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Choice, Rules and Collective Action

The Ostroms on the Study of Institutions and Governance

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Chapter Four

An Agenda for the Study of Institutions[1]

Elinor Ostrom[2]

The multiple meanings of institutions

Recently, public choice theorists have evidenced considerable interest in the study of institutions. William Riker (1982: 20) recently observed, for example, that 'we cannot study simply tastes and values, but must study institutions as well'. Little agreement exists, however, on what the term 'institution' means, whether the study of institutions is an appropriate endeavour, and how to undertake a cumulative study of institutions.

Riker defines institutions as 'rules about behavior, especially about making decisions' (1982: 4). Charles Plott also defines institutions to mean 'the rules for individual expression, information transmittal, and social choice [...]' (1979: 156). Plott uses the term 'institutions' in his effort to state the fundamental equation of public choice theory. Using $\oplus$ as an unspecified abstract operator, Plott's fundamental equation is:

preferences $\oplus$ institutions $\oplus$ physical possibilities = outcomes (1)

Plott himself points out, however, that the term institution refers to different concepts. He ponders:

> Could it be, for example, that preferences and opportunities *alone* determine the structure of institutions (including the constitution)? These questions might be addressed without changing 'the fundamental equation' but before that can be done, *a lot of work must be done on determining exactly what goes under the title of an 'institution'*. Are customs and ethics to be regarded as institutions? What about organizations such as coalitions? These are embarrassing questions

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2. This paper was delivered as the Presidential address at the Public Choice Society meetings, Phoenix, Arizona, March 30, 1984. It was initially published in *Public Choice* 48 (1), 1986, pp. 3–25.

which suggest the 'fundamental equation' is perhaps not as fundamental as we would like (Plott 1979: 160; my emphasis).

Plott's questions are indeed embarrassing. No scientific field can advance far if the participants do not share a common understanding of key terms in their field. In a recent volume entitled *The Economic Theory of Social Institutions*, Andrew Schotter specifically views social institutions as standards of behavior rather than the rules of the game. What Schotter calls 'social institutions':

> are not rules of the game but rather the alternative equilibrium standards of behavior or conventions of behavior that evolve from a given game described by its rules. In other words, for us, institutions are properties of the equilibrium of games and not properties of the game's description. We care about what the agents do with the rules of the game, not what the rules are (Schotter 1981: 155).

Schotter sees his enterprise as a positive analysis of the regularities in behavior that will emerge from a set of rules and contrasts this with a normative approach that attempts to examine which rules lead to which types of behavioural regularities. Schotter draws on a rich intellectual tradition that stresses the evolution of learned strategies among individuals who interact with one another repeatedly over a long period of time (Menger 1963; Hayek 1976; 1978; *see also*, Ullman-Margalit 1978; Taylor 1976; Nozick 1975). Rawls characterizes this view of how individuals come to follow similar strategies over time as 'the summary view of rules' (Rawls 1968: 321).

Still another way of viewing 'institutions' is equivalent to the term 'political structure'. This view differs from that of Schotter in that it does not equate institutions with behavioural regularities. It differs from that of Riker and Plott in that it does not focus on underlying rules. Institutions, defined as political structure, refer to attributes of the current system such as size (Dahl and Tufte 1973), degree of competition (Dye 1966; Dawson and Robinson 1963), extent of overlap (ACIR 1974) and other attributes of a current system.

The multiplicity of uses for a key term like 'institution' signals a problem in the general conception held by scholars of how preferences, rules, individual strategies, customs and norms, and the current structural aspects of ongoing political systems are related to one another. Over time we have reached general agreement about how we will use such key theoretical terms as 'preferences', 'actions', 'outcomes', 'coalitions' and 'games'. Further, we have a general agreement about how these concepts are used in our theories to generate predicted outcomes.

The multiple referents for the term 'institutions' indicate that multiple concepts need to be separately identified and treated as separate terms. We cannot communicate effectively if signs used by one scholar in a field have different referents than the same sign used by another scholar in the same field. As scholars, we are in our own game situation – a language generating game. The 'solution' is the result of our choice of strategies about the use of a set of terms to refer to the objects and relations of interest in our field.

No one can legislate a language for a scientific community. Scholars begin to use a language consistently when terms are carefully defined in a manner perceived by other scholars as useful in helping to explain important phenomena. In this presentation, I do not try to resolve the debate over which of the definitions of institution is the 'right definition'. Instead, one concept –that of rules– is used as a referent for the term 'institution', and defined. I distinguish rules from physical or behavioural laws and discuss the prescriptive nature of rules. Then I show how theorists use rules in public choice analysis. Two methodological issues are raised. One relates to the configurational character of rules. A second relates to the multiple levels of analysis needed for the systematic study of rules. In the last section, I propose an alternative strategy that takes into account the configurational character of rules and the need for a self-conscious study of multiple levels of analysis.

What is meant by rules

Focusing specifically on the term 'rule' does not immediately help us. Even this narrower term is used variously. Shimanoff (1980: 57) identified over 100 synonyms for the term 'rule' (*see also* Ganz 1971). Even among political economists the term is used to both refer to personal routines or strategies (e.g. Heiner 1983) as well as to a set of rules used by more than one person to order decision making in interdependent situations. In game theory, 'the rules of the game include not only the move and information structure and the physical consequences of all decisions, but also the preference systems of all the players' (Shubik 1982: 8).

Rules, as I wish to use the term, are potentially linguistic entities (Ganz 1971; V. Ostrom, 1980; Commons, 1957) that refer to prescriptions commonly known and used by a set of participants to order repetitive, interdependent relationships. Prescriptions refer to which actions (or states of the world) are required, prohibited, or permitted. Rules are the result of implicit or explicit efforts by a set of individuals to achieve order and predictability within defined situations by: (1) creating positions (e.g. member, convener, agent, etc.); (2) stating how participants enter or leave positions; (3) stating which actions participants in these positions are required, permitted, or forbidden to take; and (4) stating which outcome participants are required, permitted, or forbidden to affect.

Rules are thus artifacts that are subject to human intervention and change (V. Ostrom 1980). Rules, as I wish to use the term, are distinct from physical and behavioural laws. I use the term differently than a game theorist who considers linguistic prescriptions as well as physical and behavioural laws to be 'the rules of the game'. If a theorist wants only to analyse a given game or situation, no advantage is gained by distinguishing between rule on the one hand, and physical or behavioural laws, on the other hand. To change the outcomes of a situation, however, it is essential to distinguish rules from behavioural or physical laws. Rules are the means by which we intervene to change the structure of incentives in situations. It is, of course, frequently difficult in practice to change the rules participants use to order their relationships. Theoretically, rules can be changed

while physical and behavioural laws cannot. Rules are interesting variables precisely because they are potentially subject to change. That rules can be changed by humans is one of their key characteristics.

That rules have prescriptive force is another characteristic. Prescriptive force means that knowledge and acceptance of a rule leads individuals to recognize that, if they break the rule, other individuals may hold them accountable (*see* Harré 1974). One may be held accountable directly by fellow participants, who call rule infraction to one's attention, or by specialists – referees or public officials – who monitor performance. The term 'rules' should not be equated with formal laws. Formal laws may become rules when participants understand a law, at least tacitly, and are held accountable for breaking a law. Enforcement is necessary for a law to become a rule. Participants may design or evolve their own rules or follow rules designed by others.

An unstated assumption of almost all formal models is that individuals are, in general, rule followers. Even when theorists like Becker (1976) have overtly modelled illegal behavior, some probability is presumed to exist that illegal actions will be observed, and if observed by an enforcer, that penalties will be extracted. Most public choice analysis is of the rules in use – or working rules as John R. Commons (1957) called them. Many interesting questions need exploration concerning the origin of rules, the relationship of formal laws to rules, and processes for changing rules. But, these topics cannot be addressed here.

Considerable dispute exists over the prescriptive force of 'permission'. Ganz (1971) and Shimanoff (1980) argue that prescriptive force is restricted to 'obligation' and 'prohibition' and does not include 'permission', while Commons (1957), von Wright (1968), V. Ostrom (1980) and Toulmin (1974) all overtly include 'permission' in their conception of rules. Part of this difficulty stems from efforts to predict behavior directly from specifying rules rather than viewing rules as a set of variables defining a structured situation. In this rule-structured situation, individuals select actions from a set of allowable actions in light of the full set of incentives existing in the situation.

Instead of viewing rules as directly affecting behavior, I view rules as directly affecting the structure of a situation in which actions are selected. Rules rarely prescribe one and only one action or outcome. Rules specify sets of actions or sets of outcomes in three ways:

1. A rule states that some particular actions or outcomes are forbidden. The remaining physically possible or attainable actions and outcomes are then permitted. The rule states what is forbidden. A residual class of actions or outcomes is permitted. (Most traffic laws regarding speed are of this type. The upper and lower bounds of the permitted speed are delimited by forbidding transit above and below specific speeds.)

2. A rule enumerates specific actions or outcomes or states the upper and lower bound of permitted actions or outcomes and forbids those that are not specifically included. (Most public agencies are authorized to engage in only those activities specifically enumerated in the organic or special legislation that establishes them.)

3. A rule requires a particular action or outcome. (Recent efforts to constrain judicial discretion are rules of this type. A judge must impose a particular sentence if a jury concludes that a defendant is guilty of a particular crime.)

Only the third type of rule requires that an individual take one and only one action rather than choose from a set of actions. The third type of rule is used much less frequently to structure situations than the first two.

In the everyday world, rules are stated in words and must be understood (at least implicitly) for participants to use them in complex chains of actions. For analysis, however, rules can be viewed as relations operating on the structure of a situation. Rules can be formally represented as relations, whose domain are the set of physically possible variables and their values, and whose range are the values of the variables, in the situation under analysis. (*See* below for further elaboration.) Viewing rules as directly affecting the structure of a situation, rather than as directly producing behavior, is a subtle but extremely important distinction.

How rules are used in public choice theory

Most public choice theorists 'know' that multiple levels of analysis are involved in understanding how rules affect behavior. But this tacit knowledge of the multiple levels of analysis and how they intertwine is not self-consciously built into the way we pursue our work. Plott, for example, has been engaged in a sophisticated research program related to the theoretical and experimental study of rules. Yet, as discussed above, he poses the central question of our discipline as a single equation, rather than as a set of equations. We have not yet developed a self-conscious awareness of the methodological consequences of the multiple levels of analysis needed to study the effects of rules on behavior and outcomes.

Most public choice theorists also 'know' that configurations of rules rather than single rules, jointly affect the structure of the situations we analyse. Again, this tacit knowledge is not reflected in the way we proceed. Most of our theoretical work has proved theorems about the expected results of the use of one rule in isolation of other rules as if rules operated separably rather than configurationally.

To illustrate the multiple levels of analysis and the configurational character of rules, I will use several examples from public choice literature. The first example combines the work of several scholars who have studied how citizen's preferences for public goods are translated through two arenas - an electoral arena and a bargaining arena - into an agreement that a bureau will produce a particular quantity of goods for a particular budget. The second example is from an experimental study of Grether, Isaac and Plott (1979) of the combination of default condition rules used in conjunction with aggregation rules. The third example is from McKelvey and Ordeshook (1983) who conducted an experimental study of the conjunction of three rules.

Rules as they affect outcomes in electoral and bargaining arenas. In a classic model of the election arena, Anthony Downs (1957) concludes that electoral procedures based on plurality vote will constrain a governing party to select (and therefore produce) the output-cost combination most preferred by a median voter within a community. The Downsian model predicts an optimal equilibrium in terms of allocative efficiency. Downs's prediction of optimal performance results from his analysis of the behavior of elected officials under the threat of being voted out of office by a competing party. It is the presence of a competitor ready to snatch any advantage that pushes the government party toward constant attention to what citizens prefer.

When William Niskanen (1971) examines how bureaucracy affects the linkage between citizen preferences and government performance, he focuses on the process of bargaining between the team of elected officials (called the sponsor by Niskanen) and bureau chiefs assigned the responsibility to direct agencies producing the desired goods and services. Niskanen assumes that a bureau chief attempts to obtain as large a budget as possible in order to secure the most private gain and to produce the most goods and services for a community. Niskanen's elected officials, like Downs's, know the preferences of the citizens that elect them. So do the bureau chiefs. However, elected officials do not know the production costs of the bureau. The equilibrium predicted by Niskanen is not responsive to citizen preferences since more than optimal levels of output are produced. The predicted result is technically efficient, but unresponsive to the preferences of those served.

Niskanen's model is based on an assumption that bureau chiefs could threaten elected officials with no output if the officials did not agree to the initial demand. Romer and Rosenthal (1978) argue that a more realistic assumption would be that the budget reverts to the status quo budget (the one used for the previous year) if the officials (or, the general public in a referendum) did not agree to the initial budgetary request. Changing this assumption in the model, Romer and Rosenthal continue to predict that the equilibrium budget-output combination represents a nonoptimal, oversupply. Their predicted outcome is, however, less than that predicted by Niskanen.

A dramatic change in assumptions is made by McGuire, Coiner and Spancake (1979) who introduce a second bureau to compete with the monopoly bureau chief in the bargaining arena.[3] Whatever offer is made by one bureau can then be challenged by the second bureau. Over time the offers will approach the same optimal level as predicted by Downs. If one bureau proposes too high a budget, the other will be motivated to make a counteroffer of a more optimal budget-output combination. As the number of bureaus increases beyond two, the pressure on all bureaus to offer an optimal budget-output combination also increases.

3. Niskanen had himself suggested that an important structural change that could be made to improve bureau performance was to increase the competition between bureaus.

The above models focus primarily on the structure of an operational situation and only indirectly on the rules yielding that structure. Without explicit analysis of the rules and other factors affecting the structure of a situation – such as the attributes of goods and the community – implicit assumptions underlying the overt analysis may be the most important assumptions generating predicted results.[4] In the analysis of electoral and bargaining arenas, all theorists used similar assumptions about the nature of goods and community norms. Goods are modelled as divisible in production and subject to a known technology. In regard to norms, all presume a high level of cutthroat competition is acceptable. These assumptions are not responsible for the differences among predicted outcomes.

The models have, however, different implicit or explicit assumptions about some of the rules affecting the situation. The models developed by Niskanen and by Romer and Rosenthal both give the bureau chief the capacity to make a 'take it or leave it' offer. Both of these models assume an authority rule giving the bureau chief full control over the agenda. Both models also assume that the aggregation rule between the bureau chief and the sponsors is unanimity. The models differ, however, in regard to the default specified in the aggregation rule. Niskanen presumed this rule would allow the budget to revert to zero. No agreement – no funds! An aggregation rule with such a default condition can be formally stated as:

$B_{t+1} = \{B_{bc}$ iff $B_{bc} = B_s$; 0 otherwise$\}$, where (2)
B_{t+1} = the budget-output combination for the next period,

B_{bc} = the budget-output proposal of the bureau chief,
B_s = the budget-output proposal accepted by the sponsor.

In other words, the aggregation rule affecting the structure of this situaction requires unanimity among the participants and sets the budget for the next time period to zero if such agreement is not reached. The first part of this rule states the outcome when there is unanimous agreement. The second part of this rule states the outcome when there is no agreement, or the default condition.

Romer and Rosenthal presumed the rule would be to continue the budget in effect for the previous year. No agreement - continuance of the status quo! Their rule can be formally stated as:

$B_{t+1} = \{B_{bc}$ iff $B_{bc} = B_s$; B_t otherwise$\}$ (3)
where B_t is the level of the current budget-output combination.

Niskanen and McGuire, Coiner, and Spancake agree on unanimity and the default condition of the aggregation rule, but differ on the boundary rules allowing

4. *See* Kiser and E. Ostrom (1982) for a discussion of how rules, goods, and attributes of a community all contribute to the structure of a situation.

entry of potential producers into the bargaining arena. Once a position rule has defined a position, S_i, such as a bureau chief, a formal boundary rule consistent with the Niskanen model could be stated as:

$$\text{Let } S_i = \{1\} \tag{4}$$

A boundary rule consistent with the McGuire, Coiner, and Spancake model would be the following:

$$\text{Let } S_i = \{1, \ldots, n\} \tag{5}$$

Assuming that the other rules are similar, we can array the configuration of rules that differ in the various analyses as shown in Figure 4.1. The Downsian model is placed in the upper left cell since he made a similar assumption about the default condition of the aggregation rule as Romer and Rosenthal (*see* Downs 1957: 69), but had to assume implicitly that elected officials controlled the agenda in their bargaining relationships with bureau chiefs (*see* Mackay and Weaver 1978). Consequently, the difference in the results predicted by Downs, by Niskanen, and by Romer and Rosenthal can be related to changes in authority rules and aggregation rules holding other rules constant.

McGuire, Coiner, and Spancake accepted the Niskanen presumption of a zero reversion level while changing the boundary rules allowing producers to enter the bargaining process. This change in boundary rules generates a different situation leading to a prediction of relatively optimal performance as contrasted to Niskanen's prediction of nonoptimality. The change in boundary rules opens up a new column of potential operational situations under varying conditions of authority and aggregation rules. An effort that Parks and Ostrom (1981) made to examine the effect of multiple producers in metropolitan areas upon the efficiency of public agencies is closely related to the rule conditions specified in the upper right-hand cell. The implications of the situations created by the other combinations of rules represented in the second column have not yet been explored.

In this discussion I wanted to illustrate what I meant by a 'rule configuration'. Figure 4.1 presents a visual display of the configuration of rules that are consistent with the models of Downs, Niskanen, Romer and Rosenthal, and McGuire, Coiner and Spancake. The results predicted in a situation, using one rule, are dependent upon the other rules simultaneously in force. Both Niskanen, and Romer and Rosenthal assume that only one bureau can be present in the bargaining. The boundary rule is the same. Their different results stem from the variation in the default condition of the aggregation rule. Both Niskanen and McGuire, Coiner, and Spancake agree on the default condition, but differ in regard to the boundary rule. Different results are predicted dependent on the configuration of rules, rather than any single rule, underlying the operational situation.

Second, I wanted to illustrate the multiple levels of analysis involved. The overt models presented by these theorists are all at one level. By examining the rules affecting the structure of these models, I have focused on a second level of analysis.

Figure 4.1: Predicted Equilibrium Budget/Output Combinations Under Different Rule Configurations

Authority rules	Boundary rules	
Aggregation rules	Entry to bargaining process restricted to one bureau.	Allow multiple bureaus to enter bargaining process.
Open agenda Reversion level is status quo	Downs (1957) Equilibrium is the most preferred budget/output combination of the median voter. Thus, preferences of median voter dominate decision.	Parks and E. Ostrom (1981) Even if no direct competition between two producers serving same jurisdiction, presence of comparison agencies in same urban area will reduce costs of monitoring and increase pressure toward equilibrium producing the highest net value for the community.
Reversion level is zero budget	No model yet developed for this combination of rules.	No model yet developed for this combination of rules.
Restricted agenda controlled by bureau chief Reversion level is status quo	Romer and Rosenthal (1978) Equilibrium is the highest budget/output combination that provides the median voter with at least as much value as the status quo.	No model yet developed for this combination of rules, but given McGuire, Coiner, and Spancake (1979) status quo reversion level can only enhance tendency of equilibrium to move forward highest net value for the community.
Reversion level is zero budget	Niskanen (1971; 1975) Equilibrium is the largest budget/output combination capable of winning majority approval in an all-or-nothing vote. Preference of median voter is only a constraint.	McGuire, Coiner, and Spancake (1979) Equilibrium tends over time toward budget/output combination producing the highest net value for the community.

Committee decisions under unanimity and varying default conditions. A second example of the study of rules by public choice theorists is a recent set of experiments conducted by Grether, Isaac and Plott (1979) who examine the effect of various rules for assigning airport slots. Under one experimental condition, the Grether, Isaac and Plott situation involves a committee of 9 or 14 individuals that had to divide a discrete set of objects ('cards' or 'flags') using a unanimity rule. Three default conditions are used if unanimity is not reached:

1. If the committee defaulted, each committee member received his/her 'initial allocation' of slots that was unambiguously specified and known before the meeting began.
2. If the committee defaulted, slots were allocated randomly.
3. If the committee defaulted, slots were taken at random only from those with large initial allocations and given to those with small or no initial allocation (Grether, Isaac and Plott 1979: V-2).

All three of these rules can be stated in a form similar to that of equations (2) and (3) above.

While Romer and Rosenthal make a theoretical argument that the particular default condition used as part of an unanimity rule affects the predicted outcomes, Grether, Isaac and Plott provide evidence that default conditions markedly affect behavior. The decisions about slot allocations reached by committees tended to shift directly to the value specified in each of the default conditions.

> In summary, the committee decisions are substantially influenced if not completely determined by the consequences of default. Under the grandfather arrangement, 'hardnosed' committee members will simply default rather than take less than the default value. Social pressures do exist for those with 'large' initial endowments to give to those with 'small' endowments, but even if there is no default because of concessions to social pressure the final outcome is not 'far' from the `grandfather' alternative. On the other hand, when the consequence of default is an equal chance lottery, the slots will be divided equally, independent of the initial allocation [...] Default values literally determine the outcomes in processes such as these (Grether, Isaac and Plott, 1979: V-7).

It has frequently been presumed that aggregation rules varied unidimensionally across one continuum from an 'any one' rule to a unanimity rule (Buchanan and Tullock 1962). What should now be recognized is that most prior analysis of aggregation rules has implicitly or explicitly assumed only one of the possible default conditions that work in combination with the voting rule to yield incentives in the operational situation. There is nothing inherently conservative about a unanimity rule unless the default condition is the status quo.

Cumulative knowledge from the analysis of these diverse situations requires that we understand that Romer and Rosenthal and Grether, Isaac and Plott are examining the effect of variations of the same rule given the preferences of participants. If some participants strongly prefer other outcomes to that stated in a default rule, a strong bargainer can threaten them with the default unless the final outcome is moved closer to his own preferred outcome. But when some participants prefer the outcome stated in the default rule, they can afford to block any proposals that do not approach this condition (*see* Wilson and Herzberg 1984).

To enhance cumulation, we need to develop formal representations for rules themselves as well as for the action situations on which rules operate. Most formal analyses loosely state the rules affecting the structure of the action situation: (1) in the written paragraphs leading up to the formal representation of the situation, (2) in footnotes justifying why the presentation of the situation is modelled in a particular manner, or (3) even worse, leave them unstated, as implicit assumptions underlying the formal analysis of the situation itself.[5]

PMR, germaneness, and open versus closed information rules. An experiment conducted by McKelvey and Ordeshook strongly demonstrates the configurational relationships when pure majority rule (PMR) is combined with one 'germaneness' rule and two information rules. PMR and a loose operationalization of a germaneness rule – a change in outcome can be made in only one dimension on any one move – is used throughout the experiment.[6] McKelvey and Ordeshook use a closed or an open information rule. Under their 'closed' rule, members of a five-person committee can speak only if recognized by the chair, can address only the chair, and can make comments solely related to the particular motion immediately being considered. Under their 'open' rule, participants can speak without being recognized, can talk to anyone, and can discuss future as well as present motions.

McKelvey and Ordeshook find that the distribution of outcomes reached under the closed information rule, when used in combination with PMR and their germaneness rule, to be significantly different than the distributions of outcomes reached under the open information rule. The experiment is a good example of how rules operate configurationally.

Rules affecting communication flow and content affect the type of outcomes that will be produced from PMR combined with a particular germaneness rule. McKelvey and Ordeshook, however, interpret their own results rather strangely. Their overt hypothesis is 'that the ability to communicate facilitates circumventing formal procedural rules' (p. 8). A close examination of their series of experiments finds no evidence of participants breaking the rules laid down by the experimenters. What they do test is whether a rule giving capabilities or assigning limitations on

5. It is surprising how often one reads in a public choice article that prior models had implicit assumptions that drove the analysis. A recent example is in Mackay and Weaver (1978: 143) where they argue that:

   > Standard demand side models of the collective choice process, in which fiscal out-comes are considered representative of broad-based citizen demands, implicitly assume not only that a 'democratic' voting rule is employed to aggregate citizen-voters' demands but also that the agenda formation process is characterized by both free access and unrestricted scope.

6. They do not specifically mention that they intend to operationalize the concept of germaneness, but it would appear from the 'dicta' that they think they have done so. However, as Shepsle (1979a; 1979b) conceptualized this rule, decisions about one dimension of a policy space would be made sequentially. Once a decision about a particular dimension had been reached, no further action on that dimension would be possible. Allowing members to zig-zag all over the policy space, one dimension at a time, is hardly a reasonable operationalization of the germaneness rule as specified by Shepsle.

communication patterns changes the way in which PMR and their germaneness rule operate. They test the configurational operation of rule systems. And, they find that the operation of one rule depends upon the operation of other rules in a rule configuration.

Consequences of the configurational character of rules on the appropriate strategies of inquiry

These three examples provide strong evidence for the configurational or, nonseparable, attribute of rules. This leads me to argue against an implicitly held belief of some scholars that what we learn about the operation of one rule in 'isolation' from other rules will hold across all situations in which that rule is used. I will characterize this view as a belief in the separable character of rules. I presume that rules combine in a configurational or interactive manner. If rules combine configurationally rather than separably, this dramatically affects the scientific strategy we should take in the study of rules and their effects.

A key example of the problems resulting from the view of the separable character of rules is the way theorists have approached the study of PMR as an aggregation rule. Many scholars, who have studied PMR, have self-consciously formulated their models in as general a manner as possible. By proving a theorem in a general case, it is presumed that the theorem will hold in all specific cases that contain PMR.

The penchant for generality has been interpreted to mean a formulation devoid of the specification of any rule, other than PMR. A set of N individuals somehow forms a committee or legislature. Position rules are rarely mentioned. The implicit assumption of most of these models is one and only one position exists - that of member. No information is presented concerning boundary rules. We do not know how the participants were selected, how they will be retained, whether they can leave, and how they are replaced. The participants compare points in n-dimensional space against one point in the same space called the status quo. We have no idea how that policy space came into being and what limits there may be on the policies that could be adopted. (One might presume from the way such general models are formulated that no constitutional rules protect against the taking of property without due process or prohibiting infringements on freedom of speech.) Authority rules are left unstated. We must guess at what actions individual participants are authorized to take. From the way that the models are described, it appears that any participant can make any proposal concerning movement to any place in policy space. We do not know anything about the information rules. Everyone appears to be able to talk to everyone and provides information about their preferences to everyone. PMR is the only rule specified.

In this general case, in which only a single rule is formulated, theorists typically make specific assumptions about preference orderings. This suggests that the concepts of 'generality' and 'specificity' are used arbitrarily. Specific assumptions about preference orderings are accepted as appropriate in general models, while efforts to increase the specificity of the rules in these same models are criticized because they are too specific.

The search for equilibria has occurred predominantly within the context of such 'general' models. And, in such 'general' models, equilibria are virtually nonexistent and are fragile to slight movements of preferences or the willingness of participants to dissemble (Riker 1981). McKelvey and Ordeshook (1983: 1) are willing to state that 'the principal lesson of social choice theory is that preference configurations which yield majority undominated outcomes are rare and almost always are fragile and thus are unlikely to be found in reality'.

If rules combine in a configurational manner, however, theorems proved about a 'zero' institutional arrangement will not necessarily be true when other rules are fully specified. Shepsle and his colleagues at Washington University have repeatedly shown that when several other rules are overtly combined with PMR, equilibria outcomes are more likely. Shepsle and Weingast (1981) have summarized the effects of:

1. Scope rules that operate to limit the set of outcomes that can be affected at a node in a process, e.g. amendment control rules (Shepsle 1979a; 1979b), 'small change' rules (Tullock 1981), rules requiring the status quo outcome to be considered at the last decision node, and rules requiring a committee proposal to be considered at the penultimate decision node.

2. Authority rules that operate to create and/or limit the action sets available to participants in positions, e.g. rules that assign a convener special powers to order the agenda (McKelvey 1979; Plott and Levine 1978; Isaac and Plott 1978), rules that assign a full committee, such as the Rules Committee in the House of Representatives, authority to set the procedures for debate and even to exclude a bill from consideration, and rules that constrain the action sets of members in regard to striking part of a motion, adding a part of a motion, and/or substituting a part of a motion (Fiorina 1980).

Structure-induced equilibria are present in many situations where scope rules, that limit the outcomes that can be reached, or authority rules, that constrain the actions of the participants in particular positions, are combined with PMR. This leads to an optimistic conclusion that equilibria are more likely, than previously argued, in committees and assemblies using majority rule to aggregate individual votes. This substantive optimism is, tempered somewhat when one recognizes the methodological consequences of rejecting the belief that rules can be studied as separable phenomena.

The methodological problem rests in the logic of combinatorics. If we were fortunate enough to be studying separable phenomena, then we could simply proceed to study individual rules out of context as we have done with PMR. We could then proceed to study other rules, out of context, and derive separable conclusions for each type of rule. Eventually, we could add our results together to build more complex models. This is an appropriate scientific method for the study of separable phenomena.

However, if the way one rule operates is affected by other rules, then we cannot continue to study each rule in isolation from others. A simple, scientific program is more difficult to envision once the configurational nature of rules is accepted. A configurational approach affects the way we do comparative statics. Instead of studying the effect of change of one rule on outcomes, regardless of the other rules in effect, we need to carefully state which other rules are in effect which condition the relationships produced by a change in any particular rule. We cannot just assume that other variables are controlled and unchanging. We need to know the value of the other variables affecting the relationship examined in a comparative statics framework.

Thus, we have much to do! It is more comforting to think about proving theorems about the effects of using one particular rule out of context of the other rules simultaneously in effect. If, however, combinations of rules work differently than isolated rules, we had better recognize the type of phenomena with which we are working and re-adjust our scientific agenda. We do, however, need a coherent strategy for analysing and testing the effects of combinations of rules. How can we isolate a key set of generally for mutated rules that provide the core of the rules to be studied? How can we build on the results of previous analytical work in our field?

Multiple levels of analysis and alternate strategy of inquiry

I have no final answers to these questions, but I do have an initial strategy to propose. This strategy relates to my earlier stress on the multiple levels of analysis involved in the study of rules. We have a relatively well developed body of theory related to the study of situations such as markets, committees, elections, and games in general. Thus, we already know what variables we must identify to represent one level of analysis. We can build on this knowledge as we develop the second level of analysis.

The structure of an action situation

The particular form of representation differs for neoclassical market theory, committee structures, and games in extensive form. However, in order to analyze any of these situations, an analyst specifies and relates together seven variables that form the structure of a situation.

1. The set of positions to be held by participants.
2. The set of participants (including a random actor where relevant) in each position.
3. The set of actions that participants in positions can take at different nodes in a decision tree.
4. The set of outcomes that participants jointly affect through their actions.

5. A set of functions that map participant and random actions at decision nodes into intermediate or final outcomes.
6. The amount of information available at a decision node.
7. The benefits and costs to be assigned to actions and outcomes.

These seven variables plus a model of the decision maker must be explicitly stated (or are implicitly assumed) in order to construct any formal model of an interdependent situation. We can consider these seven to be a universal set of necessary variables for the construction of formal decision models where outcomes are dependent on the acts of more than a single individual. This is a minimal set in that it is not possible to generate a prediction about behavior in an interdependent situation without having explicitly or implicitly specified something about each of these seven variables and related them together into a coherent structure. I call the analytical entity created when a theorist specifies these seven variables an action situation.

The most complete and general mathematical structure for representing an action situation is a game in extensive form (Selten 1975; Shubik 1982). The set of instructions given to participants in a well-constructed laboratory experiment is also a means of representing an action situation. Using these variables, the simplest possible working model of any particular type of situation whether a committee, a market, or a hierarchy can be constructed.[7] A change in any of these variables produces a different action situation and may lead to very different outcomes. More complex models of committees, markets, or other interdependent situations are constructed by adding to the complexity of the variables used to construct the simplest possible situations.[8]

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7. The simplest possible representation of a committee, for example, can be constructed using the following assumptions:
   1) One position exists; that of member.
   2) Three participants are members.
   3) The set of outcomes that can be affected by the member contains two elements, one of which is designated as the status quo.
   4) A member is assigned an action set containing two elements: (a) vote for the status quo and (b) vote for the alternative outcome.
   5) If two members vote for the alternative outcome, it is obtained; otherwise, the status quo outcome is obtained;
   6) Payoffs are assigned to each participant depending on individual actions and joint outcomes.
   7) Complete information is available about elements (1) through (6).

   For this simplest possible representation of a committee, and using a well-defined model of the rational actor, we know that an equilibrium outcome exists. Unless two of the members prefer the alternative outcome to the status quo and both vote, the status quo is the equilibrium outcome. If two members do prefer and vote for the alternative outcome, it is the equilibrium outcome. The prediction of outcomes is more problematic as soon as a third outcome is added. Only when the valuation patterns of participants meet restricted conditions can an equilibrium outcome be predicted for such a simple committee situation with three members and three potential outcomes using majority rule (Arrow 1966; Plott 1967).
8. A more complex committee situation is created, for example, if a second position, that of

An action arena: Models of the situation and the individual

In addition to the seven universal variables of an action situation, an analyst must also utilize a model of the individual, which specifies how individuals process information, how they assign values to actions and outcomes, how they select an action, and what resources they have available. The model of the individual is the animating force that allows the analyst to generate predictions about likely outcomes given the structure of the situation (Popper 1967). When a specific model of the individual is added to the action situation, I call the resulting analytical entity an 'action arena'. An action arena thus consists of a model of the situation and a model of the individual in the situation (*see* E. Ostrom 1985).

When a theorist analyses an action arena, the model of the situation and the model of the individual are assumed as givens. At this level of analysis, the task of the analyst is viewed as one of predicting the type of behavior and results, given this structure. Questions concerning the presence or absence of retentive, attractive, and/or stable equilibria and evaluations of the efficiency and equity of these results are pursued at this level. The key question at this level is: Given the analytical structure assumed, how does this situation work to produce outcomes?

Rules as relations

Let me return now to the point I made above that all rules can be represented as relations. I can now be more specific. From sets of physically possible actions, outcomes, decision functions, information, positions, payoffs, and participants, rules select the feasible sets of the values of these variables. The action situation is the intersection of these feasible sets. In regard to driving a car for example, it is physically possible for a 13 year old to drive a car at 120 miles per hour on a freeway. If one were to model the action situation of a freeway in a state with well enforced traffic laws, one would posit the position of licensed drivers traveling an average of 60 to 65 miles per hour (depending on the enforcement patterns of the state). The values of the variables in the action situation are constrained by physical and behavior laws, and then, further contained by the rules in use. Most of formal analyses, to date, are of action situations; this is the surface structure that our representations model. The rules are part of the underlying structure that shapes the representations we use.

But, how do we overtly examine this part of the underlying structure? What rules should be examined when we conduct analysis at a deeper level? The approach I recommend is that we focus on those rules that can directly affect the structure of an action situation. This strategy helps us identify seven broad types of rules that operate configurationally to affect the structure of an action situation.

a convener, is added to the situation, and the action set of the convener includes actions not available to the other members (e.g. Isaac and Plott 1978; Eavey and Miller 1982). *See* also Gardner (1983) for an analysis of purges of recruitment to committees. Gardner's approach is very similar to the general strategy I am recommending.

These rules include:

1. *Position rules* that specify a set of positions and how many participants hold each position.
2. *Boundary rules* that specify how participants are chosen to hold these positions and how participants leave these positions.
3. *Scope rules* that specify the set of outcomes that may be affected and the external inducements and/or costs assigned to each of these outcomes.
4. *Authority rules* that specify the set of actions assigned to a position at a particular node.
5. *Aggregation rules* that specify the decision function to be used at a particular node to map actions into intermediate or final outcomes.
6. *Information rules* that authorize channels of communication among participants in positions and specify the language and form in which communication will take place.
7. *Payoff rules* prescribe how benefits and costs are to be distributed to participants in positions.

Given the wide diversity of rules that are found in everyday life, social rules could be classified in many ways. The method I am recommending has several advantages. First, rules are tied directly to the variables of an analytical entity familiar to all public choice theorists, economists, and game theorists. From this comes a strategy, or a heuristic, for identifying the rules affecting the structure of that situation. For each variable identified in the action situation, the theorist interested in rules needs to ask what rules produced the variable as specified in the situation. For example, in regard to the number of participants, the rule analyst would be led to ask: Why are there N participants? How did they enter? Under what conditions can they leave? Are there costs, incentives, or penalties associated with entering or exiting? Are some participants forced into entry because of their residence or occupation?

In regard to the actions that can be taken, the rule analyst would ask: Why these actions rather than others? Are all participants in positions assigned the same action set? Or, is some convener, or other position, assigned an action set containing options not available to the remaining participants? Are sets of actions time or path dependent?

In regard to the outcomes that can be affected, the rule analyst would ask: Why these outcomes rather than others? Are the participants all principals who can affect any state variable they are defined to own? Or, are the participants fiduciaries who are authorized to affect particular state variables within specified ranges but not beyond? Similar questions can be asked about each variable overtly placed in a model of an action situation.

Answers to these sets of questions can then be formalized as a set of relations that, combined with physical and behavioural laws, produce the particular values of the variables of the situation. I am not arguing that there is a unique set of relations that produce any particular model of a situation. Given the pervasiveness of situations with the structure of a Prisoners' Dilemma, one can expect that multiple sets of rules may produce action situations with the same structure. This is not problematic when one focuses exclusively on predicting behavior within the situation. It poses a serious problem when the question of how to change that structure. To change a situation, one must know which set of rules produce the situation.

Other factors also affect this structure. We know, for example, that rules which generate a competitive market produce relatively optimal equilibria when used to allocate homogeneous, divisible goods from which potential consumers can be excluded. The same rules generate less optimal situations when goods are jointly consumed and it is difficult to exclude consumers. But the theorist interested in how changes in rules affects behavior within situations must hold other factors constant while an analysis is conducted of changes in the rules.

Besides providing a general heuristic for identifying the relevant rules that affect the structure of a situation, a second advantage of this approach is that it leads to a relatively natural classification system for sets of rules. Classifying rules by what they affect enables us to identify sets of rules that all directly affect the same working part of the situation. This should enhance our capabilities for developing a formal language for representing rules themselves. Specific rules used in everyday life are named in a non-theoretical manner - frequently referring to the number of the rule in some written rule book or piece of legislation. Theorists studying rules tend to name the rule they are examining for some feature related to the particular type of situation in which the rule occurs.

For systematic cumulation to occur, we need to identify when rules, called by different names, are really the same rule. It is important that scholars understand, for example, that Romer and Rosenthal and Grether, Isaac and Plott all examined consequences of default conditions of aggregation rules. Proceeding to formalize the rules used by Grether, Isaac and Plott in their series of experiments would help other scholars identify which rules, called by other everyday terms, are similar to the 'grandfather' default condition, to the random default condition, or to 'taking from the large and giving to the small' default condition.

By paying as much care to the formalization of the rules affecting an action situation as we do to formalizing the action situation itself, we will eventually establish rigorous theoretical propositions concerning the completeness and consistency of rules themselves. From Romer and Rosenthal and from Grether, Isaac and Plott, we now know that any specification of a unanimity rule without an explicit default condition is incomplete. I am willing to speculate that any aggregation rule without a default condition is incomplete.

Some concluding thoughts

Given the multiple referents for the term 'institutions', our first need is for a consistent language if public choice scholars are going to return to a major study of institutions. To begin this task, I have focused on one term - that of rules - used by some theorists as a referent for the term institutions. My effort is intended to clarify what we mean by rules, how rules differ from physical or behavioural laws, how we can classify rules in a theoretically interesting manner, and how we can begin to formalize rule configurations. I have not answered the question, 'What are institutions?' This involves an argument over which referent is 'the' right or preferred referent. Rather, I try to clarify one referent and leave the clarification of other referents to other scholars.

Secondly, I provided several examples of how public choice analysts have studied rules. These examples illustrate two points. First, rules operate configurationally rather than separably. Second, the study of rules involves multiple levels of analysis rather than a single level of analysis. The configurational character of rules significantly affects the strategies we use to analyse rules. One approach has been to posit a single rule and examine the type of equilibria, or absence of equilibria, likely to result from the operation of this single rule. Scholars have concluded that stable equilibria do not exist in situations in which individuals use majority rule aggregation procedures. This is not consistent with empirical observation. Further, when scholars introduce rules constraining actions and outcomes into majority rule models, it is then possible to predict stable equilibria. The methodological consequence of the configurational character of rules is that theorists need to specify a set of rules, rather than a single rule, when attempting to ask what consequences are produced by changes in a particular rule.

Once this conclusion is accepted, a method to identify sets of rules is essential if we hope to develop any cumulative knowledge about the effects of rules. If more than one rule need be specified, the key question is how many different rules must be specified to know that we have identified a rule configuration. My preliminary answer is that we need to identify seven types of rules that directly affect the seven types of variables we use to construct most of the action situations we analyse. When we analyse changes in one of these rules, we should identify the specific setting of the other variables that condition how the changes in the first rule affects outcomes.

The analysis of rules needs at least two levels. We can represent these levels by reformulating Plott's fundamental equation into two equations:

Structure of an Action Situation	$\oplus$	Model of a Decision Maker	=	Outcomes	(6)
Rules + Physical Law	$\oplus$	Behavioural Laws	=	Structure of an Action Situation	(7)

Equation (6) is the one most public choice theorists use in their work. As we delve somewhat deeper into the analysis of rules themselves, previous work that has focused on action situations themselves can be integrated into a broader framework. Equation (7) involves the specification of the rules, as well as the physical and behavioural laws, that affect the values of the variables in an action situation. The seventh equation is the one we must use when we want to analyse how rules change the structure of a situation leading, in turn, to a change in outcomes (*see* V. Ostrom 1982; 1984). The seventh equation makes apparent the need to study the effects of rules where physical and behavioural laws are invariant.

In light of these characteristics, much future work needs to be done. We need a formal language for the representation of rules as functions affecting the variables in an action situation. We also need to address questions concerning the origin and change of rule configurations in use. How do individuals evolve a particular rule configuration? What factors affect the likelihood of their following a set of rules? What affects the enforcement of rules? How is the level of enforcement related to rule conformance? What factors affect the reproducibility and reliability of a rule system? When is it possible to develop new rules through self-conscious choice? And, when are new rules bound to fail?

References

Advisory Commission on Intergovernmental Relations (1974). Governmental functions and processes: Local and area wide. Volume IV of substate regionalism and the federal system. Washington, D.C.: U.S. Government Printing Office.

Arrow, K. (1966) *Social Choice and Individual Values*, 2nd edition, New York: Wiley.

Becker, G. S. (1976) *The Economic Approach to Human Behavior*, Chicago: University of Chicago Press.

Buchanan, J. M. and Tullock, G. (1962) *The Calculus of Consent,* Ann Arbor: University of Michigan Press.

Commons, J. R. (1957) *Legal Foundations of Capitalism*, Madison: University of Wisconsin Press.

Dahl, R. A. and Tufte, E. R. (1973) *Size and Democracy*, Stanford, Calif.: Stanford University Press.

Dawson, R. E. and Robinson, J. A. (1963) 'Interparty competition, economic variables and welfare policies in the American states', *Journal of Politics* 25:265–289.

Downs, A. (1957) *An Economic Theory of Democracy,* New York: Harper and Row.

Dye, T. R. (1966) *Politics, Economics, and the Public*, Chicago: Rand McNally.

Eavey, C. L. and Miller, G. J. (1982) *Committee Leadership and the Chairman's Power*, Paper delivered at the Annual Meetings of the American Political Science Association, Denver, Colo., September 2–5.

Fiorina, M. P. (1980) 'Legislative facilitation of government growth: Universalism and reciprocity practices in majority rule institutions', *Research in Public Policy Analysis and Management* 1:197–221.

Ganz, J. S. (1971) *Rules: A systematic study,* The Hague: Mouton.

Gardner, R. (1983) 'Variation of the electorate: Veto and purge', *Public Choice* 40(3): 237–247.

Grether, D. M., Isaac, R. M. and Plott, C. R. (1979) *Alternative methods of allocating airport slots: Performance and evaluation*, A report prepared for the Civil Aeronautics Board.

Harré, R. (1974) 'Some remarks on "rule" as a scientific concept', in T. Mischel (ed.) *Understanding Other Persons*, Oxford: Basil-Blackwell, pp. 143–183.

Hayek, F. A. (1976) *The Mirage of Social Justice,* Chicago: University of Chicago Press.

Hayek, F. A. (1978) *New Studies in Philosophy, Politics, Economics, and the History of Ideas,* Chicago: University of Chicago Press.

Heiner, R. A. (1983) 'The origin of predictable behavior', *American Economic Review* 83 (4): 560–597.

Isaac, R. M. and Plott, C. R. (1978) 'Comparative game models of the influence of the closed rule in three person, majority rule committees: Theory and experiment', in P. C. Ordeshook (ed.) *Game Theory and Political Science*, New York: New York University Press pp. 283–322.

Kiser, L. and Ostrom, E. (1982) 'The three worlds of action: A meta-theoretical synthesis of institutional approaches', in E. Ostrom (ed.) *Strategies of Political Inquiry*, Beverly Hills: Sage Publications, pp. 179–222.

Mackay, R. J. and Weaver, C. (1979) 'Monopoly bureaus and fiscal outcomes: Deductive models and implications for reform', in G. Tullock and R.E. Wagner (eds) *Policy Analysis and Deductive Reasoning*, Lexington, Mass.: Lexington Books, 141–165.

McGuire, T., Coiner, M. and Spancake, L. (1979) 'Budget maximizing agencies and efficiency in government', *Public Choice* 34 (3/4): 333–359.

McKelvey, R. D. (1979) 'General conditions for global intransitivities', *Econometrica* 47: 1085–1111.

McKelvey, R. D. and Ordeshook, P. C. (1984) 'An experimental study of the effects of procedural rules on committee behavior', *Journal of Politics* 46 (1): 185–205.

Menger, K. (1963) *Problems in Economics and Sociology* (Originally published in 1883 and translated by Francis J. Nock), Urbana: University of Illinois Press.

Niskanen, W. A. (1971) *Bureaucracy and Representative Government*, Chicago: Aldine-Atherton.

Nozick, R. (1975) *Anarchy, State, and Utopia,* New York: Basic Books.

Ostrom, E. (1985) 'A method of institutional analysis', in F. X. Kaufmann, G. Majone and V. Ostrom (eds) *Guidance, Control and Performance Evaluation in the Public Sector*, Berlin, New York: de Gruyter.

Ostrom, V. (1980) 'Artisanship and artifact', *Public Administration Review* 40 (4): 309–317.

— (1982) 'A forgotten tradition: The constitutional level of analysis', in J. A. Gillespie.

— (1986) 'Constitutional considerations with particular reference to federal systems', in F. X. Kaufmann, G. Majone and V. Ostrom (eds), *Guidance, Control, and Performance Evaluation in the Public Sector*, Berlin, New York: de Gruyter, pp. 111–25.

Ostrom, V. and D. A. Zinnes (eds) *Missing Elements in Political Inquiry: Logic and Levels of Analysis*, Beverly Hills: Sage Publications, pp. 237–252.

Parks, R. B. and Ostrom, E. (1981) 'Complex models of urban service systems', in T. N. Clark (ed.) *Urban Policy Analysis: Directions for Future Research. Urban Affaire Annual Reviews* 21:171–199.

Plott, C. R. (1967) 'A notion of equilibrium and its possibility under majority rule', *American Economic Review* 57 (4): 787–807.

— (1979) 'The application of laboratory experimental methods to public choice', in C.S. Russell (ed.) *Collective Decision Making: Applications from Public Choice Theory*, Baltimore, Md.: Johns Hopkins University Press, pp. 137–160.

Plott, C. R. and Levine, M. E. (1978) 'A model for agenda influence on committee decisions', *American Economic Review,* 68:146–160.

Popper, K. R. (1967) 'La rationalité et le statut du principle de rationalité', in E. M. Classen (ed.) *Les foundements philosophiques des systemes economiques: Textes de Jacques Rueff et essais rediges en son honneur 23 aout 1966*, Paris, France: Payot, pp. 145–50.

Rawls, J. (1968) 'Two concepts of rules', in N. S. Care and C. Landesman (eds), *Readings in the Theory of Action*, Bloomington, Ind.: Indiana University Press, pp. 306–340. Originally printed in *the Philosophical Review* 4 (1955).

Riker, W. H. (1982) 'Implications from the disequilibrium of majority rule for the study of institutions', in P. C. Ordeshook and K. A. Shepsle (eds) *Political equilibrium*, Boston: Kluwer-Nijhoff, pp. 3–24. Originally published in *The American Political Science Review* 74 (June 1980): 432–447.

Romer, T. and Rosenthal, H. (1978) 'Political resource allocation, controlled agendas, and the status quo', *Public Choice* 33 (4): 27–43.

Schotter, A. (1981) *The Economic Theory of Social Institutions,* Cambridge: Cambridge University Press.

Selten, R. (1975) 'Reexamination of the perfectness concept for equilibrium points in extensive games', *International Journal of Game Theory* 4:25–55.

Shepsle, K. A. (1979a) 'Institutional arrangements and equilibrium in multidimensional voting models', *American Journal of Political Science,* 23 (1): 27–59.

— (1979b) 'The role of institutional structure in the creation of policy equilibrium', in D. W. Rae and T. J. Eismeier (eds) *Public Policy and Public Choice*, Sage Yearbooks in Politics and Public Policy 6, Beverly Hills: Sage Publications, pp. 249–283.

Shepsle, K. A. and Weingast, B. R. (1981) 'Structure-induced equilibrium and legislative choice', *Public Choice* 37 (3): 503–520.

Shimanoff, S. B. (1980) *Communication Rules: Theory and Research*, Beverly Hills: Sage Publications.

Shubik, M. (1982) *Game Theory in the Social Sciences: Concepts and Solutions*, Cambridge, Mass.: The MIT Press.

Taylor, M. (1976) *Anarchy and Cooperation*, New York: Wiley.

Toulmin, S. (197) 'Rules and their relevance for understanding human behavior', in T. Mischel (ed.), *Understanding Other Persons*, Oxford: Basil-Blackwell, pp. 185–215.

Tullock, G. (1981) 'Why so much stability?', *Public Choice* 37 (2): 189–205.

Ullman-Margalit, E. (1978) *The Emergence of Norms*, New York: Oxford University Press.

von Wright, G. H. (1968) 'The logic of practical discourse' in R. Klibansky (ed.) *Contemporary Philosophy*, Florence: La Nuova Italia Editrice, pp. 141–167.

Wilson, R. and Herzberg, R. (1984) 'Voting is only a block away: Theory and experiments on blocking coalitions', Paper presented at the Public Choice Society meetings, Phoenix, Ariz., March 29–31.