

## Conference on Path Dependence

A conference on defining, measuring and analyzing path dependency in social processes was held on June, 4 & 5, 2010 at the University of Minnesota, under the auspices of and with support from the Society for Political Methodology, National Science Foundation, and the Department of Political Science at the University of Minnesota. Several important topics were explored.

The critical distinctions between equilibrium dependence, outcome dependence, and state dependence were emphasized. The first concept, where a long-run equilibrium outcome depends at least partially on early events, encompasses the most frequent use of the term path dependence. This equilibrium dependence may be either path dependent, meaning the sequence of these early events is important, or “phat” dependent, in which the collection but not the sequence of events matters. Outcome dependence defines situations where current outcomes but not necessarily any equilibrium depend on historical events. Conventional linear covariance stationary AR(n) and MA(n) processes are examples of processes that are outcome but not equilibrium dependent. These definitional properties were related to the specification and parametric values of different time-series models.

In addition, a new concept, forward path dependence, was introduced. This concept describes processes in which current outcomes influence past outcomes. Forward dependence occurs whenever an agent overturns an existing choice in response to current events. An example is a government bureau switching its technology to match that of a newly created government agency.

Conference discussions covered both discrete and continuous measures of outcomes. In the former the dynamics are modeled as Markov processes, where the ergodicity of the transition matrix determines whether the system is outcome or path dependent.<sup>1</sup> With outcomes that are represented with continuous variables, the possibility of path dependence depends upon the variations in and values of the autoregressive term and the variance of any stochastic component.

A second theme was exploration of different processes that might be equilibrium dependent, and under what precise conditions. Several participants built on current work in network analysis to examine what properties of networks produce path dependence. The applications included military alliances, regional differentiation with respect to electoral forces, and the formation of political attitudes.

The presentations also included discussions of various methods for assessing empirically whether a process met the criteria for path dependence. The methods included experimental design along with traditional cross-sectional and time series analysis.

The following is a list of the discussion papers and their authors (arranged alphabetically). Copies can be obtained at <http://jgill.wustl.edu/Path.Dependence>.

“History Dependence in Network-Behavior Coevolution” (Robert Franzese, Jr., Jude Hays, and Aya Kachi)

“Can Time Series Methods Be Used to Detect Path Dependence?” (John Freeman)

“Looking Back: An Ordered Network Model of Legal Precedent” (Steven Haptonstahl)

“Modeling, Measuring, and Detecting Path Dependence, Outcome Dependence, and Path

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<sup>1</sup> A state-dependent process is said to be ergodic if through some series of states it is possible to get from one state to any other. (Page, Scott “Path Dependence” *Quarterly Journal of Political Science* 2006, 1: 95).

- Dependence” (John Jackson and Kenneth Kollman)
- “Spatial Regression, Increasing Returns, and Regionalism” (Tse-min Lin and Matthew Cohen)
- “Evolutionary Theory and History-Dependent Politics” (Jacob Montgomery)
- “Forward Path Dependence” [Two files] (Scott Page and Jameson Toole)
- “Feedback in Opinion Formation” (David A. Siegel)
- “The Trouble with Mathematical Analogies: Path Dependence, Irreversible Branching Processes, and the Inability of Knowing the Way in Which History Matters (Robert Walker)