tropical diseases will spread.
- It is impossible to predict the total impact of the change, although most analysts think that the net effects will be harmful. The faster the temperature rises, the worse these effects will be.

Policy Issues

- Currently nations of the world are engaged in individual voluntary efforts to limit greenhouse gas emissions. In an effort further to curb global warming, the United States and other industrialized countries have signed the Kyoto Protocol. The Kyoto Protocol requires industrialized countries to reduce greenhouse gas emissions to targets below 1990 levels.
- The United States must soon choose about its future participation in the Kyoto Protocol. It can decide to ratify the Kyoto Protocol, and the international regulation of greenhouse gas emissions to reach emissions targets. Or, it can decide not to ratify the Kyoto Protocol, and to rely on voluntary emissions limits. It is widely believed that many other countries will follow its decision on the Kyoto Protocol.
- Ratifying the Kyoto Protocol would result in lower greenhouse gas emissions, and 1°C to 2°C less global warming over a 50-year period, along with fewer localized impacts of climate change, than would occur with reliance on voluntary emissions limits.
- Relying on voluntary emissions reductions would lead to lower prices on energy and other goods and services than would occur with the ratification of the Kyoto Protocol. These lower prices would lead real GNP to be higher over a 50-year period by between 1% and 3%.

Decision Question

- Which way should the United States choose?

Continue with existing voluntary emissions reductions

Ratify the Kyoto Protocol and move toward international regulation of greenhouse gas emissions

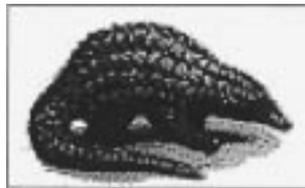
Appendix C—SQB to AB Base Case Survey, Version I

Imagine you are the head of a community foundation. It has recently received a gift of \$10,000, which is supposed to be given to the local zoo, but with no further instructions. After further consultation with the zoo's director, you decide to give a breeding pair of relatively exotic and endangered animals. You have narrowed the choice to two: the ring-tailed lemur or the cape pangolin. The zoo director has said she would be delighted with a pair of either animal.



Ring-tailed lemur

Ring-tailed lemurs are native to the rainforest in Madagascar, and are being threatened by deforestation. They are closely related to primates, and are nocturnal. This breeding pair would come from the Betampona Natural Reserve in central Madagascar. The zoo currently has one pair of ring-tailed lemurs. Your gift would provide the zoo its second pair of ring-tailed lemurs.



Cape pangolin

Cape pangolins are native to the savannas of South Africa, Botswana, and Zimbabwe, and are threatened by the conversion of their habitats into farmland. They are closely related to anteaters, and are nocturnal. This breeding pair would come from Hwange National Park in western Zimbabwe. In the 1960s, the zoo had two pairs of cape pangolins. Since then, the zoo has maintained just one pair of cape pangolins. Your gift would, after thirty years, make it two pairs once again.

Which type of animal would you give?

Ring-tailed lemur _____

Cape pangolin _____

Notes

1. In that spirit, we thank Miriam Avins, Richard Cooper, David Laibson, Howard Kunreuther, and Kip Viscusi, whose comments had a positive impact.
2. However, what is rational for the agent may be inappropriate for the principal. Given information asymmetries, an agent's need to "prove his worth" imposes agency losses.
3. King Midas found a way to overcome action bias in favor of spending. His continual counting of money enabled him to see the impact of even small additions.
4. Two central contributions to behavioral economics have been widely cited. They are Tversky and Kahneman (1974) and Kahneman and Tversky (1979). Laibson and Zeckhauser (1998) assess the impact of these papers. In this context, we should also cite Richard Thaler, the initial principal host within economics for the behavioral experiment. W. Kip Viscusi, a frequent collaborator with Magat and now a sympathetic behavioralist, gives Magat credit for "being there long before me." Personal communication, December 1999.
5. It is not evident how strongly loss aversion applies to multiattribute situations, as opposed to lottery situations with both wins and losses. Regret clearly plays a major role with lotteries: "I lost; I made the wrong choice." In the multiattribute situation, by contrast, a loss on one attribute would be fully expected before the choice was made.
6. In its treatment of probabilities, prospect theory highlights the importance of 0 and 1.
7. An academic advisor remarked that uncertainties were implicit.
8. Protective measures, such as polio shots, have the disadvantage that we can never know whether they worked. Flu shots, which offer imperfect protection, are worse still, since we do know when they fail. It is not surprising that many people refuse flu shots, though by any reasonable valuation of time, discomfort, and sick days they are extremely worthwhile.
9. The most salient example in the environmental field is the vast disparity between willingness-to-accept (WTA) and willingness-to-pay (WTP) values for the same environmental benefit.
10. This observation is in the spirit of DeGeorge, Patel, and Zeckhauser (1999), who examined cases of corporate managers' manipulating earnings to surpass bright lines such as positive profit levels or analysts consensus estimates, a clear demonstration of accomplishment. Such earnings management incurs a less identifiable loss in long-run efficiency.
11. Overall, the water option was preferred. In contrast to a perfectly balanced situation, this suggests that more people would have a choice independent of framing, and that AB would be less likely to manifest itself.
12. Using a new group of test subjects, we administered follow-up surveys to examine the sensitivity of our results to different factors. Kahneman (1986) and Irwin et al. (1993) have shown for many

environmental goods that the results of direct choice contingent surveys often differ from the results of comparisons of contingent valuation surveys. Hence, we distributed four contingent valuation questions: as executive director of the organization, how much money would you devote to clean the water, preserve water quality, clean the air, or preserve air quality? Consistent with the first set of surveys, we suggested that \$5–6 million was the usual contribution. Again, the answers showed AB. With both water and air projects, the average money allocated for clean-up exceeded the money devoted to preservation. Across both water and air projects, the average amount devoted to clean-up exceeded the average for preservation by \$0.520 million, a difference significant at the .05 confidence level.

13. Of course, the bias in the agency situation would suggest that the reward structure for the agent had not been or could not be appropriately structured.
14. We believe two factors may have led to finding strong AB in the forest-marsh example. First, in this example, we believe, it is far easier to visualize what would have happened at the initially proposed development site. Second, in the experiment, subjects read about the intended placement of the development first. This may have given that site added salience.
15. Though zoos have consciousness-raising benefits through their preservation of endangered animals, many environmentalists object to the unnatural confines they impose on animals.
16. We used slightly different language during separate survey sessions. In the first, the pair of animals had died thirty years ago. In the second, which had far more respondents, we simply presented the fact that the zoo had another pair thirty years ago, but for undisclosed reasons no longer did. The two sessions yielded qualitatively similar results, and we present them aggregated together.
17. Consider a farmer who has planted two crops, corn and wheat. The yield of the corn crop is highly variable and depends on many factors, some unobservable, while the yield of the wheat crop is relatively certain. The farmer can apply fertilizer to the wheat, because at the harvest time he will be able to determine the fertilizer's effect. The corn crop has greater background noise. If he fertilized it, he can not know whether a yield in excess of the expected value resulted from the fertilizer, or from random variation. Hence, if he starts with the corn, he will learn little, and will not know whether to use the fertilizer next year.
18. What may be a mistake in particular circumstances, however, could be part of a worthwhile global strategy to economize on cognitive effort, if a penchant for action is generally desirable and it is expensive to determine when.
19. Breyer (1993) identifies such inconsistencies.

References

- Baron, Jonathan. (1994). "Nonconsequentialist Decisions," *Behavioral and Brain Sciences* 17, 1–42.
- Baron, Jonathan, and Ilana Ritov. (1994). "Reference Points and Omission Bias," *Organizational Behavior and Human Decision Processes* 59, 475–498.
- Breyer, Stephen. (1993). *Breaking the Vicious Circle: Toward Effective Risk Regulation*. Cambridge, MA: Harvard University Press.
- DeGeorge, Francois, Jayendu Patel, and Richard Zeckhauser. (1999). "Earnings Management to Exceed Thresholds," *Journal of Business* 72, 1–33.
- Gordon, Danielle, and Daniel Kammen. (1996). "Uncertainty and Overconfidence in Time Series Forecasts: Application to the Standard & Poor's 500 Stock Index," *Applied Financial Economics* 6, 189–198.
- Gregory, Robin, Sarah Lichtenstein, and Paul Slovic. (1993). "Valuing Environmental Resources: A Constructive Approach," *Journal of Risk and Uncertainty* 7, 177–197.
- Hahn, Robert. (1998). *The Economics and Politics of Climate Change*. Washington, DC: AEI Press.
- Hamilton, James, and W. Kip Viscusi. (1999). *Calculating Risks? The Spatial and Political Dimensions of Hazardous Waste Policy*. Cambridge, MA: MIT Press.

- Irwin, Julie, Paul Slovic, Sarah Lichtenstein, and Gary McClelland. (1993). "Preference Reversals and the Measurement of Environmental Values," *Journal of Risk and Uncertainty* 6, 5–18.
- Kahneman, Daniel. (1986). "Comments on the Contingent Valuation Method." In Ronald Cummings, David Brookshire, and William Schulze (eds.), *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*. Totowa, NJ: Littlefield, pp. 185–194.
- Kahneman, Daniel, and Amos Tversky. (1979). "Prospect Theory: An Analysis of Decision under Risk," *Econometrica* 47, 263–291.
- Knetsch, Jack. (1997). "Reference States, Fairness, and the Choice of Measure to Value Environmental Changes." In Max Bazerman, David Messick, Ann Tenbrunsel, and Kimberly Wade-Benzoni (eds.), *Environment, Ethics, and Behavior*. San Francisco: New Lexington Press, pp. 13–32.
- Knetsch, Jack, and J. A. Sinden. (1984). "Willingness to Pay and Compensation Demanded: Experimental Evidence of an Unexpected Disparity in Measures of Value," *Quarterly Journal of Economics* 99, 507–521.
- Laibson, David, and Richard Zeckhauser. (1998). "Amos Tversky and the Ascent of Behavioral Economics," *Journal of Risk and Uncertainty* 16, 7–47.
- Ludwig, Donald, Ray Hilborn, and Carl Walters. (1993). "Uncertainty, Resource Exploitation, and Conservation: Lessons from History," *Science* 260, 17, 36.
- Mintzer, Irving. (1987). *A Matter of Degrees*. Washington, DC: World Resources Institute.
- Neumann, Bruce, and Laurence Friedman. (1978). "Opportunity Costs: Further Evidence Through an Experimental Replication," *Journal of Accounting Research* 16, 400–410.
- Odean, Terrence. (1998). "Volume, Volatility, Price, and Profit When All Traders are Above Average," *Journal of Finance* 53(6), 1887–1934.
- Ritov, Ilana, and Jonathan Baron. (1990). "Reluctance to Vaccinate: Omission Bias and Ambiguity," *Journal of Behavioral Decision Making* 3, 263–277.
- Ritov, Ilana, and Jonathan Baron. (1992). "Status-Quo and Omission Biases," *Journal of Risk and Uncertainty* 5, 49–61.
- Ritov, Ilana, Jonathan Baron, and John Hershey. (1993). "Framing Effects in the Evaluation of Multiple Risk Reduction," *Journal of Risk and Uncertainty* 6(2), 145–159.
- Samuelson, William, and Richard Zeckhauser. (1988). "Status Quo Bias in Decision Making," *Journal of Risk and Uncertainty* 1, 7–59.
- Seligman, Martin. (1975). *Helplessness*. San Francisco: W.H. Freeman and Company.
- Seligman, Martin. (1990). *Learned Optimism*. New York: A.A. Knopf.
- Schelling, Thomas. (1960). *The Strategy of Conflict*. Cambridge, MA: Harvard University Press.
- Schlyakhter, Alexander, Daniel Kammen, Claire Broido, and Richard Wilson. (1994). "Quantifying the Credibility of Energy Projections from Trends in Past Data," *Energy Policy* 22(2), 119–130.
- Thaler, Richard. (1980). "Toward a Positive Theory of Consumer Choice," *Journal of Economic Behavior and Organization* 1, 39–60.
- Thaler, Richard, Daniel Kahneman, and Jack Knetsch. (1992). "The Endowment Effect, Loss Aversion, and the Status Quo Bias." In Richard Thaler (ed.), *The Winner's Curse*. Princeton: Princeton University Press, pp. 63–78.
- Thompson, Leigh, and Richard Gonzales. (1997). "Environmental Disputes: Competition for Scarce Resources and Clashing of Values." In Max Bazerman, David Messick, Ann Tenbrunsel, and Kimberly Wade-Benzoni (eds.), *Environment, Ethics, and Behavior*. San Francisco: New Lexington Press, pp. 75–104.
- Tversky, Amos, and Daniel Kahneman. (1974). "Judgment under Uncertainty: Heuristics and Biases," *Science* 185, 1124–1131.
- Viscusi, W. Kip, Wesley Magat, and Joel Huber. (1987). "An Investigation of the Rationality of Consumer Valuations of Multiple Health Risks," *Rand Journal of Economics* 18, 465–479.
- Viscusi, W. Kip, Wesley Magat, and Joel Huber. (1991). "Pricing Environmental Health Risks: Survey Assessments of Risk-Risk and Risk-Dollar Trade-offs for Chronic Bronchitis," *Journal of Environmental Economics and Management* 21(1), 32–51.