NEH Project: Computer Simulations in the Humanities

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Abstract

Simulation techniques have long sustained research in various domains of physical, biological, and social sciences. Currently, humanists are exploring the usefulness of simulations for addressing various research questions. The nature and challenges of this enterprise are presented here in respect to collaborative work, the relation of humanities to the sciences, the transformative nature of digital methods of research within the humanities. This article describes a coordinated attempt to pursue these issues via a Summer Institute funded by the National Endowment for the Humanities, and briefly notes the projects of three of the Institute's participants. Their work is described in detail elsewhere within this volume

Digital Technology in the Humanities

Humanities address fundamental questions about what it is to be human. Such questioning has traditionally been rooted in reflective, interpretive, and critical thought aimed directly at the works of interest (texts, performances, paintings, sculptures, architectural productions, etc.). These inquiries have always employed some technology or procedure for understanding these works, even when the phenomena themselves were subjective in nature. Today the digital humanities employ electronic representations and related data analysis techniques to expose new features and generate new types of questions relevant to objects of study. Of related value is the preservation and increased access to these objects. Most recently, network analysis and simulation modeling are energizing innovative research in the humanities, often fueling themselves via new ways of visualizing and conceiving of the material under study. The Office of Digital Humanities within the

National Endowment for the Humanities provides support for a number of different projects in this area.

What makes computer simulations relevant to humanistic research? One answer highlights the fundamental nature of temporal change, which is to say, it's importance in characterizing human activities, creations, and concepts. Dynamic simulations reveal many aspects of temporal change (cycles, patterns, direction, and rates of change, including acceleration and deceleration). These features are connected to concepts of emergence within complex adaptive systems and to documentation of phase transitions, tipping points, thresholds, and non-linear processes. This kind of modeling uses digital techniques not to generate static representation of the objects of study but rather to reveal their dynamic aspects. These aspects can often be visualized in ways that suggest new elaborations of the model and potential explanations for evaluation. In discussing value of modeling, Epstein (2008) lists a variety of factors, perhaps the most important of which is the heuristic impact that observing many runs of a model has in iteratively shaping new concepts of the subject matter.

A concerted exploration of these simulation techniques within the humanities is currently underway within a two-year Summer Institute funded by NEH. The first segment of this endeavor took place at UNC Charlotte, June 1-17, 2011 and will conclude during the Summer of 2012. Humanists and modeling experts gather to develop dynamic models within various humanities disciplines. The range of disciplines and areas of research is quite varied. Topics of discussion center on complex adaptive systems, agent-based modeling, and connectionist networks. Mentors closely guide participant learners, and this assistance emphasizes both the conceptualization of research questions in terms of simulation techniques and the hands-on development of particular models. The group has focused on the use of NetLogo as a means of building

dynamic, agent based models. Gilbert and Troitzsch's *Simulation for the Social Scientist* (2005) and Drucker's *SPECLAB: Digital Aesthetics and Projects in Speculative Computing* (2009) can provide both technical and conceptual background for such projects. The projects of three participant humanists (Gillian Crozier, Graham Sack, and Stephen Crowley) are described in separate articles within this volume. Crozier's research addresses the mechanisms of cultural evolution. Her simulations suggest new informative field experiments and specific ways of improving current models. Sack articulates the narrative structure of 19th century British novels by modeling various features of plot and character development. Here, too, the cumulative impact of iterative development is evident. Crowley analyzes the conceptual and communicative mechanisms that undergird cross-disciplinary research. As seen below, modeling projects often draw upon the resources of various disciplines. The progress made within these investigations is representative of what has thus far been achieved by many of the Summer Institute participants.

Discussions and presentations at the Summer Institute include critical reflection upon the methods and scope of humanities research. This reflection revolves around the value of collaborative research, the relation between the sciences and the humanities, and the transformative potential of the digital humanities. These issues are inseparable, and discussion of one inevitably leads to the others. For organizational purposes, these topics will next be taken up sequentially, but the cyclical nature of the discussion is not only inherent but logically mandated.

Collaborative Research

Within the humanities there has been less collaboration than within the sciences, and there has been more resistance to the use of digitally based methods of research (Palmer and Neumann 2002; Anderson 2004). Arguably, the use of simulation methods can be a force for increased cooperative research. Adopting new technical methods of investigation inevitably leads to collaboration with experts in other disciplines. This is obvious in respect to technical advice and/or support for implementing a computer model using some particular tool. Beyond this, collaboration with modeling experts facilitates articulation of basic concepts ('complex adaptive system', 'network', 'agents', etc.) within a particular modeling enterprise. This articulation can be promoted by understanding the progress of similarly motivated colleagues and modelers in other disciplines. Digital humanities research naturally leads to interdisciplinary inquisitiveness and makes evident the underlying tension/connection between the humanities and the sciences. Understanding the complexities of human

existence is simultaneously a conceptual, empirical, and pragmatic enterprise. New ways of thinking intertwine with scientific perspectives and findings (changeable as they are) and with efforts to improve the human condition. On another level, the concerns of humanists and social scientists may converge upon the same phenomena from different routes (economic, political, cultural, etc.). Working in modeling groups varied by discipline provides helpful ways of coming to see one's own inquiry as a promising modeling project. In some cases, this will involve the heuristic impact of readily visualized quantitative change.

Science or Humanities?

The advent of simulation techniques is contributing to the growth of digital humanities. Only a decade ago, Anthony Kenny of the British Academy could write that "the research methods of social scientists have been transformed by the use of the computer; the humanities have been comparatively unaffected" (Kenny 1999). Exploring the applicability of networks and simulations are among the newer technologies that have contributed to the increased use of computers in humanities research. This usage necessarily confronts issues concerning the portrait of humankind painted by various scientific traditions, the relevance/irrelevance of scientific methods (particularly quantitative), and the value of the knowledge produced by each tradition. Social sciences are routinely taken to be part of the humanities, given their focus on human interaction and resulting phenomena, but quantitative methods can be narrowly focused and often in need of interpretation. Nevertheless, the key issue here concerns the ways in which quantitative characterizations of change can contribute towards and widen the scope of alternative perspectives within humanities research. But is this humanities or science? While some may see this as an exclusive disjunction, the answer is clearly "both." Science and the humanities are separate only if each is seen as finite and undeniable. Both, however, are in process and continually contributing to the comprehension of the other. In general, intellectual inquiry transforms itself via interactive conceptual and empirical processes of elaboration and criticism. Neither science nor the humanities provides an exception.

The Transformative Nature of Digital Technology in the Humanities

Proposing new methods of investigation within an established research program will raise questions about proper application and the significance of results produced.

In particular, the issue is whether the results of the new methods advance the original inquiry or substitute new but irrelevant questions (those easily addressed by the new method). Advances within the digital humanities are increasingly raising such questions. It is obvious that any data structure renders an abstraction, as does any representation, and data structures of various types are increasingly being used within humanities research (Moretti 2007). However, the issue here concerns implications of new methodologies that recast the basic aims and assumptions of an entire discipline. This issue is taken on by humanists who are directly involved in the technological explorations of digital research (Deyrup 2009; Berry 2011). Confronting such self-reflective, methodological questions is crucial for the health of any intellectual enterprise.

Acknowledgements

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