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FREE RIDERS AND ZEALOTS: THE ROLE OF SOCIAL NETWORKS

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As is well known, the incentives for providing a public good are such that rational individuals will not provide it, or will provide it at a suboptimal level. Only a fraction of the benefits of a person's action accrue to that person. As a consequence, each, motivated only by the benefits accruing to him from his own action, will be unmoved both by the benefits his action provides to others and by the benefits others' actions provide to him. These incentives induce each to become a "free rider" on the others' actions. When all are in such a situation, with no one for whom the benefits of his own action loom sufficiently large that he has an incentive to provide the public good on his own, then little or none will be provided by rational actors, as has been shown repeatedly in the literature.

Overcoming free rider activity, or more generally activity involving external effects experienced by those other than the actor, involves organization of some sort, which in the case of externalities is ordinarily described as "internalizing externalities". In the case of public goods, this is ordinarily described as creating organization which will allocate the cost of providing the public good among those who experience its benefits. The particular way of allocating these costs is quite problematic, and has been discussed by a number of investigators, beginning with Eric Lindahl (1958 [1919]), continuing through Mancur Olson (1965), who pointed to "exploitation of the large by the small," in which the large actors pay a disproportionately large share of the cost, and including the method of revealed preferences explicated by Tullock and others (Tideman and Tullock, 1976). But apart from this question of allocation, solution of the problem is ordinarily seen as involving organization in which individual members give over some rights to a collectivity which then uses these rights to enforce an allocation of costs of the public goods.

All of the ideas which I have discussed above are by now so well recognized that we could express their central point as the conventional wisdom of the field: When a

number of self-interested persons are interested in the same outcome which requires expenditure of effort by one or more to bring about, there will, in the absence of explicit organization, be a failure to bring about that outcome, although an appropriate allocation of effort would bring about that outcome, at a cost to each which was less than the benefits each experienced.

Yet there are many empirical situations in which just the opposite of free rider activity seems to occur, although the circumstances are like those in which free riders would be predicted to abound. That is, there is an outcome in which a number of persons are interested, which requires effort on the part of one or more of the number. In some such situations, what is found is the opposite of free riding, that is, an excess of zeal. In the fever of patriotic zeal during wartime, men will volunteer for military service, once in military service, will volunteer for front-line duty, and once in front-line duty, will volunteer for dangerous missions. Even among those who are opposed to violence there are those who will volunteer for front-line duty in providing medical aid to the wounded. In all these cases, the costs that are borne are the most extreme, including a greatly increased probability of being killed.

Similarly extreme costs are borne by small groups who engage in militant or even terroristic behavior on behalf of what they regard as a public good. Examples include the IRA hunger strikers in Northern Ireland some of whom fasted until death, Mohandas Ghandi and his followers who endured extreme hardship for a cause, the Red Guards in Italy, engaged in terrorism designed to bring down the system, activists in the PLO in the Middle East, leaders and activists in Solidarity in Poland. In all these cases, a number of persons experience extreme costs to bring about a result from which they personally can hardly expect to benefit sufficiently to justify the costs they incur.

Another example, where free-rider behavior is expected, but instead zealous activity is of-

ten found instead, is in team sports. In team sports, since the benefits of winning are experienced by all team members, one would expect, by free-rider rationality, to find little or no activity by team members. Yet both in practice and in games, team members often work harder than do participants in individual sports activities (such as track and field events). Even if one accepts the caveat that is often introduced to free rider predictions—that it does not occur in small groups—this would not explain *higher* levels of effort in team sports than in individual sports. It would predict at most equal levels of effort. What seems instead to occur is some free rider activity, that is some greater loafing than occurs in individual sports, but also some zealous activity, at a greater level of effort than occurs in individual sports. The overall average is probably higher than in individual sports.

Rationality of Free Riding and of Zeal

How can these two phenomena coexist? How can we have both free riders and zealots, in similar situations? The trivial explanation, that people differ, some evading the draft, others eagerly volunteering, is not acceptable.

If a number of persons' interests are satisfied by the same outcome, then each has an incentive to work for that same outcome. But if the benefits that one experiences from his own actions that contribute to the outcome are less than the costs of his actions, if he is rational, he will not contribute. If others contribute, he will experience the benefits of the outcome without costs. This is the rationality of the free rider.

But if a number of persons' interests are satisfied by the same outcome, then each has an incentive to reward the others for working toward that outcome. If these rewards are provided, then each has two sources of satisfaction when he works for this outcome: the objective achievement of his interests through the contribution of his actions to the outcome, and the rewards provided by the others for helping to achieve that same outcome. Thus one's efforts directly help to satisfy his interests (even if not enough to outweigh the costs of his efforts) and they also bring rewards from others for helping to satisfy their interests. In some cases the combination of these two benefits is far greater than the costs of the activity to the person.

This is the rationality of the zealot. Yet the rationality of the free rider and the rationality of the zealot both arise under the same form of social organization. In most social organizations, the goals of different persons are complementary, and these goals are achieved through some kind of social exchange. In other situations, goals are diametrically opposed, so that the achievement of one person's goal is at the expense of another. Achievement of one person's goal in these situations requires a conflict in which the other's goal is overcome.

But it is sometimes the case that goals are neither complementary nor in conflict, but are common, so that one person's achievement of his goal helps in the achievement of others' goals as well. These are the sort of situations I have described, and it is in these situations that both free ridership and zealotry can be found. I will for convenience call this form of social structure in which interests are common a conjoint structure of interests, in contrast to the others, which can be called disjoint.

How can these two "rational explanations" be made consistent in a way that will allow prediction as to when one will occur and when the other will occur? To answer this requires looking at what is alike and what is different in the rationality of the free rider and the rationality of the zealot. Both arise in a conjoint interest structure. The conjoint structure reduces the individual's interest in his own action, thus creating the logic of free ridership. And the conjoint structure brings about an interest in the actions of others, hence an interest in providing encouragement to others, thus creating (if the encouragement is provided, and is effective) the logic of zealotry. The same structure of interests leads to a deficiency of incentive to contribute to the common cause (thus free riders) and an excess of incentive to contribute to the common cause (thus zealots).

It should be clear that the logic of zealotry has the incentive of free ridership, together with a second incentive superimposed on the first. The second incentive, however, becomes effective only through an intervening action: the "encouragement to others," which then can more than overcome for those to whom encouragement is provided the deficiency of incentive created in the first place.

It is this intervening action that makes the difference between the deficient incentive

leading to free riders activity, and the excess incentive, leading to extra zeal. Thus the condition under which free riding occurs and the condition under which extra zeal is exhibited are separated by the absence or presence of this intervening activity. The question can be targeted: What are the conditions under which the intervening activity is present?

When this intervening activity, which I have described as encouragement of others, is examined more closely, it can be seen to be one of a general class of activities that we describe as sanctions in enforcement of a norm. (There can be, as I will indicate later, encouragement of others' activity in the absence of a norm, but this can be effective only under special circumstances which I will specify.) The sanction is of a certain kind, a sanction that *encourages* the action, rather than one which *discourages* it, and the norm is of a certain kind, one which *prescribes* a certain action rather than one which *proscribes* an action. A prescriptive norm arises when there are positive externalities of action, as in the case of a public good, while a proscriptive norm arises when there are negative externalities of action. But to say that "a norm arises" in those two circumstances is to beg half the question. The existence of externalities is a necessary condition for the existence of an effective norm, but not a sufficient one—for if it were, free ridership would not exist.

The closure of networks

To see the condition under which externalities will lead to a norm with effective sanctions, it is useful to examine two forms of social networks, as shown in Figure 1a, 1b, and 1c.

In figure 1a, actors A, B, and C are not part of the same network. Whatever social relations they have are not with each other. In both 1b and 1c, actor A in the system is connected to actors B and C. In Figure 1b, actors B and C are not themselves connected, while in 1c they are connected.

Now suppose some circumstances arises which fit the incentive structure for both free ridership and zeal. That is, there is an activity in which the actions of one benefit each, though the benefits to the actor of his own action are insufficient to overcome the costs of the action. For concreteness, suppose there is a potential project, in which a contribution from each of \$9 will lead to a benefit worth \$12 to each. But the contribution of one leads to benefits to all: A \$9 contribution from A will bring a \$4 benefit to each of A, B, and C.

This means, of course, that A's contribution gives him a net loss of \$5, while the contribution of B or C each gives him a net gain of \$4. If all three contribute, he has a net gain of $-5 + 4 + 4 = \$3$, while if he alone contributes, he has a net loss of \$5.

In a social structure like that of Figure 1a, then each has no possibility of influencing the contribution of either of the others. They have no relation, and thus they cannot provide the "encouragement," or the sanctions that will induce the others to contribute. It would be irrational for any of the three to contribute.

In a social structure like that of Figure 1b, matters are more problematic. If A proposes not to contribute, but to free ride upon the contribution of A and B (by which he would increase his net gain from \$3 to \$8), then B would like to induce him to contribute; and unlike Figure 1a, 1b puts B (and C as well) in a social structural position that facilitates this. However, if B must compensate A in some

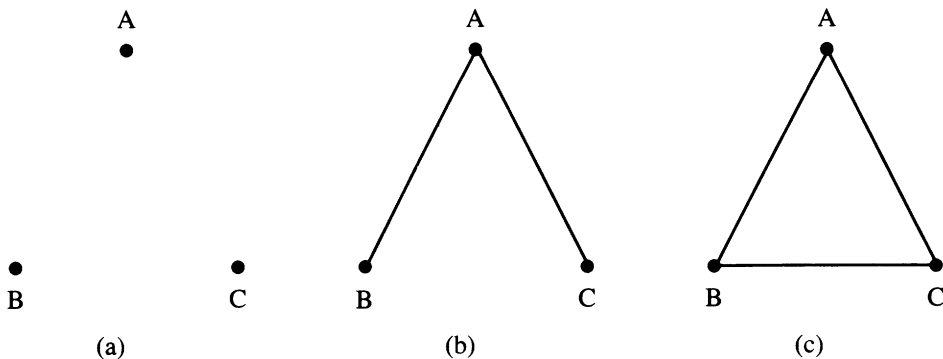


Figure 1

common medium of exchange, in order to induce him to contribute, he cannot do so.¹ He must give A at least \$5 to induce A's contribution, but he only benefits from the contribution by \$4. Thus to provide this inducement is not worthwhile for him. The same, of course, can be said for C.

Two comments may be made here. First, there are public goods in which the inducement by B would be sufficient to lead A to contribute while still providing a net benefit to B. (For example, suppose A's contribution of \$9 brought a benefit of \$6 to each. Then B could induce A to contribute by offering him anything over \$3, while he will benefit if he offers A anything less than \$6.)

The second comment is that even with the original numbers, the existence of a relation between A and B implies more than a communication link. It may bring about a situation in which B has something worth less than \$4 to him but more than \$5 to A. Then he could offer this to A with a net surplus for both parties. For example, if B is highly respected by A, then B's gratitude to A for contributing may fulfill this condition of costing B less than \$4 is worth to him and benefiting A by more than \$5 is worth to him.

However, absent such a commodity, neither B nor C are in a position to single-handedly induce A to contribute. Nor can they, in the social structure represented by Figure 1b, coordinate their actions to bring about a change in A, for they have no relation between them.

In Figure 1c, the situation is different. The two actors who would benefit from A's contribution (and who thus experience a relative loss if he does not contribute) have a relation, and each has a relation to A. Here, either of two forms of inducement will be beneficial to all concerned. The first may be called a "collective sanction" or "incremental sanction." It consists of inducements from both B and C to A, of something more than

\$2½ each, providing them each a net benefit from A's contribution of something less than \$1½ ($\$4 - 2½ = 1½$). The reason this is possible in a structure like that of Figure 1c lies in the relation between B and C. The relation means not merely that they can coordinate, but that they can enforce agreements. If C does not provide his inducement to A, then B can sanction him—either by providing him an inducement to compensate A, or by threatening him with non-contribution on future projects. The inducement B must provide to C is only \$½, because C's expenditure of 2½ to A brings him a return of \$2 (since B's compensation of A brings the other \$2 to make \$4 altogether). This amount B can provide, along with his \$2½ compensation of A, because this still leaves him a net benefit of \$1 ($\$4 - 2½ - ½ = \1).

The second form of inducement that will be beneficial to all concerned is what might be called a "heroic sanction" followed by a secondary sanction. B will induce A to contribute by compensating him with \$5. This, however, imposes a \$1 loss on B. The loss is made up by a secondary sanction from C, who compensates B by something more than \$1. If B compensated A with \$5, and C compensated B with \$2½, then from the project as a whole, A would gain 8, B would gain ½, and C would gain ½. Comparatively, of course, B and C do badly, gaining only ½ while A gains 8 from the project. But because of the social structure, they are able to construct a sanctioning system that is not feasible in a structure like that of 1(a) or 1(b).

The sanctions may in fact not be so costly to B and C as this suggests, because there may exist in the relation between B and C something that C can provide to B that is worth much more to B than to C. If so, then even if B must compensate A in money (which costs him as much as it benefits A), he may get rewards from C that make both him and C better off than the dollar figures indicate.

But a further possibility exists as well. The complete social structure, which makes possible the sanctioning system of B and C to induce A's contribution, also makes possible a sanctioning system of A and C to induce B's contribution, and A and B to induce C's contribution. These three sanctioning systems which can offer credible compensation or threats (because B and C might just as well

¹ Although I write of B's possible compensation of A, his inducement could just as well take the form of a threat not to contribute in the next project. I will continue to use the terminology consistent with positive sanctions, with the implicit understanding that so long as there was a subsequent common project, threats could be used just as well as could positive inducements. A threat from B, however, is no more effective in the case of a common project than is compensation, for B's participation in the next project is worth only \$4 to A less than the \$5 he must contribute on this one.

have threatened A with non-contribution on the next project, a threat that poses a potential loss of \$8 to A) means that the system is fully protected against free rider activity. If we think of a norm as a transfer of the rights of control over an action from the actor to those affected by it, then the three actors have an incentive to establish a norm—for a norm will eliminate the necessity of compensation, and sanctions need not be applied (so long as each actor recognizes the superior resources of the other two, which they can use for sanctioning).

Where is the excess of zeal?

The above indicates how closure of social networks can overcome free rider activity through the creation of norms and sanctioning systems, but it does not indicate how the contributions (of money, or effort, or time) can be *greater* than would occur if the three actors were each engaged in producing a private good. In the example, the norm brought the contributions back to what they would have been if they had produced private goods, in which each received \$12 for his \$9 investment but none from the others' investment. The existence of a norm with sanctions does in principle what formal organization does in the presence of externalities: It internalizes the externalities.

However, social networks, and the norms they facilitate, do more than this. They generate, under certain circumstances, the excessively zealous activity which indicates not a deficiency of incentives to contribute, but an excess. The question is, what can lead members of an interconnected group to manifest the opposite of free ridership?

Earlier, I indicated that if B held something that was worth less than \$4 to him and more than \$5 to A, he could induce A's contribution without loss even in the social structure of Figure 1b. And in the social structure of Figure 1c, there is the additional possibility of gains through C's holding something of greater value to B than to himself, which he could use for the secondary sanction of B in place of money.

The relationships of which social structures are composed contain such possibilities in abundance. An expression of encouragement or gratitude at another's action may cost its owner very little, but provide a great reward for the other. The shouts of encouragement to

an athlete from his teammates may cost them little but provide rewards to him that leads him to work even harder. Or a girl's smile to the athlete may cost her little, but impel him to new heights of determined effort.

When there are such differentials, then the social structure does more than merely internalize externalities. The system is not like one in which the efforts of each produce private goods, leading each to adjust his effort so that marginal cost equals marginal return. The social system has within it a potential, analogous to the potential in an electrical system, such that when one actor carries out an action, thus experiencing the costs, and others receive the benefits, the return that he experiences consist not merely of those benefits, transmitted back to him through the social structure. They consist of those benefits amplified by this potential that exists in the structure. Thus when his activity levels off at the point where marginal cost equals marginal return, this is a higher level, produced by the amplified return he received, which were in turn produced by the potential that exists in the structure.

The impact of social structure

The networks shown in Figure 1 exhibit two components of a social structure that are important for the existence of norms which can transform a deficiency of incentive into an excess of incentive. The first of these two components is the existence of social relations between an actor and those for whom he generates externalities. Even if they are disconnected members of an audience of his actions, their connection to him may mean that they can provide rewards, at a cost to themselves that is below their benefit from his actions, that spur him on to greater efforts. It is for this reason that a performing athlete, or musician, or actor, can experience motivation far greater than those of a book author, who cannot see the reactions of his audience.

The second component of a social structure that is important for norms is exhibited by the difference between Figure 1b and 1c. This is the closure of the networks, the existence of relations between those who experience externalities from another's action. In the example discussed earlier, it was clear how these relations can make a difference between a system in which there is a deficient incentive to act and thus suboptimal level of

activity, and a system in which there is an excess incentive to act, and thus a system marked by an excess of zeal. More generally, the closure of networks gives increased potential for amplifying the returns to the actor. Thus although a system with a degree of connection to the actor may exhibit a strong potential that induces higher levels of activity, a system with high closure provides an added potential, due to the benefits received from one another by each of those who experience externalities of an actor's action. There is an amplification that occurs even before the rewards get back to the actor himself.

Implications for the political system

I will say little about the implications of these results for the political system, but I will mention one implication. Elsewhere (Coleman, forthcoming) I have shown that the paradox of voting can be accounted for by normative systems, within the supporters of each candidate on each party, that make it to a citizen's interest to vote. But since these normative systems are composed of supporters of each candidate, their strength depends on the inward-lookingness or closure of each

of these sets of supporters. If the social networks that link persons together are not somewhat distinct, so that there is a correlation between the political preferences of friends, then these normative systems cannot function. Thus one prediction that would be made by this theory is that the lower that correlation, so that social networks are largely random with respect to political preference, the lower the proportion of the population voting. It is a small additional step to show that when this correlation between social relations and political preference is lower, the rate of voting should be lowered most for those candidates in a minority position in the system under consideration (e.g., a city or a town).

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