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Interactive Governance : Power and Stability = Siła i stabilność rządów opartych na interakcji

Humanistyka i Przyrodoznawstwo 19, 165-169

2013

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INTERACTIVE GOVERNANCE. POWER AND STABILITY

Siła i stabilność rządów opartych na interakcji

Słowa kluczowe: funkcja społecznego wyboru, strategiczna forma gry, mechanizm rozwiązywalny, problem implantacji.

Key words: social choice function, strategic game form, solvable mechanism, the implementation problem.

Streszczenie

Autor proponuje bardzo specyficzny opis procesów podejmowania zbiorowych decyzji. Analizuje strategiczną formę gry, mechanizmy rozwiązywalne, problem implementacji oraz wiązki skuteczności.

Abstract

Author proposes very specific description of collective decision processes and analyzes strategic game form, solvable mechanism, the implementation problem and effectivity bundles.

If men's minds were transparent, their needs easily identified and their preferences publicly known, then, as far as the collective choice is at stake, it would be possible, at least in theory, to design institutions that satisfy some unanimously approved general principles. This is the so-called normative approach. The alternatives relevant for choice would be listed, the individuals concerned with the collective choice would report their preferences, and according to a precise protocol the procedure would be applied to come up with a decision, the collective outcome. Such a device will be called a *social choice function*.

Acting sophisticatedly

But however cautiously designed institutions are, by the fact that minds are not transparent, that individuals can hide their real preferences, and that they cannot be asked to do more than obey the rules, their actions can be different from the sincere actions innocently expected. Agents would have a conflict between their feelings and their interests. Rational agents would choose the latter. That is to say they will *act strategically*.

The relevance of formal modeling

If I propose this extremely stylized description of collective decision processes, it is clearly not my purpose to overlook the problems embodied in a formula like "unanimously approved general principles" used above or other ethical difficulties that must be solved before reaching this approval, it is merely to underscore the simple formal structure of the problem. After all, compared to any economic or military problem, the one we have here is relatively well posed. Governance is a political problem that depends heavily on institution design, and in this field there is room for voluntary and controlled action, whereas in economics, war and international relations *both* the state of the world and the rules of the game are a *fait accompli* and they are generally unclear and therefore the agents have no choice other than to try to behave optimally in a risky context. By contrast, in political design, once a procedure is chosen, each of the steps leading to the final outcome will obey precise rules that may be written and made common knowledge. For all these reasons formal models provide relevant tools for the analysis of governance and more general political systems.

If we address the problem along this line of thought it will be clear that the main question about an institution is its universality and its viability, and this is closely related to its stability. To make my statement clear and general let us represent the whole procedure that describes the essence of some political decision process by a device that we shall call a mechanism. It is an object with precise rules, that can be used by the individuals composing the society. Sometimes we refer to the society as the committee, whose members are called the agents. The objects of the choice will be called candidates or alternatives when the decision problem is an election or a vote, but they can, more appropriately, be called social states when the aim is, for instance, a government formation. In game theory such a device is called a *game form* or *strategic mechanism.*

Strategic game form

Suppose that the mechanism is, at some instance, going to be used by some fixed committee deliberating on a fixed set of alternatives. The agents are supposed to feed the mechanism by some action and the outcome depends on the joint action of all agents. The agents are assumed to be rational, that is, they will try to act so as to maximize their interests. In order to do so, agents are supposed to dispose of preferences over the alternatives. A preference for an agent is a ranking of the alternatives from the best to the worst one. It turns out that we have here precisely a strategic interaction known as a *game* in strategic form. In such a game an agent does not generally dispose of a so-called dominant strategy, that is he does not have a policy that prescribes to him to behave in such or such manner in order to achieve the best outcome, *independently* of the others' behavior. The first question is therefore what we mean by a good strategy. In the sequel we shall assume that a good joint behavior is one that results in an equilibrium. If we have such a situation then we shall say that the game is solvable (in some precise sense).

Solvable mechanisms

Moreover if the mechanism were to be used extensively and repeatedly, maybe with different sets of agents members – and by its very nature a mechanism is designed in order to be used in many committees in the same country, the same voting procedure is instituted in many legislatures etc. – then we should not only be concerned that one precise interaction be solvable but that all possible ones are. That is we must have in mind that a good mechanism should lead to clear solutions in all possible situations. Solvability must prevail for all types of players, with all kinds of preferences. The mechanism is said to be *solvable or stable* if it is solvable for all preference profiles.

The implementation problem

Why should we care at all about solvability? An equilibrium cannot be contested from within the institution, that is using the rules of the game. Solvability therefore means that, in some sense, the outcome of the interaction is predictable. Now if we can predict the outcome for every preference profile, then we would indirectly obtain a social choice function, precisely the kind of normative objet that we presented in the first paragraph. Therefore if our aim is to make this normative object truly effective, we should seek to design an appropriate mechanism the solutions of which would lead to the normatively desired outcomes. This is the famous *implementation* problem[1].

One should be aware that implementation depends on the type of solution admitted for the game. Consider, for instance, the most desirable notion of so-

[1] E. Maskin, *Nash equilibrium and welfare optimality, mimeo*, Institute of Technology. Massachussetts 1977; idem, *Nash equilibrium and welfare optimality*, "Review of Economic Studies" 1999, no. 66, p. 23–38.

lution, that is the one obtained by dominant strategies. If the number of achievable alternatives is at least 3 then the only social choice function that can be implemented is a dictatorial one. This seems incompatible with any acceptable notion of democracy, not to mention plurality. Thus one is led to the study of mechanism solvability with other solution concepts like Nash equilibrium or strong Nash equilibrium. Here too there are only a few implementable social choice functions. Therefore what is needed is a more extensive study of mechanisms in view of a rational classification of mechanisms with respect to their stability. To do so I suggest the following general approach.

Power and effectivity

Assume that we start with a game form. Then we can describe the underlying power of agents or coalitions. A simple way to describe global power is to list coalitions that can achieve, by using an appropriate coordinated response, any alternative, whatever is the strategy of their opponents. These will be called *winning* coalitions. For instance, in a majority vote, any majority is a winning coalition, and similarly in a weighted majority. A more detailed power description may be obtained as follows: Take a coalition S and a subset of alternatives B. Say that S is *β-effective* for B if S can achieve some alternative in B, whatever is the strategy of its opponents, by using an appropriate coordinated reply[2]. We have thus the b-effectivity function associated to the initial game form.

Effectivity bundles

So far the power that we defined is global. But we can refine the description in many directions. The local version of the effectivity function is obtained as follows. Assume that some alternative a is proposed as a starting point. Then a coalition S is b-effective for B at a if S can achieve some alternative in B whatever is the starting situation with outcome a. We thus have the *β-effectivity bundle*. This is clearly a refinement of the effectivity function. But it is far more instructive to go further.

Joint disjunctive power

So far we considered only coalitions acting in some sense independently from each other. Now we can describe the joint action of admissible coalitions.

[2] H. Moulin, B. Peleg, *Core of effectivity functions and implementation theory*, "Journal of Mathematical Economics" 1982, no. 10, p. 115–145.

Assume again that we start at *a*. Take an array *f* of subsets of alternatives, that is (*f(S)*, where *S* goes through all admissible coalitions). We call such an object an *interaction array*. Consider interaction arrays *f* satisfying the following property: starting from any situation that results in *a*, there exists some admissible coalition *S* that possesses an appropriate reply that can achieve some point in *f(S)*. The collection of all such arrays is called the *interactive form* associated to the game form. It is worthwhile noting that the power system considered in an interaction form is a joint disjuctive power. It is joint since in an interaction array all the admissible coalitions are considered simultaneously, disjuntive since either one of the coalitions can be actively exerting its opposition (or objection) power. Dually one can describe the joint conjunctive power. It turns out that solvability of game forms is closely related to stability of the interactive form.

Interactive forms and stability index

We can go a step further by getting rid of the strategies. An abstract *interactive form* is simply a description of the joint power of coalitions and agents involved in some interaction. For every alternative *a* we are given a set of arrays as described above. This unified model embeds essential features of both cooperative and strategic concepts in standard game theory. It is an intrinsic description of the interactive power of the agents. Like in a cooperative game, no strategies are explicitly given. The notion of solution is called a *settlement*. It is defined in a universal fashion, that is independently of the strategic background. An interactive form is *stable* if for every preference profile there exists some settlement. Moreover the model allows a comparison between different interactive forms. Furthermore one can define, in this unified setting, a *stability index*.

A political stalemate is the result of conflicting interest and a distribution of power that does not allow for a settlement. Instability is thus equivalent to the possibility of a stalemate. The stability index is a number that describes the minimal distribution of the forces involved in some unstable situation, thus allowing an a priori description of the lines along which the society is likely to be split in a stalemate. Thus in this model, we can learn not only if an interactive form is stable or not but also how unstable it is, if it is[3].

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[3] J. Abdou, H. Keiding, *On necessary and sufficient conditions for solvability of game forms*, "Mathematical Social Sciences" 2003, no. 46, p. 243–260; J. Abdou, *Stability Index of local Effectivity Functions*, "Mathematical Social Sciences" 2010, no. 59, p. 306–313; idem, *The structure of unstable power mechanisms*, "Economic Theory" 2012, no 50, p. 389–415.