

# In the balance

Ivar Ekeland

One could write a history of science around the concept of equilibrium. It originates in mechanics, denoting a situation in which a balance of conflicting forces results in rest. It moves into physics as thermodynamic equilibrium, a situation in which a flurry of microscopic motions results in macroscopic rest. It then crosses a new boundary, entering the social sciences as economic equilibrium, a set of prices that equate supply and demand across goods, thereby enabling producers and consumers to trade.

During this journey, the mechanical analogy had always served as a trustworthy guide — in, for example, such expressions as ‘market forces’. Yet the concept has now taken on a new meaning, and biological or sociological analogies have become much more relevant. Game theory, starting with the seminal work of John von Neumann and John Nash, has had its main effect in the study of systems in which decision-making

agents interact in a complex way, recrafting equilibrium into a coherent, powerful and widely applicable concept. In the social sciences, an equilibrium is a situation that involves several individuals or groups, in which each one’s actions turn out to be the best reply to everyone else’s. It is a situation of stable mutual adjustment — everyone anticipates everyone else’s behaviour, and all these anticipations turn out to be correct. In other words, it is a set of self-fulfilling prophecies that individuals formulate about each other’s actions.

Such situations are central to social life because they are the only stable ones. Not to be in equilibrium means that some anticipations turn out to be wrong, so that some actions are inappropriate in a particular situation. This leads the affected individuals or groups to revise their anticipations and adjust their actions, thereby creating new discrepancies to be corrected at the next stage. Hence the entire situation is destabilized, and the system begins to oscillate wildly. In equilibrium, on the other hand, all anticipations are confirmed by experience and every acquired behaviour turns out to be appropriate to every situation, so that anticipations become more ingrained as time goes on, eventually solidifying into social norms.

Basic features of social organization, such as trust and power, simply express some underlying equilibrium. Power is nothing but the illusion of power, the universally held belief that a certain person is to be obeyed, that certain orders are to be followed. It is self-fulfilling, for if I am given an order by such a person, I will follow it for the simple reason that if I don’t, someone else will, and it will probably be the worse for me. Trust is the belief that others will comply with certain rules; each time I myself comply with those rules I strengthen the general feeling of trust.

Note that distrust is also self-supporting. If I distrust you and you distrust me, I will take precautions to protect myself against your anticipated behaviour, giving you good reason to distrust me a little bit more; sadly, we are witnessing precisely this situation in the Middle East. Trust is an equilibrium, distrust is another. In the former, everyone trusts everyone else, and is right to do so; in the latter, everyone distrusts everyone else, and is right to do so. A situation in which some trust but others don’t would not be stable, for the first group would soon learn to join the second. The main (unanswered) question of social science is thus: which equilibrium will prevail?

Reaching equilibrium does not even require intelligence — a darwinian process without conscious decisions will do just

## Equilibrium

*In the social sciences, an equilibrium is a situation that involves several individuals or groups, in which each one’s actions turn out to be the best reply to everyone else’s.*

as well. Natural selection leads competing species to an equilibrium — a stable adjustment to each other. Off the west coast of South Africa, the waters of Malgas Island are dominated by seaweed and rock lobsters that prey on mussels and whelks. Nearby Marcus Island is similar in every respect, but its waters have extensive mussel beds and whelks at high density, lobsters and seaweed being notably absent. In a famous experiment, Amos Barkai and Christopher McQuaid transferred thousands of adult lobsters from Malgas to Marcus — the whelks simply ate the much bigger creatures, and within a week there was not a single lobster left. Yet local fishermen claim that there were lobsters on both islands around 20 years before.

The prevailing equilibrium on these islands is therefore not determined by a local condition but by past history — a catastrophic event must have occurred to switch Marcus to another equilibrium. This example shows how rules that we assume to be universal, such as predator–prey relationships, in fact are relative to some equilibrium. If the lobsters on Malgas were able to think, they would believe it to be a rule of nature that lobsters prey on whelks, whereas just the opposite is true one island away.

Humans are also susceptible to this illusion: we are born into an equilibrium, the extent of which we do not appreciate. Our ethics of behaviour, our sense of justice, our social habits and our individual rights are not reflections of absolute truths or of human nature. They are relative to an equilibrium that our species, or society, has reached. Social norms and mores have no reality other than our belief that others behave according to them — they are self-fulfilling prophecies. Our social fabric and our personal ethics, everything we stand for, rest on equilibria, which we conjure out of nothing. We are such stuff as dreams are made on. ■

*Ivar Ekeland is at the Institute of Finance, Université Paris-Dauphine, 75775 Paris, France.*

### FURTHER READING

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**Balancing act:** in society, as in acrobatics, a single wrong move can upset the fragile equilibrium.