Preventing Deterioration in International Cooperation For Global Justice

Paper to be presented at the Canadian Political Science Association, workshop 'Non-Ideal and Institutional Theory'.

Holly Lawford-Smith
RSSS Philosophy, Australian National University
holly@coombs.anu.edu.au

1.0 Introduction

Today we face immense global problems, from climate change, deforestation, and fisheries depletion, through loss of biodiversity, and ecosystem losses. There is much talk about international cooperation solving these problems, but little is known about the problems likely to confront such a large-scale endeavor. Although groups of states often cooperate among themselves (e.g. the European Union), empirical data on cooperation between all or most countries is reasonably limited. The idea behind this paper is that we would be better equipped to deal with the challenges of securing and sustaining large-scale cooperation between states, especially in providing global public goods, if we had some idea of what to expect; and we might come to have some idea of what to expect by way of experimental evidence about cooperation between other kinds of agents.

Public goods are characterized by being non-excludable, which means that once provided they are available to everyone.[1] Because the good is non-excludable, there will be a temptation for those potentially responsible for providing it to free-ride on the contributions of others. It may be in the interests of a group to have the good, but not in the interests of a given member of the group to pay the costs of providing it if there is a way she can avoid doing so. Public goods experiments in experimental economics and other disciplines[2] have been explicitly designed to investigate people's behaviour in contexts where their (at least short-term) individuals interests conflict with the interests of a group to which they belong (Henrich et al., 2005).

The experiments have tested the effects of a huge variety of conditions on cooperation between individuals when it comes to public goods provision. The conditions vary across cooperative partners (random interactions, interactions only with strangers, interactions with neighbours or known partners), ability to communicate (a single message at the beginning of a series of interactions, communication throughout a series of interactions, no communication at all), anonymity (whether group members are seen or known to each other, whether group members are seen or known to the experimenter), transparency (whether individual contributions are known by each other or the experimenter, or whether totals only for group contributions are known), punishment (whether there is any means of reacting against non-cooperative players other than defecting in turn, such as disesteem, financial sanctions, exclusion from play), voluntary interaction (whether players can choose

1 As James Gardener and his colleagues point out, it is not that it must be *impossible* to exclude people from using them once they have been provided, but it must be that it is at least very difficult (Gardener et al., 1990, p. 335).

2 Experimental economists and experimental biologists, sociologists and psychologists have all been concerned to answer the question of how cooperation is possible, focusing in their experiments and research on the kinds of strategies that lead to the dominance of cooperators in a population, or the kinds of situations in which people are likely to behave 'selfishly' or 'altruistically'. The topics they deal in are similar, but it seems that experimental economics is more concerned to test the theoretical economic hypothesis of rational self-interest, while experimental biologists are more concerned to show how and why cooperative behaviour evolved and has become to entrenched, i.e. to say what kind of adaptive advantage it confers. In this paper I will for the most part discuss the experimental economists' results, but at several points, especially when it comes to considering mechanisms shown to improve cooperation, I shall refer to the results of some of the biological experiments. For example, the section on exclusion / assortation is drawn from the biological literature.

who they interact with), learning (by trial and error, by imitation of successful strategies), and repetition (whether games were one-shot or repeated, and if repeated whether for a known or an unknown duration). Often experiments are run on small groups in the laboratory, but sometimes they are run in the field, with groups of various sizes. Public goods experiments have been conducted between and across cultures, often with surprising results.

In short, this work in experimental economics and elsewhere constitutes a vast empirical resource containing valuable information about the conditions under which cooperation between members of groups of varying sizes is likely to be more and less successful. Because so many parameters have been tested, we are able to get a fairly good handle on what features of an environment are conducive to cooperation, and which are not. We are also able to explain how cooperation is possible, given the intuitive conflict between individual self-interest and the greater good of the group. All of this is a fantastic resource in beginning to talk about large-scale cooperation, because after all, states are just large groups, and much of the literature tells us what to expect when groups of different kinds endeavor to produce public goods. All of this might be an even more fantastic resource from which to draw lessons about the conditions under which international cooperation is likely to succeed, and the conditions, to be avoided, under which it is likely to fail, if taking the games as modeling collective agents can be justified. The experiments tell us something about what to expect from individuals in group contexts, but do they also tell us something about what to expect from *groups* in *supergroup* contexts? Can they give us any information about how the group of all states might behave if it tries to produce a global public good?

As a matter of fact, some have simply assumed that it is permissible to generalize from the experiments in that way, recently and notably the team lead by Nicholas Stern in their independent report on climate change (2009, esp. Part VI),[3] but also Charles Kindleberger in his (1973) argument that a hegemon is necessary in securing the global public good of international monetary stability, Lisa Martin in her (1994) discussion of international issue-linkage, and probably others that I am unaware of. But of course, the assumption that the behaviour of individual subjects playing public goods games for money in the laboratory simply generalizes to similar behaviour when states come together to negotiate public goods provision is far from uncontroversial.

Resolving that controversy is more than I can do in this paper, given constraints on space and my wish to focus on what we can learn from the experiments, but it would hardly do to say nothing on the issue. Thus in the next section I will briefly present a few different ways we might defend the generalization, hoping only to convince the reader that the move is a plausible one to make. I will concentrate elsewhere on arguing more fully for that move. In the subsequent longer sections, I shall present the general results of the public goods experiments, and discuss some of the less-commented upon cooperation-enhancing mechanisms tested in the experimental literature. To foreshadow, the experiments suggest that cooperation between states to provide some global public good is likely to deteriorate across time (which means that in many cases the good will not be provided), but several mechanisms have been shown to improve the chances of successful public goods provision, in particular framing effects, between-group competition, issue-linkage, and exclusion (assortation).

3 Although Stern focuses more on game theory, the theoretical resource, whereas I focus on the empirical experiments testing game-theoretic predictions.

2.0 From behavioural data about individuals to predictions about states?

The experimental literature reports on certain kinds of entities, in certain kinds of contexts. The entities are players, and the contexts are characterized by the unique combination of players' interests that make a public goods game. It won't do to assume that states are the same kinds of entities as individuals, because it might not be that they find themselves in the same kinds of contexts; and it won't do to assume that states find themselves in the same kinds of contexts as individuals, because it might not be that they are the same kinds of entities. Only if they are the same kinds of entities in the same kinds of contexts can we expect a straightforward generalization from cooperation between individuals to cooperation between states to be convincing, and unfortunately they are not obviously either.

At first glance, it might seem there's simply nothing to say to justify applying the data generated by experimental economics and experimental biology at the collective level. After all, those experiments have exclusively involved individual subjects, and just as individuals and collectives are very different kinds of entities, so too are individuals and the special kind of collective entity that is the state. That is not something I want to deny. But there are a few things to consider that may make the move from one level to the other seem less blatantly unjustifiable. The first is that it is not only individual subjects who play cooperation games. For the games testing conditions like communication and punishment, it is individuals, because it is human psychology and motivation that is of interest. But for the games testing e.g. learning and adaptive strategies, it is sometimes computers. Computer simulations have brought important information to the table, about, for example, stable cooperative strategies across generations (Axelrod, 1986). This suggests that it is not who or what the player of a cooperation game is that is important, but rather that it has the relevant features. There is no *a priori* reason to assume that states do not have those relevant features. Figuring out whether the move from individual players to collective players is justifiable will require identifying the relevant features of players, and looking at whether states possess them.

So what are the relevant features of players, especially of public goods and resource dilemma games, which will be the focus of this paper? Reading through the literature one notices recurring characteristics of players. They must be able to *understand* the structure of the game they are playing. They have *interests*, for example in the material rewards generated by providing the public good. They also have *endowments*, for example resources they may access or contribute. In some cases they have *ideas about which behaviours are appropriate in the context they're in*, for example they might believe that there are requirements upon them to play in certain ways, or they may believe that there are no such requirements. More simply, players must have *beliefs and desires*, beliefs about the game environment and desires about how they want to play. Public goods and resource dilemma games are characterized by the interests of their players, rather than being characterized by some other external features. As long as the group has an interest in providing the public good, while any player has an interest in defecting on its provision in favour of his own short-term interest (hoping that others will provide the good so that he will get the benefit without paying the cost of providing it), there is a public goods dilemma.

Taken together, these features look a bit like they require some kind of agency. Many theorists concerned with the metaphysical nature of groups and collectives refuse to grant agency to anything other than individuals. But it should not be necessary for the purposes of this paper to take a stance on the metaphysics of groups. All I need is for it to be

plausible that states in particular possess the relevant features, making them suitable players of public goods games.

One straightforward way to argue that states do possess the relevant kinds of features is to notice that for the purposes of many cooperative interactions, states in a certain sense *are* individuals. That is to say, negotiation between states usually takes place between the *delegates* or *representatives* of states, and these individuals obviously possess the characteristics listed above. Another is to consider that even though some would deny that groups are *more* than the sum of their parts, no one would deny that groups *are* the sum of their parts. That is just to say that if the parts all have the relevant features, the group has them in abundance. (Of course, the theoretical problem is not that groups (understood as the composite of their membership) don't have, for example, interests, but rather that they have *conflicting* interests. The fact of conflict might be enough to make it the case that the groups don't count as having the relevant features, because for example part of having 'interests' might be to have a well-ordered preference set).

Another way to argue for the same point is to notice that one of the most entrenched models of state decision-making is a kind of unified actor model, seeing the state as an actor with a unified set of preferences and goals. (However, other models of state decision-making (e.g. Putnam, 1988; Allison, 1969) reject that model as oversimplified, introducing competition between e.g. the domestic and the international level, or powerful members of government, or the various loosely-aligned organizations that operate within the state).

Yet another way is to follow Philip Pettit in arguing for a functional equivalence between groups and individuals. On this model, the claim is not that states actually have e.g. beliefs and desires, but rather that they have institutions that are functionally equivalent. For example, states make law and write constitutions, they allocate officials and institute decision-making processes (Pettit, manuscript). If states (and certain kinds of groups in general) are able to create the functional equivalents of beliefs and desires, it is unproblematic to take them to have features necessary to play public goods games.

Another way to try to elicit the intuition that the move is possible is to just consider a case. Let's suppose the government of New Zealand has the opportunity to enter into a cooperative arrangement with Australia and the United Kingdom such that its citizens may work and travel freely between the other countries. We can imagine that this opportunity could generate a payoff structure similar to that which might arise between three individuals proposing a similar arrangement for access to work in each other's businesses, or travel through each other's cities with the extension of various hospitalities. In both cases all three would do best by cooperating in combination, worst by being the sole cooperator, and okay by sticking with the status quo, e.g. none cooperating (the example follows the structure of Brian Skyrms' Stag Hunt). We can clearly imagine the New Zealand government, or some sub-committee reporting to the government, discussing the proposal and reasoning through the pros and cons before formulating an intention on whether or not to take up the opportunity. The opportunity is one that we can understand to be either in the country's interest, or against it. And we can assume that New Zealand is able to act on its intentions by inference from the fact that it has acted upon similarly formed intentions in the past. So it looks at least superficially like 'New Zealand' has the features required of a player in the kinds of cooperation games under consideration.

To summarize, the proposal is that what defines a player is not that she is an individual, but that she meets certain criteria that make her able to play, criteria like understanding the payoff matrix, being limitedly rational, and being able to form and act on intentions.

For those who are dissatisfied by the kind of argument just given (or just unimpressed by how fast it was), let me give a different understanding of the project. Instead of arguing that it is *particular features* that characterize the players of public goods games in the experimental literature, features which states plausibly have, we might instead simply *start* with cooperation-enhancing mechanisms. The results of public goods / resource games taking individuals as their subjects suggest that certain mechanisms are likely to make cooperation successful, and others to make it unsuccessful. For example, it is widely reported in that literature that pre-play communication has an enormous effect on whether or not a public good will be successfully provided. Thus instead of accessing the experimental literature by way of arguing that both states and individuals can equally well fill the role of 'players' in the games, we might skip ahead and simply start asking whether those cooperation-enhancing mechanisms can be expected to play the same role in cooperative endeavors between states. To restate, instead of accessing cooperation-enhancing mechanisms as the *conclusion* of an argument in which they are shown to be relevant, the strategy might just as well be to take the mechanisms as *premises*, and explore the likelihood of each to succeed in improving the chances of successful global public goods provision.

3.0 Public Goods / Resource Dilemmas… but which ones?

There are two models of public goods games, one in which voluntary contributions to the provision of a public good are made, the other in which withdrawals from a common resource are taken (although both are public goods games, I refer to the former as Public Goods, the latter as Resource Dilemmas, following e.g. van Dijke et al., 1999). The former has been more common, of which the following is a standard version. Four undergraduate students are brought into the lab and each given twenty tokens. They are told that they must choose how to divide those tokens between keeping some for themselves and donating some into a common pool. The experimenter collects the donations, and multiplies them by a given amount. The multiplied amount is then divided equally among the players (Ledyard, in Roth & Kagel, 1995). The amount the players choose to retain is referred to as the 'private good', and the amount donated by all players to the common pool the 'public good'. The good provided is divided among all of the players to mirror the fact that the goods are non-excludable.

The Resources Dilemma is similar to the model just outlined, expect for the fact that the players do not receive individual endowments at the beginning of the game. Instead, they each have access to a common fund, from which they are able to choose to make a withdrawal. Whatever remains in the fund will be multiplied and divided among the players. This game is almost always played as a one-shot interaction, while the former model is often repeated across several rounds (see e.g. Henrich et al., 2005, p. 789).

A real-world public goods 'game' comes from the problem of fisheries depletion. Over one billion people worldwide rely on fish and shellfish as their main or only source of protein, especially in developing countries (Millennium Ecosystem Assessment, 2005). Over 200 million people depend on fishing for their main source of income. An estimated 50% of all marine fisheries in the world are fully exploited, and a further 25% are overexploited (FAO, 2007). Current projections suggest that all of the world's commercial fisheries will have collapsed within 50 years if current trends are not reversed (Worm et al., 2006; Sukhdev, 2008). The 'players' are states. Many states (perhaps all) have a short-term economic (and in some cases subsistence) interest in overfishing. The dominant strategy in such games is defection, in this case on any agreement to reduce overfishing. But if that happens, the public good is lost: the fisheries do not stabilize, and there can be no more fisheries-based

economic or subsistence gain in the future.

I said earlier that public goods games have been varied according to many different experimental conditions. Some of these will be more relevant to cooperations between states than others. But which ones? What are some features of cooperation between states that are represented in the public goods literature? Most Public Goods experiments have modeled cooperation between players with equal endowments and equal interests. But it is clear that such a situation of equality does not, and perhaps never will, prevail between states. Cooperative interaction between states is characterized by an asymmetry of both interests and contribution-capacity. Sticking with the fisheries example, a state that is dependent on fishing as its main source of income, and whose citizens are dependent on fish for their main source of food, obviously has a greater *interest* in protecting the global fisheries than a state not dependent in that way. Richer states have a greater *capacity* than poorer states to contribute to protective schemes, e.g. policing the oceans and auditing major fishing companies. And richer states likewise have a greater capacity to cease overfishing (i.e. withdraw less from the common pool), because they have access to diverse other sources of food and income. Thus one important way to narrow the pool of relevant experiments is to focus on those where players are heterogeneous (there are other ways, but I will concentrate on this one in the present paper), having either asymmetric interests or asymmetric endowments.

3.1 Asymmetries in interests and endowments in public goods games

The clearest and best confirmed result of public goods games between *homogeneous* players is that while the economists' assumption that players will play the equilibrium strategy of free-riding is rejected, contributions (a) are average in the initial round of a repeated game, or in the only round of a one-shot game, and (b) decline across repetitions of the game, converging over time on full free-riding. So while players do not start out free-riding, they usually end up that way. This is certainly something to worry about given the value of the global public goods at stake between states. There are various explanations of why that might be, and various conditions that improve the level of contributions (although for many of these, they push the level of contributions higher without changing the shape of the contribution curve, which is to say, decay across time is a more or less permanent feature of the experimental results) (for more details see Ledyard, 1995 and references therein). Are the results of games with heterogeneous players any different?

Unfortunately, nearly every game I have managed to find involving players with either heterogeneous endowments or heterogeneous interests has been one-shot. Generally in these games the public good is provided (when it involves a provision-point) or contributions are at above average levels. One set of experiments showed that heterogeneous groups with a member whose interest in the public good was greater than the cost of its provision were much more likely than homogenous groups to provide the (provision-point) public good. In 63% of cases the high-interest member contributed enough to provide the good alone, and normally others in the group contributed without allowing for that possibility which made the level of contribution even higher (Marwell & Ames, 1979, p. 1335). Another set of experiments showed no significant difference between homogeneous and heterogeneous groups, except in the case that providing the public good required contributions at or near the limit of a player's endowment. In that case, heterogeneous groups were less likely than homogeneous groups to succeed in providing the good (Rapoport & Suleiman, 1993, p. 191).

But the most unsettling result of public goods games with homogeneous players is the fact

that contributions decay toward zero over time. Thus what we really need for comparison purposes is an experiment that combines heterogeneity of interests and endowments with repetitions of the game, so that we can see if the heterogeneity affects the decline or not. As far as I have found, only one experiment combines heterogeneity with repetition. In that experiment, players' interests varied in that they received either a 'high' or a 'low' payoff. There were several periods to any game. It was found that contributions had decayed until near zero *by the fifth round of play* (Isaac, McCue & Plott, 1985, p. 58). By the fifth period in one set of games, contributions were at a mere 8.8% of the optimum (the point at which the good would be provided). The authors reassert the conclusion, robust in experiments with homogeneous players, that 'with replication, the level of public goods provision falls' (*ibid*, p. 64). They also reassert the conclusion that most players contribute something in the initial period of the game (so it is not surprising that the one-shot games with heterogeneous players mentioned above are successful in providing the public good). The researchers hypothesize that the fluctuating levels of contribution, i.e. the fact that levels remain above zero even if they're very close to it, can be explained by players occasionally attempting to encourage others to cooperate by cooperating themselves (*ibid*, p. 65), but this unilateral effort had no significant impact on others' levels of cooperation (*ibid*, p. 68).

Thus it looks as though heterogeneity has little effect on levels of contribution to provide public goods. John Ledyard in his meta-study of public goods games classifies it as having a 'weak effect' (Ledyard, 1995). If the various contribution-enhancing mechanisms surveyed below cannot be implemented at the international level, one possible solution is to avoid repeated contributions as much as possible. Given the success of one-shot interactions compared with repeated ones, we might consider trying to restrict cooperation between states over the provision of public goods to single efforts. (The problem with this, of course, is that some goods will simply require a long time to produce, an obvious example being a stable climate. It would be nearly impossible to limit cooperation over climate change to a one-shot encounter).

4.0 Solving (expected) international cooperation problems

Many different mechanisms have been shown to have an effect on levels of contribution in public goods games. Cooperation-enhancing mechanisms include transparency (knowing the others with whom we interact, knowing what their contributions are), communication (talking with the other group members, whether informally or in an effort to agree on a strategy), reputation (interacting repeatedly with the same individuals, so that we can come to know what to expect of them, and they of us), exclusion (interacting only with those we expect to contribute), punishment (levying social sanctions of various kinds upon those who do not contribute at sufficient levels), framing (requesting contributions in ways designed to elicit maximal support), linkage (linking issues together to enable bargaining), norms (creating norms to sustain high levels of cooperation), competition (introducing competition between groups to support cooperation within them), and payoffs (making defection less profitable). Some of these have received a lot of attention in the literature already, for example the benefits of communication and sanctions, so in the rest of the paper I will concentrate on the lesser known mechanisms.

4.1 Framing effects

In their (2000), Eric van Dijke and Henk Wilke demonstrate that one 'solution' to the problem of decay in contributions in public goods games is to frame the games differently. The authors argue that the Public Goods (voluntary contributions) model is usually set up by asking participants how much of their endowments they would like to *give* to the public

good, while the Resource (withdrawal) model is usually set up by asking participants how much they would like to *take* from the common pool. The authors suggest that this framing might cause people to focus implicitly on their own gain, rather than on the potential benefit to the group. They show that we can reframe those public goods games and get very different results. For example, instead of asking participants in a resource game how much they would like to take, we should instead ask them how much they would like to *leave* in the pool. This causes them to focus on the public good which will accrue to the whole group. Applying an idea like this at the international level would mean for example that in discussions over stabilizing the fisheries, rather than asking states how much they want to (over)fish in the future, which pushes them to focus on what they want for themselves, discussion and negotiation should rather be focused on asking states instead how much they are happy to leave behind, perhaps prompted by empirical data on what a safe level to leave in the common pool is.

4.2 Between-group competition

In their (2009), Mikael Puurtinen and Tapio Mappes added a new element to standard public goods experiments by testing the effect on within-group cooperation of between-group competition. Players played ten rounds of a standard game, and then ten rounds of a game in which the overall money units earned in a standard round were compared with those earned by a randomly-assigned partner group. The difference in earnings between the two groups was doubled and redistributed evenly among the members of the group with the higher earnings, and deducted evenly from the members of the group with the lower earnings. The researchers found that between-group competition had a significant effect on cooperation, suggesting as one explanation that the between-group game changed what it was in a player's material best interest to do. The researchers argue that with stronger between-group competition, we should expect to see stronger within-group cooperation. An advantage of this result is that between-group competition does not impose additional costs, and such competition is a general feature of the decision-making and acting landscape. A problem that the researchers acknowledge is that their model conceives between-group competition as zero sum, in which one group's gain is another group's loss. But of course this is an oversimplification; there are many cases in which between-group interaction can be for mutual gain (Puurtinen & Mappes, 2009).

Of course, for there to be between-group competition at the international level, there will have to be groups, i.e. groups of states. One possible example is to arrange groups of states by geographical region, and have them agree to compete over a contract for the exclusive supply of a particular good globally. So for example Europe and the Americas could compete for greatest advance in energy efficiency, with the winning group gaining the right to supply a previously agreed-upon product. Of course, agreement over terms would be crucial in any endeavor involving *all* states. Another possibility is to maintain an external arbiter, for example have the European Union agree to accept a particular good from only the winning group of states. More consideration will have to be given to whether the creation and maintenance of such groups for competitive-cooperative purposes is feasible or desirable, all things considered.

4.3 Issue-linkage

In her (1994), Lisa Martin argues that although some public goods experiments suggest that heterogeneity has an adverse effect on cooperation, this particular result does not 'travel well' to the international level. She suggests that heterogeneity might actually lead to better cooperative outcomes, because resolving the heterogeneity, especially of states'

preferences, will require issue-linkage and ratification institutions that allow more credible commitments from states. Issue-linkage is conducive to cooperation because, for example, states will have varying strengths of preferences with respect to different issues, so when issues are linked they may agree to make concessions on one issue in order to satisfy their preferences on another (Martin, 1994, p.483). Martin argues that issue linkage is most probable when preferences are heterogeneous, and unanimity between decision-making parties is required. Issue-linkage is least probable when preferences are homogeneous, and majoritarian or supermajoritarian decision-procedures are used (Martin, 1994, p. 484).

4.4 Exclusion (assortation)

Robert Burlando and Francesco Guala ran two temporally distinct public goods experiments with the same players. In the first set of games, players were randomly assigned to groups. Their behaviour in those groups was used as a way of assigning 'types' of players, divided into three main groups: free riders, co-operators, and reciprocators, and also 'noisy' groups of players too hard to classify. In the second set of experiments, players were put in groups of only their own type of player, so that were groups of co-operators, groups of free riders, groups of reciprocators, and noisy groups. Comparison between the first and second set of experiments allowed the researchers to track the benefits of assortation, i.e. the benefits of creating groups where players are homogeneous in terms of strategy. The results were undeniable. In the first experiments, results were much as for the standard games described earlier. In the second experiments, for co-operators and reciprocators levels of cooperation (or contribution) were *nearly perfect*. Reciprocators' contributions, for example, jumped from 10.38 tokens (out of a possible twenty) to 18.76 (Burlando & Guala, 2005).

The assortation result is exciting for a number of reasons. First of all, it indicates that in contexts where we can freely choose our partners in cooperation, we can expect to avoid the results typical to standard public goods games. Second of all, we can avoid those results without the use of force of any kind. While punishment has been shown to be an effective promoter of cooperation, especially in combination with communication (Ostrom et al., 1992), the costs of its provision often neutralize the advantage it confers. Exclusion is not costly in the way punishment is, if at all.

In fact, one plausible hypothesis is that the primary driver of decay in experiments without punishment is retaliation. The only way players can sanction those who defect in such games is to defect in turn. But there's no way for players in subsequent rounds to distinguish a retaliatory defection from a genuine defection, thus a cascade toward full defection begins. Burlando and Guala agree with this hypothesis: 'frustrated attempts at reciprocation play a major role in the decay of contribution in P[ublic] G[oods] experiments' (Burlando & Guala, 2004, p. 49). If a public good has a provision point, and those members of the potential group identifiable as co-operators or reciprocators do not have the resources between them to provide the good, it may not make sense to employ an assortative strategy. This was ostensibly the reason the objective of the Copenhagen conference on climate change last year was to reach a universally binding agreement. Perhaps 'avoiding climate catastrophe' is a provision-point good, requiring that we lower global carbon emissions to scientists' recommended levels. But certainly 'mitigating the projected effects of climate change' is an incremental public good, which means that the more we do, the better off we'll be. If the conditional and unconditional cooperators form a group and make an agreement, they are likely to achieve their goals, because the defectors who would inspire retaliation and trigger the cascade in contribution levels have been excluded from play.

One reason a country might defect is that the risk of contributing alone is too great. Or a defector may be enticed by the advantages of belonging to the group of cooperators (in the same way that for example the economic benefits of membership in the European Union may attract countries who were not founding members). Thus the *demonstration* of successful provision of an incremental public good, such as is made possible with assortation, may encourage cooperation from those who would otherwise be classified as defectors. A further issue is how to classify states into strategy-types. One possibility is to use the same strategy as Burlando and Guala. For example, we can take the Copenhagen conference on climate change as the 'first round' at which we identify strategies. Brazil, South Africa, China and India were quite clearly the 'defectors' (Rapp et al., 2010), while most European countries were 'cooperators' (many have gone ahead with unilateral carbon reduction programmes), and e.g. the United States and Australia were reciprocators. So in the second round, perhaps it would be prudent to aim only for an agreement between the cooperators and reciprocators, hoping that the defectors may later be enticed or compelled to change their strategies.

5.0 A couple of important caveats

I called this paper "Preventing Deterioration in International Cooperation *For Global Justice*". The idea was to exploit research in social dilemmas to gain useful information about what to expect from international cooperation. But a few caveats need to be made. The first is to note the distinction between certain kinds of issues of concern to theorists of global justice. The climate, the rainforests and the fisheries are all good examples of global public goods, and appropriate targets for the kinds of results discussed here. But global poverty, universal healthcare, universal human rights and so on are not good examples of global public goods, although they are the kinds of things that theorists of global justice are mainly concerned about. They are not global public goods simply because public goods dilemmas are defined by the interests of the players. All players should have an interest in the good being provided, even though they may choose not to contribute to its provision themselves because they prefer to satisfy their own short-term self interest. But all players in the international cooperation game do not have an interest in the kinds of issues just mentioned. No state can plausibly pretend to have no interest in the stabilization of the fisheries or the climate, but many states can (and do) refuse to acknowledge an interest in the welfare of citizens of other nations. Thus it is important to acknowledge that the scope of the discussion here, over preventing deterioration in cooperation for global justice, is limited to those goods that can plausibly be characterized as public goods.

The second caveat is to note that the experiments in social dilemmas discussed here contain one very important oversimplification that may well destroy any possibility of transplanting the results from the individual to the global case (or may even prevent the results applying from the lab to the world even just for individuals). That simplification is the fact that participants in public goods experiments are *blameless* in the fact that the public good needs to be provided at all. Not so in the real world. The reason the fisheries will collapse if we don't instantiate serious quotas some time very soon is that *we have completely overfished them*. The reason the climate is predicted to reach catastrophic highs is that *we have completely abused environmental resources*. It may be that contributions to public goods would look very different indeed if the experiments could somehow capture the fact that the reason the goods need to be provided at all is that certain members of the group had abused their privileges.

Finally, many researchers in the literature discussed in this paper have suggested that what accounts for the divergence from economists' predictions about contributions is that

cooperative behaviour is governed by social norms. Members contribute because they perceive that there is a norm of contributing, and they contribute a certain amount because they believe there are norms of fairness governing what a reasonable contribution is (see e.g. Kerr, 1995; van Lange & Messick, 1996). For example, van Dijke and Wilke reported that group members prefer the equal division rule in a resource dilemma with asymmetry of access (van Dijke & Wilke, 1995), but prefer the proportionality rule in a public goods dilemma with asymmetry of endowments (van Dijke & Wilke, 1995).

But while there are certain norms emerging globally, such as those driving the development of international law, there is nothing like the kind of social consensus that supports social norms within domestic groups. Norms of fairness, for example, have been shown to be overwhelmingly prevalent among young university students in many English-speaking countries, but not cross-culturally (see e.g. Bowles & Gintis, 2006). We cannot expect social norms to carry collective action in the international case in the same way we might expect it to domestically.

One promising thread in the experimental literature concerns sequentially played games. It is standard to have all members of a group make investment or withdrawal decisions simultaneously, but in experiments where decisions are made publicly and sequentially, the public good has been shown to be much more successfully provided (see e.g. Erev & Rapoport, 1990). Sequential play might imitate social norms in that players behave in a way they perceive as appropriate, given what they have observed (this fits with earlier theories about reciprocity / conditional cooperation, see e.g. Axelrod, 1984; Axelrod, 1986). That result accommodates what is more colloquially referred to as the 'snowball' or 'bandwagon' effect, where people behave cooperatively because they have seen others do so, and that inspires still more others to do so. Solving global problems by e.g. stabilizing the fisheries, protecting the rainforests, and lowering carbon emissions are long-term projects, which means it is possible to make contributions sequential (probably they will be both sequential and repeated).

6.0 Conclusion

It should be obvious that this issues touched on in this paper are just the beginning of the discussion. Certainly a fuller development of the generalization from individual players to state players is needed. In addition it would be possible to narrow the pool of relevant experiments even further, perhaps by focusing on cross-cultural experiments, so that we get a better idea of cooperation between people from very different backgrounds, or to focus on experiments in which players identities and contributions are known to each other, as they often will be in international cooperative contexts. The idea of the paper has been simply to point out that experimental economics (and the other disciplines that deal in public goods) may be an under-exploited resource if the argument for functional equivalence between individuals and states in cooperative contexts can withstand philosophical scrutiny.

5.0 References

Allison, Graham T. “Conceptual models and the Cuban missile crisis” in *American Political Science Review* (Vol. 63, No. 3, Sept. 1969, pp. 689-718).

Axelrod, Robert. *The Evolution of Cooperation*. New York; Basic Books, 1984.

Axelrod, Robert. “An Evolutionary Approach to Norms” in *American Political Science Review*

(Vol. 80, 1986, pp. 1095-1111).
Bowles, Samuel. & Gintis, Herbert. "Social Preferences, *Homo Economicus*, and *Zoon Politikon*" in Robert Goodin and Charles Tilly. *The Oxford Handbook of Contextual Political Analysis*. London; Oxford, 2006.

Burlando, Robert. & Guala, Francesco. "Heterogeneous Agents in Public Goods Experiments" in *Experimental Economics* (No. 8, 2005, pp. 35-54).

Erev, Ido. & Rapoport, Amnon. "Provision of Step-Level Public Goods: The Sequential Contribution Mechanism" in *Journal of Conflict Resolution* (Vol. 34, 1990, pp. 401-425).

FAO – Food and Agriculture Organization of the United Nations (2007). *The State of World Fisheries and Aquaculture 2006.* Rome. Available at ftp://ftp.fao.org/docrep/fao/009/a0699e/a0699e.pdf (accessed 08/05/08.

Gardener, J., Ostrom, E. & Walker, J. "The Nature of Common-Pool Resource Problems" in *Rationality and Society* (Vol. 2, 1990, pp. 335-358).

Hackett, Steven. "Heterogeneity and the Provision of Governance for Common Pool Resources" in *Journal of Theoretical Politics* (Vol. 4, 1992, pp. 325-342).

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElreath, R., Alvard, M., Barr, A., Ensminger, J., Hill, K., Gil-White, F., Gurven, M., Marlowe, F., Patton, J., Smith, N., Tracer, D. ""Economic Man" in cross-cultural perspective: Behavioural experiments in 15 small-scale societies" in *Behavioural and Brain Sciences* (Vol. 28, 2005, p. 789).

Isaac, Mark. McCue, Kenneth. Plott, Charles. "Public Goods Provision in an Experimental Environment" in *Journal of Public Economics* (Vol. 26, 1985, pp. 51-74).

Kerr, N. L. (1995). Norms in social dilemmas. In D. Schroeder (Ed.). Social Dilemmas: Social *Psychological Perspectives* (pp. 31–47). New York: Pergamon.

Johnson, Ronald. & Libecap, Gary. "Contracting Problems and Regulation: The Case of the Fishery" in *American Economic Review* (Vol. 72, 1982, pp. 1005-1022).

Kindleberger, Charles. *The World in Depression 1929-1939.* Berkeley; University of California Press, 1973.

Ledyard, John. "Public Goods: A Survey of Experimental Research" in Roth & Kagel, *The Handbook of Experimental Economics.* New Jersey; Princeton, 1995.

Libecap, Gary. "Distributional Issues in Contracting for Property Rights" in *Journal of Institutional and Theoretical Economics* (Vol. 145, 1989, pp. 6-24).

Martin, Lisa. "Heterogeneity, Linkage, and Commons Problems" in *Journal of Theoretical Politics* (Vol. 6, No. 4, 1994, pp. 473-493.

Millennium Ecosystem Assessment. *General Synthesis Report.* Washington DC; Island Press, 2005.

Ostrom, Elinor., Walker, James., & Gardner, Roy. "Covenants With and Without a Sword:

Self-Governance is Possible" in *The American Political Science Review* (Vol. 86, No. 2, Jun. 1992, pp. 404-417).

Pettit, P. "Groups with Minds of their Own" in F. Schmitt (Ed.) *Socializing Metaphysics*. New York; Rowan and Littlefield, 2003.

Putnam, Robert. "Diplomacy & domestic politics: the logic of two-level games" in *International Organization* (Vol. 42, No. 3, 1988, pp. 427-60).

Rapoport, A., Budescu, D., & Suleiman, R. "Sequential requests from randomly distributed shared resources" in *Journal of Mathematical Psychology* (Vol. 37, 1993, pp. 241–265).

Rapoport, A., Budescu, D., Suleiman, R., & Weg, E. "Social dilemmas with uniformly distributed resources" in W. Liebrand, D. Messick & H. Wilke (Eds.). *Social dilemmas: Theoretical issues and research findings*. Oxford; Pergamon Press, 1992, pp. 43-57.

Rapp, Tobias. Schwägerl, Christian. & Traufetter, Gerald. "How China and India Sabotaged the UN Climate Summit" in *Spiegel Online International*, May 20th, 2010.

Stern, Nicholas. *Stern Review on The Economics of Climate Change.* Available online at http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/sternreview_index.htm. Accessed 20/05/10.

Sukhdev, P. "Economics of Ecosystems and Biodiversity Interim Report". Wesseling, Germany;Welzel & Hardt, 2008. Also available online at http://ec.europa.eu/environment/nature/biodiversity/economics/pdf/teeb_report.pdf accessed 27/10/08.

Takagi, E. *Another Look at the "Hegemony Hypothesis": Fairness Considerations May Promote Public Goods Provision*. Unpublished Manuscript. Saitama University, 1990.

van Dijke, Eric. & Wilke, Henk. "Coordination Rules in Asymmetric Social Dilemmas: A Comparison Between Public Goods Dilemmas and Resource Dilemmas" in *Journal of Experimental Social Psychology* (Vol. 31, 1995, pp. 1-27).

van Dijke, Eric. Wilke, Henk. Wilke, Mareike. Metman, Linda. "What Information Do We Use in Social Dilemmas? Environmental Uncertainty and the Employment of Coordination Rules" in *Journal of Experimental Social Psychology* (Vol. 35, 1999, pp. 109-135).
Van Lange, P. A. M., & Messick, D. M. (1996). Psychological processes underlying cooperation in social dilemmas. In W. Gasparski, M. Mlicki & B. Banathy (Eds.), *Social agency: Dilemmas and Educational Praxiology* (Vol. 4: pp. 93–112). New Brunswick: Transaction.

Worm, B., Barbier, E.B., Beaumont, N., Duffy, J.E., Folke, C., Halpern, B.S., Jackson, J.B.C., Lotze, H.K., Micheli, F., Palumbi, S.R., Sala, E., Selkoe, K.A., Stachowicz, J.J. and Watson, R. "Impacts of biodiversity loss on ocean ecosystem services" in *Science* (Vol. 314, 2006, pp. 787-790).