

that situations reasonably depicted by the prisoner's dilemma do have a structure, and it was precisely the analysis of *that* structure that Professor Axelrod singled out for attention in his book.

Dr Falger barely touches on the biological context of Professor Axelrod's analysis (which follows closely that of the renowned biologist J. Maynard Smith), except to say that the evolutionary approach proceeds 'more in a metaphorical than a technical way'. There is nothing 'metaphorical' about the concept of the 'evolutionarily stable strategy'. It is necessarily idealized, being derived from a mathematical model, but it is enormously fruitful in the context of the theory of natural selection. It provides a reasonably plausible explanation of the evolution of co-operation among animals, normally engaged in intra-specific combats, by way of reducing the intensity of these combats. I fail to see what Falger means by 'Lamarckian type of evolution', which, he says, is recognizable in patterns of behavior. Inheritance of acquired characteristics (the crux of Lamarckian theories) nowhere enters the picture.

The important connection between the evolution of co-operation in the biological context and the structure of social conflicts was provided by game-theoretic analysis of situations in which the value of a particular strategy depends crucially on the proportion of the interacting individuals who resort to that strategy, a principle that somehow slips out of the sphere of attention of persons most concerned with designing 'rational' strategies of conflict.

Finally, I cannot resist commenting on Falger's statement that the 'arms race *itself* is a perfect manifestation of intense co-operation between the superpowers'. I have been steadily insisting that this is indeed the case. I see the war establishments of the 'big two' as linked components of a single global war machine. Each is indispensable for the other's existence. The growth of one nurtures the growth of the other and protects it from possible assaults by those who see the continued existence of the war machine as a mortal danger to humanity. And indeed this co-operation pays off for those who identify with one or the other component of the machine, reap rich benefits either in professional prestige or profits or simply derive satisfaction from doing their jobs well. Some of the rest of us, however, take a dim view of this 'co-operation'. Indeed, 'co-operation' is neither an unmitigated good nor an end in itself. Its value depends on who is co-operating with whom and to what end.

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Response by Vincent Falger

In my response to Professor Rapoport's TIT I will emphasize once more the kind of message which Axelrod's book contains and his fundamental lack of attention to differences of power between actors.

In my view, *The Evolution of Co-operation* is a good example of the kind of literature in which the suggestion of a malleable, better world is the real basis of its attractiveness. The text on the dust jacket is not to be misunderstood and is worth quoting:

This pathbreaking and provocative work provides a bold answer to one of the oldest and most important questions human beings face: how can co-operation emerge among self-seeking

individuals when there is no central authority to police their actions? It is a question that has troubled philosophers and statesmen for hundreds of years; its importance has never been greater than in today's world of nuclear weapons.

The advance praise of Lewis Thomas, printed on the back of the book, leaves no room for doubt about the book's general message: 'I never expected to find wisdom or hope for the future of our species in a computer game, but here it is, in Axelrod's book'.

Although I do not review books on the basis of their puffs, I am curious about Professor Rapoport's comments on that last quote, because here, too, someone took the implicit, but nonetheless evident, promise of the model, the possibility of tacit co-operation as a general model of conflict, seriously. I am not convinced at all by Rapoport's exegesis that nothing of the sort was intended. Strictly, logically, and scientifically speaking, this may be true, but the strength of the book's argument is in its suggestive coupling between the scientific basis and a hopeful future. Of course, Rapoport is right when he writes that there are only models that 'work' and models that 'don't work' in particular contexts. My principal objection to the book as such is that Axelrod hardly examines vital contexts in which the model does *not* work.

It is this selectivity of examples which permits the author to virtually ignore differences in power between actors (and the perceptions of these) as a very important structural aspect of most political contexts. That is somewhat more complex than analyzing the structure of situations which can be depicted by the 'prisoner's dilemma'. As in the past, however, the structure of power relations will in the future continue to exert its decisive influence. Any analysis and advice keeping this out of sight is suggesting much more than it has to offer, and this goes *a fortiori* for the domain of international relations, the sphere where, according to Axelrod, the most important problems facing humanity are located. And here, too, I am not convinced by Axelrod's comment on my review, because the undeniable co-operation between the United States and the Soviet Union in terms of a high tech armament race does not imply effective influence, let alone control over other actors in world politics who benefit from the technological developments on the central axis. A very relevant sphere of co-operation in this context is the so-called non-proliferation regime which today does not show a tendency of more mutual beneficial co-operation, but of some co-operation between, on the one hand, the 'haves' (and even that is becoming ever more dubious) and, on the other hand, the 'have nots'. Maybe that is the reason why Professor Rapoport makes a distinction between (valuable) co-operation and (non-valuable) 'co-operation' (his quotation marks). Unfortunately for him, evolution, also of co-operation, is a teleonomic, not a teleologic process; this is at right angles to the main message of the book.

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