Networks, Agents and Models: Objections and Explorations

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ABSTRACT

Actor-Network Theory proves particularly inspiring in reconsidering the tenets of quantitative research and computational methods in the social sciences. However, translating insights from this perspective into operational models is problematic. The paper examines, in the form of a dialogue, critical problems of the computational modelling of network topologies considered from the point of view of Actor-Network Theory. In particular, the paper discusses the impetus of simulation and the inappropriateness of the distinction between agents and links.

Keywords: Actor-Network Theory, Agency, Modelling, Networks, Quantification, Simulation, Stochastic Automata, Topology

INTRODUCTION

What a network is, what a model is or what a quantity is are all questions worthwhile being asked from a methodological viewpoint. At the same time, all these things (networks, models, quantities) are all particularly relevant in the characterisation of contemporary cultures and deserve also to be studied as such. Work in Actor-Network Theory has certainly already provided good occasions to engage into discussions on network topology, on modelling and on quantification as both vehicles for scientific investigation and as constitutive features of the social world (e.g., Callon, 2006; Latour, 2010). This paper elaborates on the discussion held at a workshop hosted at the CSI (Centre de Sociologie de l’Innovation), in the Ecole des Mines de Paris, on October 30th, 2008. The workshop was part of the ATACD project (A Topological Approach to Cultural Dynamics) and consisted of an informal discussion on methods in network analysis, stochastic automata modelling and Actor-Network Theory.1 The point of the discussion is: how can Actor-Network Theory still contribute to the renewal of network topology? The question is rendered here in the form of a dialogue between two human agents, A and B, freely inspired by the transcripts of the discussion: A is working on how to use stochastic automata to model heterogeneous networks, while B is mainly formulating objections. The discussion starts with an argument about the purpose of models and simulations.

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OBJECTING TO SIMULATION

A: You don’t seem very happy with the whole idea of using mathematical models and computer simulations to understand the dynamics of networks. Can’t you grant them some empirical value? What do you think a simulation is, anyway?

B: I can think of two major directions for understanding the value of a simulation. One would be a rather sociological one, a direction in which you start with a dataset, or a database. You don’t care about things such as whether or not you are confronting a stable state – what you primarily need is to describe the dataset itself. You can then imagine a computational model that is useful or interesting in order to describe the dataset, to find an analytical vocabulary that allows making sense of the assemblage of data. The other way of understanding simulation would start with getting rid of data and just playing the game of the computational device. You might hook the device onto a dummy database, a database without data – a kind of artificial situation that does not correspond (does not need to correspond and could actually hardly correspond) to any empirical situation. The second option is the fashionable tendency in computation models, in financial computational modelling particularly. Just build an artificial world and play the game within – describing, at best, the behaviour of a world that you have provoked yourself.

A: Come on. That is a bit of an exaggeration. Model-based prediction of empirical behaviour is a real possibility. What about predictions based on the simulation of real empirical data, such as predictions of energy consumption which are based on established trends and which allow for a pretty accurate prospective modelling of future behaviour?

B: Of course, prediction of behaviour. But we are talking here rather about different cultures of using models. Prediction is a very fashionable issue indeed. What makes a prediction possible is the certitude or belief that you understand the initial state (and those preceding it). This is not always the case. So maybe understanding is more important. Understanding is definitely more in the line of Actor-Network Theory – not to predict anything, but just to describe, to understand what happens in a dataset. I agree that as soon as you enter into the business of computational models, there is an urge to go into ‘prediction mode’. So data from the past may be interesting, but what is more important is the dynamics of the model itself.

A: When you are trying to build a model, there is a lot of ‘trade’, a lot of ‘surplus’ coming out of it, especially when you are modelling small, local phenomena. First, you are using not only certain variable distributions to define the optimal states and so forth, but there are also pretty good statistical tools that enable you to establish the main interdependencies between some variables, the main types of interaction. Then you can base your assumptions on this specific model even if it refers to a specific moment only – it does not matter so much whether this is a moment of crisis or a stable situation. The logic is simple enough: in the economy, for instance, if a given company is on the market for long enough, it necessarily accumulates some experience that is reflected in the specific values of the variables describing it. It might be on the verge of collapse, like Lehman Brothers, but you study it a few months or weeks before it collapses. Yet, even in this case your model will be viable enough, i.e., more viable than those based on pure computation, pure combinatorial logic. Second, there is no need to model events in their full complexity. The idea of ‘stacked networks’ is very useful here, right?
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