This issue of *Structure and Dynamics* is dedicated to the memory of Steve Berkowitz, (1943 - 2003), [1] a major pioneer in social network analysis.

Concluding S&D eJournal Issue 1#2: Progress and Prognosis

We conclude the second issue of *Structure and Dynamics* with considerable satisfaction, not to mention certain amazement, as editors, at the success of the journal. Our efforts in providing an eJournal that draws upon the fertile connections between anthropology and other disciplines have found steady and growing reception. We described our institutional base and mission in issue one. As a standard of quality, we have published 12 full articles out of 48 submitted, while all of the commentaries have seen their way through editing to publication. Commentaries and rejoinders have characterized the journal from the beginning. Full text downloads continue to rise in number, as shown in Figure 1, reaching 5,313 by August 23, 2006, 11 months after publication of the first article. The journal has captured the attention of social scientists and successfully met the challenge of the new media of scholarly communication. Authors are thus assured of a wide readership and wide citation. With a high-quality review process, the normal time for indexing in the Social Science Citation Index (SSCI) is three years. We thank our many peer reviewers, now grown into the hundreds and from diverse fields, for their contributions in achieving a review process that is rapid and high in quality.

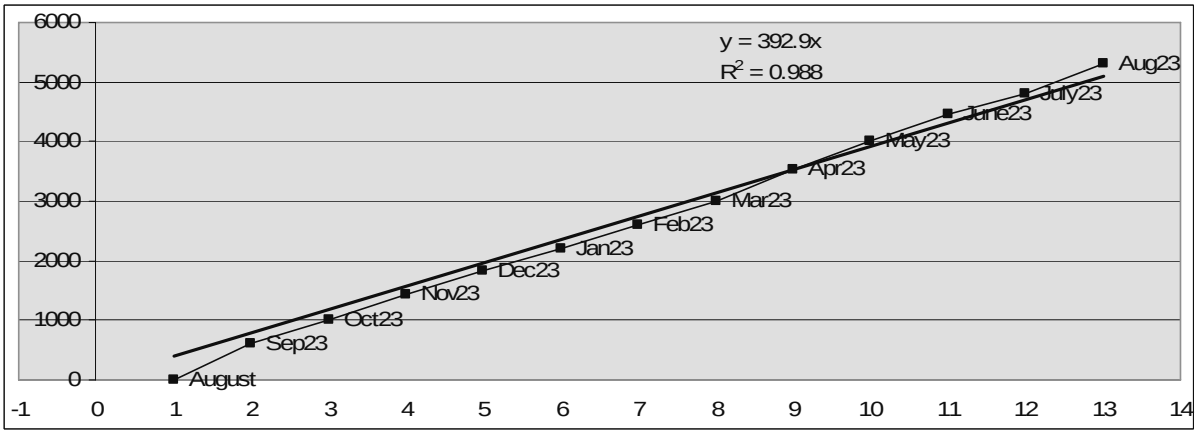

Figure 1: Roughly linear rise in full text downloads on a monthly basis since the first article publication (articles are published sequentially before closure of an issue).

Articles and their cumulative pagination are currently indexed in the Directory of Open Access Journals (DOAJ).[2] The American Anthropological Association is working on how to index journals like ours within the on-line AnthroSource portal which currently has full text access to AAA journals and anthropological material from the last 100 years.

[1] Barry Wellman's eloquent eulogy in *Connections* can be found at http://www.chass.utoronto.ca/~wellman/publications/berkowitz/berkowitz.htm.

[2] Access to the DOAJ is http://www.doaj.org/openurl?genre=journal&issn=15543374.

Features of Electronic Publication

Here we want to give readers an idea of the unusual and unique features of electronic publication. Responses to our issue 1#1 illustrate rapid dissemination and impact. The deployment of color and interactive graphics are illustrated in both issues 1#1 and 1#2.

Rapid dissemination and scientific impact: Issue 1#1

In keeping with rapid growth of readership, our inaugural article, Guillermo Algaze's "The Sumerian Takeoff," occupies 47 entries in the blogosphere, including comments at http://3quarksdaily.blogs.com/3quarksdaily/2005/10/explaining_the_.html by complexity physicist, statistician and commentator Cosma Shalizi and at a growing number of university sites. Jürgen Jost's "Formal Aspects of the Emergence of Institutions" has 33 such google links, including one in the Complexity Digest. Turchin's "Dynamical Feedbacks between Population Growth and Sociopolitical Instability in Agrarian States" has 28 such google links. It was also referenced at http://en.wikipedia.org/wiki/Social_cycle in a Wikipedia entry, alongside a link to his 2003 book, *Historical Dynamics: Why States Rise and Fall* (Princeton, NJ: Princeton University Press). The Internet is a strong multiplier of readership.

The findings and conclusions of Turchin's article in issue 1#1, along with those of Turchin and Korotayev (2006), have also been replicated in Southwestern Colorado for the pre-Chacoan, Chacoan climax, and post-Chacoan collapse, CE 600–1300, in a intensive study appearing in the journal *Complexity* by Tim Kohler, et al. The preprint of their article has already generated 24 Google citations. This is the first evaluation for pre-state societies of Turchin's model. The region studied represents "one of the most accurate and precise demographic datasets for any prehistoric society in the world" (Kohler, et al.). [Only] "when this area is a more or less closed system" do the data show support for Turchin's model, which "fits poorly during the time [a 200 year period] when this area is heavily influenced first by the spread of the Chacoan system, and then by its collapse and the local political reorganization that follows." As had been specified by Turchin, relative regional closure is a precondition of the applicability of the model. As Kohler et al. note, their findings offer strong support for the model's utility: "The model is helpful in isolating periods in which the relationship between violence and population size is not as expected. The mechanisms by which it achieves its success need to be elaborated," a task they have already begun. Hopefully, we will hear more both from Kohler et al. on these issues, and from Turchin, in forthcoming issues of *Structure and Dynamics*.

Color and dynamical graphics: Issue 1#1

Krempel and Schnegg's "About the Image: Diffusion Dynamics in an Historical Network" was the first of our articles to make use of electronic color imagery. It surpassed 180 full-text downloads and explains a technology for network visualization that is starting to diffuse widely. In contrast to print journals, in which researchers may pay $800 or more per page to have color illustrations, this imagery is a normal, free part of our publication. Krempel and Schnegg's article offers a good example of its use in explaining the kinds of complex networks in which diffusion may be one of the objects of study. The article is written as an explanation of their research on the complementarity between substantive

research and graphical presentation of complex and dynamical patterns, and as an explanation for what lies behind our choice of Krempel's dynamic gif as the eJournal logo appearing on the title page.

Features of Issue 1#2

Issue 1#2, along with illustrations for network analysis (Palmer et al., Berkowitz et al.) introduces the on-line provision of open access calculators (Moody), open access software (Downey), links to software used in simulations and related tutorials (Downey; Christiansen and Altaweel), fully interactive graphics (de Nooy; Richards et al.), and mathematical modeling with explanations and visuals (Wilkinson and Tsirel; Palmer et al.).

Sean Downey's simulation of Working Lad culture as depicted in the classic ethnography of Paul Willis's *Learning to Labor: How Working Class Kids Get Working Class Jobs* (1981) gives the reader an unparalleled ability to download and install the simulation software, generate the visual images of the model or design new variants, or learn a whole new simulation approach that might be used in the classroom situation. All the download links that are needed are on the journal's site for his publication. His study shows how to interrogate ethnographic and historical texts with the aid of simulation, how to identify the ethnographic lacunae that limit what can be simulated, and how to identify the limits of this genre of simulation. He is also able to use his approach to show strengths and weaknesses of contemporary social theories such as those of Antony Giddens (1984).[3]

"Understanding Ancient Societies: A New Approach Using Agent-Based Holistic Modeling," where Christiansen and Altaweel describe their broad simulation framework, offers a series of productive complementarities to Algaze's lead-article in our first issue. Algaze poses a series of questions, hypotheses, and possible lines of evidence with which to explore the processes that lead to the first cities' takeoff. Christiansen and Altaweel, along with collaborators at the University of Chicago (and including Tony Wilkinson, who provides an S&D commentary on the article), develop an agent-based model for addressing research questions about Mesopotamia that builds on the general-purpose Argonne National Labs simulation framework. The holistic component involves the incredible amount of real-world information that can be brought into the modeling effort from the earth sciences, satellite imagery, climate modeling, the agricultural sciences, ethnography, network analysis, and a host of other areas. The way that they couple realism in what is known about a large series of nested and networked processes with simulation modeling represents something of a revolution in agent-based modeling. Their core idea is that the objects in an object paradigm represent a problem domain wherein their own dynamic behaviors are expressed but in ways that link not to "owner" objects but calling upon an open-ended array of possible models that are not embedded in the object itself but merely linked at run-time to the object-owner hierarchy. The framework of FACET software modules (Christiansen 2000b) allows modelers, as in the Mesopotamian example, "to construct models of

[3] We are delighted to note that Sean is a graduate student at the University Arizona (Anthropology), and serves as webmaster for the Anthropology and the Environment Section of the American Anthropological Association, Student Representative to the Society for the Anthropological Sciences, and Research Associate at the Climate Assessment for the Southwest.

persistent social behavior patterns for individuals and organizations that operate within the social and environmental context of the larger holistic simulations." The connection to the data-input framework takes place within DIAS (Christiansen 2000a), "a generic object-oriented Java computer simulation framework that makes it feasible to build and run complex simulation scenarios that involve thousands of heterogeneous domain objects interacting via scores of concurrent dynamic processes…. Under DIAS, each model is formally defined as being able to implement a specific *abstract* behavior called out in the definition of a class of domain object. When the abstract behavior is invoked by the object, the model that is dynamically linked to the behavior will be triggered to run. Thus, various alternative model formulations, perhaps embodying different hypotheses or different levels of detail, can be invoked 'painlessly,' without changing simulation source code and at run-time, a key advantage in flexibility and ease of use as a research tool."

In "Stories, Scripts, Roles, and Networks," Wouter de Nooy studies the networks and structural dynamics of folktale plots, tested as well against literary interactions through time among Dutch literary critics. His network images use the SVG (Scalable Vector Graphics) technology of Adobe, that the reader can download at http://www.w3.org/Graphics/SVG/ as a free resource. He treats the network that is the object of his analysis as a single complex graphic whose components can be separated in the on-line imagery by pressing selection buttons to show its different aspects. The SVG was made by Pajek, the network software of Vladimir Batagelj and Andrej Mrvar, faculty members of the University of Ljubljana. The innovation of de Nooy, who as a humanist is the first author of their three-authored book (de Nooy, Batagelj, and Mrvar 2005), was to embed the selection buttons within the SVG script that controls the image. Viewing the pdf of his paper for this image, the reader can view the interactive SVG image to begin to engage the image by clicking the url http://repositories.cdlib.org/cgi/viewcontent.cgi?filename=2&article=1034&context=imbs/socdyn/sdeas&type=additional. His Pajek co-authors were sufficiently impressed as to make his innovation a regular feature when saving SVG images from within the Pajek software. De Nooy's article is cited in new media such as like "Tricia's blogspot, The Resource Connection," maintained by a librarian at http://resourceconnection.blogspot.com/2006_07_01_resourceconnection_archive.html to support the efforts of academic researchers in the behavioral sciences.

Wilkinson and Tsirel's paper contains a plethora of images that allow the willing reader to compare visualizations of the results of a whole battery of methods applied to their problem of evaluating limit cycles over two millennia in the political polarities of the Indic region. Our favorites are the two images on their page 39: periodograms that show statistical tendencies for different bands of limit cycles of different lengths, and showing the historical periods for which these tendencies are operative. The eye is caught by the bands that show generational and multigeneration limit cycles in the medieval periods and 90-year limit cycles from 0-700 CE giving way to those of 70 and then 60 years after 700 CE. Their article is lengthy but, in this exhaustive and un-foreshortened version, it serves as a strongly refereed manual and handbook for appropriate historical time series and spectral analysis. An aspect of their statistically conservative approach, in treating significance tests of hypotheses as two-tailed, as if they were ignorant of processes that would predict the observed results, is that the significance levels of one-tailed tests in the light of knowledgeable predictions—were they allowed the benefit of the doubt—would be much

stronger. There is good seed here for follow-up discussions over theoretical implications, methodology, and potential sources of controversy over data and interpretation.

The most dynamic of our interactive images are the panigrams of Seary, Richards, McKeown-Eyssen, and Baines in their "Networks of Symptoms and Exposures." Panigrams were devised by Richards as a way of visualizing network crosstabulation results for a research client who found the percentages in three-way crosstabulations too confusing to understand, even with pages of explanation. Originally, in the computer program FATCAT (Richards, 1986), panigrams were implemented for network crosstabulation—"categorical who-to-whom analysis"—in which the rows and columns of an adjacency matrix were replaced by rows and columns based on attributes of the senders and receivers of links. Seary wrote the code that drew panigrams on the screen, making them more useful for exploratory analysis of network data. Versions were later implemented for ordinary crosstabs and more complex types of network crosstabulation. Seary (1995) further extended the methods to include continuous variables (ANOVA and Scatterplots) in the computer program MultiNet and added stacking and the various interpretations available with the Rotate command. He also gave panigrams their name, in analogy to histograms which were named from the Greek *istos* ("mast"). Early histograms resembled a forest of one-dimensional ship's masts. Panigrams are named from the Greek *panis* ("sail"), which are two-dimensional objects attached to masts.

Their interactive histogram and 3D panigram images, from the article, can be seen at
http://repositories.cdlib.org/cgi/viewcontent.cgi?filename=0&article=1050&context=imbs/socdyn/sdeas&type=additional
http://repositories.cdlib.org/cgi/viewcontent.cgi?filename=2&article=1050&context=imbs/socdyn/sdeas&type=additional
http://repositories.cdlib.org/cgi/viewcontent.cgi?filename=17&article=1050&context=imbs/socdyn/sdeas&type=additional
The third url and 3D image has a control bar off screen at the bottom of the image that activates the main image when the cursor is moved over the control bar.

Panigrams as implemented in MultiNet are both more complete and interactive than any other method for visualizing cross-tab results (Seary 2005). The row and column variables may be transposed at the click of a Transpose button. MultiNet also allows stacking on a third categorical variable, enabling the Rotate buttons to select any pair of variables for display and analysis, along with Last/Next buttons to step through the stacked variable. Panigrams also show up in stacked ANOVA when both the displayed variables are categorical. Any of these displays may be stepped through in great detail by clicking Help→Interactive, which highlights each chosen cell and displays an informative description at the bottom of the display. It is this interactivity which is featured in the article, as programmed by Richards using a unique mixture of web-based graphics.

Spectral analysis (eigendecomposition) of networks as implemented in MultiNet allows highly interactive multi-dimensional displays showing clustering of links and relationships among node attributes. The coordinates of nodes in these displays are meaningful and can be used in further analyses. The interactivity and display abilities were condensed into a single image with a simple control allowing smooth movement from a bipartite graph through rotation of nodes colored by three modes (people, symptoms and exposures) to zooming in on labeled nodes showing the co-clustering of types of symptoms and exposures. This co-clustering is revealed in more detail by the panigrams, which use categories derived from the coordinates used in these displays. The interactive version of

the figure allows the reader to rotate and zoom in on the image, showing how these analytic results make it easy to see the important pattern in the set of relationships.

Berkowitz, Woodward, and Woodward's "The use of formal methods to map, analyze and interpret *hawala* and terrorist-related alternative remittance systems" is co-authored by Steve Berkowitz, one of the pioneers in social network and structural analysis in the social sciences. His untimely death occurred in 2003. He draws in this article on his scholarship about the role of family and informal institutions in historical world economies to write of venerable and legal networks of exchange that have operated for millennia and yet that make it impossible to trace financial transactions through the modern computerized credit banking systems.

Our dedication of this issue is to the inspired scholarship of Stephen Berkowitz. His classic work, *An Introduction to Structural Analysis* (1982), is as relevant and important today as it was when published. His edited book of readings with Barry Wellman, *Social Structures: A Network Approach* (1988), is one of the most cited of the sociological books in the field of social networks. The *hawala* article, the article of Seary, Richards, McKeown-Eyssen and Baines in our issue 1#2 and Kadushin's contribution in issue 1#1 were among the articles selected by Steve to be published in an expanded edition of *Social Structures: A Network Approach* that he was editing before he died.

Palmer, Steadman, and Coe, in "More Kin: An Effect of the Tradition of Marriage," utilize genealogical graphics, a mathematical model of networks and demography, and analysis of the relation between biology and culture to reopen important questions about the role of human kinship systems in human evolution, considered both in terms of networks and cognition. Their results for numbers of kin at various distances in bilateral kinship networks, depending both on demography and issues of social recognition, are cited in the article by Moody.

James Moody's "Fighting a Hydra: A Note on the Network Embeddedness of the War on Terror" shares in common with Berkowitz et al.'s article a concern for misunderstandings that prompted and have emerged out of the War on Terror. Moody writes of the effects of misguided policies, such as described in the recent best seller by Thomas Ricks (2006), that fail to take into account the "blowback" consequences of the killing, wounding, and arresting of civilians and torture of suspected insurgents, as well as the effects of the wounding and deaths of soldiers recruited from the U.S. and elsewhere, on those in their home communities, families and social networks. His on-line innovation is to provide a calculator for the network scale-up model of Killworth et al. (1998) to allow readers to make their own estimate of the number of people affected and possibly radicalized by military or terrorist-related events.

In Killworth et al.'s model, summarized by Moody, the scale-up function $r = 1-(1-e/t)^c$ (as implemented in the calculator) works as follows: as the scale of e (event size) increases within a population of size t, those who know someone involved in the event increase their proportion r in the population. This increase is asymptotic to a power law that gradually decreases in slope into a crossover to exponential decay as it reaches the whole population.

This is an extremely strong effect for blow-back phenomena. The parameter *c*, for the average number of people a person knows, governs the vertical rise in the slope of the power law. The function that describes how network scale-up works is related to the *q*-exponential family, e.g., with $r' = (1-(1-e/tc))^c$, for which relationships to the parameters of network feedback are described by White, et al. (2006). We shall be seeing more of the *q*-exponential family in later journal issues.

Conclusion

It is apparent from this discussion and from the two issues now published that *Structure and Dynamics* has come a long way in attaining the initial goals for the eJournal as an outlet for scholarly publication and debate in contemporary social science, and in bringing forward and making available new forms of analysis and visualization and channels for debate. The journal is thus positioned for maximizing communication and dissemination at the cutting edges of the human sciences. As we proceed into the era of electronic journals, we invite your participation.

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