

**Decision-making about the resolution of social dilemmas:  
outcome heterogeneity, individual differences in social values  
and the exercise of power.**

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**Abstract**

*This paper summarizes some social psychological research into the conditions under which solutions to social dilemmas are voluntarily introduced (instrumental cooperation). Consistent with the research of authors such as Knight (1992) and Keohane & Ostrom, (1995), it is assumed that a wide range of inequalities can influence preference for change and that ‘power’ may be exercised over this decision-making process. Several studies have now been conducted and are outlined in this paper. Some directions for future research are suggested and the importance of interdisciplinary work is emphasized.*

**Introduction**

Social dilemmas are situations in which each individual receives a higher payoff by selecting a socially defecting choice (e.g., using all available energy) than by selecting a socially cooperative choice, but all individuals are better off if all cooperate than if all defect (Dawes, 1980). The conditions under which individuals voluntarily cooperate for the introduction of institutional change to resolve such situations (termed “instrumental cooperation” by Yamagishi, 1986a) have been of great interest to social psychologists and studied in both public goods and “take-some” situations. (See for example, the work of Sato, 1987; Yamagishi, 1986b; Yamagishi, 1988a; Rutte et al., 1987; Messick, Wilke, Brewer, Kramer, Zemke, & Lui, 1983; Rutte & Wilke, 1984; Rutte & Wilke, 1985; Samuelson, Messick, Rutte & Wilke, 1984; Samuelson & Messick, 1986a; Samuelson & Messick, 1986b; and Samuelson, 1993.) The aim of the current paper is to provide a summary of some recent research in this field that has investigated how (as argued by authors such as Knight, 1992; Keohane & Ostrom, 1995) social institutions and change to those arrangements have distributional consequences and how heterogeneity can affect preference for institutional change and may be constrained by power processes.<sup>1</sup>

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<sup>1</sup> Note that in contrast to Keohane and Ostrom (1995) and colleagues’ definition of heterogeneity in terms of differences in preferences, goals, capabilities, and information and beliefs of people with access to common pool resources, these studies only used a definition of heterogeneity as inequalities in various types of outcomes and examined the reactions of individuals with different preferences and goals to those inequalities.

## Background

Initially, social psychological research in this field was concerned with the prediction of an individual's choice between an in situ (status quo) 'structure', characterised by a social dilemma incentive structure, and one or more 'alternative structures' (Webb, 1995). In all of the empirical studies, with the exception of Sato (1987), the status quo structure was represented as a situation characterised by a social dilemma incentive structure, where there was either no sanctioning system or all actors had free access to the shared resource. The alternative structures, on the other hand, were more varied and included: the introduction of various types of sanctioning systems (Sato, 1987; Yamagishi, 1986b; Yamagishi, 1988a); the appointment of a leader to make allocation decisions (Rutte et al., 1987; Messick et al., 1983; Rutte & Wilke, 1984; Rutte & Wilke, 1985; Samuelson, Messick, Rutte & Wilke, 1984; Samuelson & Messick, 1986a; Samuelson & Messick, 1986b; Samuelson, 1993); the creation of large majority, unanimity and small majority decision structures (Rutte & Wilke, 1985); the introduction of equal or proportional territorialization of resources (Samuelson & Messick, 1986a; Samuelson & Messick, 1986b; Samuelson, 1993); and the introduction of a harvest cap option or restriction upon individual harvest size per trial (Samuelson, 1993).

Typically, it was assumed that these alternatives represented "solutions" to a social dilemma either because they represented a change to the incentive structure to make cooperation more attractive or they eliminated interdependence among individuals with access to the shared resource (Foddy & Crettenden, 1994; Samuelson & Messick, 1986a).<sup>2</sup> Arguably, such structures also satisfied Ostrom's (1990) definition of an institution as:

....the sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided and what payoffs will be assigned to individuals dependent on their actions. (p.51)

### ***Heterogeneity of Outcomes and Instrumental Cooperation***

Where social psychological studies have investigated the conditions of instrumental cooperation, the representation of heterogeneous outcomes has tended to be restricted to the manipulation of inequalities in access to shared resources. (See for example, Marwell & Ames, 1979, 1980; McGuinness, 1986; Murningham, King & Schoumaker, 1990; Samuelson & Messick, 1986b; Van Dijk & Wilke, 1993; Van Dijk & Wilke, 1995; Wade-Benzoni, Tenbrunsel, & Bazerman, 1996.) These investigations offer a wealth of findings and important observations about institutional change decision-making for the resolution of social dilemmas. For example, Yamagishi (1986b; 1988a; 1988b) provided evidence regarding how there are feedback loops between different levels of cooperation and how people's perceptions and expectations affect structural arrangements but in turn, structural arrangements impact on such psychological factors. Likewise, Samuelson and Messick (1986b) contributed quite specific predictions and research findings regarding how access inequalities affect preference for particular forms of institutional change and Sato (1987) reported how the decisions of participants may depend on the group outcome that is experienced.

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<sup>2</sup> It is only in recent times that researchers have begun to question such assumptions (see for example, Beckenkamp & Ostrmann, 1999; Foddy & Hogg, 1999; and Van Vugt & De Cremer, 1999).

The issue of whether self-interest motivates preference for a particular distribution of outcomes, or the judgements that are made about the fairness of those distributions, has also been a central issue in this area of research. (For a useful review of this literature see Wade-Benzoni et al., 1996. Also see related research into distributive justice: e.g., Allison & Messick, 1990; Allison, McQueen & Schaerfl, 1992; Cook & Hegtvedt, 1983; Deutsch, 1975; and Van Dijk & Wilke, 1993, 1995 and 1996.)

Despite earlier calls by authors such as Cook and Hegtvedt (1986) to explore links between power and fairness judgements, it is, however, only more recently that researchers have begun to consider how feedback loops may exist between heterogeneous outcomes, structural change preferences, higher-order decisions, the form of status quo structures and subsequent experiences of institutional arrangements. (See for example, Wade-Benzoni et al., 1996; Webb, 1999; Webb & Foddy, unpublished.)

Researchers have also begun to investigate the ways in which individual differences in variables such as social values (i.e., consistent preferences for a particular distribution of outcomes to self and others, McClintock, 1978) may subjectively transform the meaning of institutional arrangements and thereby affect preferences and decisions regarding institutional change (e.g., Samuelson, 1993; Samuelson & Messick, 1995; Webb, 1995; Webb & Foddy, unpublished).

The aim of the current paper is to report on a research program that has addressed some of these issues and is based on an approach (Webb, 1995, 1999) that was developed in parallel to that of Knight (1992) and Keohane & Ostrom (1995).<sup>3</sup> Webb (1995, 1999) called for social psychological research in this field to recognize and to investigate how:

1. Under different types of institutional arrangements, it is possible to experience various outcome inequalities (e.g., in terms of fines, bonuses, access to shared resources and even influence over the decision-making process) and that there are numerous possible reference points for comparing distributed outcomes.
2. Such heterogeneity under both status quo and alternative structural arrangements could affect preferences and/or decision-making regarding alteration of dilemma structures.
3. Each combination of status quo and alternative structure may provide a specific context or frame of reference for each decision-maker and individuals may be moved through a network of outcomes, with or without their consent.
4. The different weights that people place on outcomes for self and others (social value orientation) may subjectively transform the meaning of those specific outcomes and hence preferences and decisions regarding institutional change.
5. Individuals may not necessarily always have the same experience or the same preference for institutional change as the majority of others in their group.
6. Institutional arrangements may be chosen not because they remedy social dilemmas, restore equality, or preserve the resource, but because they reproduce, maintain or further inequalities which are in the interests of certain members of the community.

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<sup>3</sup> The author welcomes feedback about similarities and differences between these approaches.

7. In addition, as per the conceptualisations of power offered by authors such as Bachrach and Baratz, (1962, 1970), Kelley (1984) and Heckathorn (1990), it was recognized that higher-order power processes might serve to perpetuate inequalities previously created by means of institutional change decision-making.

Details now follow of some empirical work that has since been conducted into some of these processes at La Trobe and Deakin Universities in Australia<sup>4</sup>. In all of these studies participants were asked, via computer, to make harvesting decisions from a simulated common resource (plantation of trees) in what is known as a replenishable resource testing paradigm (see Parker, Lui, Messick, Messick, Brewer, Kramer, Samuelson & Wilke, 1983, for a description of this type of task). This testing paradigm requires participants to make a series of decisions about harvesting from the shared resource over several trials and, in contrast to the situation where participants repeatedly play uniform games, represents a situation in which the consequences of a choice are distributed through time (Messick & Brewer, 1983). In all of the reported studies, participants were only asked their preferences for change after they had made these harvesting decisions and experienced rapid overuse of the shared resource and the collapse of the shared resource.<sup>5</sup> Where social value orientation was assessed, this was done via computer prior to completion of the replenishable resource paradigm. The two social value classifications utilized in these studies were: cooperator (ie., those found to consistently place greatest weight on maximizing joint gain) and proself (ie., individualists who consistently place greatest weight on maximizing their own individual gain or competitors who consistently place greatest weight on maximizing relative gain).

#### Research into the effect of heterogeneity on preferences regarding institutional change

##### ***1. The impact of inequalities in access and fines on harvesting and preference for institutional change***

Given our reasoning regarding the role of heterogeneous outcomes in institutional change decision-making, we strongly rejected Sato's (1987) apparent assumption that the experience of the individual corresponds to the experience of the group. This dissatisfaction prompted an initial, exploratory study (reported by Webb, 1995) into the effect of heterogeneous outcomes on willingness to introduce different types of sanctioning systems.

In Sato's study, participants were assigned to either an "equality" or "punishment" rule system (for distributing the costs of running a shared resource) and, after making harvesting decisions, were asked if they wanted to keep their existing system or to introduce the alternative system. Sato's main prediction was that the "equality-rule" system was a "deficient structure" (one that encouraged defection) and hypothesized that people who had experienced "poor group performance" (apparently equated with worse, suboptimal levels of profit) in this "deficient" structure would realise the need for a sanctioning system and, when given the opportunity, would be more willing to implement a sanctioning system than those who did not have such an experience. Consistent with these expectations, the equality-rule was found to result in greater premature harvesting

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<sup>4</sup> The first two reported studies were conducted as part of the author's doctoral dissertation under the supervision of Dr. M. Foddy at La Trobe University.

<sup>5</sup> At the time of developing these studies, it was not considered important for all of the 'structural' change options presented to satisfy Ostrom's (1990) definition of an institution. The reader is cautioned that some of the alternatives offered (eg., type of subsidy system) may not do so.

than the alternative “punishment-rule” and the number of voters in the equality-rule condition who voted for adoption of the punishment-rule was greater than the number of voters in the punishment-rule condition who voted for the equality-rule.

In our view, there needed to be some exploratory research into the extent to which having structural change alternatives (equality rule and punishment rule) had different implications for different individuals and whether these individual-level outcomes had any effect on voting for change.

Sato’s study was useful here and had a number of features that were consistent with our framework (see Webb, 1995 for further details). While her two fining systems led to two very different types of group experiences (unequal and equal distribution of costs), at another level (ie. of the individual) Sato’s equality rule and punishment rule also seemed to represent very different allocations of fine. Under the punishment rule, depending on his/her harvesting behavior, an individual group member received either 100% of the fine distributed in the group if they took the largest number of trees, or none of the fine. In contrast, if the individual was assigned to the equality rule condition, s/he received 25% of the fine that was distributed to the group as a whole. It was also apparent that any change to the number of group members could have resulted in very different allocations (*percentage share* of a variable distributed in the group).

In short, it did not seem to be the case that all equality and punishment rules (or, for that matter, forms of leadership or territorialisation of shared resources) would necessarily create the same experience for different group members. Moreover, when combined as different status quo and alternative ‘structures’, it seemed possible that these different forms of equality and punishment rules could result in even more varied experiences for decision-makers and there seemed to be numerous different types of experiences that could result for individual group members within those different group level decision-contexts, especially when one allowed for the distribution of more than one variable (eg., costs; level of resource access; influence over the political system).

This first exploratory study therefore attempted to identify the different types of group and individual experiences and decision-contexts that were actually created when the type of fining system (equality rule; punishment rule) and the distribution of access to shared resources (unequal; equal) were manipulated. Using a free-running testing environment where the harvesting of individuals really did affect the common pool, the more specific aims of this study were as follows:

1. To identify the ‘positioning’, within structural arrangements, of group members with different levels of access to the shared resource. It was of particular interest to identify which group member took the most resources and incurred a fine when there was an unequal distribution of fines that was contingent on harvesting behavior.
2. To identify the aggregate effect of harvesting behavior on the group outcome (number of resources left in the shared resource).
3. To explore the impact of individual group members’ ‘positions’ and decision-contexts on their preference for a particular fining system.

It was hoped that the various interests of different group members in institutional decision-making could be disambiguated in this study. It was also of particular interest to explore whether the maximisation of self-interest by different group members might, in aggregate,

appear to be a rejection of a fining system with a “poor group outcome”, as in Sato’s (1987) study.

When only the group’s experience of a structure was considered, the results of the study were as predicted and similar to those obtained by Sato (1987). That is, there was a worse group outcome and greater willingness to vote for the alternative fining system among groups that initially experienced the equality rule, than among groups that initially experienced the punishment rule. Furthermore, these effects did not depend on whether access was distributed equally or unequally within the group.

However, when the experiences of individual group members were considered, a more complex picture emerged. Little evidence was provided for the idea that actors attended to the group outcome when voting for structural change and the results suggested the importance of controlling for social value orientation. The importance of assessing participants’ beliefs regarding the implications of different structures for self; of identifying the numerous possible reference points for making outcome comparisons; and the difficulty of making the implications of different fining systems unambiguous were also noted.

## ***2. The Effect of Social Values and Level of Resource Access on Preference for Institutional Change and the Exercise of Power***

Controlling for social value classification and level of access to the shared resource, the next study aimed to force these different groups of participants to choose between structural alternatives that pitted the maximization of self-interest against the maximization of other goals. Such a contrast seemed to be absent in prior research. In addition, this study represented the first social psychological study in the field of social dilemmas to investigate how social values and inequalities in resource access affect higher-order decisions to limit the institutional change options available to others. (For details see Webb, 1995; and Webb & Foddy, unpublished.)

The study used a 2 (social values: cooperators; proselves) X 2 (access: high; low) X 2 (feedback about preferences of others: same as self; different to self) factorial design and presented participants with three different types of institutional change, representing different distributions of subsidies to compensate for the cost of selling trees.

Making the assumption that actors would maximise profit for self, no difference was expected between participants with high and low resource access in their preference for the three types of subsidies. Similarly, no difference in preference for the alternatives was expected between participants with different social value classifications. It was, however, predicted that the type of feedback received about the preferences of other group members would affect willingness to exercise power over others’ choices.

The results of the study revealed that approximately two-thirds of participants were actually willing to restrict others’ choice about the form of institutional change. In addition, preference for the three alternative subsidies was found to be influenced by a person’s position in the status quo structure, relative to their position under alternative structures. That is, when the implications of a given structural change were divergent for individuals with different levels of access to the shared resource, their preferences also diverged.

Nevertheless, consistent with research by Samuelson (1993) and Samuelson and Messick (1995), social values were still found to play a role in structural change decision-making.

That is, cooperators and non-cooperators who were assigned high access to the shared resource were found to have different preferences for the offered alternatives. This suggested the importance of adopting the assumption that individuals subjectively transform the meaning of outcomes and, depending on their social value orientation, maximize different goals.

Interestingly, however, cooperators (allocated high access to shared resources) did not prefer to compensate those with low access for their level of access. Instead, they preferred a form of structural change that equally distributed bonuses across the group but also gave self more profit than others. There are various possible explanations for this finding (see Webb & Foddy, unpublished). However, even though this finding seemed to be consistent with the maximisation of joint interests (and thus, a cooperative social value orientation) it still seemed to beg the question of the exact form of “fairness” that cooperators introduce when making structural change decisions.

It was also unknown whether participants’ level of decision-making or voting influence had affected the obtained results. In this study, all individuals were placed in the situation where, even though they had power over the choice of structures that would be presented to others, they did not actually get to vote for a structural alternative. It seems possible that level of voting influence affected the results, especially in view of written explanations ratings of the fairness of others (but not self) being able to vote. In the absence of prior research, the effect of decision-making influence at time  $t$  on instrumental decision-making at time  $t + 1$  remained an empirical question.

### ***3. Further Investigations***

Against this background, two additional studies have been conducted. The first of these investigations aimed to provide a more direct assessment of the willingness of high and low access participants, with different social values, to restore equality between group members.<sup>6</sup> The results of this study are still being analyzed.

Another investigation<sup>7</sup> aimed to explore how inequalities in decision-making influence affect the structural change preferences of individuals with different social values for inequitable alternatives that resolve social dilemmas. In this study, individuals with different social values were given the experience of having either less (none), more or the same level of decision-making influence as others and were asked to indicate their preference to divide the shared resource in a way that either resulted in more, less or the same outcomes for self as fellow group members.<sup>8</sup>

That individuals with a proself classification (competitors and individualists) might be especially sensitive to changes in the state of the common, resource pool had been previously suggested by Roch and Samuelson (1997). However, these results only applied to (elementary) cooperation in the original social dilemma situation. Previous research findings suggested that quite a different direction of results might be obtained for instrumental cooperation, given that the effect of variables is often reversed with such decision-making. (See for example Yamagishi, 1986b; 1988a; 1988b).

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<sup>6</sup> This study was funded by an Australian Research Council (Small) Grant.

<sup>7</sup> This study was funded by a Deakin University, Faculty of Health and Behavioural Sciences research grant.

<sup>8</sup> The results of this study are being related to research into people’s preference for (and effectiveness of) different types of leadership and their reactions to authority (e.g., Foddy & Hogg, 1999; Martin & Sell, 1986; Van Vugt & De Cremer, 1999).

Non-cooperators and cooperators were therefore expected to have different levels of preference for different types of solutions. However, these differences were expected to depend on the level of decision-making influence previously held. More specifically, it was expected that cooperators (not non-cooperators as proposed by Roch & Samuelson, 1997) would be more sensitive to violations of an equality rule than those with a proself categorisation. Non-cooperators, who by definition place greatest weight on gain for self, were expected to always indicate greater preference for an alternative that maximized profit for self. In contrast, cooperators, who have been found to place greater weight on “fairness” than non-cooperators (Samuelson, 1993), were expected to attend to any prior experience of inequality when indicating their preferences. That is, only among cooperators, was it expected that preference for type of solution to the social dilemma would depend on the level of disadvantage or advantage (in the distribution of decision-making influence) that they had previously experienced within the group under the status quo arrangement.

Consistent with previous research by Samuelson (1993), the results of this study indicated the majority of participants preferred to equally divide the shared resource. However, social value orientation was not found to affect this preference. Nevertheless, degree of preference for dividing the shared resource to the decision-maker’s own advantage and preference for obtaining equality in final outcomes was found to depend on social value classification (c.f., Van Dijk & Wilke, 1995).

These findings suggest that it might be worthwhile to repeat this study allowing participants to only select from alternatives that represent inequitable (rather than equitable) outcome distributions. In other words, there is now an opportunity to explore how individuals, with different social values, respond to inequalities in decision-making influence when they cannot have their most preferred option of equally dividing the shared resource.

#### Some Directions for Future Research

The above research findings offer some limited evidence that inequalities in outcomes can affect preferences and decisions about institutional change. Moreover, consistent with previous research by Samuelson (1993), they suggest the important role of individual differences in variables such as social value orientation. It is also evident that people are actually willing to exercise power over the choice of institutional change alternatives presented to others.

The investigation of a much greater range and combination of outcome inequalities does, however, still await investigation and there is an opportunity to further explore the beliefs of group members regarding heterogeneous outcomes.<sup>9</sup> Moreover, it is evident (e.g., in the study manipulating decision-making influence) that there are circumstances where heterogeneity of outcomes does *not* seem to result in a difference in preferences between groups.

In the reported work, there are numerous possible explanations for these inconsistencies. Not the least, is the particular reference point that was utilized by participants. Obviously, as argued by there is a range of different reference points that may be used for comparing

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<sup>9</sup> Here, the theoretical approach of Samuelson (1993) and Samuelson and Messick (1995) offers an important avenue for future research. This approach proposes that decision-makers engage in an evaluation process that involves the perceived position of various “allocation structures” on a number of different dimensions, as well as the relative importance that an individual attaches to these dimensions.

distributed outcomes and the role of these reference points awaits further investigation. Van den Bos, Wilke, Lind and Vermunt (1998) also note that the basis for these comparisons may vary. Thus, for example, the extent to which individuals will actually compare inequalities across different variables (e.g., decision-making influence and access to the shared resource) awaits further investigation.

The role of time in such comparisons could also be explored. Indeed, as recognized by Ostrom (1990) and Samuelson and Messick (1995), individuals may make a succession of structural change choices or only a single choice between two structures. Hence, consistent with Kelly's (1984) framework, there may be a network of outcomes through which individuals may be moved (Webb, 1995; 1999).

Of course it also remains possible that, as assumed in the above research, the particular "context" of decision-making is determining whether or not heterogeneity in outcomes results in differences in preferences for particular forms of institutional change. Is it the case, for example, that it is only when institutional change serves to maximize both individual interests as well as those of the majority, that differences in institutional change preferences or decision-making do not emerge? Likewise, is it the case that the preferences of individuals with different social value orientations only emerge in certain contexts of decision-making? (For example, when they cannot have their most preferred equality rule.) In short, there seems to be a theoretical challenge to specify more exactly when it might be the case that differences in institutional change preferences and decision-making might emerge and to try to test these ideas in both the field and the laboratory. The difficulty of systematically altering the presentation of institutional change alternatives that serve to maximize different goals for different individuals (e.g., with different social value classifications) must, however, be acknowledged.

Existing research in social psychology (e.g., Van Lange's, 1999, framework for understanding differences among prosocial and proself social value orientations) may help to answer some of the above questions. Other research such as the large body of work in (distributive and procedural) justice and leadership literature (e.g., Azzi & Jost, 1997; Foddy & Hogg, 1999; Platow, Reid & Andrew, 1998; Tyler & DeGoey, 1995; Van Dijk & Wilke, 1995; and Van Vugt & De Cremer, 1999) may also usefully extend our understanding of the conditions of instrumental cooperation.

Reference to the research that occurs in political science and economics will also greatly improve our understanding. Hausken & Plumper (1999), for example, refer to the conclusions of two conferences held in 1992 and 1993 into the impact of heterogeneity on international cooperation and the provision and maintenance of public goods. They also discuss how divergent results have been found regarding the impact of heterogeneity on cooperation and specify the conditions under which actor heterogeneity may have positive effects on the likelihood that international goods will be provided. Similarly, Edwards & Steins (1998) discuss the role of "context" in Common Pool Resource research and Keohane & Ostrom (1995) and colleagues discuss at length the role of heterogeneity on institutional change. Clearly, this is a rich pool of research, from which social psychologists might learn.

## References

- Allison, S. T., McQueen, L. R. & Schaerfl, L. M. (1992). Social decision making processes and the equal partitionment of shared resources. *Journal of Experimental Social Psychology*, 28, 23–42.
- Allison, S. T. & Messick, D. M. (1990). Social decision heuristics in the use of shared resources. *Journal of Behavioral Decision Making*, 3, 195–204.
- Bachrach, P., & Baratz, M. (1962). Two faces of power. *American Political Science Review*, 56, 947-952.
- Bachrach, P., & Baratz, M. S. (1970). *Power and Poverty. Theory and Practice.* New York: Oxford University Press.
- Beckenkamp, M. & Ostmann, A. (1999). Missing the Target? Sanctioning as an Ambiguous Structural Solution. In M. Foddy, M. Smithson, S. Schneider, & M. Hogg (Eds.), *Resolving Social Dilemmas. Dynamic, Structural and Intergroup Aspects.* Philadelphia, PA.: Psychology Press.
- Cook, K. S. & Hegtvedt, K. A. (1983). Distributive justice, equity and equality. *Annual Review of Sociology*, 9, 217-241.
- Cook, K. S. & Hegtvedt, K. A. (1986). Justice and power. An exchange analysis. In H. W. Bierhoff, R. L. Cohen, & J. Greenberg (Eds.), *Justice in Social Relations*, New York: Plenum Press.
- Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology*, 31, 169–193.
- Deutsch, M. (1975). Equity, equality, and need: what determines which value will be used as the basis of distributive justice? *Journal of Social Issues*, 31(3), 137-149.
- Edwards, V. M., & Steins, N. A. (1998). The Role of Contextual Factors in Common Pool Resource Analysis. Conference paper presented at the *seventh annual conference of the International Association for the Study of Common Property*, Vancouver, British Columbia, Canada, June 10-14, 1998.
- Foddy, M., & Crettenden, A. (1994). Leadership and group identity as determinants of resource consumption in a social dilemma. In U. Schulz, W. Albers and U. Mueller (Eds.), *Social Dilemmas and Cooperation* (pp. 207–232). Berlin:Springer-Verlag.
- Foddy, M., & Hogg, M. (1999). Impact of leaders on resource consumption in social dilemmas: The intergroup context. In M. Foddy, M. Smithson, S. Schneider, & M. Hogg (Eds.), *Resolving Social Dilemmas. Dynamic, Structural and Intergroup Aspects.* Philadelphia, PA.: Psychology Press.

- Hauskin, K., & Plumper, T. (1999). The impact of actor heterogeneity on the provision of international public goods. *International Interactions*, 25(1), 61-94.
- Heckathorn, D. D. (1990). Collective sanctions and compliance norms: a formal theory of group-mediated social control. *American Sociological Review*, 55, 366-384.
- Kelley, H. H. (1984). The theoretical description of interdependence by means of transition lists. *Journal of Personality and Social Psychology*, 47(5), 956-982.
- Keohane, R. O., & Ostrom, E. (1995). Introduction. In R. O. Keohane and E. Ostrom (Eds.), *Local Commons and Global Interdependence. Heterogeneity and Cooperation in Two Domains*. (pp. 1-26). London: Sage.
- Knight, J. (1992). *Institutions and Social Conflict*. New York: Cambridge University Press.
- Martin, M. W., & Sell, J. (1986). Rejection of authority: the importance of type of distribution rule and extent of benefit. *Social Science Quarterly*, 67(4), 855-868.
- Marwell, G. & Ames, R. E. (1979). Experiments on the provision of public goods. I. Resources, interest, group size, and the free-rider problem. *Australian Journal of Sociology*, 84(6), 1335-1360.
- Marwell, G. & Ames, R. E. (1980). Experiments on the provision of public goods. II. Provision points, stakes, experience, and the free-rider problem. *Australian Journal of Sociology*, 85(4), 926-937.
- McClintock, C. G. (1978). Social values: Their definition, measurement and development. *Journal of Research and Development in Education*, 12(1), 121-137.
- McGuinness, J. (1986). *Inequality of access and the consumption of a regenerating resource*. Unpublished Honour's thesis, La Trobe University, Bundoora, Australia.
- Messick, D. M. & Brewer, M. B. (1983). Solving social dilemmas a review. In L. Wheeler & P. Shaver (Eds.), *Review of Personality and Social Psychology*. (pp. 11-44). Beverly Hills: Sage Publications.
- Messick, D. M., Wilke, H., Brewer, M. B., Kramer, R. M. Zemke, P. E., & Lui, L. (1983). Individual adaptations and structural change as solutions to social dilemmas. *Journal of Personality and Social Psychology*, 44(2), 294-309.
- Murnighan, J. K., King, T. R., & Schoumaker, F. (1990). The dynamics of cooperation in asymmetric dilemmas. *Advances in Group Processes*, 7, 179-202.
- Olekalns, M., & Smith, P.L. (1999). Social value orientations and strategy choices in competitive negotiations. *Personality and Social Psychology Bulletin*, 25(6), 657-668.
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, New York: Cambridge University Press.

- Parker, R., Lui, L., Messick, C., Messick, D., Brewer, M. B., Kramer, R., Samuelson, C., & Wilke, H. (1983). A computer laboratory for studying resource dilemmas. *Behavioral Science*, 28, 298–304.
- Platow, M., Reid, S., & Andrew, S. (1998). Leadership endorsement: The role of distributive and procedural behaviour in interpersonal and intergroup contexts. *Group Processes & Intergroup Relations*, 1(1), 91-103.
- Roch, S. G. & Samuelson, C. D. (1997). Effects of environmental uncertainty and social value orientation in resource dilemmas. *Organizational Behavior and Human Decision Processes*, 70(3), 221-235.
- Rutte, C. G., & Wilke, H. A. M. (1984). Social dilemmas and leadership. *European Journal of Social Psychology*, 14, 105–121.
- Rutte, C. G., & Wilke, H. A. M. (1985). Preference for decision structures in a social dilemma situation, *European Journal of Social Psychology*, 15, 367-370.
- Rutte, C. G., Wilke, H. A. M. & Messick, D. M. (1987). The effects of framing social dilemmas as give-some or take-some games. *British Journal of Social Psychology*, 26, 103-108.
- Samuelson, C. D. (1993). A multiattribute evaluation approach to structural change in resource dilemmas. *Organizational Behavior and Human Decision Processes*, 55, 298–324.
- Samuelson, C. D., & Messick, D. M. (1986a). Alternative structural solutions to resource dilemmas. *Organizational Behavior and Human Decision Processes*, 37, 139-155.
- Samuelson, C. D., & Messick, D. M. (1986b). Inequities in access to and use of shared resources in social dilemmas. *Journal of Personality and Social Psychology*, 51(5), 960-967.
- Samuelson, C. D., & Messick, D. M. (1995). When do people want to change the rules for allocating shared resources? In D. A. Schroeder (Ed.), *Social Dilemmas: Perspectives on Individuals and Groups* (pp. 143–162). Westport, Connecticut: Praeger.
- Samuelson, C. D., Messick, D.M., Rutte, C.G., & Wilke, H. (1984). Individual and structural solutions to resource dilemmas in two cultures. *Journal of Personality and Social Psychology*, 47 (1), 94-104.
- Sato, K. (1987). Distribution of the cost of maintaining common resources, *Journal of Experimental Social Psychology*, 23, 19-31.
- Tyler, T. R., & Degoey, P. (1995). Collective restraint in social dilemmas: Procedural justice and social identification effects on support for authorities. *Journal of Personality and Social Psychology*, 69(3), 482-497.

- Van den Bos, K., Wilke, H.A.M., Lind, E.A., & Vermunt, R. (1998). Evaluating outcomes by means of the fair process effect: evidence for different processes in fairness and satisfaction judgments. *Journal of Personality and Social Psychology*, 74(6), 1493-1503.
- Van Dijk, E., & Wilke, H. (1993). Differential interests, equity, and public good provision. *Journal of Experimental Social Psychology*, 29, 1-16.
- Van Dijk, E., & Wilke, H. (1995). Coordination rules in asymmetric social dilemmas: a comparison between public good dilemmas and resource dilemmas. *Journal of Experimental Social Psychology*, 31, 1-27.
- Van Dijk, E., & Wilke, H. (1996). Tacit coordination and fairness judgments in social dilemmas. In W. Liebrand & D. M. Messick (Eds.), *Frontiers in Social Dilemmas Research*. New York: Springer.
- Van Lange, P. A. M. (1999). The pursuit of joint outcomes and equality in outcomes: An integrative model of social value orientation. *Journal of Personality and Social Psychology*, 77 (2), 337-349.
- Van Vugt, M., & De Cremer, D. (1999). Leadership in social dilemmas: The effects of group identification on collective actions to provide public goods. *Journal of Personality and Social Psychology*, 76(4), 587-599.
- Wade-Benzoni, K. A., Tenbrunsel, A. E., & Bazerman, M. H. (1996). Egocentric interpretations of fairness in asymmetric, environmental social dilemmas: explaining harvesting behaviour and the role of communication. *Organizational Behavior and Human Decision Processes*, 67(2), 111-126.
- Webb, J. (1995). *A Theory of Allocation Processes in Social Dilemmas: Structural Change Preferences, The Exercise of Power and The Maximisation of Self-interest*. Unpublished Ph.D. thesis, La Trobe University, Bundoora, Australia.
- Webb, J. (1999). Decision-contexts for structural change in social dilemmas: A preliminary framework. In M. Foddy, M. Smithson, S. Schneider, & M. Hogg (Eds.), *Resolving Social Dilemmas. Dynamic, Structural and Intergroup Aspects*. Philadelphia, PA.: Psychology Press.
- Webb, J., & Foddy, M. Heterogeneous outcomes and social dilemmas: The effect of access inequalities and social values on the exercise of power. *Unpublished manuscript under review*.
- Yamagishi, T. (1986a). The structural goal/expectation theory of cooperation in social dilemmas. In E. J. Lawler (Ed.), *Advances in Group Processes* (Vol 3, pp. 51-87). Greenwich, Connecticut.: JAI Press Inc.

- Yamagishi, T. (1986b). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology*, 51(1), 110-116.
- Yamagishi, T. (1988a). Seriousness of social dilemmas and the provision of a sanctioning system. *Social Psychology Quarterly*, 51(1), 32-42.
- Yamagishi, T. (1988b). The provision of a sanctioning system in the United States and Japan. *Social Psychology Quarterly*, 51(3), 265-271.