

Complexity science and evolution



How can we understand complex systems such as stock markets or ecosystems?

Professor Peter Allen argues that to understand the behaviour of such systems it's important to consider all levels - from atoms and molecules to organisms and individuals. He uses evolutionary theory to help him understand complex social and industrial systems. In these, as in nature, some individuals survive better than others and the interaction between different individuals leads to a co-evolutionary process of mutual change and adaptation.

Professor Allen's work suggests, perhaps surprisingly, that in systems, evolution selects for the ability to evolve and favours populations continually generating diverse individuals.

Learning populations

In other words, in evolutionary systems - ecological, social or economic - we will not find populations with 'optimal behaviour', but instead populations that can 'learn'.

For instance, in the car industry different manufactures take different approaches to making and selling cars. This is governed by the multitude of underlying opinions of the people who make up each company, from designers and engineers to market researchers and managers. The differential success of the different manufacturers leads to the evolution of cars and car companies – as those that have 'learnt' to be successful succeed.

This ongoing learning process of exploration and experimentation takes place at the underlying "microscopic" level. It generates the higher level of strategic organisation. These mechanisms alone can explain (though not predict) the co-evolutionary processes in markets and organisations.

Professor Peter M. Allen works at the Complex Systems Research Centre at [Cranfield University](#).

Further reading

- PM Allen, M Strathern, JS Baldwin: "[Evolutionary drive: New understanding of change in socio-economic systems](#)" (Emergence Complexity & Organization, Vol 8 No 2 July 2006)
- Keith Ridgway, Belinda Winder, Peter Allen: "[Modelling the Evolution of the Aerospace Supply Chain](#)"