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THE IMPLICATIONS OF THE LOGIC OF COLLECTIVE INACTION FOR ADMINISTRATIVE THEORY

by

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Abstract

The publication in 1965 of Mancur Olson's book The Logic of Collective Action fundamentally changed the view of many scholars and public officials about the likelihood that individuals will solve collective action problems without the intervention of central administrative authorities. Olson built his analysis on two broad presumptions that are fundamentally sound. The first presumption is that attributes of the set of individuals facing a common problem affect their capabilities to solve problems themselves. Olson identified the size of the group as the most important group attribute affecting collective action. The second presumption was that attributes of the phenomena involved in a problem -- exclusion and jointness -- would also affect the capabilities of a set of individuals to solve a common problem.

In regard to both of these foundational building blocks, Olson made particular choices in the way he defined and used concepts which have generated considerable confusion. Since the concepts of group size and the nature of goods are important elements of future work, it is important to examine how Olson used these terms, what problems he ran into, and how we can reformulate these concepts for future theoretical and empirical work.

This paper contains an analysis of the concepts of size of group and public goods as contained in Olson's theory. Where Olson used one term to refer to several concepts, separate terms will be defined for each of the concepts he uses. Where Olson incorrectly argued that he

had established a general, rather than a limited, proposition, the conditions affecting whether a particular proposition stands or not will be discussed. The implications of this reformulated foundation for the practice and theory of administration is discussed in the last section.

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The publication in 1965 of Mancur Olson's book The Logic of Collective Action fundamentally changed the view of many scholars and public officials about the likelihood that individuals will solve collective action problems without the intervention of central administrative authorities. From the grand optimism of the group theorists' prediction that individuals with common interests will voluntarily act so as to try to achieve these interests (Bentley, 1949; Truman, 1958), the presumption of many analysts today is that individuals with common interests will not act so as to achieve common goals.

Olson self-consciously attempted to change the dominant view. On the first page of his book, he summarized the then accepted view:

> The idea that groups tend to act in support of their group interests is supposed to follow logically from this widely accepted premise of rational, self-interested behavior. In other words, if the members of some group have a common interest or object, and if they would all be better off if that objective were achieved, it has been thought to follow logically that the individuals in that group would, if they were rational and self-interested, act to achieve that objective (Olson, 1965: 1).

Olson challenged the presumption that the presence of a benefit for a group was sufficient to generate collective action to achieve that benefit. In the most quoted sentence of his book, Olson argues that:

> unless the number of individuals is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self-interested individuals will not act to achieve their common or group interests (Olson, 1965: 2).

The publication three years later of Garrett Hardin's "The Tragedy of the Commons" greatly speeded the acceptance of a view that individuals will not organize themselves for collective action, particularly in regard to environmental and resource problems. Hardin predicted an inexorable tragedy for individuals sharing an allegorical commons. Hardin describes the tragedy in this way:

> Each man is locked into a system that compels him to increase his herd without limit -- in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons (Hardin, 1968: 1,244).

The rapid acceptance of this grim view of the likelihood of collective action has led to equally grim policy recommendations. Ophuls (1973: 228) argues, for example, that "because of the tragedy of the commons, environmental problems cannot be solved through cooperation . . . and the rationale for government with major coercive powers is overwhelming. . . ." Ophuls concludes that "even if we avoid the tragedy of the commons, it will only be by recourse to the tragic

necessity of Leviathan" (Ibid., 229). Hardin himself indicated a decade after his initial article that change must be instituted and with "whatever force may be required to make the change stick" (1978: 314). In other words, "if ruin is to be avoided in a crowded world, people must be responsive to a coercive force outside their individual psyches, a 'Leviathan,' to use Hobbes's term" (1978: 314).

The presumption that Leviathan is necessary to avoid the problem of collective inaction has led to the recommendation of central government control of most natural resource systems. Robert L. Heilbroner (1974) argues that "iron governments," perhaps military governments, are necessary to achieve control over ecological problems. In a less draconian view, Ehrenfeld (1972: 322) suggests that if "private interests cannot be expected to protect the public domain then external regulation by public agencies, governments, or international authorities is needed." The theory of collective inaction is used repeatedly to justify the intervention of strong, central authorities in many domains of public life, particularly in the Third World (see Carruthers and Stoner, 1981; Bromley and Chapagain, 1986; Dove, 1986).[1]

In this chapter, I wish to argue that Olson was too successful in shifting the perspective of scholars and public officials from what was, admittedly, an overly optimistic view of human capabilities to organize themselves to achieve common objectives. Olson's book can be viewed as an effort to state the conditions which affect the likelihood and degree of optimality of collective action rather than a proof of its impossibility. The dramatic statement that "rational, self-interested individuals will not act to achieve their common or

group interest" has, however, come to have an importance in public administration theory greater than the more complex and, at times, confusing formulations presented in the rest of the book.

The issues raised by the logic of collective action or inaction are crucial for the study of democratic administration (see V. Ostrom, 1974; 1987). When citizens facing common problems in local communities, or fishermen using an inshore fishery, are perceived as unable to overcome the temptations to free ride or overuse through their own restructuring of the incentives they face, then it is only the administrative state which is perceived to be able to "protect" them from their own weaknesses. Once created, however, central administrative agencies have not proved themselves entirely benign instruments able to achieve common objectives through central directives. Are the only alternatives the Charybdis of unconstrained individualism or the Scylla of an externally imposed order? As long as we presume that the logic of collective inaction is as attractive and retentive as a whirlpool, we may over-react and establish Leviathans to impose the constraints that individuals supposedly cannot impose on themselves. The need in administrative theory, it seems to me, is to develop a theory which explains the conditions which inhibit or facilitate efforts to achieve collective benefits through self-organization.

If scholars of public administration are to gain a better understanding of the conditions which affect the capabilities of citizens to self-organize and administer arrangements to achieve collective action, where should this attempt at a new synthesis start? My answer is that it should start with an effort to clarify Olson's

more complex analysis. As with any truly seminal work, Olson's original theory is afflicted with many inconsistencies and incoherent formulations. One is never certain how much effort should be allocated to untangling insightful, but at times seriously confused, concepts of the scholar who effectively opened up a new field of inquiry. Sometimes it is better to start over.

In this case, however, much can be gleaned by an effort to identify the essential foundations of Olson's theory that would be needed in any theory of collective action. Olson built his analysis on two broad presumptions that are fundamentally sound. The first presumption is that attributes of the set of individuals facing a common problem affect their capabilities to solve problems themselves. Olson identified the size of the group as an important attribute affecting collective action. The second presumption was that attributes of the phenomena involved in a problem -- exclusion and jointness -- would also affect the capabilities of a set of individuals to solve a common problem. I presume that all future theories explaining under what conditions individuals are likely or not to organize to provide collective benefits for themselves will be based on these two foundations. In regard to both of these foundational building blocks, Olson made particular choices in the way he defined and used concepts which have generated considerable confusion. Since the concepts of group size and the nature of goods are important elements of future work, it is important to examine how Olson used these terms, what problems he ran into, and how we can reformulate these concepts for future theoretical and empirical work.

Thus, I propose to analyze the concepts of size of group and public goods contained in Olson's original formulation. Where Olson used one term to refer to several different concepts, we will need to define separate terms for each of the concepts he uses. Where Olson incorrectly argued that he had established a general proposition instead of a more limited proposition, we will need to understand the conditions that particular propositions stand or do not stand. Having reconstructed the foundations, we can then begin to describe what a reconstructed theory of collective action useful for the study of public administration would contain and begin to take some steps toward that reconstruction.

Size of Group in Olson's Theory

A basic assumption in Olson's theory is that the size of a group affects group interactions and results. The term "size of group" is ambiguous in his original formulation since Olson uses this term to refer to several conceptually different variables. Olson himself slips from one meaning to another within his text. In his formal model, Olson defines the term "size of group" (S_g) by referring to the quantity of relevant assets held by individuals in a group (1965: 23). Much confusion would have been avoided if Olson had called this variable something like "quantity of assets" rather than the "size of group." No logical relationship exists between the quantity of relevant assets that a group owns and the number of individuals in a group, even though these two variables may be related in particular empirical settings.

When Olson defined the concept of a public good, he defined it in terms of a set of persons, X_i in a group, $X_1 \ldots, X_i \ldots, X_n$, who benefit when that good is provided. The number of persons benefitting from the provision of a public good is, thus, X_n. X_n is, however, not a term included in his formal model. Olson obviously presumes that the amount of assets held by members of a group is closely associated with the number of persons in the group [$S_g = f(X_n)$], but he does not formally state this relationship. Most of his references to "size of group," however, appear to refer to X_n rather than to S_g.

The confusion in referents between X_n (number of beneficiaries) and S_g (quantity of assets affected) is compounded further when Olson developed a taxonomy of groups dependent on two additional conceptual variables. The first variable he uses in this taxonomy has come to be known in the literature as the "minimal contributing set" for which the symbol k is most frequently used (Schelling, 1978; van de Kragt, Orbell, and Dawes, 1983; Rapoport, 1985; R. Hardin, 1982). A definition of k is the minimum number of individuals in a situation whose independent selection of a particular strategy yields a collective benefit greater than the sum of the costs of their individual actions. In Olson's small group, $k = 1$, no matter how large X_n is. For a small group, Olson predicts that a single individual will provide the good for all others.

In intermediate and large groups $k > 1$. Olson uses a second concept, which he calls "noticeability," to distinguish between intermediate and large groups. By noticeability, Olson (1965: 45) refers to the degree of perceptible difference that any one person's contribution makes to the result for the group. In Olson's words:

> The noticeability of the actions of a single member of a group may be influenced by the arrangements the group itself sets up. A previously organized group, for example, might ensure that the contributions or lack of contributions of any member of the group, and the effect of each such member's course on the burden and benefit for others, would be advertised, thus ensuring that the group effort would not collapse from imperfect knowledge. I therefore defined 'noticeability' in terms of the degree of knowledge, and the institutional arrangements, that actually exist in any given group, instead of assuming a 'natural noticeability' unaffected by any group advertising or other arrangements (1965: 45).

Noticeability of actions is the variable that Olson uses to demark intermediate from large groups. When $k > 1$ and each person's contribution is noticeable, Olson calls this an intermediate group and predicts that some groups will and some will not achieve collective objectives. A large group, where $k > 1$ and each person's actions are not noticeable, will not, according to Olson, achieve collective objectives without coercion or selective benefits. Olson argues that intermediate groups can more easily develop low-cost rules and organizational arrangements over time than large groups. He assumes that successful collective action in the long-run depends on many factors, including the availability of existing organizations, past history of a group, whether the collective good is an inclusive or exclusive good, and the costs of decision making and coordination. If organization costs are low (because of existing organizations or other

factors), and the benefits to each individual are high, individuals may be willing to switch from independent to coordinated actions producing collective goods. Olson assumes that decision making and coordination costs are positively related to the number of individuals that must agree prior to action. This reinforces his view that groups containing larger numbers of relevant actors will be less likely to achieve forms of collective action than smaller groups.

Large groups, Olson argues, will need to resort to some form of coercion (or use selective benefits) to achieve collective goods. Olson's long-run theory for large groups has a surface resemblance to Garrett Hardin's, but differences also exist. Garrett Hardin argues that a majority of individuals in a group must decide upon general rules and assign officials the discretionary task of administering these rules. Olson is not specific in his theoretical chapter about the type of institutional alternatives available to individuals. His analysis, however, of how unions try to obtain legislation to require workers to become members of a union does not portray the recommended mechanisms specified by Hardin. Once a union obtains a rule requiring "beneficiaries" to be members (a closed shop), union leaders do not want external officials to be assigned responsibility for making the discretionary decisions about the day-to-day operations within the union.

By his examples, therefore, Olson envisions different long-run mechanisms for achieving collective action than those recommended by Hardin. Olson also alludes to the importance of institutions that make individual actions "noticeable." Thus, rules that require some form of recordation of individual actions and publication of these

records may enable larger groups to achieve collective action without the necessity of assigning external administrative authorities the power to decide on all the specific day-to-day operational decisions.

In discussing "size of group," Olson thus refers to four different concepts:

(1) The quantity of assets held by a group (S_g in his formal model);

(2) Number of persons who would benefit from collective action (X_n in his definition of the group benefitting from collective action);

(3) The minimal number of persons required to achieve a common objective (which demarks small from intermediate groups); and

(4) Noticeability of actions (which demarks intermediate from large groups).

Most of Olson's propositions about size of group appear to relate to the number of persons who benefit from collective action. It is this concept of group size that Olson must have had in mind when he argues, for example, that:

> . . . the larger a group is, the farther it will fall short of providing an optimal supply of any collective good, and the less likely that it will act to obtain even a minimal amount of such a good. In short, the larger the group, the less it will further its common interests (Olson, 1965: 36).

Olson's conclusions about the effect of group size have, however, been challenged (see Frohlich and Oppenheimer, 1970; Chamberlin, 1974; and McGuire, 1974) as well as defended (see R. Hardin, 1971; Buchanan,

1968). The debate has not yet served the purpose of clarifying the different definitions of size of group used by Olson and others. Russell Hardin (1980: 38-49) has written a cogent critique and summary of the literature deriving different implications about the effect of group size. Hardin stresses that much of the debate relates to implicit assumptions made by theorists about other variables that may be affected if the number of actors is increased or decreased. As he argues:

> The apparent disagreement in these findings lies in the implicit ceteris paribus clauses of the authors. It is not logically possible to increase group size, n, ceteris paribus. As n increases, something else must change: for instance, average costs (especially for perfectly joint goods), individual valuation, total cost, or level of supply (R. Hardin, 1982: 44).

A series of experiments conducted by Isaac and Walker (1986; 1987) has attempted to separate the effects of an absolute increase in group size from the effects of the marginal return to each person from contributing to benefits that all share. While it may be difficult to separate these two variables in natural settings, one advantage of experimental settings is the capacity to change one variable while holding others constant. When Isaac and Walker increased the number of persons from four to ten, who decide how much to contribute to a group benefit, holding the marginal return to each individual constant, they found no simple effect. If anything, they found a slight qualitative tendency for the ten-person group to provide "a slightly larger proportion of the optimal level of the group good than

did the four-person groups (Isaac and Walker, 1987: 14). Isaac and Walker are careful to stress that this result should not be interpreted as showing that group size makes no difference. Rather, it shows how important it is to carefully identify all of the variables involved in the concept of group size and to be sure that further theoretical and empirical work treats these variables as separate concepts.

This is the lesson that is important for administrative theory. A simple presumption that any group other than an extremely small, face-to-face group will be unable to provide any or close to optimal levels of a group benefit is not an adequate starting place for administrative theory. In addition to the absolute number of persons involved, analysis of collective action problems should also include an examination of the distribution of assets among members of that group, the minimal number of persons required to achieve a common objective, the noticeability of actions, and the marginal return to each person from contributing to a benefit.

The Concept of Public Goods

By centering his theory of collective action around the concept of "public good," Olson built his theoretical edifice upon a second fundamental presupposition that the type of problem(s) that individuals attempt to solve affect the responses that they make to these problems. This is by no means a unique presupposition. Once this position is accepted, however, the knotty problem remains as to <u>which</u> attributes of goods are most important in dividing the "problems" humans face into as parsimonious a set as possible.

A major debate over this issue was brewing when Olson wrote his book. The debate was initiated in 1954 by Paul Samuelson when he used one attribute of phenomena -- jointness of consumption -- to divide the world into the two classes: private consumption goods and public consumption goods. In 1959, Richard Musgrave argued that a different attribute of goods -- whether or not someone can be excluded from benefitting once a good is produced -- is more important than jointness of supply. Musgrave asserted that the exclusion principle can be used by itself to divide the world into private and public goods. The classification debate was associated with a major policy concern over the role of governmental institutions allocating resources.

Olson explicitly adopted Musgrave's definition of public goods. Using this one-dimensional criteria, Olson then tried to establish a general theory for all goods meeting Musgrave's definition. It was here that he failed. Several scholars have shown that several of his propositions do not hold for all public goods meeting the Musgrave definition even though these same propositions do hold for a smaller class of events than Olson asserted. Obviously, Olson's hope was to develop as general a theory as possible. His long-term contribution may be based, however, on his identification of key variables which affect whether and how much collective action may be forthcoming.

Samuelson's Classification Based on Jointness of Consumption

In a seminal article, Paul Samuelson divides the world of goods into two types:

> . . . ordinary <u>private consumption goods</u> ($X_1, \ldots, X_n$) which can be parcelled out among different individuals (1, 2, ..., i, ...,s) according to the relations $X_j = \sum_1^s X^i{}_j$; and <u>collective consumption goods</u> ($X_{n+1}, \ldots, X_{n+m}$) which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good, so that $X_{n+j} = X^i{}_{n+j}$ simultaneously for each and every ith individual and each collective consumption good (1954: 387).

The attribute which Samuelson used in his classification of goods has been variously called "jointness of supply," "non-subtractability," "non-rivalness," and "non-depletability." It has been viewed as a key attribute because of its effect on the efficiency of market institutions. Market institutions are predicted to produce an optimally efficient allocation of goods when equilibrating processes lead to prices of the goods supplied to the nth consumer to just equal the marginal cost of that good. If goods consumed do not subtract from those available to others, then the marginal cost of the good supplied to the nth consumer is zero. Marginal cost pricing in this instance does not yield optimal results. No one would produce if the price they could obtain were zero.

By identifying jointness of supply as the crucial variable, Samuelson addressed the question of the capability of competitive market institutions to help individuals arrive at optimal patterns of allocation for all goods. By deriving the marginal conditions that must be met for private and for public goods, Samuelson showed that:

(1) decentralized, competitive market institutions can work like an analogue calculating machine for the private goods of the world, but that (2) "no decentralized pricing system can serve to determine optimally these levels of collective consumption" (Ibid., 388). Some other institutional mechanism such as "voting" is needed to solve production and allocation problems for these goods. Further, Samuelson argues, in regard to collective consumption goods, there are advantages that do not exist for private consumption goods for any individual to "snatch a selfish benefit" by not revealing true preferences. Consequently, designing nonmarket institutional mechanisms to insure honest and full preference revelation and payment on the part of beneficiaries is the key problem.

Musgrave's Classification Based on the Exclusion Principle

Richard Musgrave (1959) used the exclusion principle -- whether it is possible to exclude someone from benefitting from a good once it is produced -- to divide the world into two types of goods. Musgrave demonstrates that there exists a substantial class of goods "where the market mechanism fails all together. . . . Social wants must be satisfied through the budget if they are to be satisfied at all" (1959: 809).

Both Samuelson and Musgrave were interested in the same question. They attempted to find a single criteria that would enable them to predict when market institutions would perform optimally and when markets would fail. The difference in their approach can be illustrated in Figure 1. Samuelson uses his classification to argue that all of the left-hand column, and none of the right-hand column,

include goods which can effectively be allocated through market mechanisms. Musgrave uses his classification to argue that all of the top row and none of the bottom row include goods which can effectively be allocated through market mechanisms.

[Figure 1 About Here]

Both Samuelson and Musgrave were criticized for their inadequate definition of goods for which a market is (or is not) an efficient allocation arrangement. Margolis (1955), for example, pointed to many goods, such as airplanes and theaters, which met Samuelson's definition of collective consumption goods but were easily to be allocated using market mechanisms. John Head (1962) pointed out that most of the exemplars used by economists as "clearly" public goods needing public, rather than private, provision shared both attributes. It is infeasible to exclude anyone within a nation from gaining the benefit of national defense once it is produced, and one person's benefit does not subtract from that available to others. Head argued that both attributes were independent and both were needed to define what has traditionally been considered a pure public good (see also V. and E. Ostrom, 1977, and Riker and Ordeshook, 1973).

Head made a convincing argument for the independence of these two attributes and the necessity of using both to begin to include the exemplars of public goods normally included as well as excluding some of the problematic exemplars. While some scholars carefully use both attributes to define public goods (see, for example, Chamberlin, 1974), many theorists including Olson have continued to rely explicitly on Samuelson's criteria or Musgrave's criteria. (See Blumel, Pethig, and van den Hagen, 1986, for a recent review of this literature.)

The reluctance to use two attributes, rather than one, to classify phenomena in the world stems from two concerns. The first concern is the generality of a theory. The fewer variables needed to identify the empirical referent of a theory, the more general, i.e., the more inclusive, the frame of reference of that theory. To the extent that social scientists can develop theories with a wide scope of reference, theories are considered more powerful in the sense that they can be used to explain a wider array of phenomena. Substantial resistance is exhibited by some social scientists to using more than a single variable to identify the phenomena of relevance to a theory. If it were possible to develop useful theories based on dichotomizing the world into two types of phenomena and institutional arrangements into market and government, then only two general theories would be needed to explain social, economic, and political phenomena. While both dichotomies have been useful for some purposes, both fail for other purposes as each sweeps vast diversity into the "same" class. Plott and Meyer (1975: 66) have observed that "the conception of a public good" relying on a single variable "is so broad it comes dangerously close to being empty in content." A similar critique can be levied against theories of institutions which demark market and government with a single attribute.

The other source of resistance to using both jointness and exclusion as independent variables is that some scholars cannot accept them as independent attributes. Barry and Hardin (1982: 183), for example, question the logical independence of the two variables. To them "jointness does not imply impossibility of exclusion." But they cannot accept the other part of genuine independence. "The literal

impossibility of exclusion, however, does imply jointness because if no one can be excluded then everyone can enjoy the good at no cost" (Ibid., 183-184; see also Snidal, 1979).

Olson's Classification Based on the Exclusion Principle

It is in the context of this unsettled conceptual debate that Olson's theory needs to be viewed. Olson's purpose in using the concept of public goods differed from that of Musgrave and Samuelson. He was not interested in establishing the types of goods which could or could not be allocated effectively through market institutions. Rather, he tried to argue that the phenomena called "public goods" was a large class including many states of affairs relevant to private associations. He presumed that when individuals wished to achieve a common objective -- whatever that might be -- problems stemming from the lack of exclusion would make it difficult for them to achieve this common objective without positive or negative incentives.

In his attempt to base this argument on logical grounds, he chose to use Musgrave's definition of public goods. His formal definition of a public good was:

> A common, collective, or public good is here defined as any good such that, if any person X_i in a group $X_1,\ldots,X_i,\ldots,X_n$ consumes it, it cannot feasibly be withheld from the others in that group. In other words, those who do not purchase or pay for any of the public or collective good cannot be excluded or kept from sharing in the consumption of that good, as they can where noncollective goods are concerned (Olson, 1965: 14-15).

In a long footnote, Olson justifies the use of Musgrave's criteria because "collective goods produced by organizations of all kinds seem to be such that exclusion is normally not feasible" (1965: 14). Olson also mentions that Head had shown "most clearly that nonexcludability is only one of two basic elements in the traditional understanding of public goods" (Ibid.). Olson identified the other attribute involved in the "traditional" understanding as jointness of supply. He defined jointness as characteristic of a good when "making it available to one individuals means that it can be easily or freely supplied to others as well" (Ibid.). Olson specifically states that by his definition, "jointness is not a necessary attribute of a public good." The footnote makes clear that Olson self-consciously adopted Musgrave's single attribute definition, rejected Samuelson's single attribute definition, and rejected Head's argument that two attributes were necessary to define public goods.

This self-conscious choice of a single attribute in the explicit definition was most likely an effort to build as general a theory as he could. If Olson could develop a theory which was relevant for the entire bottom row (including both Cell C and Cell D) of Figure 1, it would be a more general and powerful theory than if he explicitly limited his theory to only one cell. Olson takes considerable pains at several junctures in the text and in footnotes to stress the generality of the analysis. Given this self-conscious decision, it is important to ask whether Olson was successful in developing a theory that applied equally well to all phenomena included in Cell C and Cell D. Or, was his work limited in its relevance to a single cell?

In his formal model, Olson uses two terms which could be interpreted as a collective good. The first term is "T" which he defines to be a rate or level variable similar to a tax rate or, to use his specific example, a tax rebate rate. The property owners within a jurisdiction all share an interest in obtaining a rebate. If a rebate were obtained, no one who owns property in the jurisdiction can be excluded. Olson is always careful to note that the group affected by a good is specific to that good. The second term is what he calls "group gain" or "V_g." V_g is obtained when T is applied to the assets held by the group "S_g." The value to the group in the example is equal to TS_g. In the example which he interweaves with his formal model, V_g is the total amount of money saved by the property owners of a jurisdiction from any particular tax rebate obtained. Each taxpayer receives a fraction of this total $F_i = V_i/V_g$ depending on the amount of assets Si held by the taxpayer.

T and V_g both meet Musgrave's criteria for a public good, but they differ in regard to Samuelson's criteria. T is jointly supplied and would be classified in Cell D of Figure 1. V_g can be parcelled out to individuals according to the relations $Vg = \sum_{i}^{n} Vi$. Thus, Vg meets Samuelson's definition of a "private consumption good" and would be classified in Cell C.

Olson uses this model to address the question whether any collective good will be provided and, if so, whether the amount will be optimal. He presumes that each individual acts independently of all others and either invests or does not invest in some of the collective good depending on the benefit consumed by the individual. The consumed benefit is V_i and not T. (T can be thought of as the

means of producing a pot of money, called V_g, which is then parcelled out to all who are eligible.) The individual decision maker concentrates on V_i and not on T in making independent decisions.

If V_i exceeds the costs of obtaining V_g at some level for at least one individual, some investment in the collective good will be made. The likelihood of this occurring is considered slim in large groups where Olson presumes, but does not logically establish, that F_i will be small for all individuals. He predicts that: (1) collective action will occur only in very small groups, (2) the level of collective good obtained will usually be less than optimal, and (3) the extent of nonoptimality will be positively associated with group size. From the way Olson set up his formal model, these predictions relate to V_g and not to T. Thus, the model applies specifically to phenomena in Cell C and not both Cell C and Cell D.

Olson has actually used two variables to define the phenomena of relevance to his theory: (1) nonexcludability -- by including it in his definition and (2) nonjointness of supply (subtractability of consumption) -- by the way he formulated his model. The illusion of extreme generality disappears once this implicit reliance on two variables is recognized. John Chamberlin (1974) and Martin McGuire (1974) have both shown that most of Olson's conclusions about the level of a good to be provided and the effect of group size hold only for Cell C. They have also shown that the opposite from Olson's conclusions hold for phenomena included in Cell D. Thus, whether the good is subtractive or nonsubtractive in consumption is important enough to change the direction of predicted relationships.

The question now is how this dependence of Olson's predictions on two attributes of goods rather than one should be interpreted. Brian Barry and Russell Hardin (1982: 185) conclude, after reviewing the debate over the definition of public goods, that the analysis of public goods "does not finally play a major role in determining what will or will not be realms for collective action or when collective action will fail or succeed." They reject the presupposition that the types of problems individuals attempt to solve affect the "logic of the situation" that individuals face. Instead, they assert that: "It is the nature of politics, not the nature of the goods, that determine the logic of collective action" (Ibid.)[2] The opposite view has been articulated by A. Allan Schmid in a recent review of neo-institutional economic theory (1986: 133) where he states:

> A key concept for neo-institutional economic theory is the classification of the characteristics of goods which are sources of interdependence. It is the inherent features of goods which influence how one person's acts can potentially affect another. The instrumentality of law depends on the source of the interdependence. If you do not know where the ability of one person to affect another is coming from, you cannot control the opportunities of the parties to potential transactions.

Schmid's position appears is a better foundation for scholars in public administration than the position articulated by Barry and Hardin. Following Schmid, we should attempt to understand the types of interdependencies that citizens face when they attempt to organize in relationship to the achievement of different kinds of goods. The

problems of organizing to provide irrigation, police, education, and public health all differ from one another. One cannot expect that the same kind of institutional arrangements that are equitable and efficient in regard to large-scale water transmission in the Western part of the United States will be equitable and efficient in regard to the provision of quality education for kindergarten to eighth grade even in the same region. Which "instrumentality of law" will work best for organizing collective action does depend "on the source of the interdependence." Casual and not so casual empiricism (as discussed in the last section) provides evidence that a considerable amount of collective action is forthcoming without external coercion. It is hard to accept that the only reason people join groups, such as environmental protection groups, is to obtain a monthly magazine and that the lobbying activity carried on by this group is only a by-product of their success in selling magazines.[3] Theories of collective action need to be able to predict and explain variable responses rather than constant relationships. To do this, theories need to specify variables which produce differences rather than one and only one response. The development of a theory that begins to specify some of the conditions that enhance or detract from the likelihood of efforts to engage in collective action problems is a major step forward.

Some of Olson's most interesting propositions occur where he overtly posits differences within the broad class of events that he calls public goods. This is in his discussion of inclusive and exclusive public goods, which he overtly defines using two attributes:

> My exclusive collective good is then a good such that, at least within some given group, exclusion is not feasible, but at the same time such that there is no jointness of supply whatever, so that the members of the group hope that others can be kept out of the group. My inclusive collective good is also such that exclusion is infeasible, at least within some given group, but it is however also characterized by at least some considerable degree of jointness in supply, and this accounts for the fact that additional members can enjoy the good with little or no reduction in the consumption of the old members (Footnote 58, p. 38).

Olson compares the internal behavior of groups primarily related to exclusive public goods (Cell C) and those related primarily to inclusive public goods (Cell D). When compared, groups who are benefitted primarily by exclusive public goods will be characterized by the following:

(1) They will try to keep the size of their group as small as possible by discouraging new entrants.

(2) They will make a great effort to get as close as possible to 100 percent participation in collective action since "even one non-participant can usually take all of the benefits brought about by the action of [others] for himself" (Olson, 1965: 41).

(3) The incentives for individuals to be holdouts are higher and thus any collective action is more unlikely.

(4) Each individual member is more likely to perceive the structural interdependence of outcomes on the actions of others as well as on his own.

(5) Therefore, the intensity and complexity of the bargaining processes will be higher.

The quantity of a collective good which is consumed jointly is not limited, Olson argues, for the inclusive group (Cell D). An inclusive group will follow a long-run strategy of adopting rules that increase membership. The more members in an inclusive group, the more individuals who will share the costs of providing a good to all beneficiaries. Olson also predicts that bargaining and strategic interaction will be less intense in an inclusive group.

> This is partly because there is no desire to eliminate anyone from the inclusive group. It is also partly because nothing like unanimous participation is normally required, so that individuals in the inclusive group are not so likely to try to be holdouts in order to get a larger share of the gains. This tends to reduce the amount of bargaining (and also makes group-oriented action more likely) (Olson, 1965: 42).

A central conclusion of Olson's theoretical chapter is that internal group dynamics will vary in dramatic ways depending on whether the good which a group is attempting to obtain is subtractive in consumption or not. Groups trying to organize to provide a good which is subtractive in consumption will attempt to stay quite small, attempt to move toward unanimous participation, and may be characterized by intense negotiation and bargaining. Groups trying to

provide a good which is not subtractive in consumption will tend to expand membership to a large group, rely to a lesser extent on 100 percent participation, and will be characterized by less intense bargaining. These conclusions do not carry the same substantive implications as Olson's introductory statement that . . . "rational, self-interested individuals will not act to achieve their common or group interests."

Implications for Administrative Theory

The implications of a theory of collective action based on finer distinctions among the attributes of goods as well as a clearer set of definitions about the attributes of a group, will lead to different conclusions than the presumption that individuals will usually not achieve collective interests. Instead of concluding that collective action is extremely unlikely, the conclusion is that various factors related to the physical world and to the group involved affect the probability that individuals will achieve collective action. A recent set of studies, commissioned by a panel of the National Academy of Science, provides evidence consistent with this presumption that humans are able, under some conditions, to organize themselves voluntarily for a common objective. The panel commissioned a series of studies of small resource systems all of which meet the conditions of Cell C in Figure 1 (see Oakerson, 1987, for the model used in designing the studies). The resource systems studied included small inshore fisheries, irrigation systems, grazing lands, forest lands, and common agricultural/grazing lands. The resource systems were

located in Third World settings where the dominant presumption has been that indigenous peoples are not able to avert the "tragedy of the commons" through their own collective action.

The surprising findings from this set of commissioned studies is that where central administrative agencies have not yet attempted to manage local resources on a day-to-day basis, many fragile resource systems are being managed through self-organized and administered rule systems. Cordell (1987) describes a form of "sea tenure" developed by extremely poor, black fishermen living along the swamps of Brazil which has enabled local fishermen to maintain a sustainable yield of fish for many years. Wade (1987) describes a sophisticated village-operated system to auction the rights to graze residual stubble to migrating herdsmen. The herdsmen must not only pay for the stubble but they must also abide by the village's rules when they bring large herds of sheep onto village lands. The system that Wade describes is intriguing not only for the delicate balance achieved through a rather ingenious set of rules but also because the apparatus is essentially illegal from the perspective central administrative officials.

Berkes (1987) describes common-property arrangements developed in three modern Turkish inshore fisheries that have improved the cost effectiveness of the fisheries and achieved an equitable allocation of rights to fish. Berkes also describes two inshore fisheries in Turkey which have not achieved local regulation. The key differences between the successful and unsuccessful cases is the number of fishermen and the availability of multiple places to land boats and sell fish (thus reducing the noticeability of each fisherman's actions). Thus size of group and noticeability appear to make a fundamental difference in the

capacity of a local group to organize itself to manage an inshore fishery (see also Berkes, 1985; 1986).

Failure to achieve effective management of small resources has also occurred in the case of forestry management in Nepal (Arnold and Campbell, 1987). In Nepal, indigenous institutions were replaced by a central administrative agency unable to enforce its rules of access and use after destroying the local rule systems which had been in operation for years. Kisangani (1987) describes the hunting patterns for elephants under several colonial regimes in Zaire where central administrative agencies tried unsuccessfully to impose one set of rules on all. Instead of protecting the elephants from excessive hunting, the centrally imposed rules protected the wealthy, white hunters from prosecution and exposed indigenous hunters, who had respected hunting norms for centuries, to prosecution for "poaching on government land." Wynne (1987) describes a central government reform in Botswana which replaced local institutions for the allocation of land with a system where the participants are not able to obtain the necessary information to allocate land in an equitable and productive manner. Thomson, Feeny, and Oakerson (1987) also address the question of what happens when indigenous institutions are replaced by central administrative agencies.

The findings from this series of studies are strong and surprising to those who have presumed that individuals cannot organize themselves to achieve collective ends. An initial search of literature reveals a large number of case studies describing indigenous local institutions which enable local groups to manage complex common-pool resource systems rather well (Netting, 1976; 1982;

Gilles and Jamtgaard, 1981; Gray, 1963; Coward, 1980; Dahlman, 1980; Liebenow, 1981; Martin, 1987; McCay and Acheson, 1987; Rhoades and Thompson, 1975; Siy, 1982; Field, 1985). What we know from these studies is that it is possible for humans, who use a relatively small, common-pool resource system, and who are allowed to organize their own sets of rules related to entry and use, to manage these resources in an equitable and an efficient manner over long periods of time. Locally organized and administered, small-scale, resource management regimes exist in many different settings all over the world. The evidence is consistent with Olson's theory. These groups would be classified as intermediate groups because the institutional rules they are using make each person's actions noticeable. Since these groups are organized to obtain exclusive, rather than inclusive goods, we should expect, and do find, these groups trying to keep their size relatively small and trying to achieve close to full participation. It is no wonder that long-standing forms of cooperation disappear when external governmental authorities sponsor new and external users to engage in "resource development" in regions that had previously been subject to common-property management. Some of the most notorious examples of the collapse of previously stable institutions for managing resources have occurred in regard to inshore fisheries (see Cordell, 1987; Davis, 1984).

This is not to say that all such systems work well. Nor, can we ignore the many large-scale "tragedies of the commons" which have ended in the elimination of valuable species, high levels of pollution in urban areas, and many other collective "bads." Our attention, however, has been diverted in recent times to large-scale systems as

exemplars for all resource systems everywhere. The interpretation given to the work of Olson and that of Garrett Hardin has led to the expectation of failure unless central authorities intervene.

The implications for the practice of administration -- particularly development administration -- are rather important (see Uphoff, 1982; Esman, 1986; and Leonard and Marshall, 1982, for a similar argument). Instead of presuming that all resources in developing areas will be overused unless central authorities impose central rules, one might reverse the "burden of proof." Before the imposition of a central administrative system to regulate all water, land, and forest resources in a country, serious efforts should be made to understand where local rules and customs may effectively regulate environmental use even though overt signs of modern administrative agencies do not exist. Unless one looks carefully at many of these local resource management systems, one cannot see the administrative apparatus. Those who are the users of many common-pool resources are themselves the co-owners, the co-administrators, and to co-governors of their own systems. The absence of a local office, local files, and specialized officers is not prima facia evidence that collective action is absent.

The implications for the study of administration are also rather important. We need to undertake more theoretical work on the theory of collective action so that we can begin to generate a much richer set of testable hypotheses about the conditions which enhance or detract from the likelihood that individuals will engage in collective action to regulate important aspects of their own lives. A useful theory of democratic administration is dependent on an understanding

of the conditions under which humans will accept responsibility for managing their own environments as well as the conditions under which this will not occur (see Kaufmann, Majone, and V. Ostrom, 1986). There is an important role for large-scale administrative agencies in all societies. But, if this becomes the major institutional device recommended for all social ills, we may find ourselves with an administrative theory adequate for the study of Leviathans but not for the study of mixed, multi-level administrative systems characteristic of truly democratic societies.

Notes

[1]In a fascinating study of the unintended and perverse consequences of national governmental regulation of coastal fishery resources, Anthony Davis (1984) points out that officials of the Canadian Federal Department of Fisheries are firmly convinced that a "tragedy of the commons" will occur in all fisheries without a uniform imposition of central regulations. These national regulations ignore, and, in some cases, are contrary to local regulations for managing small boat fisheries that have been in practice for several generations. The national policies are generating substantial threats to the long-term viability of small boat fisheries which had been ecologically viable for a long time.

[2]Hardin himself does not seem to accept this assertion himself as he attempts to develop in his own book (1982) several attributes of goods that he considers to affect the logic of collective action.

[3]This is an argument that Russell Hardin (1982) makes quite effectively. A recent series of studies sponsored by the Panel on Common Property Management of the National Academy of Science has produced considerable evidence of collective action without external administrative action (see National Research Council, 1987).

References

Arnold, J. E. M. and J. Gabriel Campbell. 1987. Collective Management of Hill Forests in Nepal: The Community Forestry Development Project. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Barry, Brian and Russell Hardin. 1982. Rational Man and Irrational Society? An Introduction and Source Book. Beverly Hills: Sage Publications.

Bentley, Arthur. 1949. The Process of Government. Evanston, IL: Principia Press.

Berkes, Fikret. 1985. Fishermen and 'The Tragedy of the Commons'. Environmental Conservation, 12:199-206.

_____. 1986. Local-Level Management and the Commons Problem: A Comparative Study of Turkish Coastal Fisheries. Marine Policy, 10:215-229.

_____. 1987. Marine Inshore Fishery Management in Turkey: Some Examples, Problems and Prospects." In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Blumel, Wolfgang, Rüdizer Pethig, and Oskar van den Hagen. 1986. The Theory of Public Goods: A Survey of Recent Issues. Journal of Institutional and Theoretical Economics, 142:241-309.

Bromley, Daniel W. and Devendra P. Chapagain. 1984. The Village Against the Center: Resource Depletion in South Asia. American Journal of Agricultural Economics, 66:868-873.

Buchanan, James. 1968. The Demand and Supply of Public Goods. Chicago: Rand McNally.

Carruthers, Ian and Roy Stoner. 1981. Economic Aspects and Policy Issues in Groundwater Development. World Bank Staff Working Paper No. 496. Washington, DC: The World Bank.

Chamberlin, John. 1974. Provision of Collective Goods as a Function of Group Size. American Political Science Review, 68:707-716.

Cordell, John. 1987. Sea Tenure in Bahia. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Coward, E. Walter, Jr. 1980. Irrigation and Agricultural Development in Asia: Perspectives from Social Sciences. Ithaca, NY: Cornell University Press.

Dahlman, Carl. 1980. The Open Field System and Beyond: A Property Rights Analysis of an Economic Institution. Cambridge, England: Cambridge University Press.

Davis, Anthony. 1984. Property Rights and Access Management in the Small Boat Fishery: A Case Study from Southwest Nova Scotia. In Cynthia Lamson and Arthur J. Hanson, eds., Atlantic Fisheries and Coastal Communities: Fisheries Decision-Making Case Studies. Halifax: Dalhousie Ocean Studies Programme.

Dove, Michael R. 1986. Peasant versus Government Perception and Use of the Environment: A Case-study of Banjarese Ecology and River Basin Development in South Kalimantan. Journal of Southeast Asian Studies, 17:113-136.

Ehrenfeld, David W. 1972. Conserving Life on Earth. New York: Oxford University Press.

Esman, Milton. 1986. The Maturing of Development Administration. Paper presented at the American Society for Public Administration, Anaheim, California.

Feeny, David. 1987. Where Do We Go From Here?: Observations on the Implications for the Research Agenda. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Field, Barry C. 1985. The Evolution of Individual Property Rights in Massachusetts Agriculture, 17th-19th Centuries. Northeastern Journal of Agricultural and Resource Economics, 14:97-109.

Frohlich, Norman and Joe A. Oppenheimer. 1970. I Get By with a Little Help from My Friends. World Politics, 23:104-120.

Gilles, Jere Lee and Keith Jamtgaard. 1981. Overgrazing in Pastoral Areas: The Commons Reconsidered. Sociologia Rurales, 21:129-141.

Gray, Robert F. 1963. The Sonjo of Tanganyika. An Anthropological Study of an Irrigation-Based Society. London: Oxford University Press.

Hardin, Garrett. 1968. The Tragedy of the Commons. Science, 162:1,243-1,248.

Hardin, Russell. 1971. Collective Action as an Agreeable N-Prisoners' Dilemma. Behavioral Science, 16:472-481.

Hardin, Russell. 1982. Collective Action. Baltimore, MD: The Johns Hopkins Press.

Head, John G. 1962. Public Goods and Public Policy. Public Finance, 17:197-219.

Heilbroner, Robert L. 1974. An Inquiry Into the Human Prospect. New York: W. W. Norton.

Isaac, R. Mark and James M. Walker. 1986. Group Size Effects in Public Goods Provision: The Voluntary Contribution Mechanism. Working paper. Tucson: University of Arizona, Department of Economics.

_____. 1987. Success and Failure of the Voluntary Contributions Process: Some Evidence from Experimental Economics. Prepared for the Liberty Fund Seminar on the Ethics and Economics of Charity, San Diego, California.

Jodha, N. S. 1987. Common Property Resource and Rural Poor in Dry Regions of India. Economic and Political Weekly, 21:1,169-1,181.

Kaufmann, Franz-Xaver, Giandomenico Majone, and Vincent Ostrom. 1986. Guidance, Control, and Evaluation in the Public Sector. Berlin and New York: Walter de Gruyter.

Kisangani, Emizet. 1987. A Social Dilemma in a Less Developed Country: The Massacre of Loxodonta Africana in Zaire. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Leonard, David and Dale R. Marshall. 1982. Institutions of Rural Development for the Poor: Decentralization and Organizational Linkages. Berkeley: University of California, Institute of International Studies.

Liebenow, J. Gus. 1981. Malawi: Clean Water for the Poor. American University Field Staff Reports, Africa, No. 40.

Margolis, Julius. 1955. A Comment on the Pure Theory of Public Expenditures. Review of Economics and Statistics, 37:347-349.

Martin, Fenton. 1987. Common Pool Resources and Collective Action: A Preliminary Bibliography. Bloomington, IN: Indiana University, Workshop in Political Theory and Policy Analysis.

McCay, Bonnie J. and James M. Acheson. 1987. Capturing the Commons. Tucson: University of Arizona Press.

McGuire, Martin. 1974. Group Segregation and Optimal Jurisdictions. Journal of Political Economy, 82:112-132.

McKean, Margaret. 1987. Management of Traditional Common Lands (Iriaichi) in Japan. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Musgrave, Richard A. 1959. The Theory of Public Finance: A Study in Public Economy. New York: McGraw-Hill.

National Research Council. 1987. Proceedings of the Conference on Common Property Management. Washington, DC: National Research Council.

Netting, Robert McC. 1976. What Alpine Peasants Have in Common: Observations on Communal Tenure in a Swiss Village. Human Ecology, 4:135-146.

_____. 1982. Territory, Property, and Tenure. In R. McC. Adams, N. J. Smelser, and D. J. Treiman, eds., Behavioral and Social Science Research: A National Resource. Washington, DC: National Academy Press.

Norgaard, Richard B. 1981. Sociosystem and Ecosystem Coevolution in the Amazon. Journal of Environmental Economics and Management, 8:238-254.

Oakerson, Ronald J. 1987. A Model for the Analysis of Common Property Problems. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Olson, Mancur. 1965. The Logic of Collective Action, Public Goods and the Theory of Groups. Cambridge, MA: Harvard University Press.

Ophuls, William. 1973. Leviathan or Oblivion. In Herman E. Daley, ed., Toward a Steady State Economy. San Francisco: W. H. Freeman.

Ostrom, Vincent. 1974. The Intellectual Crisis in American Public Administration. University, AL: University of Alabama Press.

Ostrom, Vincent. 1987. The Political Theory of a Compound Republic: Designing the Political Experiment. Lincoln, NE: University of Nebraska Press.

_____ and Elinor Ostrom. 1977. Public Goods and Public Choices. In E. S. Savas, ed., Alternatives for Delivering Public Services. Boulder, CO: Westview Press, 7-49.

Plott, Charles and Robert A. Meyer. 1975. The Technology of Public Goods, Externalities, and the Exclusion Principle. In Edwin S. Mills, ed., Economic Analysis of Environmental Problems. New York: National Bureau of Economic Research.

Rapoport, Annon. 1985. Provision of Public Goods and the MCS Experimental Paradigm. American Political Science Review, 79:148-155.

Rhoades, Robert E. and Stephen J. Thompson. 1975. Adaptive Strategies in Alpine Environments: Beyond Ecological Particularism. American Ethnologist, 2:535-551.

Riker, William and Peter C. Ordeshook. 1973. An Introduction to Positive Political Theory. New York: Prentice Hall.

Runge, Carlisle F. 1984. Institutions and the Free Rider: The Assurance Problem in Collective Action. Journal of Politics, 46:154-181.

Samuelson, Paul A. 1954. The Pure Theory of Public Expenditure. Review of Economics and Statistics, 36:387-389.

Schelling, Thomas C. 1978. Micromotives and Macrobehavior. New York: W. W. Norton.

Schmid, A. Allan. 1986. Neo-Institutional Economic Theory: Issues of Landlord and Tenant Law. In Terence Daintith and Gunther Teubner, eds., Contract and Organization: Legal Analysis in the Light of Economic and Social Theory. New York: Walter de Gruyter.

Siy, Robert. 1982. Community Resource Management: Lessons from the Zanjera. Quezon City: University of the Phillippines Press.

Snidal, Duncan. 1979. Public Goods, Property Rights, and Political Organizations. International Studies Quarterly, 23:532-566.

Thomson, James T., David Feeny, and Ronald J. Oakerson. 1987. Institutional Dynamics: The Evolution and Dissolution of Common Property Resource Management. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Truman, David B. 1958. The Governmental Process. New York: Alfred A. Knopf.

Uphoff, Norman T. 1982. Local Institutional Development: An Analytical Handbook with Empirical Examples. West Hartford, CT: Kumarian Press.

van de Kragt, Alphons, John Orbell, and Robyn Dawes. 1983. The Minimal Contributing Set as a Solution to Public Goods Problems. American Political Science Review, 77:112-122.

Wade, Robert. 1987. Common Property Resource Management in South Indian Villages. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Wynne, Susan. 1987. Information Problems Involved in Partitioning the Cultivation Commons. In National Resources Council, Proceedings of the Conference on Common Property Resource Management. Washington, DC: National Resources Council.

Figure 1

Samuelson's and Musgrave's Classification of Goods

Musgrave's Classification	Samuelson's Classification: 1 person's consumption subtracts from total available to others	Samuelson's Classification: 1 person's consumption does not subtract from total available to others
Exclusion is feasible	Cell A	Cell B
Exclusion is not feasible	Cell C	Cell D