Simulation Models of Ethnocentrism and Diversity

– An Introduction to the Special Issue

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Abstract. The theme and key ideas behind the special issue are discussed, in particular the terms: "ethnocentrism" and "diversity". It picks out three very influential simulation models in this area, pointing out that these are at the abstract end of the simulation spectrum, thus not strongly related to any data and over-interpreted by many subsequent readers. It also briefly discusses four themes that emerged in an associated workshop. Finally, the four papers in the special issue are outlined and this concludes with a plea for research which (a) makes greater use of social science data, (b) is more open-minded about the assumptions made, and (c) is more cautious as to the interpretation of simulations.

Migration, or the movement of individuals across borders accompanied by a "change of residence" (Lee 1966, p. 49), is one of the defining phenomena of our time[i]. However, this concern is not new and has found itself at the centre of many debates and scientific enquiries across time and geographies. It has many short- and long-term effects on individuals, groups, communities, and institutions in almost all societies, whether they are net sending or net receiving societies. Two such effects include a change in the (national, ethnic, linguistic, cultural) profile within receiving societies – their *diversity* – or one of the reactions to such change within those societies – *ethnocentrism*. In an era where migration is perceived to be large in scale and varied in its origins, both diversity and ethnocentrism have piqued increased scientific, political, and public interest.

"Ethnocentrism" is supposed to be a weak form of racism – a bias in individuals towards those they perceive as being of the same ethnicity as themselves. The implications of this term are that such biases might be that it is (in some sense) 'natural' and that it does not necessarily result in active discrimination against others, but these are contentious claims. However, the term also indicates that demonstrable racism might only be the 'tip of the iceberg' and that an underlying bias (conscious or otherwise) might be far more widespread. In contrast, "diversity" is intended as a positive term that highlights the advantages of having people with many different backgrounds and characteristics. We have chosen the terms of "ethnocentrism" and "diversity" to characterise this special issue, because we wanted to indicate that we are interested in the more widespread, less visible and maybe underlying, phenomena of bias (and not just provable racism) as well as to avoid solely negative connotations of these issues.

Due to its historic involvement in slavery and the civil rights movement in the US – issues of 'race' were of great concern to many academics there from the 1960's onwards. From a more modern perspective, the problem was not of 'race' but rather of rac*ism*[ii]. Although these days, in many countries, discriminating against people on grounds of ethnicity is illegal when making many important decisions, racism continues to be a major problem. Racism is an odd phenomenon because, *prime face*, it is irrational – why should it make sense to discriminate against a person based on how much melanin they happen to have in their skin (or other irrelevant physical difference)? Thus, it is natural to want to understand the phenomenon of racism – in particular: when it occurs, why it occurs, and how might it be tackled.

Three influential simulation models came out of these concerns: the Sakoda/Schelling model of racial segregation (Sakoda 1971; Schelling 1971), Axelrod's model of the polarisation of cultures (Axelrod 1997) and the related Axelrod and Hammond (2006) model of the possible biological evolution of an ethnic bias[iii]. These models are all agent-based simulations. Agent-based simulation

is a technique for modelling social phenomena as a collection of interacting individual computational entities, called 'agents'. These allow for the projection and examination of interactions between actors that would be too complicated to follow otherwise. It does not require the kind of strong assumptions of some other techniques (as in some economic or equation-based models). They represent a shift from only considering variables or factors that might impinge upon a situation, to that which allows the consideration of socially embedded individuals (Macy & Willer 2002). For an introduction to ABM see the 2014 special issue of SSCR and with its survey paper, Squazzoni, Jager, & Edmonds (2014).

The first of these influential models is the Schelling 'checkerboard' model of the emergence of ethnic segregation (Schelling 1971), which was prefigured by Sakoda's suggestion in (Sakoda 1971). This model showed that a relatively small preference for in-group neighbours could still result in significant levels of spatial segregation. Often cited as the first agent-based social simulation, it has received much attention and has led to the development of many versions of the model. Another is Axelrod's (1997) model about the polarization of culture within a 2D grid via horizontal transmission. This showed how a diverse set of groupings (defined by a vector of characteristics) could emerge, each being internally coherent, but clearly distinguishable from the other groups they adjoin. Hammond and Axelrod's (2006) model, following up on this earlier work, showed how a preference for cooperating with those of a similar biological type could result from a process of vertical (e.g. biological) evolution. In this last model, the agents could interact cooperatively or otherwise with their neighbours and those that are more successful are more likely to produce surviving offspring.

These three papers have been highly cited within the academic literature, including within the literature concerned with policy (e.g. Börzel & Risse, 2016; Eppstein & al. 2011; Galster, Quercia & Cortes 2000). They have inspired many others to 'build upon' their achievements by developing

models on similar lines and making similar assumptions. However, many of these models have tended to be at the abstract end of the 'simulation spectrum'. That is relatively simple models that are used in a suggestive, analogical manner – influencing ideas – rather than related to any data in a more empirical manner. Part of the problem here is that two, very different, communities of researchers have been involved: those that have a social science or humanities background who are interested in the potential of simulation and more technically minded researchers many of whom come from the formal or computational sciences but are interested in social phenomena. Whilst the former might well understand that a simple computational model is but an illustration of an idea, and it is the idea that needs to be assessed for its explanatory power, the latter has had a tendency to take such simple models too seriously – to project such models upon many phenomena without a well-defined empirical connection. Such over-enthusiastic projection can often be seen as naïve by those more immersed in the complexity and messiness of the social world. Furthermore, the formal and computational modelling of social phenomena has been tainted by association with that of over-reductionist economic modelling, much of which has had a free-market agenda[iv]. This special issue aims to be part of present work that tries to connect models to data in a more direct manner and to explicitly represent more of the social complexity that is observed.

This special issue originates from an interdisciplinary research project funded by the EPSRC from 2010 to 2016, called "the Social Complexity of Immigration and Diversity"[v]. The project applied agent-based simulation to different issues that are effected by immigration and diversity (e.g., political participation, migration, emergence of ethnic clusters in employment, inter-marriage and trust). Two of the guest editors were part of the project. The topic was inspired by issues encountered throughout the project that highlighted the lack of a unified framework to promote the use of agent-based simulations to help understand the field of migration and ethnicity, and to help grow the network of like-minded scholars that are involved in such work.

In addition, the co-editors organised a workshop in June 2017 at Manchester Metropolitan University on the same subject. Based on an open call, the workshop comprised 12 presentations and 2 panel discussions over two half days. Participation in discussions was lively, focused and of high quality, benefitting from the coherency of the workshop topic and the enthusiasm and knowledge of participants. A post workshop report providing details of each presentation, participant and the discussions is available (Hales 2018). Here we briefly summarise some of the themes and ideas that emerged from the workshop during these discussions.

The status of models. All models are simplified representations (abstractions) of reality. A distinction can be made between models that are strongly related to empirical data and those that are not. We can also distinguish between simple models (with few parameters) and less simple models with many parameters. The "Schelling / Axelrod" type models are simple (agent-based) models that are not strongly related to empirical data. However, their outcomes are complex and can suggest an understandable explanation (or story) of broad social patterns that emerge from individual behaviour. Most of the models in this area do not support any kind of prediction and it is dangerous to present them as such.

The relation of models to policy. Modellers and policy stakeholders should be aware that framing and choices depend on the model assumptions. Hence the major assumptions underlying any policy model must be clearly and transparently communicated to all stakeholders, not just other modellers. Modellers should consider that policy makers in controversial areas may look for models that fit their existing beliefs. Modellers should be clear about the limitations, scope and application of models and not "oversell" them in a policy context. For example, rational action may apply in some circumstances but does not in others. Modelling is often viewed as a technocratic exercise rather than a critical one but models in this area may not be mature enough to warrant this stance.

There is a dearth of thorough reproduction and critical evaluation of previous models. Critical approaches should be encouraged because this, done properly, improves rigour and transparency.

Identity in the networked age. In a globalised and networked world identity may, paradoxically, become more significant yet less stable. This creates new dynamics and new problems. Modern identity can be more problematic / fluid and, perhaps, new forms of group antagonisms and nationalisms may reflect this. With the emergence of social networks and online communities it seems that group based identities can be created in a fluid way. Although the networks offer the possibility of open universal interaction. Existing models, with minimal assumptions suggest that segregation and grouping dynamics can quickly emerge even from the most superficial forms of distinctions, so we should not be surprised when this emerges. Modelling and understanding such identity dynamics is a key future challenge.

The missing role of politics and history. Most existing models in the area do not model "politics" in which agents explicitly pursue their goals through political actions and institutions. Similarly, situations where one agent has power over another are not often represented. In many agent-based models, agents are often passive, leaderless and unable to take reflective political action. This precludes the critical review, understanding and representation of power relations using such models. Implicitly this could be viewed as complicity with power as it obscures its important role. History in often missing from models – many models start in a kind of "state of nature" where from randomised initial conditions it is demonstrate how individual interactions emerge social patterns and structures. It is rare for models to embed history in the form of individual beliefs and institutions at the outset. Addressing these issues is another future challenge.

The papers in this special issue touch upon these challenges, and can be seen as initial efforts to address them. There are four papers in this special issue. All of these present agent-based simulation models that represent some of the dynamic processes that might be occurring. All of

them are embedded within the issues and conclusions of the social science literature. All try to use plausible micro-level processes from the literature. They all use empirical data to help judge the models. All try to advance our knowledge of social phenomena in a way that is difficult without such models.

Poalillo and Jager look at processes of acculturation (or otherwise) in the face of immigration. It integrates the dynamics of migration intake and post-migration adaptation. Under conditions of fast intake the model shows higher levels of polarisation, whilst with slow intake they see a staged progression: from assimilation to integration for liberal migrants and from marginalization to separation for conservative migrants. These outcomes are consistent with SCIP survey in Germany, suggesting an explanation.

Meyer and Vasey look at the development of ethnically segmented labour markets focussing on low-skill roles where entry requirements are minimal. They implement key elements from Waldinger & Lichter's (2003) networked explanation of ethnic labour market segmentation and investigate the relative impacts of the different causal processes involved. Their results suggest that ethnically homogenous social networks increase the level of ethnic segmentation, but that these networks also help immigrant populations grow and protect them from the negative impacts of employer discrimination. It also suggests that these networks have a greater impact on labour market segmentation than discrimination alone. The results were consistent with data from the case study data in (Waldinger & Lichter 2003).

Bravo and Yantseva extended (Hammond & Axelrod 2006) to include a greater range of possible actions by agents, including that of actively harming others. This allowed them to investigate whether and under which conditions xenophobia can emerge beside or in alternative to ethnocentric cooperation in their model. The results were compared to Swedish data documenting social unrest and proxies of cooperative behaviours at the municipal level. These supported the

model predictions on conflict but not the ones on cooperation, casting doubts on Hammond and Axelrod's original argument.

Loughran, Fieldhouse, Lessard-Phillips and Bentley investigate whether introducing ethnic minority immigrants (with varying levels of commitment to voting) into a previously homogenous non-immigrant ethnic majority population influences voter turnout among the native majority group. They investigated varying the levels of civic duty (commitment to voting) norms among the ethnic minority immigrants coming into a previously homogenous non-immigrant ethnic majority population and then looking at the influence of this on voter turnout among the non-immigrant majority group. The results contradict the popular belief that increased immigration and diversity in a specific community will always lead to lower turnout levels. Indeed their results suggest that, other factors being equal, increased levels of immigration lead to a small but significant increase in turnout among the non-immigrant population.

This kind of research focuses on some of the possible influences and mechanisms that may shape a society as it dynamically changes – how social structure and individual properties may simultaneously affect each other. Whilst traditional discursive approaches are valuable, the distributed and heterogeneous nature of such processes mean that agent-based simulation – or something like it – is required to capture such dynamics. At the moment, agent-based simulation is the only formal technique to relate what happens at the micro-level with other levels (e.g. macro-level outcomes) without the need to hypothesize these *a priori*. However, to make progress such models need do three things. *Firstly*, to incorporate rich sources of evidence and data from the social science literature – including qualitative studies. *Secondly*, it needs to be open minded in terms of the assumptions and structures it assumes – exploring possibilities beyond that of established models. *Lastly*, it needs to be cautious in its conclusions about the observed world; mindful of the power of simple models to shape how we think about what we observe.

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[i] Or to be precise, it is the reaction to migration that is.

[ii] Indeed, it turned out that the whole concept of race as a biologically-based phenomena was ill-founded.

[iii] Strictly, Axelrod and Hammond (2006) are about vertical transmission, that is from parent to child – this could be biological or just what the child learns from the parent.

[iv] There are many left-wing economists, but the influence of the neo-classical "Chicago" school has meant that not many of these have been on the formal modelling end of economics.

[v] Project number EP/H02171X. For more about the project see http://cfpm.org/scid