On the dynamics of progress

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Autonomy is a unique defining feature of living systems, from bacteria -- or even from viruses, the organisms at the 'edge of life' -- striving to survive in evolving environment. Yet, evolution is a collective phenomenon requiring interaction, 'counterintuitively' to autonomic thinking of individual organisms allowing their species to survive.
Such an apparent dichotomy and the struggle of the 'opposites' is ubiquitous in most complex dynamical systems, entailing complex adaptive systems which encompass living systems.
The struggle of the opposites underlies most if not all roads to progress, understood as the evolution of 'fitness' -- be it adaptation to environment for species survival or evolution of scientific paradigms, or indeed, the evolution of the market share for those financially challenged.

Curiously, the concept of the 'roads to progress' has to date not sufficiently been studied using the language of physics of complexity. Indeed, physics traditionally understood, stayed away from investigating phenomena involving engaging in any laws of -- and due to -- individual and individualised behaviour.
Yet, as becomes apparent, such seemingly impenetrable problems as evolution of social standards such as morality or religion are not principally different from evolution of scientific paradigms and innovation, these in turn not being that different from the evolution of generic actors in a competitive company market.

Such universality is where physics can flourish and indeed, a rapidly growing range of reports shows intriguing beauty of the phenomena characterising the dynamics of the road to progress. In my talk, I will present our own recent work on the game-of-life like system which - to our surprise - showed exciting richness of critical phenomena. I will also refer to selected works in order to encourage listeners to engage in research of the 'physics of struggle'.