

5. Social and Economic Phenomena: as per the web site

- [Social Dynamics and Evolution](#) : [Butts](#), [Narens](#), [Romney](#), [Saari](#), [Skyrms](#), [Smyth](#), [Stern](#), and [White](#)

Text on the program:

In January, 2004, the IMBS created a new focus research group on “Social Dynamics and Evolution,” chaired by Douglas White. Their activities this year include the first two issues of their new *Structure and Dynamics: eJournal of Anthropological and Related Sciences*, which is electronically peer reviewed through UC eScholarship publications under IMBS auspices, allows interactively sophisticated color graphics, and is indexed in the Directory of Open Access Journals as a subscription-free journal at no cost to authors to publish with high quality peer reviews and copy editing. It now has more than 4,500 full-text article pdf downloads. The Social Dynamics and Evolution group does the editing and received a large grant from a benefactor non-profit foundation to cover copy editing, fund MBS graduate students and faculty to collaborate with other scientists through visits to the Santa Fe Institute and across UC campuses. The other program they initiated is the UC Multicampus Group in Human Sciences and Complexity (UC-HSC). Formed and led by the chair and members of the Social Dynamics and Evolution group, UC-HSC started running, in fall 2005, year-long HCS Seminars with quarterly MBS conferences with both graduate and undergraduate enrollments in cross-campus videoseminars. Twenty-two speakers in seventeen presentations averaged 26 faculty and student attendees, split roughly half and half, and were recorded for fourteen on-line on-demand streaming videos of the presentations and discussion following. The HSC seminars will continue with course credit in coming years, and a four-campus minor is proposed by the faculty involved that will expand the scope of the current UCLA minor in Human Complex Systems.

1. A one-paragraph summary, in terms that intelligent non-specialists can grasp, of some important findings, theoretical or empirical.

In 2006 *Physical Review E* published my simulation model, done with Santa Fe Institute physicists, for investigating the occurrence of scale-free, navigable, and other types of feedback and feed-forward phenomena in networks. The model led to new understandings of network dynamics and demonstrated the existence of a universality class of networks that generates many of the known empirical network topologies from processes consistent with generalized (‘Tsallis’) entropy models for nonindependent interactions. Realizing the significance of this finding, I applied the same measurement and modeling techniques to data on city-size distributions from 23 historical periods in the last millennium. This led to an entirely new way to describe and theorize urban hierarchies and their dynamics, described in terms of long periods of normal city hierarchies punctuated by rapid transitions to and eventually back from equally long periods of slumped ‘city-quake’ distributions. This and my further discoveries this year

form part of the key insights in a chapter on “Markets and Hierarchy” for *A New Perspective on Innovation and Social Change*, edited by Santa Fe Institute scientists David Lane, Geoffrey West (Time magazine 100: “Top 10 Scientists and Thinkers category for 2006”), Sander van der Leeuw, and Denise Pumain, a book that gives the results of our 1 million Euro project on Information Society as a Complex System. One discovery was that cityrise/cityquake oscillations double in length those of population oscillations and associated conflicts in the decline phases of major world regions such as China or Europe. I also discovered how these two types of major historical and demographic/economic processes, cityquake and population oscillations, are dynamically interlocked. I found similar contrasts found in new research work this year, with a Japanese colleague on industrial production networks in Tokyo’s largest Industrial District, as to how two forms of hierarchical supply-chain organization and their competing market mechanisms coexist in the industrial network of 8,500 firms.

2. Papers and books published as well as those accepted during the academic year (as full a citation as possible).

2005 "Network Dynamics and Field Evolution: The Growth of Interorganizational Collaboration in the Life Sciences." Walter W. Powell, Douglas R. White, Kenneth W. Koput and Jason Owen-Smith. **American Journal of Sociology** 110(4):1132-1205. Special Issue on Computation in the Social Sciences.

2005 "Multiple Measures of Alyawarra Kinship," Woodrow W. Denham and Douglas R. White. **Field Methods** 17(1):70-101.

2006 "Generative Model for Feedback Networks." Douglas R. White, Nataša Kejžar, Constantino Tsallis, Doyne Farmer, Scott White. **Physical Review E** 73, 016119 doi:10.1103/Section: General Methods of Statistical Physics. Reprinted, **Virtual Journal of Biological Physics Research** February 1, 2006 issue. Reviewed in **Europhysicsnews** 36(6):218-220.

Accepted 2006. Transforming Ethnographic Data and Analytical Problems into Network Data Suitable for Complementary Analysis and Theory Douglas R. White and Patrick Heady. **Working Paper, Halle Max Planck Institute for Social Anthropology**

Accepted 2006 (Invited paper). "Discovery of oscillatory dynamics of city-size distributions in world historical systems," D. White, N. Kejzar, and L. Tambayong. In preparation for G. Modelski, ed., **Globalization as Evolutionary Process Modeling, Simulation, and Forecasting Global Change**.

3. A list of talks (e.g., seminars, conferences, outside presentations) given during the academic year, including dates and location.

PLENARY ADDRESS

“Civilizations as Dynamic Networks: Networks, Hierarchy and Complexity.” European Conference on Complex Systems, Paris. November 16, 2005.

WORKSHOPS

“Historical City Networks.” For: Measuring and modeling state formation since the iron age, San Diego, ISA workshop meeting organized by Chris Chase-Dunn and Peter Turchin. March 20, 2006.

“Network Biconnectivity, Trade, and the Q-Dynamics of Historical City Size Distribution,” Laurent Tambayong and Douglas White. Santa Fe Institute research workshop. May 15, 2006.

INVITED TALKS

“Transforming Ethnographic Data and Analytical Problems into Network Data Suitable for Complementary Analysis and Theory.” Max Planck Institute for Social Anthropology, Halle. Summer 2005.

“Civilizations as Dynamic Networks.” Institute of Ethnology, University of Cologne. Summer 2005.

“Theory and Analysis of Kinship Networks.” Anthropology Department, University of Hamburg, Summer, 2005.

“Civilizations as Dynamic Networks.” Anthropology and Sociology, Central European University. Summer, 2005.

“Network Dynamics of Inter-Organization Collaborations in Biotechnology, 1988-1999.” in collaboration with W. W. Powell and J. Owen-Smith. Jointly sponsored by Faculty of Economics and School of Social Science, University of Ljubljana. Summer, 2005.

“Causality of Network Configurations in Historical Dynamics: Some Hypotheses and Evidence.” San Diego 47th Annual International Studies Association: The North-South Divide and International Studies. March 23, 2006.

"Discovery of oscillatory dynamics of city-size distributions in world historical systems." Douglas White, Nataša Kejžar and Laurent Tambayong. Seminar on Globalization as Evolutionary Process Modeling, Simulation, and Forecasting Global Change. Paper given and participation by two-way television. International Institute for Applied Systems Analysis, Laxenburg, Austria, April 7, 2006.

"Network Dynamics of City Sizes, Trade Networks, and Conflict." Annual Science Board Symposium, Santa Fe Institute. May 12, 2006.

"Innovation, Networks and Dynamics." Information Society as a Complex System EU Project Final Reports, Venice. May 26, 2006

VIDEOCONFERENCE PRESENTATIONS

"Civilizations as Dynamic Networks: Historical Modeling and Simulation." Four-Campus UC Human Sciences and Complexity, UCI. Sept 30, 2005 streaming video F05#1: <rtsp://media.nacs.uci.edu:554/ITC/SocialScience/White/Anthro-093005.rm>

"Networks-Affect-Pricing Theory in Modern Production Industry: Three Network Studies of the Giant Industrial District of Tokyo." Tsutomu Nakano, Kwansai Gakuin University, and Doug White. Four-Campus UC Human Sciences and Complexity Seminar,. UCSD. April 21, 2006. Streaming video S06#8: http://media.nacs.uci.edu:554/ITC/SocialScience/White/2006_04_21_ASC.rm

"The Five Alternations Between Global Economy and Regional Economies in Eurasia in the Last Millennium: Definitive Evidence of Macro Civilizational Dynamics." Doug White and Laurent Tambayong. Four-Campus UC Human Sciences and Complexity Seminars. UCSD, June 22. streaming video S06#8: rtsp://media.nacs.uci.edu:554/ITC/SocialScience/White/2006_06_22_ASC.rm

4. Any honors or special recognition that you have received in the past year.

In summer, 2005, White received two months of summer research invitations as: Guest-in-Residence, Max Planck Institute for Social Anthropology, Halle, Germany; Collegium Guest-in-Residence, Institute for Advanced Study, Budapest, Hungary; and Guest-in-Residence and Visiting Faculty, School of Social Science Sciences, University of Ljubljana, Slovenia (6 weeks, summer, 2005).

Asked by the Max Planck Institute (MPI) for Social Anthropology in Germany to develop an analytic guide for the network component of a 4€ million Euro 8-country European Union project with 19 full-time researchers on **Kinship and Social Security**, I wrote a design for integrating computer-based network analysis into the MPI and other major research institutes.

A lengthy 2006 review in the **International Journal of Middle East Studies** cast critical acclaim on "what could be the most important book in anthropology in fifty years," White and Johansen's 2005 book, **Network Analysis and Ethnographic Problems: Process Models of a Turkish Nomad Clan**, which "begins with an introduction to network analysis in relation to ethnography, providing a succinct history of network thinking including very recent developments in various disciplines about network topology and dynamics." "In addition to its contribution to our understanding kinship theory in a quite new way, this book makes an outstanding contribution by reintroducing ethnographers to the network perspective." "The authors point out that 'taking a network path to coding and analysis' in ethnography leads to the ability to understand the emergence of social structural phenomena that would otherwise remain unobserved." "Whether the reader is interested in kinship, in economics, in politics or history, this book might be considered must reading."

5. Current and pending grants (dates and amounts, etc.)

“Informatic Treatment of Kinship Phenomena: An Integrated Approach in Anthropology and History,” Agence Nationale de la Recherche (France), January 2006-December 2008. \$150,000€ euros. The project brings together anthropologists and historians of the family,” including those who participated in my NSF funded workshops in kinship analysis, and follows my lead in a “veritable revolution in the study of kinship.”

6. Names of those graduate students you have supervised whose research falls under the general scope of the IMBS.

Laurent Tambayong, MBS. Advisor, Ph.D. Chair.

Steve Doubleday, MBS. Advisor.

International: Nataša Kejžar, *Faculty of Social Sciences, University of Ljubljana, Slovenia*

International: Camille Roth, Centre de recherche en épistémologie appliquée, Ecole Polytechnique

International: Carl Nordlund, University of Lund, Sweden (External Examiner)

International: Stefano Pedrazzi, University of Reggio and Modena.

7. Graduate research seminars conducted during the academic year.

Human Sciences and Complexity Videoconference Seminar F-W-S 2005-2006

Social Networks and Dynamics Fall 2005 Soc 229/Anthro 289B

Global Networks. Winter 2006 Soc 229 Soc Sci 249A Anthro 289B

8. Conferences, workshops, etc., that you organized.

ECCS06 Satellite Workshop on Social and Historical Dynamics: Emergence, Robustness, Resilience, and Coevolution. European Complexity Conference, Oxford 2006. Partial funding by the James Martin Institute for science and civilization.

Human Sciences and Complexity (UC-HSC) Multicampus Videoseminar Series, 2005-2006.

9. Anything else that you think I might include in the Annual Report.

External Faculty, Santa Fe Institute. Second year of a 3-year renewable appointment.

Council Member, European Complexity Science Society, 2005-2009

Steering Committee, European Complexity Science Conferences, 2005-2009.

Conference Programme Committee, European Conference on Complex Systems 2006 (ECCS '06).

Networks Sections Reviewer, Papers for the European Conference on Complex Systems 2006 (ECCS '06), Saïd Business School, University of Oxford, 25-29 September.

Editor-in-Chief, *Structure and Dynamics: eJournal of Anthropological and Related Sciences*, UC eScholarship Publications.