Special Topics: Issues in Crisis Response

Carter T. Butts

Winter Quarter, 2004

Class Schedule

Meeting time: Wednesday, 1:00-3:50

Classroom: SSPB 2214

Instructor

Name: Carter T. Butts

Office: SSPA 2145

Office hours: TBA

Email: buttsc@uci.edu

Telephone: (949)824-8591

Class Website

http://eee.uci.edu/04w/69797/

Course Objectives

By their very nature, disasters and other crisis situations represent unusual scenarios which stretch the limits of existing social and physical infrastructure. This course will survey a range of issues involved in the effective assessment of and response to crisis situations. Emphasis will be placed on the intersection of technical and social scientific challenges involved in the crisis response process, including the use of potentially unreliable informant reports, sampling of hard-to-reach populations, modeling of rare/extreme events, and deployment of information systems in unfavorable environments. In addition to reviewing relevant literature, students in this class will develop their own research projects involving crisis response, and opportunities will be provided to present this work to the class as a whole.

Prerequisites

None, although graduate-level probability and statistics is strongly recommended.

Course Requirements

Readings:

Assigned readings for each class session are listed in the course outline (see below). Students should complete any assigned readings for a given session *before* class begins, so as to allow for informed discussion of the material. In addition, each student will be assigned certain readings for which he or she will lead class discussion; creation of a short (≤ 1 page) handout summarizing key points and/or critiques of designated readings is expected.

Research Project:

Over the course of the quarter, each student is expected to work on a research project of his or her choosing, related to some aspect of crisis response. This project may be a component of a larger, group project, but the project proposal/presentation/paper must center on the student's individual contribution. The research project is evaluated via three milestones:

Project Proposal: In the fifth week of class, each student must turn in an approximately three to five page research proposal (in the general style of an NSF project description) outlining his or her chosen project, and indicating the research which is to be performed.

Project Presentation: In the final week of class, each student will be asked to give a brief in-class presentation of his or her research findings. This presentation will be approximately 15-20 minutes in length, and should be in the style of an academic conference presentation.

Project Paper: In addition to the proposal and presentation, each student must submit a paper summarizing his or her research. (Where feasible, this paper should be prepared as a manuscript for eventual publication.) This paper will be due at the end of the exam period (March 26).

Grading

Assignments will be weighted as indicated below. Note that the proposal, presentation, and paper for the research project are graded separately.

Class participation: 20%

Research project (proposal): 20%

Research project (presentation): 20%

Research project (paper): 40%

Course Outline

Week 1 (1/12–1/16): Introduction

Practitioner Reading: Auf der Heide, Erik. 1989. *Disaster Response: Principles of Preparation and Coordination*, Online edition. `http://216.202.128.19/dr/static.htm`

Week 2 (1/19–1/23): Informant Accuracy

Batchelder, W.H. and Romney, A.K. 1988. "Test Theory Without an Answer Key." *Psychometrika,* 53(1), 71-92.

Bernard, H.R.; Killworth, P.; Kronenfeld, D.; Sailer, L. 1984. "The Problem of Informant Accuracy: The Validity of Retrospective Data." *Annual Review of Anthropology,* 13, 495-517.

Butts, C.T. 2003. "Network Inference, Error, and Informant (In)Accuracy: A Bayesian Approach." *Social Networks,* 25(2), 103-140.

Freeman, L.C.; Romney, A.K.; Freeman, S.C. 1987. "Cognitive Structure and Informant Accuracy." *American Anthropologist,* 89(2), 310-325.

Practitioner Reading: Emergency Management Institute. "Principles of Emergency Management." Emergency Managment Institute Course IS 230. Washington, DC: FEMA.

Week 3 (1/26–1/30): Risk Perception and Behavior

Asgary, A. and Willis, K.G. 1997. "Household Behavior in Response to Earthquake Risk: an Assessment of Alternative Theories." *Disasters,* 21(4), 354-365.

Balluz, L.; Schieve, L.; Holmes, T.; Kiezak, S.; Malilay, J. 2000. "Predictors for People's Response to a Tornado Warning: Arkansas, 1 March 1997." *Disasters,* 24(1), 71-77.

Drabek, T.E. 2001. "Disaster Warning and Evacuation Responses by Private Business Employees." *Disasters,* 25(1), 76-94.

Slovic, P. 1987. "Perception of Risk." *Science,* 236(4799), 280-285.

Practitioner Reading: National Science and Technology Council. 2000. "Effective Disaster Warnings." Report of the Working Group on Natural Disaster Information Systems Subcommittee on Natural Disaster Deduction. Washington, DC: NSTC.

Week 4 (2/2–2/6): Panic and Rumor Propagation

Butts, C.T. 1998. "A Bayesian Model of Panic in Belief." *Computational and Mathematical Organization Theory,* 4(4).

Feinberg, W.E. and Johnson, N.R. 2001. "The Ties That Bind: A Macro-Level Approach to Panic." *International Journal of Mass Emergencies and Disasters,* 9(3), 269-295.

Sinha, D. 1952. "Behavior in a Catastrophic Situation: a Psychological Study of Reports and Rumors." *British Journal of Psychology,* 43, 200-209.

Turner, R.H. 1994. "Rumor as Intensified Information Seeking: Earthquake Rumors in China and the United States." In Dynes, R.R. and Tierney, K.J. (eds), *Disasters, Collective Behavior, and Social Organization,* 244-256. Newark: University of Delaware Press.

Practitioner Reading: Emergency Management Institute. 1998. "Incident Command System." Emergency Managment Institute Course IS 195. Washington, DC: FEMA.

Week 5 (2/9–2/13): Damage/Loss Assessment

Project Proposal Due

Brown, V.; Jacquier, G.; Coulombier, D.; Balandine, S.; Belanger, F.; Legros, D. 2001. "Rapid Assessment of Population Size by Area Sampling in Disaster Situations." *Disasters,* 25(2), 164-171.

Handmer, J. 2002. "The Chimera of Precision: Inherent Uncertainties in Disaster Loss Assessment." *International Journal of Mass Emergencies and Disasters,* 20(3), 325-346.

Shoaf, K.L.; Nguyen, L.H.; Sareen, H.R.; Bourque, L.B. 1998. "Injuries as a Result of California Earthquakes in the Past Decade." *Disasters,* 22(3), 218-235.

Spiegel, P.B.; Sheik, M.; Woodruff, B.A.; and Burnham, G. 2001. "The Accuracy of Mortality Reporting in Displaced Persons Camps During the Post-emergency Phase." *Disasters,* 25(2), 172-180.

Practitioner Reading: Emergency Management Institute. 1998. "Introduction to Mitigation." Emergency Managment Institute Course IS 393. Washington, DC: FEMA.

Week 6 (2/16–2/20): Network Sampling, and the Measurement of Hidden Populations

Bernard, H.R.; Johnsen, E.C.; Killworth, P.D.; Robinson, S. 1991. "Estimating the Size of an Average Personal Network and of an Event Subpopulation: Some Empirical Results." *Social Science Research,* 20(2), 109-121.

Heckathorn, D.D. 1997. "Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations." *Social Problems,* 44(2), 174-199.

Heckathorn, D.D. 2002. "Respondent-Driven Sampling Ig II: Deriving Valid Population Estimates from Chain-Referral Samples of Hidden Populations." *Social Problems,* 49(1), 11-34.

Thompson, S.K. and Frank, O. 2000. "Model-based Estimation with Link-tracing Sampling Designs." *Survey Methodology,* 26, 87-98.

Practitioner Reading: Emergency Management Institute. "State Disaster Management." Emergency Management Institute Course IS 208. Washington, DC: FEMA.

Week 7 (2/23–2/27): Modeling Extreme Events

Fawcett, W. and Oliveira, C.S. 2000. "Casualty Treatment after Earthquake Disasters: Development of a Regional Simulation Model." *Disasters,* 24(3), 271-287.

Feinberg, W.E. and Johnson, N.R. 1995. "FIRESCAP: A Computer Simulation Model of Reaction to a Fire Alarm." *Journal of Mathematical Sociology,* 20(2-3), 247-269.

Smith, J. and French, S. 1992. "Bayesian Updating of Atmospheric Dispersion Models for Use After an Accidental Release of Radioactivity." *The Statistician,* 42(5), 501-511.

Zelterman, D. 1993. "A Semiparametric Bootstrap Technique for Simulating Extreme Order Statistics." *Journal of the American Statistical Association,* 88(422), 477-485.

Practitioner Reading: Federal Emergency Management Agency 1998. *EXERCISE 98 Evaluation Report.* Washington, DC.

Week 8 (3/1–3/5): Information Systems in Crisis Response

Chengalur-Smith, I.; Belardo, S.; Pazer, H. 1999. "Adopting a Disaster-management-based Contingency Model to the Problem of ad hoc Forecasting: Toward Information Technology-based Strategies." *IEEE Transactions on Engineering Management*, 46(2), 210-220.

Kaiser, R.; Spiegel, P.B.; Henderson, A.K.; and Gerber, M.L. 2003. "The Application of Geographic Information Systems and Global Positioning Systems in Humanitarian Emergencies: Lessons Learned, Programme Implications, and Future Research." *Disasters,* 27(2), 127-140.

Kerle, N. and Oppenheimer, C. 2002. "Satellite Remote Sensing as a Tool in Lahar Disaster Management." *Disasters,* 26(2), 140-160.

Pelletier, D.L. and Msukwa, L.A.H. 1990. "The Role of Information Systems in Decision-making Following Disasters: Lessons from the Mealy Bug Disaster in Northern Malawi." *Human Organization,* 49, 245-254.

Practitioner Reading: Human Technology, Inc. 2003. *Community Emergency Response Team: Instructor Guide.* McLean, VA.

Week 9 (3/8–3/12): Organizational Structure in Crisis Situations

Carley, K.M. 1991. "Designing Organizational Structures to Cope with Communication Breakdowns: A Simulation Model." *Industrial Crisis Quarterly,* 5(1), 19-57.

Drabek, Thomas E; McEntire, David A. 2002. "Emergent Phenomena and Multiorganizational Coordination in Disasters: Lessons from the Research Literature." *International Journal of Mass Emergencies and Disasters,* 20(2), 197-224.

Krackhardt, D. and Stern, R.N. 1988. "Informal Networks and Organizational Crises: An Experimental Simulation." *Social Psychology Quarterly,* 51(2), 123-140

Topper, C.M.; Carley, K.M. 1999. "A Structural Perspective on the Emergence of Network Organizations." *The Journal of Mathematical Sociology,* 24(1), 67-96.

Practitioner Reading: Wahle, T. and Beatty, G. 1990. *Emergency Management Guide for Business and Industry.* Federal Emergency Management Agency: Washington, DC.

Week 10 (3/15–3/19): Final Project Presentations

No readings.