

Bootstrap Your Way to Cooperation:  
Collective Action, Social Networks, and Institutional Origins<sup>1</sup>

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Why do people sometimes work together to promote their common welfare, even when cooperation means going against their individual interests? Scholars have come to see institutions, both formal and informal, as potential solutions to problems of collective action, which align individual incentives with shared interests. And yet, as Derek Parfit (1986) has pointed out, creating institutions itself entails cooperation, so institutional explanations of cooperation simply push the puzzle of collective action back a level. In this essay, I argue that, to explain collective action by large groups, we must focus first on small groups. Because it is generally easier for small groups to engage in collective action than large groups, one or more subgroups of a population could sometimes initiate a process of institution building that would eventually culminate in the establishment of institutions to promote cooperation by the population as a whole. I propose a few models for understanding how and when such a process would work.

The collective action dilemma applies to the provision of public goods, such as a healthy global ecosystem or national defense. As Olson (1965) explains, public goods are non-excludable: they cannot feasibly be withheld from anyone. The dilemma is that, since people who don't bear the costs of providing the public good get the same benefit as those who do pay, no one has much incentive to contribute. More precisely, suppose all individuals in a group receive the same benefit from a given level of a public good. Then the

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marginal benefit of each individual's contribution to the good will be  $\frac{1}{n}$  times the marginal benefit for the group.<sup>2</sup> Thus while individuals will contribute to the point where the private marginal benefit equals the marginal cost, everyone would be better off if all members of the group contributed to the point where the marginal cost of contributing equals  $n$  times the private marginal benefit, which will be a higher level of contribution, assuming non-declining marginal costs of contribution.<sup>3</sup>

Many social scientists view institutions as a potential way to solve collective action dilemmas. Olson (1965) provided an influential framework for the study of institutions and collective action with his notion of "selective incentives": by providing excludable goods only to contributors or punishing shirkers, an organization or group could motivate its members to contribute closer to optimal levels. Selective incentives can be created by both formal and informal institutions. Systems of taxation force people to contribute to the public goods that governments provide, using the threat of criminal punishment for tax evaders as a sanctioning mechanism (Parfit 1986). Gugerty and Miguel (2005) note that communities sometimes employ informal "social sanctions." Communities often have collective control over certain excludable resources, from physical resources to networks of insurance and participation in social activities. By threatening to exclude non-contributors from access to these common resources, groups can induce contributions to local public goods.

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<sup>2</sup> Olson (1965) generalizes the dilemma to cases where individuals receive different levels of benefit from the same public good. If an individual receives a share  $S_i$  of the group benefit, the marginal benefit of that individual's contribution is  $S_i$  the group benefit. Thus individual marginal benefits from contributing will be lower than collective marginal benefits so long as more than one individual receives at least some benefit from the group.

<sup>3</sup> Note that the Olsonian framework assumes there are no spillover costs or benefits from the costs that individuals pay.

However, Parfit points out a serious objection to institutional explanations. “A solution [to the collective action problem] is a public good, benefiting each whether or not he does his share in bringing it about. In most large groups, it will not be better for each if he does his share.”<sup>4</sup> All would benefit if a political or psychological solution were introduced that compelled them to contribute to public goods. But each would be individually better off not contributing to the implementation of the solution. We are back to where we started, with “another Contributor’s Dilemma.” If we think of the original problem of contributing to basic public goods as the first-order collective action dilemma, we can call this the second-order collective action.

Thus, while standard institutional theories help explain how groups sometimes solve first-order collective action problems, they do not offer explanations of the origins of institutions other than as unintended by-products of non-cooperative processes. The problem is particularly acute when explaining informal institutions in cases where state support is not available, whether due to limits on the state’s capacity or because the informal institution serves interests opposed to those of political elites. The problem would also seem apply to explaining how new formal political institutions supplant previous regimes.

However, the second-order collective action dilemma could be solved through a process initiated by a small group or groups. Such a process would leverage the cooperative advantage of small groups, for scholars generally argue that the collective action problem is less severe for small groups. (See for example, Olson [1965], Parfit [1986], and Olson [1993].) There are several reasons that small groups are thought to be better at cooperating. Firstly, on

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<sup>4</sup> Rather than being deliberately created, solutions to the Contributor’s Dilemma could arise by historical accident. Olson (1991) argues that governments could have arisen when bandits sought to monopolize control over a given territory. Such theories are example of how institutional solutions to collective action problems could come about as the unintended consequences of private actions. In this essay, I will focus on institution-building that requires deliberate effort.

average, each member of a group receives a share of the collective benefits of her contributions to public goods that is inversely proportional to the size of the group (Olson 1965). Since members of small groups face higher marginal benefits to public good contributions, they will be willing to contribute up to levels with higher marginal costs. Secondly, it may be possible for a few individuals to form agreements to cooperate in achieving common goals provided each other member of the group does so. Because only a few people are involved, it can be readily observed if anyone does not stick to the agreement; the rest of the group can then compel the shirker to contribute by threatening to withhold their own contributions (Olson 1991). Moreover, the transaction costs of forming such an agreement would presumably be smaller when fewer individuals are involved (Parfit 1986).<sup>5</sup> Furthermore, any such conditional agreement would tend to be fatally unstable for large groups. If there is even some minute probability  $q$  that the group will mistakenly conclude that a given member is shirking, leading to the collapse of the cooperative task, then the probability that the individuals succeed in cooperating is  $(1 - q)^n$ , which will approach 0 as  $n$  gets very large. For all these reasons, small groups should usually be able to engage in collective action, contributing to most public goods whose benefits to the group outweigh their cost to the group.<sup>6</sup>

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<sup>5</sup> Of course, the transaction costs might be shared equally among the members. But so long as the total costs rise at a rate that is greater than linear in the size of the group, the per capita cost of forming agreements will be higher for larger groups. Such an assumption is plausible, since the cost of forming an agreement among  $n$  individuals might be an increasing function of the complexity of the group, as measured by the number of possible dyadic interactions:  $n(n-1)$ .

<sup>6</sup> Hume (1739) vividly suggests a few of these reasons that small groups can more easily cooperate than large ones: “Two neighbours may agree to drain a meadow, which they possess in common; because `tis easy for them to know each other’s mind; and each must perceive, that the immediate consequence of his failing in his part, is, the abandoning the whole project. But `tis very difficult, and indeed impossible, that a thousand persons should agree in any such action; it being difficult for them to concert so complicated a design, and still more difficult for them to execute it; while each seeks a pretext to free himself of the trouble and expence, and would lay the whole burden on others.”

I present two possible models of the second-order collective action dilemma. The two versions make somewhat different assumptions about what is required to create an institution for promoting collective action – that is, to establish a cooperative convention with self-enforcing sanctions – and about the primary reasons for the cooperative advantage of small groups. But in both, the central element of the solution is the same. Institutions emerge because small groups are able to organize themselves for collective action, and thus are more likely than individuals to invest in institution-building at the level of the population as a whole.

Both models also maintain certain assumptions about what an institution (whether formal or informal) is: a convention or self-reinforcing shared expectation within a population that (virtually) everyone will follow certain rules of behavior. Institutions are coordination equilibria: given the rules embodied in the institution, and the shared expectation that others will follow them, (virtually) no one has an incentive to deviate from the rules. To be self-enforcing rules must not only include prescriptions and prohibitions regarding certain behaviors. They must also include prescriptions that some or all members of the group will employ specified sanctions to punish specified deviations from the rules. Moreover, not sanctioning rule-breakers (if the rules oblige one to help carry out the sanction) must itself trigger sanctions against the non-sanctioner. While an infinite regress of rules appears to loom here, Abreu (1988) shows that this is not so: a few simple recursive rules can sustain a cooperative equilibrium (with a credible threat of sanctions for non-cooperative behavior) in infinite repeated games.

Because the threat of sanctions can induce individuals to make higher contributions to public goods, solving the coordination problem by choosing an institution allows a group to solve the free rider problem (Hardin 1989). To “choose” an institution means somehow shifting a group’s expectations from those of the status quo, making a new equilibrium focal (Schelling 1980). And so we arrive at Parfit’s problem: making a new institution focal

for a group may take some kind of effort. Which implies that trying to solve a coordination problem can create a new free rider problem.

### *Representation Model*

The first model supposes that one way to establish an institution (convention) for promoting collective action is for a sufficient share of the population to agree to it or endorse it. Building such a coalition makes the convention focal with a certain probability, with the probability increasing with the percentage of the population in the coalition. That is, the higher the percentage of individuals who reach an agreement on a proposed convention, the more likely it is that everyone – even those who did not endorse choosing the convention or take part in negotiations – will expect other people to follow the convention.

Reaching an agreement has a cost to each participant that is increasing in the number of people who participate in trying to establish a convention. Because each individual who decides to participate thereby increases the percentage of the population participating by  $\frac{1}{n}$ , where  $n$  is the number of individuals in the population, the marginal benefit of participation, at any given percentage participation rate by the group, declines as  $n$  increase. At the same time, the cost per participant of negotiating with any given percentage of the population increases in  $n$ . Thus, the larger the group, the lower the net benefit of participation for an individual at any given group participation rate, and so the lower the equilibrium level of participation. As the size of the coalition declines, the likelihood that their proposed convention will become institutionalized also declines.

However, suppose that the population is composed of many communities, the members of each having more valued social connections and

frequent interaction with one another than they generally do with other members of the population outside their community. We would expect such communities to have advantages when it comes to collective action. For one thing, they are smaller than the population as a whole. But also, ongoing social relationships between members of the same community would make it easier to monitor one another's behavior, and the likelihood of future interaction could also be an inducement to cooperation.

So we can suppose that each subgroup is better able to act in its collective interest than is the population as a whole. Further suppose that the communities could try to form a coalition around a new institution by selecting delegates to represent them in negotiations. Negotiations among delegates for each community would presumably be much less costly than negotiations among the entire population, with each individual representing herself directly. Moreover, the marginal benefit to each group of sending a delegate would be higher than the marginal benefit of participation by an individual, both because the group gets a larger aggregate share of the expected benefits of creating a new institution, and because each delegate increases the percentage of the population represented (albeit indirectly) in the coalition. On the premise that small communities are more likely to act in their collective interest, they would have more incentive to participate in negotiations than lone individuals. In equilibrium, the share of the population represented in the coalition would be higher than if each individual were to negotiate with other individuals directly, and so an institution to promote collective action by the whole population would have a higher chance of success than in the absence of these communities.

How can we model the ability of the subgroup to engage in collective action? We might suppose that small groups can make shared agreements, as discussed above, that each will cooperate if everyone else does. Thus each would be willing to contribute to the achievement of a collectively beneficial goal (with public good properties for the community) because shirking would

trigger non-cooperation by all.<sup>7</sup> Of course, monitoring may not be perfect, but as noted previously, the chances that the agreement will break down for this reason are higher in larger groups. And finally, the per person cost of monitoring such an agreement will tend to be lower in each community than for the whole population: each individual has fewer other people to monitor and monitoring people in one's social network is less costly than monitoring distant strangers.

Another model would apply to cases where members of a group must split some fixed cost of bringing about a dichotomous collective benefit. Such a plan appears on the surface to be a coordination game: no one wants to shirk paying their share, because then the fixed cost would not be met and the entire benefit would be lost. However, it is unrealistic to suppose that the group knows *exactly* the minimum fixed cost. And so it is implausible to suppose that one individual's defection will lead to the group enterprise failing with *certainty*, especially if each individual's contribution represents a small share of the fixed costs. Suppose instead that the probability of attaining the public good is an increasing function of the share of the (assumed) fixed cost represented by the sum of everyone's contributions. In smaller groups, each person must pay a larger share of any fixed cost: thus shirking by a member of a small group will result in a large decline in the probability of attaining a good than shirking by a member of a larger group. Thus it is more likely that a small group's members can share a given fixed cost.

### *Hierarchical Organizing Model*

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<sup>7</sup> By contributing to the collective good, the individual ensures the cooperation of every other member of the community and thus receives a benefit to contributing equal to her personal benefit from one contribution times  $m$ , the number of individuals in the subgroup. If individuals receive similar benefits from collective action, then  $m$  times her benefit is equal to the group's benefit from her contribution, so that the conditional agreement equates the private and social benefits of cooperation.

The previous model assumed that members of a group could coordinate in sharing the costs of collective action, and that groups could in turn coordinate with one another at least to the extent of gathering representatives together for negotiations. The possibility of these forms of coordination may be explained by the fact that both the number of individuals in each community and the number of communities are by definition less than the number of individuals in the entire population. Smaller groups might be more likely to implicitly coordinate their actions (for instance, because they are more likely to have common knowledge<sup>8</sup>), especially on such salient strategies as sharing costs evenly or gathering to negotiate. Still, any coordination may be rather difficult prior to the establishment within a group of institutions for promoting collective action.

It may also be more realistic to suppose that establishing conventions (at least concerning those that are *deliberately* established) depends more on the total resources brought to bear in organizing efforts. Thus a small but organized group that devoted sufficient resources to producing and publicizing an institutional design might be able to make it focal.<sup>9</sup>

If we assume that the costs of creating an institution for a group of size  $n$  are increasing in  $n$ , and that individuals face increasing marginal utility costs to expenditures (whether of effort, money, time, or other resources), then the likelihood that a single individual will be willing to assume the costs alone will decline as  $n$  increases. If large populations are unable to coordinate on sharing the costs of collective action prior to creating institutions for collective action, they would seem to be unable to create them at all.

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<sup>8</sup> On the importance of common knowledge for solving coordination problems, see Chwe (2001).

<sup>9</sup> There are various other strategies a group might employ from facilitating grassroots input into the selection process to using coercive threats and displays of de facto power. Addressing the types of strategies available to actors for making new conventions focal – and why particular means are chosen in particular situations – is beyond the scope of this paper but worthy of future research.

However, suppose an individual could instead fund the creation of a small-scale institution for inducing collective action (through rewards or sanctions) by a small subset of the whole population composed of members of her social network.<sup>10</sup> Because of both the small size and close ties of the group, organizing it would have a lower cost for any given individual. So the likelihood is higher that some individual would be willing to organize at this small scale than at the level of the whole population.

The small-scale organization or institution would then enable the subset of the population to share the costs of collective beneficial action. In particular, the group could split the cost of establishing an institution to promote collective action by the entire population. Because the cost of institution-building per person involved would be lower than if one person bore the full cost, it might be the case that each member of the organized subset would be better off if all of them contributed to producing an institution for the whole population. In that case, the small-scale institution could induce each of them to pay their share of this cost.

### *Conclusion*

Empirical research will determine the plausibility of these proposed explanations, relative to each other and to alternatives. Of course, collective action problems can vary, for example, in the extent that free-riding versus coordination is the greater problem. The cost of providing public goods may exhibit increasing, constant, or decreasing returns to scale, depending on the situation. Alternatively, it may be possible to combine the two models – and others – into a more general framework. In any case, there is plenty of theoretical development and empirical testing to be done on this topic. For instance, when and how, if ever, would organizers (such as in the latter model) be constrained in their ability to create exploitative rather than

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<sup>10</sup> This network might be geographically-based, composed of kin or coreligionists, etc.

collectively beneficial institutions? How is a group's ability to implicitly coordinate on certain cooperative strategies affected by group size and features of the collective task? In what other ways might social networks fostering cooperation in establishing new institutions? And how and when can actors deliberately change salience from one institutional equilibrium to another?

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