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QUANTIFYING FUTURE CONFLICTS, TEERORISM AND FINANCIAL MARKET VOLATILITY: DIFFERENT PROBLEMS, SAME COMPLEXITY MODELS

There are plenty of urgent national and international threats that might potentially benefit from Complexity Science, in order to assess and quantify their future risk and likely evolution. But what, if anything, can Complexity Science actually deliver? What is the game-changing 'take-away' for practitioners and policy-makers? Looking beyond the hype, Complexity Science needs to move beyond providing yet another verbal analogy to physical or biological systems, or arbitrary screen-shot from yet another idiosyncratic computer simulation. For example, the number of candidate complexity models of financial markets has exploded in the past decade -- and looking across the computational, mathematical and social sciences, so has the number of descriptions of human conflict and terrorism. Indeed, it is now a significant challenge for any researcher (let alone graduate student) to translate between the various candidate models, compare their respective assumptions, and know which is better and for what reason. The natural tendency is therefore simply to create yet another new model, leading to further model proliferation.

So has Complexity Science lost the plot? In this talk, I try to reverse this model proliferation by addressing a number of quite different societal threats using a common 'bare-bones' complexity model which mimics features of human grouping dynamics and decision-making. I will then compare its predictions to state-of-the-art high frequency data from the real-world domains of human insurgency, global terrorism, massively multiplayer online role-playing games (e.g. World of Warcraft), urban street gangs and cyberattacks -- also in the financial domain, I will use it to examine the murky subsecond world of algorithmic trading which occupies 70% percent of all financial trades, is openly blamed in the media for flash-crash phenomena, but where the future risk has not yet been mitigated or regulated because of a lack of reliable models.

BIOGRAPHY

Neil Johnson heads up a new inter-disciplinary research group in Complexity within the University of Miami's Physics Department, where he is a professor.

He earned his B.A. at Cambridge University and his Ph.D. at Harvard University.

He was professor of physics at Oxford University from 1992-2007, when he moved to Miami. He established and co-directed Oxford University's interdisciplinary research center in Complexity Science (CABDyN: Complex Agent-Based Dynamical Systems. He also co-directed Oxford University's interdisciplinary research center in financial complexity (OCCF).

He has published more than 200 peer-reviewed articles, and 3 books: 'Financial Market Complexity' (Oxford University Press, 2003), 'Two's Company, Three is Complexity' (Oneworld Publishing, 2007) and 'Simply Complexity' (Oneworld Publishing, 2010). He is the Series Editor for the book series 'Complex Systems and Inter-disciplinary Science' by World Scientific Press; a member of the editorial board of 'Journal of Computational Science'; the Physics Section Editor for the journal 'Advances in Complex Systems'; and Associate Editor for 'Journal of Economic Interaction and Coordination'.

He is an Associate Fellow in the Institute for Science, Innovation and Society (SBS), Oxford University, U.K., and is a member of the CABDyN International Advisory Board at Oxford University.