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Social Dilemmas

THEORETICAL ISSUES AND RESEARCH FINDINGS

EDITED BY
WIM LIEBRAND, DAVID MESSICK
AND HENK WILKE

ROUTLEDGE



Social Dilemmas

Theoretical Issues and Research Findings

Edited by

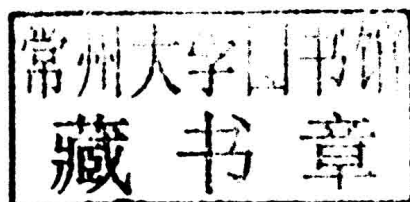
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Social Dilemmas

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Preface

SOCIAL dilemmas are societal problems that arise because we often assign higher priority to our own short-term interests than to the interests of others or to longer-term considerations. We do not generally like to ride bicycles during pollution alerts, to reduce our water or energy consumption, or to send money to the public television. However, we would all be better off if we were more inclined to cooperate in such situations.

At the Third International Conference on Social Dilemmas, we decided to prepare a book describing the advances social psychologists from around the world have made. Their insights may contribute to the understanding and resolution of social dilemmas. Each chapter in this book discusses its research findings in the context of a comprehensive view of social dilemmas. In the first two chapters of the book we try to make this comprehensive framework explicit.

We thank the Royal Dutch Academy of Sciences (KNAW), the European Association of Experimental Social Psychology, and the University of Groningen, The Netherlands, for their generous financial support of the Third International Conference on Social Dilemmas. Without their support neither the conference nor the book would have been possible.

Groningen, *March 1991*

WIM B. G. LIEBRAND
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Part I

Introduction

Social Dilemmas: The State of the Art

1

Introduction and Literature Review

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Introduction

When we go out to a nice restaurant for dinner and agree in advance to share the bill, we each tend to order things from the menu that are a bit more pricey than we would have ordered had we been alone. After all, we each pay only a fraction of the price of the meal we ordered, plus a fraction of everyone else's meal. Yet we are all shocked when the bill comes. Each of us would like to be able to shave our taxes a bit, but when we all do, our governments fail to collect enough money to pay for the services that we all need. And is there any real need for us to recycle our newspapers? We each read such an infinitesimal amount of the total newsprint produced that what we do individually makes essentially no difference to the big picture. But forests are being depleted to produce newsprint.

The situations described above are examples of what are called social dilemmas. Social dilemmas are characterized as situations in which private interests are at odds with the collective interests. The dilemma arises when all or most members of a group act in accordance with their private interests and do worse for themselves than had they ignored their own

interests. My private interest might lead me to decline to pay the membership dues to join a labor union because I know that I will enjoy the benefits provided by that union regardless of whether or not I am a member. However, if everyone declined to join the labor union, there would be no benefit to enjoy and we would all be the worse for it. We have here a social dilemma.

More formally, social dilemmas can be defined as situations in which each decision maker is best off acting in his own self-interest, regardless of what the other persons do. Each self-interested decision, however, creates a negative outcome or cost for the other people who are involved. When a large number of people make the self-interested choice, the costs or negative outcomes accumulate, creating a situation in which everybody would have done better had they decided not to act in their own private interest.

Experimental Games

Game theory, the strategic analysis of conflicts of interest, was introduced on a large scale in the social and behavioral sciences by the important book of Luce and Raiffa (1957). This work laid the foundation for the development of experimental games which can be thought of as empirical research tools that could be used to test the predictive accuracy of the formal theory of games. Game theory and experimental games provided researchers in the social sciences with a promising new methodology to analyze human behavior in situations of interdependence and conflict.

An experimental game is a situation in which each of the participants (or players) has to choose one of several well-defined alternatives. All choices have consequences for the actor as well as for the other players involved, and the players are aware of these consequences.

A famous and important example is the Prisoner's Dilemma Game (PDG) for two persons. This game constitutes a true social dilemma, consistent with the definitions given above.

The following anecdote, taken from Luce and Raiffa (1957), illustrates both the name and the social dilemma properties of the Prisoner's Dilemma. Two individuals, accused of robbing a bank, are taken into custody and separated. The district attorney, unable to prove that they are guilty, confronts each prisoner with two options: either confess to the crime (option D), or not confess to it (option C). If both suspects confess, each will receive a 5-year sentence. If neither suspect confesses, both will be convicted on some minor charge and receive a 1-month sentence. If one confesses and the other does not, the suspect who does not confess will receive a 10-year sentence while the other will be set free. The consequences associated with the four possible combinations of choices

TABLE 1.1 *Prisoner's Dilemma for Two Persons*

		Column player	
		C	D
Row player	C	3,3	1,4
	D	4,1	2,2

are such that they result in the preference orderings depicted in Table 1.1. The ordering for each prisoner is strict, ranging from 1 (worst outcome: 10-year sentence) to 4 (best outcome: free). As appears from the preference orderings, it is to each prisoner's advantage to confess, regardless of the other's choice. However, if both prisoners act in their own interest and confess, they both end up in a worse position (5-year sentence) than in case they do not confess (1-month sentence). The Prisoner's Dilemma is an example of a mixed-motive game: there is a motive to Cooperate (option C), and there is the incompatible motive to Defect (option D). The specific ordering of payoffs as depicted in Table 1.1 results in two important properties of the Prisoner's Dilemma Game. First, each player has a dominating strategy. Second, if both players choose their dominant strategy, which is prescribed by the principle to maximize the payoff or the principle to maximize the minimum payoff (maximum), a deficient outcome results.

It is obvious that in societal problems more than two persons are involved. From a formal point of view, however, the two-person PDG can be easily extended to a PDG for more than two persons. Moreover, especially the various existing N -person generalizations of the two-person PDG are expected to capture the decisional structure of several real-life problems. Examples of these N -person generalizations will be discussed throughout this book. For present purposes it is sufficient to discuss formally the N -person generalization of the two-person PDG.

To represent outcomes in three- or more-person PDGs, it often is more convenient to use graphs. Figure 1.1 illustrates the graphical display of the two-person PDG from Table 1.1 and an N -person generalization of it.

Again the D-option corresponds to the dominating strategy, the C-option to the common interest strategy. The number of persons choosing option C is depicted on the horizontal axis; the two payoff graphs for each game refer to the outcomes for a player choosing either C or D, given a particular number of C-choices. The correspondence between both graphs and between both graphs and Table 1.1 can be seen by comparing the outcome orderings. On the one hand, the outcome orderings are presented by the matrix cell entries; on the other hand, they are presented by points on the payoff graphs. For example, the payoff graph for choosing D includes always the highest possible payoff

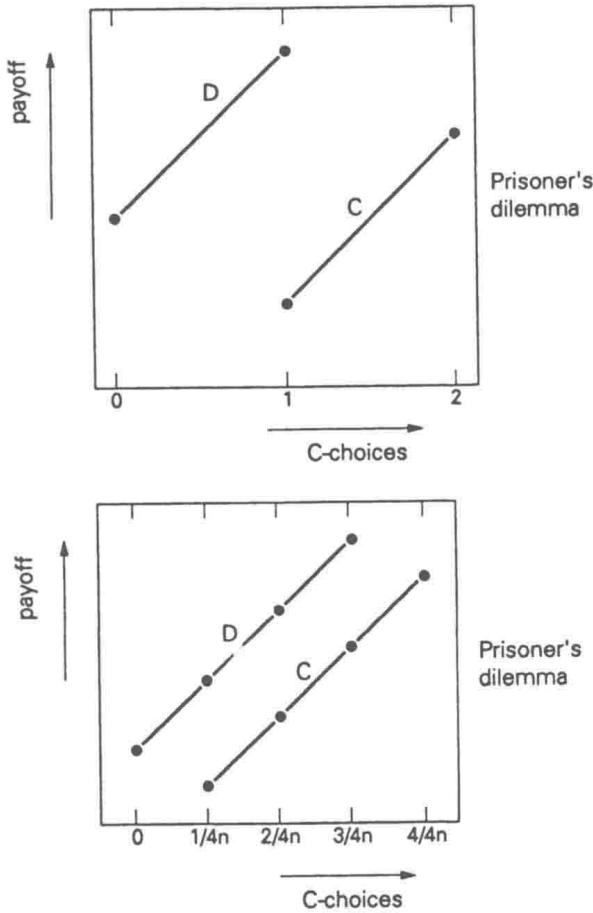


FIG. 1.1

(preference 4, Table 1.1), and lies, for a specific number of C-choices, above the graph for choosing C. However, in case nobody chooses C (left end point), the corresponding payoff for all is less than in case they all had chosen C (right end point of the C-graph is above the left end point of graph D).

An example of the N -person PDG is the decision to pollute. Pollution problems can be found at various levels of decision making, ranging from individuals to nations. For example, at the industrial level, no matter what other chemical industries may do to get rid of their chemical waste, it is cheaper to have the waste dumped at some rubbish-dump, or alternatively, in the ocean, than to take care of an adequate decomposition of the waste. The ultimate long-term consequences of this selfish act have to be shared by all individuals. At the individual level the slogan "every litter bit hurts" nicely reflects the negative consequences accompanying

the decision to pollute (alternative D). Though all individuals would like to avoid the long-term negative consequences, it remains cheaper and simpler for them to keep polluting as anonymous individuals. The payoff graph for polluting lies for its entire length above the graph indicating the payoff for not polluting.

The use of experimental games as a method of research has several advantages. First, it offers the ability to manipulate the nature of the mutual dependency of the players involved in a simple and precise way, merely by altering the entries in the payoff matrix or manipulating the payoff graphs. Second, it allows one to manipulate other factors which might influence decision making in conflict settings such as the characteristics of the other players involved. Third, it offers a clear operationalization of vague concepts like cooperation and competition. Finally, experimental games can be created that contain the basic elements of complex interpersonal and socio-economical problems. They can contain the fundamental structure of social dilemmas. This book provides numerous examples of such games.

At least partly because of the advantages noted above, the 1960s witnessed a veritable flood of experimental gaming studies. More than 1000 studies have been reported using mainly the two-person PDG. Reviews of this work can be found in Wrightsman, O'Connor, and Baker (1972), Pruitt and Kimmel (1977) and Colman (1982). Although the research effort had great potential, reviewers have been critical of the accomplishments.

According to Pruitt and Kimmel (1977), the two most important problems of the two-person experimental game tradition at that time were the lack of a theoretical basis for generating research questions and the low external validity of the abstract decision tasks for the subjects.

On the theory side, we think that the chapters in this book accurately reflect the growing concern of social dilemma researchers with theoretical concerns from diverse areas of psychology. Research issues stem from such diverse areas as interpersonal relations (Kelley & Thibaut, 1978), intergroup relations (Messick & Mackie, 1989; Rabbie, 1982), equity and fairness (Messick & Cook, 1983), and judgment and decision making (Dawes, 1988). The conceptual underpinnings of much social dilemma work are broader and more intertwined with research in other areas and hence less insular than was previously the case.

The lack of external validity still remains a bit problematic, and will probably always be so to the extent that experimental social dilemmas are evaluated as imitations of those that exist in the world outside the laboratory. Measures have been taken, however, to enhance the representativeness of experimental situations. Different experimental dilemmas are patterned more closely on real problems than was previously the case. For instance, Jerdee and Rosen (1974) and others have developed

a class of experimental tasks called resource dilemmas (Messick & Brewer, 1983). These tasks are designed to simulate the shared use of replenishable resources. In resource dilemmas, subjects take resources from a common pool and try to maintain that public good over a series of trials. After each trial the pool replenishes itself at a predetermined rate. Subject's tasks are to use the pool efficiently while trying to do well for themselves individually. The social dilemma structure is reflected by the fact that it is to each person's interest to accumulate as much as possible from the pool, but if each tries to do that the pool will be destroyed.

Another class of games is called public goods games (Messick & Brewer, 1983). These games simulate situations in which members of a group benefit from when a member makes a personally costly act. Others benefit when I join a union or when I pay my taxes. It costs me to do so, but in the long run we are all better off if we all pay the cost and resist the temptation to free-ride on the contributions of others. While public goods games have the same structure as resource dilemmas at a high level of abstraction, the external validity of the research is enhanced to the extent that the experimental paradigm that is used is chosen to mimic as closely as possible the real social dilemma in which the investigator is interested.

Pruitt and Kimmel's (1977) critical review was based mainly on the research addressed to the two-person PDG paradigm, and explicitly was announced to be not a summary of past research, but a diagnosis of a twenty-year tradition. As was implied before, experimental gaming research has addressed the criticism of their approach both in the 1970s as well as in the 1980s. Before we proceed to discuss the theoretical threads running through contemporary work, it seems to be relevant to discuss previous work in experimental gaming.

Literature Review

Formally, social dilemmas are defined by three properties (e.g., Dawes, 1980; Messick & Brewer, 1983; Yamagishi, 1986): (1) a noncooperative choice (option D) is always more profitable to the actor than a cooperative choice (option C), regardless of the choices made by the others; (2) compared to a cooperative choice, a noncooperative choice is always harmful to the others; and (3) the aggregate amount of harm done to others by a noncooperative choice is greater than the profit to the actor himself. The *social* nature of decisions in social dilemmas is obvious because people have influence on each other's welfare. The decision problem or *dilemma* underlying social dilemmas can be explained by two conflicting definitions of rationality (e.g., Kahan, 1974). Individual or egocentric rationality prescribes noncooperation, because this decision leads to individual outcomes which are always higher than those following from a cooperative decision. Collective rationality prescribes cooperation,

because each individual is better off when all people cooperate than when all people do not cooperate. This obtains because the harm done to others by noncooperation is larger than the personal profit to the individual actor.

Social dilemma research has been interesting to social and behavioral scientists for at least two interrelated reasons. First, social dilemma research focuses on the conditions under which people are willing to exercise some personal restraint, or to behave less selfishly. The primary purpose in this regard is to understand selfish and cooperative behaviors, and how these behaviors can be influenced by situational and personality variables. Second, social and behavioral scientists are increasingly aware of the fact that many societal problems are caused, at least in part, by collective selfish behavior. As was noted earlier, the problem of maintaining or providing a clean and healthy environment is caused in part by people's reluctance to give up some of their immediate well-being. So research on social dilemmas may enable scientists to offer recommendations for solutions to such societal problems. While these two objectives usually go hand in hand, most social dilemma research to date has been concerned with basic psychological processes.

The purpose of this section is to review experimental research on cooperation in social dilemmas, and to summarize factors that promote cooperation in social dilemmas. We start, however, with a description of the history of social dilemma research.

The Origins of Social Dilemma Research: Experimental Games

Historically, social dilemma research grew out of game theory which is the abstract analysis of strategic social interdependence. There are two major goals of game theory (Colman, 1982; Rapoport, 1966). The first is to describe and develop experimental games that are of theoretical interest. The second is to find rational solutions to these games. Such solutions are based upon assumptions about people's values or utilities, and upon the logical analysis of the decisions people should make given their values.

One of the first reviews of experimental gaming studies was published by Rapoport and his associates (Rapoport & Orwant, 1962; Rapoport & Chammah, 1965). They review the earliest experiments on experimental games, most of which were concerned with testing formal properties and assumptions underlying game theory as set forth by Von Neumann and Morgenstern (1944) and Luce and Raiffa (1957). This early research disclosed the relevance of some potentially important psychological variables. For instance, it showed that people's values and utilities are strongly dependent upon a variety of variables (cf. Deutsch, 1960). Such findings could not be accounted for exclusively on the basis of game theory (cf. Colman, 1982). That is, although game theory provides insight into the logical analysis of social interdependence and into rationality given