Opinion Dynamics Models of Radicalisation

Supervisor: Y. Merali (WBS) Co-supervisor: C. Connaughton (Complexity and Mathematics)

Project Outline and Objectives

The last 10 years has seen increasing interest in applying the tools of statistical physics to the modelling of social systems. This is usually done by treating individuals as agents which interact randomly with each other by some (potentially very simple) rules which are chosen to model some particular aspect of human behaviour [3]. One such application which has received a lot of attention is known as opinion dynamics. This class of models attempts to describe the process whereby communications between individuals lead to changes of opinions within a population. In the simplest example, the voter model, an opinion is simply a binary variable (yes/no opinion about a proposition) and when two agents interact (discuss), one agent chosen at random adopts the opinion of the other. A more sophisticated model, the Axelrod Model [1], takes a more nuanced approach. It allows agents to hold opinions about several issues which may take more values than just zero or one (often interpreted as "culture"). It also incorporates into the interaction rules the notion of homophily thought to be an essential ingredient by social scientists. Homophily means that an agent is more likely to interact with agents holding similar opinions. Such models are often used to investigate consensus formation. One is interested in the formation of clusters of agents who hold similar opinions. See for example [2].

In this project we will take a slightly different perspective. We would like to investigate the the extent to which opinion dynamics models can describe the process of radicalisation. A radical is interpreted as an agent whose opinion is very far from the consensus. We are interested in characterising the tails of the probability distribution of opinions in regimes where the average behaviour is to arrive at a consensus. The principle objectives of the project are, firstly, to understand the extent to which existing, well studied, models like the Axelrod model, are suited to this purpose and, secondly, to investigate the extent to which these models can be adapted to include more realistic rules which make sense from a social science perspective. The aim is not to produce an exact solution to a specific model but rather to acquire the ability to answer "what if" questions posed by social science within the setting of controlled models.

Required Background and Methodology

The student will be required to implement stochastic rules in computer simulations of particular opinion dynamics models and analyse the data. Most importantly, the student must be open minded and sincerely willing to reach out across the considerable cultural divide separating the mathematical and social sciences in order to establish meaningful dialogue.

Research Outcomes and Outlook

The principal research outcome will be a better understanding of the strengths and limitations of statistical physics models in addressing a concrete topical issue in social science - the process of radicalisation. The envisaged end-user of the research is the social science community at Warwick which will benefit from exploring what complexity science can and cannot do in the modelling domain.

References

[1] R. Axelrod. The Dissemination of Culture. *J. Conflict Resolution*, 41(2):203–226, 1997.

[2] E. Ben-Naim. Opinion dynamics: Rise and fall of political parties. *Europhys. Lett.*, 69:671–677, 2005.

[3] M. W. Macey and R. Willer. From Factors to Actors: Computational Sociology and Agent-based Modeling. *Annu. Rev. Sociol.*, 28:143–166, 2002.

Contact Information: Yasmin Merali – Centre for Complexity Science & Warwick Business School, University of Warwick. Phone: 22456, E-mail: Yasmin.Merali@warwick.ac.uk.

Warwick Center for Complexity Science