From Biel, A., Eek, D., Gärling, T, & Gustafsson, M. (Eds.) (2008). *New issues and paradigms in research on social dilemmas.* New York: Springer.

Toward a Comprehensive Model of Social Dilemmas

Robert Gifford
University of Victoria

I am honored to have been asked to write a concluding chapter for this valuable book, which represents the cutting edge of research in an area that may be called, without exaggeration I believe, “a matter of life and death” (Gifford, 2002b). This collection of authors certainly represents the most sophisticated thinking in the domain of social dilemmas, and therefore the challenge of attempting to sensibly comment on, summarize, or synthesize their collectively magnificent and manifold thoughts is a special one.

Before I leave the theme that this research area is crucially important and the well-earned flattery, I feel compelled to rant--at the risk of alienating some authors and readers--about the use of certain terms in this literature. Presumably because research on social dilemmas developed in part from game theory, some researchers and authors continue to use the terms “players” and “games” to describe the participants and paradigms in their studies. The use of these terms may well suggest, to academics from other areas of science, to students, to the general public, to funding agencies, and to research participants, that the topic is not serious, that social dilemmas and decisions made in studies of them may be treated lightly, and that winning is the goal; why else do people "play games"? Therefore, let us retire these terms, given that our studies pertain to important global issues. Many alternative terms are available for use: participants, decision-makers, contributors, paradigms, procedures, and microworlds are among the possibilities.

The Problem, and the Nay-Sayers

I will briefly re-state the central issues in resource dilemmas and public goods problems, that is, more generally, in social dilemmas. Each person and each group in this world curates a stream of natural resources that have been transformed into usable goods. Whenever we use a vehicle for transport, turn on a light, buy clothing, read a book, or even eat a carrot, natural resources have been transformed into products that are consumed and, usually but not always, one or more undesirable products (e.g., garbage, smoke, greenhouse gases, excess fertilizers, or toxic chemicals) are added to the environment. Of course, we need to consume some of these transformed natural resources to survive. Just as clearly, some persons consume far more than others, and usually find it easy to justify their consumption. Mindfully or not, individuals and groups use resources along a continuum that ranges from pure community or environmental interest to pure self-interest. Public goods problems are, in many ways, similar. Individuals and groups decide whether to support common goals and projects. They donate (or not).

In either case, decisions are made, decisions that constitute the management of resources. Whether those decisions reflect the taking or the giving of resources, decision-makers face social dilemmas in which their personal interest appears to conflict with the common interest. Certainly much management is done by governments, corporations, and other organizations, but individuals are faced with their own management problems. To varying degrees, they monitor their personal use of resources, observe the effects that their usage or donations have on the environment, and are aware of the choices made by other individuals.

Not everyone agrees that self-interest and the community interest *are* in conflict. Adam Smith (1776) asserted that acting in one's self-interest benefits humankind, and more recent

writers such as the economist Julian Simon (1980) and the political scientist Bjorn Lomborg (2001) agree. Simon closed his book with an explicit re-statement of Smith's famous dictum. Lomborg claims a conversion experience, from being a Greenpeace supporter to believing in something close to the Smith-Simon viewpoint. These economists believe that environmental problems are exaggerated. In contrast, William Lloyd (1837/1968) long ago pointed out that when natural resources are finite, widespread self-interest must eventually have fatal, rather than beneficial, consequences. The Simonites prefer to believe that in a functional sense, resources probably are not finite.

Public goods problems appear to be less controversial in that no one denies that if enough contributors do not appear, the public good will not be realized. No one denies that there *are* publics goods problems. However, Simon (1980) argued that a greater population will produce more humans, from which one may expect more contributors to the public good, including very rich ones like Andrew Carnegie and Bill Gates, and that these greater numbers and wealthy persons will always step to the fore, in Smithian invisible-hand fashion, to save the day.

Simon and other nay-sayers do admit that real problems exist, at least in the short term, but have faith that in the long term, all will be well, primarily based on their contention that so far in history everything *is* getting better, at least for *this* species. Perhaps one way of resolving what seems to be irreconcilable differences between these optimistic economists and many authors in this book is to believe that environmentalists *are* the invisible hands that are guiding society toward salvation from environmental disaster. If so, the ideas described in this book are essential.

Toward A Comprehensive Model

And so, to business. For about three decades before the conference that forms the basis of this volume, social scientists have investigated influences on the decisions made by individuals in *n*-person dilemmas (cf. Dawes, 1973), which developed into studies of decisions about how to use the transformed natural resources that come within their reach, and decisions about whether to contribute to the common good. For the most part, individual studies have focused on one or a few influences. A number of earlier reviews, chapters and books have, usually in narrative fashion, summarized these influences (e.g., Dawes, 1980; Gifford, 2002a, Chapter 14; Komorita & Parks, 1994; Liebrand, Messick, & Wilke, 1992; Schroeder, 1995; Shulz, Albers, & Mueller, 1994; Suleiman, Budescu, Fischer, & Messick, 2004).

For the last several years, I have set myself the goal of integrating these many influences on and outcomes of social dilemmas into a coherent and comprehensive model (Gifford, 2002a, 2005). The value of models is that they postulate relations among key influences and help to represent complex systems in understandable ways. They can stimulate investigation of the properties of the system and suggest predictions of future outcomes. Initially, I considered that influences on cooperation could be grouped into those associated with the resource itself (its abundance, its regeneration rate, etc.), the individual decision-makers (their values and experience, for example), relations among decision-makers (trust and communication, for example), and the structure of the dilemma (the rules that govern harvesting) (Gifford, 1987). Since then, the model has been expanding and relations among these categories of influence have been described and investigated. In a meta-analysis Donald Hine and I conducted (1991), about 30 different influences could be identified. This gradually led to the attempt to create a

comprehensive model, mainly so I could comprehend this plethora of factors in a more organized way.

The antecedent influences on dilemma decisions may be grouped into five major categories, as shown in Figure 1: geophysical, governance, interpersonal, decision-maker, and dilemma-awareness influences on decision-making. The sixth category concerns the various strategies that decision-makers actually employ. Finally, two kinds of outcomes form categories seven and eight: those for the decision-maker and those for the environment (including the resource itself, the environment in general, and for other people in the community). The model is meant to apply to both main forms of social dilemmas, resource and public goods.

The eight categories require brief introductions. First, the harvesting of resources, often in their original, pre-transformed form, is affected by important non-human factors such as the elusiveness of the resource itself (e.g., wild game), extraction difficulties (e.g., mining for gold, squeezing oil from tar sands), weather (e.g., fishing in a storm), the scarcity of the resource (e.g., finding water during a drought), or uncertainty about the amount of the resource (e.g., estimates of remaining oil reserves). These *geophysical influences* are non-human, but they cannot be ignored as important factors in a comprehensive model that describes the human consumption of resources, and sometimes whether contributions are made to the public good (disasters may reduce local donations and increase donations from afar, for example). Resources may decline for different reasons, and this affects cooperation. Generally, more harvesting occurs when a resource is abundant than when it is scarce, but this difference is magnified when the cause of depletion is natural than when it is human (Rutte, Wilke, & Messick, 1987). If decision-makers think that other *people* are depleting the resource, they want to take more too, but if *nature* is

depleting the resource we are more willing to restrain our harvests. Donations to charities decline when the annual goal is met.

Second, resource harvesting and contributions to public goods are rarely, perhaps never, entirely free of constraints, and so a variety of legislated, market, and customary rules are applied to harvesting and donating (not that the rules are always followed; in the everyday world, regulations are influences, not absolute determinants). Among these *governance influences* (or "rules and regulations") are harvest limits, prices, tax incentives for giving, the creation of harvest territories, legal entitlements, organizational pressure to donate, guidelines for fair use, penalties for overuse, and regulations or customs concerning communication (e.g., of harvest amounts, mandated communication by and among the decision-makers, etc.). It must be noted that some social dilemmas are managed well; in some places hunted wildlife such as ducks and deer are managed relatively well by systems of permits, seasons, and hunting rules. Some local fisheries are well-managed through local customs (Leal, 1998). Some public goods work very well. We can and should learn from these examples of successful management, but there are many social dilemmas that are *not* working, too.

Third, decision-makers are influenced by other decision-makers. Mutual trust, conformity, competition, kinship or friendship ties, and the nature of informal (non-mandated) communication are some of these *interpersonal influences*. Non-decision-makers, such as family members or observers who are not decision-makers, may well also exert some interpersonal influence. Those others do not even have to be personally known; when decision-makers know that strangers have attitudes identical to their own they cooperate more (Smith, Bell, & Fusco, 1988).

Fourth, each decision-maker has a set of motivations, cognitions, abilities, mission statements, experience, values, skills, experience, resources (e.g., financial, tools, information, and assistants), aspirations, intelligence, need, and perceptions of equity or social comparison that influences harvesting. All these factors are located within the decision-maker, and so this category is called *decision-maker influences.*

Fifth, we have noticed in our studies, and anecdotal evidence from the everyday world strongly suggests, that not every decision-maker who is, objectively, in a social dilemma realizes that. A campaign to donate blood may not have reached some persons; some fishers have never have heard of resource dilemmas, even in some vernacular form. Yet other decision-makers experience the dilemma to various degrees, from mild concern or amusement (the latter perhaps most often among participants who have been told they are "playing a game") to acute concern or even psychological distress. Thus, the model includes *dilemma awareness,* the degree to which being in a dilemma is experienced *as* a dilemma, as a crucial influence on cooperation. Although dilemma awareness is important, it is often overlooked because experimenters usually make the dilemma clearly salient to their participants.

Sixth, as a presumed consequence of all the previous five categories of influence, decision-makers adopt some strategy, or a series of strategies. These *decision-maker strategies* include such classic plans as "getting what you can," "saving the environment," or "taking what others take." However, from our qualitative studies, we have also learned that some decision-makers employ the "strategy" of doing nothing that seems particularly strategic, such as "trying out the system" (e.g., Hine & Gifford, 1997).

Less obvious, perhaps, but certainly real, is the class of social dilemma strategies that might be called *reverse decisions*: for example, when harvesters donate resources back to the pool, as when a lumber company finances a tree-planting project, or someone removes a resource from a public good, for example, embezzling money from a charity. One study supported the notion that when donations are possible, the resource depletes less quickly (Naseth, 1990), and others demonstrate that theft does occur (Edney & Bell, 1984).

Decision-makers sometimes surprise: Although some are greedy, others are altruistic and do not even wait for an authority to tell them they can donate (cf. tree-planting as a donation practice imposed on logging companies). One of the most touching moments in my own research career occurred when a 4-year-old girl in one study saw that the resources (walnuts that could be traded later for cookies) were quickly disappearing from the bowl that held them. The other 4-year olds were in sheer greed mode. This girl looked at the bowl, looked at her own stash, looked at me, and then put some of her own walnuts back into the bowl.

Sometimes participants harvest according to needs or goals that are only dimly related to the dilemma. For example, we once interviewed decision-makers after each season in a fishing simulation, and were told by one that she took a few extra fish because she imagined that some guests were coming to dinner that day (Gifford, 1994). This may have been idiosyncratic, but one wonders how many decision-makers base their choices on rationales that are far from the neatly postulated IV-based decision-making that researchers assume is occurring. Almost all social dilemma experiments apply a set of conditions to the participants and then measure

objective differences in cooperative behavior. Such a strategy ignores the thinking processes engaged in by participants as they face the dilemma.

Therefore, it is important to examine the “online” thinking processes of group members as they grapple with the dilemma (Hine & Gifford, 1997). One way to do this is grounded theory analysis (e.g., Strauss & Corbin, 1990). Such qualitative approaches, or at least interviews of decision-makers, could be employed more often than the extant literature suggests that they are being used now. We need to "get inside the heads" of decision-makers. The results, in some instances, can be startling.

Whatever strategies or non-strategies are used by individual decision-makers, they have immensely important consequences, particularly once they are aggregated. These consequences may be divided into those for the decision-makers and those for resource, the environment, and the community. The seventh category, *decision-maker outcomes,* range from becoming wealthy, to breaking even, to losing everything. In resource dilemmas, this is the familiar range of consequences; in public goods situations, the decision-maker may receive tax breaks and social recognition for contributing, social recognition, the benefits of free-riding if others successfully support the public good, or personally suffer a loss because the good was not established.

The eighth category includes *environmental outcomes*, ranging from extinction to sustainability to an increase in abundance in the resource in question (as when an endangered species is rescued by a successful conservation program or, in public goods contexts, the failure or success of the project or organization). They also include epiphenomenal outcomes for the environment: for resource dilemmas, reductions in a resource of interest often has some ecological consequence for other flora, fauna, or non-living yet important components of the

ecosystem, and for public goods, this might be unemployment for staff and the economic loss to the community. Community outcomes represents the consequences for those who do not make decisions, but must live with the consequences of those decisions. For example, when a species is extinguished, most people did not directly kill it, but they will never see a live example of that animal or plant again. On the positive side, when organ donation campaigns are successful, someone who may not have made a decision either way about donating organs may benefit from others' decisions by receiving a donated organ. All of us who move into a community that has established public goods, whether by being born into it or through immigration, benefit without having contributed as a decision-maker.

Such a listing of influence and outcome categories is fairly straightforward. Postulating links *among* them is both more interesting and more challenging. For example, some decision-makers' strategy is geared toward sending a message to other decision-makers; the explicit message of some participants in our resource dilemma studies has been, for example: "Look, I am taking a sustainable amount and I want you to do the same." Hence, a causal link exists between *decision-maker strategies* and *interpersonal influences.* At the larger social scale, consequences for resources (*environmental outcomes*) often are reflected in changes in policies or regulations (*governance influences*). These hypothesized links between categories, and the conditions under which influence occurs or does not occur, represent the heuristic value of the model. The reader may easily postulate other links among the model's categories.

The objective of this chapter is to identify how the ideas presented earlier in this volume complement and supplement this developing model. Figure 1 represents some updates from its

predecessor (Gifford, 2002b) based on insights I was privileged to glean from the chapters in this volume.

Complementary and Supplementary Ideas

In reviewing the contributions to this symposium, the foregoing chapters, one may see how each supplements the model, or finds a place in it. For example, Au (Chapter 2) describes the somewhat neglected influence called “protocol of play” (Budescu, Au, & Chen, 1997). As Au notes, the information that each person possesses when making a decision is “determined by the various institutional arrangements that control the nature of the interactions” between the individuals and their access to the resource. When participants were assigned a place in the harvest sequence requests, Budescu et al. (1997) found, were greatest by the first decision-maker and least by the final decision-maker. Au and others are therefore sensitive to the second category in the model, *governance influences*. Thus, protocol of play affects *decision-maker strategies*, that is, the actual pattern of resource choices made by those in the dilemma.

Decision-makers are only new to a dilemma once. Much more often, one presumes, decision-makers have made decisions more than once, and therefore have some experience with choices in social dilemmas. What is “the effect of having a common history on decision making in social dilemmas” (van Dijk, De Cremer, Mulder, & Stouten, chapter 4)? Experience is one of many decision-maker characteristics that reflects the fourth of the the model’s categories, *decision-maker influences.* The effect of experience on defection versus cooperation is also affected, as van Dijk et al. point out, by other personal characteristics, such as social values, as well as by factors from the other main categories of influence, including trust (from the *interpersonal influence* category) and structural factors (from the *governance influence*

category). Clearly, no “simple and sovereign" theory (George, cited in Allport, 1954) can explain decisions made in social dilemmas: the truth is multi-determined and it lies in interactions within and between influences. That decision-maker experience plays an important role also shows the impact of feedback loops. In the model, *decision-maker outcomes* are proposed to affect *decision-maker influences* and the *decision-maker strategies* of participants. Illustrative of an interaction between *decision-maker influences* and *governance influences* is the finding that men and women as a whole cooperate about equally, but men cooperate more--and women do not--when group members trust one another and can communicate with each other (Moore, Shaffer, Pollak, & Taylor-Lemeke, 1987).

Another good example of this is provided by the work of Eek and Garling (Chapter 5, this volume). Social values (*decision-maker influences*) generally are thought to be associated with cooperative choices in resource dilemmas. One school of thought is that cooperation is actualized by the participant's goals or aspirations (another *decision-maker influence*) that results in maximized outcomes for self and other (*decision-maker outcomes*). However, Eek and Garling convincingly make the case that a different goal--equal outcomes for all decision-makers—often is more influential than the joint maximization goal. Thus, choices presumably are a function of social values *and* goals, rather than social values *or* goals.

Decision-makers usually are investigated in this literature as individuals, but in the everyday world, decisions are sometimes, perhaps usually, made by groups such as boards of directors or government committees. Recognizing this, Bornstein (Chapter 6) examines how individuals and two kinds of groups make decisions, and which kinds of strategic decision-making they employ. Groups may be largely unified in their goals and decisions, or not

cooperative. Kazemi and Eek (Chapter X) also demonstrate the importance of considering the group as a decision-maker. Group goals (as well as individual goals) can affect the decisions made in a social dilemma. Clearly, given the ecological validity of the group as a decision-maker, this is an important direction for research to take. The model's *decision-maker influences* category obviously must include groups as well as individuals as the decision-makers. Its *decision-maker strategies* category includes several popular strategies used by decision-makers, and a link is necessary from that category to the *interpersonal influences* category, thereby postulating that strategies used by decision-makers will influence such within-group factors as trust, admiration, and perceived similarity to self.

Some factors that may not at first appear to matter, do. For example, one might not think that whether or not harvest decisions are made at the same time is important. For a variety of reasons, it does matter, as Wit and Kerr (Chapter 7) demonstrate. Besides showing that the salience of different levels of concern (private, group, and collective) (cf. *dilemma awareness* in this model) are important, Wit and Kerr show how sequential versus simultaneous decisions (part of the *governance influences* category, that is, whether harvest sequencing is mandated, customary, or not) is a significant influence on cooperation. Increased concern for and contributions to the collective interest occur when decision-makers think that others have yet to make their decision, compared to when they think the others are doing so at the same time, or have already decided.

The sense of fairness and justice, and the procedures designed to achieve these goals, are an essential part of public goods and resource dilemmas. Probably every researcher in the area, and certainly myself, has heard at least figurative and sometimes literal cries of revenge or

anguish from participants who found the actions of others reprehensible. Therefore, justice-related issues cannot be ignored in social dilemma contexts. Schroeder, Steel, Bembenek, Woodell, and Kinsey (Chapter 8) consider four justice systems: distributive, procedural, restorative, and retributive. Justice systems may be imposed from above (*governance influences*), or agreed-upon by decision-makers (*interpersonal influences)* but then implemented *as* rules and regulations, thus creating a link between those two categories.

Quite a number of studies have investigated the implications for cooperation in social dilemmas as a function of rules for distribution, governance, or justice. Schroeder et al. believe that procedural justice systems will be more stable and cooperation-inducing than distributive justice systems, and explicitly argue that although such systems are best created through communication and agreements among those most affected (the decision-makers), they should become instituted as structural (i.e., rules and regulations) solutions to the eternal problem of transgressions in the commons.

Another essential element of the social dilemma is trust (or the lack of it). When decision-makers remove less of the resource than they could have, or donors make a sizable contribution, many of them are trusting in a norm of fairness and reciprocity that, unfortunately, is not always shared by other decision-makers. For example, laboratory studies show that stealing from others in the commons is frequent (Edney & Bell, 1984). Another factor, a sense of community or group identity, is important (Dawes & Messick, 2000), and can provide a positive glow in the dilemma. Apparently, not much is required to create enough group identity to improve cooperation. In one study, the only difference between "high-identity" and "low-identity" participants was that the high-identity participants came to the lab and received their

instructions together, yet the high-identity harvesters cooperated more (Samuelson & Hannula, 2001). When harvesters think of themselves more as individuals than as group members, they over-harvest more (Tindall & O'Connor, 1987).

As an example of how decision-maker influences are affected by geophysical influences, Brann and Foddy (1987) showed that less trusting participants harvested at about the same rate regardless of how fast the resource disappeared, but more trusting participants harvested more when the resource was depleting slowly and less when the resource was rapidly disappearing. Thus, trusting harvesters seem to be sensitive to the rate of resource depletion, but distrusting harvesters seem not to be. Foddy and Dawes (Chapter 9) report that trust is greater for others who are believed to be part of one's own group, even if the decision-maker knows little or nothing else beyond membership about the other decision-maker. This much seems intuitive enough; one expects others on one's team or work unit (usually!), or one's religious faith to be more cooperative than others who are not. Trust within groups clearly is part of the *interpersonal influences* category.

Groups, however, can be constituted at multiple levels. At the largest scale, do citizens of a given country trust others citizens of the country more than citizens of other countries? At the smallest scale, would they trust members of their own family more than others? What of the mid-range? Do players on a team trust other players in the same sport (even those not on the same team, but similar only in that they play the same game) more than those who do not play the sport? The issue of group *scale* and trust may need further research.

Social dilemmas have two main forms, resource dilemmas and public goods problems. Most often, researchers study one form or the other, or at most compare the two forms in

separate conditions or studies. Gustaffson and Budescu (Chapter 10) rightly point out that in many instances, the two forms are combined in the same institution or context. The value of their contribution lies in the creation of a paradigm within which these combined forms may be studied. They focus on the important issue of uncertainty, which can take several forms (e.g., in the size of the resource to be harvested, the intentions of other decision-makers, the number of other decision-makers, the price of the resource, etc.).

In fact, uncertainty can be a factor in every part of the model, from uncertainty about geophysical influences to uncertainty about quantitative and qualitative outcomes. For example, if a fisher takes several tonnes of fish from a lake, it would not be difficult to measure the weight or number of fish taken. However, uncertainty about the effect of this harvest on the lake's ecology or whether the fisher was wrong to take the fish is not easily decided. In sum, certainty may exist *only* in the laboratory. For that reason, ecological validity in this area demands more studies of uncertainty in all the categories of the model.

McGinnis and Ostrom (Chapter 11) approach the problem of common resources from a political science perspective, and quite naturally ask whether the often optimistic results obtained by social scientists who work at the small-group level would apply at larger scales. Of course, this question has been haunting psychologists for many years (e.g., Edney, 1981), particularly when many studies show a decline in cooperation as the size of the harvesting group grows, even in fairly small groups (by societal standards) of 3 versus 7 (e.g., Sato, 1989). Nearly every study of group size has found that behavior in resource management tends increasingly toward self interest as group size increases. Cooperation declines both as the number of decision-makers

rises and as the number of groups *within* a commons with a constant total membership rises (Komorita & Lapworth, 1982).

There are some good reasons for this. First, as group size increases, the harm from any one participant's greed is spread thinner among the other participants: no single other decision-maker is badly hurt. Second, violations of sustainability or failures to donate are often less visible to others in larger groups. Third, in large groups, the effect of the harm done to other decision-makers often is less visible to the violator (Edney, 1981); it is easier to inflict pain if one does not have to watch the victim experience pain. Fourth, negative feedback or sanctions to violators or free-riders are increasingly difficult to manage in larger groups.

Obviously, McGinnis and Ostrom's ideas complement the *governance influence* portion of the model, but they greatly expand the nature of that element of the model by describing 8 "design elements" that institutions and governments would have to implement to facilitate sustainable resource management. Some of these, for example clearly defined boundaries, echo ideas and findings from small-scale studies, in which the term territorialization usually is used. Although monitoring is another element of the model drawn from small-scale studies, McGinnis and Ostrom correctly point out that outside the laboratory this monitoring of harvest practices and consequences often requires high-tech "eyes" such as satellite cameras, as opposed to proximate human scanning. Others of their design elements also reflect small-scale model elements, such as the use of sanctions for violators and the rights of participants to set and change the rules.

Yet other design elements (e.g., conflict resolution mechanisms at the local level) are implied in some small-scale investigations by the opportunity to communicate (or not) among

decision-makers, but rarely implemented in experiments as a manipulated factor in experiments. McGinnis and Ostrom add to the familiar list of factors that promote cooperation in the commons with their notion of nested enterprises, that is *layers* of governance: most small-scale studies include no more than one level of governance, and often governance does not appear at all as a factor in small-scale studies.

In general, McGinnis and Ostrom's chapter is a valuable reminder of the generalizability problem that small-scale researchers face, yet once one translates the 8 design elements into language that is familiar to, for example, psychologists who work in this area, some elements become familiar. This is reassuring; if the design elements associated with sustainable resource management at the societal or global level were completely unanticipated by small-scale theorists, the prospects for progress would be frighteningly daunting. However, identifying the design elements and noting that many are similar to those known to small-scale researchers is not the same thing as enabling the design elements in the real world. The tremendous challenge of implementing the eight design elements remains.

After becoming familiar with work such as that of McGinnis and Ostrom's at the political science level, some researchers or theorists may fear that what is found in small-group research lacks credibility. What can we really learn from a resource simulation in which three or six people manage a common resource pool in a laboratory, when political scientists and economists are studying real situations, such as international whaling or water use in the middle east? The answers are systematic control of factors and experimental realism. The ability to systematically vary the conditions under which participants manage resources permits small-scale researchers to test theories in scientifically pure ways. The results do need to be cross-checked at the larger

scale, where experimental control is impossible, but without experimental control, one can never be sure whether a given factor is influential or not.

Many small-scale studies have demonstrated the mundane realism of laboratory microworlds. Even small payoffs can produce behavior which *seems* quite similar to that which could be expected in a real, valuable, limited commons. In one study in which participants could win no more than $10.50, participants were so caught up in the dilemma that defectors were sworn at, unrequited cooperators cried, stormed out of the room, and told defectors they "would have to live with their decisions for the rest of their lives" (Dawes, McTavish, & Shaklee, 1977). Other researchers with similarly small payoffs have reported equally strong responses. Some participants have threatened ("jokingly") to beat up defectors, to destroy their reputations, and even to kill them (Bonacich, 1976)! In my own lab, subjects have said such things as "You greedy pig!" and "You die!" and "I could have smashed some heads" (Tindall & O'Connor, 1987).

Thus, despite the lack of field investigations, the research using simulations of commons dilemmas may have reasonable validity. Of course the small- and large-scale dynamics of social dilemmas are directly connected: the crucial aspect of micro-level resource management is that it sums up across thousands or millions of decision-makers to the macro level in mysterious, irrational, yet all-important ways.

Exchange, by its very nature, implies at least two parties who give and receive. Exchange is not a necessary part of social dilemmas, in the sense that some decision-makers may see the situation solely as an opportunity to take (in resource dilemmas) or to avoid contributing (in public goods problems), without consideration of others. Not to see social dilemmas as inherent

exchanges may represent a primitive viewpoint, but one that does, unfortunately, exist. Once exchange begins, however, strategy, in benign or malign forms, follows closely. Takahashi and Mashima (Chapter 12) consider the nature of social exchange, in particular generalized exchanges, in which one does not donate directly to another. In public goods problems, some decision-makers may wish to direct their donations to specific *kinds* of organizations, without being so restrictive as to specify a particular recipient.

For example, where I live, an omnibus charity exists in which management hopes that donors will donate to a general fund that the organizers can parcel out according in some rational or need-based manner. However, the charity recognizes that some donors prefer that their money to go to certain recipient groups, and that other donors wish to be sure their money does *not* go to certain other groups. For this reason, and to maximize its total donations, the omnibus charity allows donors to target their donations. In terms of the model, these considerations clearly fall into the *decision-maker strategies* category, and certainly relate to the link labeled strategic influence, which points back at the *interpersonal influences* category.

In Chapter 13, Samid and Suleiman examine a variety of strategies that an authority might use to elicit cooperation. The authors' assumption is that some coercion is necessary, and they explore the forms and limits of coercion that might best bring about a beneficial balance of exchanges. In this sense, Samid and Suleiman link the *governance influence* and *decision-maker strategies* categories, and usefully supplement the model through their observation that authorities as well as decision-makers engage in strategic efforts.

Decision-makers in the real world do not have equal economic or political power. Kopelman (Chapter 14) explores these power differentials, as well as their cultural backdrops.

This reference to differences in resources reflects the model's *decision-maker influences* category; that decision-makers are products of different cultural traditions also does so.

According to Yamagishi, Kiyonari, Tanida, and Terai (Chapter 15), participants in social dilemmas do actually seek to achieve mutual cooperation if possible at all, assuming certain external cues are available to them, a goal that falls within the *decision-maker influence* category. Using the intriguing idea of objectively monitoring which cells in a cooperation-defection matrix that participants look at, Yamagishi et al. found that most participants checked the cooperation-cooperation cell most frequently, suggesting that equity and concern for others' outcomes is very common. These studies illustrate that decision-makers are not always thinking about winning: ensuring equity can be a goals too.

In their chapter [number ?] on sanctions in social dilemmas, Shinada and Yamagishi masterfully review the history of research inspired by Hobbes's *Leviathan.* The obvious goal of sanctioning those who harvest too much or fail to contribute to the common good is to influence that malfeasant. Overlooked in that simplistic view is the interest of others in the dilemma, onlookers who wish to cooperate (e.g., Yamagishi, 1986). The "indirect effect" of sanctioning is to assure, or reassure, these would-be cooperators that it is safe to cooperate. But how strong is that effect, given that direct sanctioning of the non-cooperator seems strong and salient? Apparently, the indirect effect is about as strong as the direct effect (Eek, Loukopoulos, Fujii, & Garling, 2002; Yamagishi, Shinada, & Kasahara, 2005). In terms of the proposed model, sanctions clearly belong to the governance influences category. The "added value" for the model is the knowledge that the indirect effects of sanctions affect decision-maker influences, by changing a participant's assessment of others, and perhaps of the governance process itself.

In chapter [which number?], Fischer sets out to demonstrate genetic algorithm-based simulations are fit vehicles for reproducing social processes in social dilemmas and studying their long term effects. Although he uses a very different paradigm from that employed to develop the current model, Fischer shares with it the goal of achieving a macro-scale image of social dilemmas. Beginning from the Axelrod (1984) perspective on group competition, Fischer develops a rationale for using time-use diaries and decision-maker goals to explain the eventual outcome of dilemmas with different sets of parameters. For this writer, Fischer's chapter doubly highlights the complexity of the problem confronting social dilemma researchers: seeing the same "elephant" with very different disciplinary eyes, and seeing how very complex the elephant really is.

The chapters in this book have touched on, reinforced, and supplemented the model, for which I am grateful. Certainly it is more sophisticated than it was without the insights provided in this book. Its several influence categories, each with numerous individual factors, illustrate the complex causal and interactive dynamics that affect cooperation or the lack of it in social dilemma. In addition to these multiple causes, we have proposed that over the course of a commons dilemma, different influences are strongest at different times (Gifford & Hine, 1997). This is reflected in the “sequential strategy” note in the model. Nevertheless, however helpful a comprehensive model might be for visualizing the big picture in social dilemmas, the challenge for all of us is to find ways to encourage those influences that promote cooperation and sustainability.

References

Allport, G. W. (1954). The historical background of modern social psychology. In G. Lindzey, (Ed.), *Handbook of social psychology* (Vol. 1, pp. 3-56). Reading, MA: Addison-Wesley.

Axelrod R. (1984) *The evolution of cooperation.* New York: Basic Books.

Bonacich, P. (1976). Secrecy and solidarity. *Sociometry, 39,* 200-208.

Brann, P., & Foddy, M. (1987). Trust and the consumption of a deteriorating common resource. *Journal of Conflict Resolution, 31,* 615-630.

Budescu, D. V., Au, W. T., & Chen, X. P. (1997). Effect of protocol of play and social orientation on behavior in sequential resource dilemmas. *Experimental Behavior and Human Decision Processes, 65,* 179-193.

Dawes, R. M. (1973). The commons dilemma game: An N-person mixed motive game with a dominating strategy for defection. *ORI Research Bulletin, 13,* 1-12.

Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology, 31,* 169-193.

Dawes, R. M., McTavish, J., & Shaklee, H. (1977). Behavior communication and assumptions about other people's behavior in a common dilemma situation. *Journal of Personality and Social Psychology, 35,* 1-11.

Dawes, R. M., & Messick, D. M. (2000). Social dilemmas. *International Journal of Psychology, 35,* 111-116.

Edney, J. J. (1981). Paradoxes on the commons: Scarcity and the problem of equality. *Journal of Community Psychology, 9,* 3-34.

Edney, J. J. (1984). Rationality and social justice. *Human Relations, 37,* 163-180.

Edney, J. J., & Bell, P. A. (1984). Sharing scarce resources: Group-outcome orientation, external disaster, and stealing in a simulated commons. *Small Group Behavior, 15*, 87-108.

Eek, D., Loukopoulos, P., Fujii, S., & Garling, T. (2002). Spill-over effects of intermittent costs for defection in social dilemmas. *European Journal of Social Psychology, 32*, 801-813.

Gifford, R. (1987). *Environmental psychology: Principles and practice* (1st ed.). Newton, MA: Allyn and Bacon.

Gifford, R. (1994). A community study of the commons dilemma. Unpublished study, Department of Psychology, University of Victoria.

Gifford, R. (2002a). Environmental psychology: Principles and practice (3rd ed.). Colville, WA: Optimal Books.

Gifford, R. (2002b). *Resource management: A matter of life and death.* Keynote address to the International Association of Applied Psychology, Singapore.

Gifford, R. (2005). *Resource dilemmas: A perspective from environmental psychology*. Keynote address to the Nordic Environmental Social Science conference, Gothenburg, June, 2005.

Gifford, R., & Hine, D. W. (1997).Toward cooperation in commons dilemmas. *Canadian Journal of Behavioural Sciences, 29*, 167-179.

Hine, D. W., & Gifford, R. (1991). *The commons dilemma: A quantitative review*. Canadian Psychological Association annual meetings, Calgary, June.

Hine, D. W., & Gifford, R. (1997). What harvester really think about in commons dilemma simulations: A grounded theory analysis. *Canadian Journal of Behavioural Sciences, 29*, 180-194.

Hardin, G. (1968). The tragedy of the commons. *Science, 162*, 1243-1248.

Komorita, S. S., & Lapworth, C. W. (1982). Cooperative choice among individuals versus groups in an N-person dilemma situation. *Journal of Personality and Social Psychology, 42*, 487-496.

Komorita, S. S., & Parks, C. D. (1994). *Social dilemmas*. Madison, WI: Brown & Benchmark.

Leal, D. R. (1998). Community-run fisheries: Avoiding the "tragedy of the commons." *Pollution and Environment: A Journal of Interdisciplinary Studies, 19*, 225-245.

Liebrand, W., Messick, D. M., & Wilke, H. (Eds.)(1992), *Social dilemmas: Theoretical issues and research findings*. Oxford: Pergamon.

Lloyd, W. F. (1837/1968). *Lectures on population, value, poor laws and rent.* New York: August M. Kelley, 1837/1968.

Lomborg, B. (2001*). The skeptical environmentalist: Measuring the real state of the world.* New York: Cambridge.

Messick, D. M., Wilke, H., & Liebrand, W. B. G. (Eds.), *Social dilemmas: Theoretical issues and research findings.* Oxford: Pergamon.

Moore, S. F., Shaffer, L. S., Pollak, E. L., & Taylor-Lemeke, P. (1987). The effects of interpersonal trust and prior commons problem experience on commons management. *Journal of Social Psychology, 127*, 19-29.

Naseth, G. J. (1990). The effects of warning of impending resource depletion, resource control and environmental attitudes on behavior in a social dilemma. *Dissertation Abstracts International, 51(3-B),* 1549.

Rutte, C. G., Wilke, H. A., & Messick, D. M. (1987). Scarcity or abundance caused by people or the environment as determinants of behavior in the resource dilemma. *Journal of Experimental Social Psychology, 23,* 208-216.

Samuelson, C. D., & Hannula, K. A. (2001). *Group identity and environmental uncertainty in a sequential resource dilemma.* Unpublished manuscript, Department of Psychology, Texas A&M University.

Sato, K. (1989). Trust and feedback in a social dilemma. *Japanese Journal of Experimental Social Psychology, 29,* 123-128.

Schroeder, D. A. (Ed.). (1995). *Social dilemmas: Perspectives on individuals and groups*. Westport, CT: Praeger.

Shulz, U., Albers, W., & Mueller, U. (Eds.). (1994). *Social dilemmas and cooperation*. Berlin: Springer-Verlag.

Simon, J. (1980). *The ultimate resource.* Princeton University Press.

Smith, A. (1776). *An inquiry into the nature and causes of the wealth of nations.* London: Methuen.

Smith, J. M., Bell, P. A., & Fusco, M. E. (1988). The influence of attraction on a simulated commons dilemma. *Journal of General Psychology, 115,* 277-283.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* Newbury Park, CA: Sage.

Suleiman, R., Budescu, D., Fischer, I., & Messick, D. (Eds.). (2004). *Contemporary approaches to social dilemma research.* Cambridge, UK: Cambridge University Press.

Tindall, D. B., & O'Connor, B. (1987, June). *Attitudes, social identity, social values, and behavior in a commons dilemma*. Presentation at the Canadian Psychological Association Conference, Vancouver, BC.

Yamagishi, T. (1986). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology, 51,* 110-116.

Yamagishi, T., Shinada, M., & Kasahara, M (2005, July). *Direct and indirect effects of punishment in social dilemmas*. Paper presented at the 11th International Conference of Social Dilemma, Krakow, Poland.