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Variation in social structure by region and language family Michael L. Burton, University of California, Irvine, CA 92717, USA

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*substitution of new for old technology* with conventional aggregative macro-economic approach.

**On-Line Algorithms Versus Off-Line Algorithms: How Much is it Worth to Know the Future?** Richard M. Karp, *Computer Science Division, Department of EECS, University of California, Berkeley, CA 94720, USA*

There are many situations in which an algorithm receives a stream of requests and must respond to each one as it arrives, without knowing the future requests. Algorithms operating in this manner are called *on-line algorithms*. Such algorithms arise in connection with data structures, dynamic storage allocation, processor scheduling, bin packing, robot motion planning, graph coloring, investment analysis and equipment replacement. Traditionally, on-line algorithms are evaluated with respect to a stochastic model of the sequence of requests. An alternative approach that has been intensively studied within the past five years evaluates an on-line algorithm by comparing its performance with that of an optimal off-line algorithm; i.e. an algorithm that makes the best possible choices knowing the entire sequence of requests. An on-line algorithm is called competitive if it can guarantee coming with a constant factor of the cost of an optimal off-line algorithm. This tutorial will survey what is known about competitive on-line algorithms. A major theme in our discussion will be the role of randomization in the construction of on-line algorithms.

**Variation in Social Structure by Region and Language Family.** Michael L. Burton, *University of California, Irvine, CA 92717, USA*

This is a presentation of the results of joint research with John W.M. Whiting (Harvard University Emeritus Professor of Anthropology), Carmella Moore (UCI PhD in Anthropology in 1990) and A. Kimball Romney (Professor of Anthropology, UCI).

We reanalyzed variables that were discussed in Murdock's classic work, *Social Structure*. These included 32 social organization variables, covering such domains as mode of marriage, family type, kin groups, cousin marriage, and settlement patterns; and 31 kinterm variables. These are all coded present or absent for a world sample of 351 societies. In an earlier analysis we represented these data by optimal scaling, finding two dimensions that can be interpreted as unilineal descent versus bilateral descent and matrilineal versus patrilineal.

The present analysis is concerned with variation within the social structure space by region and language family. Data from our analysis are used to show that neither Murdock's six regions or a classification of societies by continents provides the best

division of the world into regions. We propose instead a new set of seven regions, testing its fit to the data with Quadratic Assignment Analysis.

Finally we examine the relationship between social structure and major language family membership. We find that many language families show a characteristic social structure pattern. For example, societies from Niger-Congo and Siouan language families are unilineal, Nilotic societies are patrilineal, societies from the Indo-European and Altaic language families are patridominant and societies from the Austronesian language family are matridominant. Quadratic Assignment Analysis is used to test whether language family membership has a significant effect on social structure once we control for the geographic distances between the societies.

**The Neglect of Measurement Errors in the Social Sciences.** Edward E. Leamer, *Anderson Graduate School of Management, Department of Economics, UCLA, Los Angeles, CA 90024, USA*

Specialization and the division of labor work well if there is a coordinating mechanism, but specialization can produce catastrophic results if there is inadequate coordination. Take economics, for example. The discipline of economics is highly specialized, but has no coordinating mechanism. Some of us imagine the data, some of us collect the data, some analyze the data, and some think about how to analyze imagined data. But there is no coordinating mechanism. The neglect of measurement errors is a good example. Those who collect the data know they are not perfect, but they tell us little of the imperfections. Those who analyze the data usually act as if the data were errorless. And those who think about how to analyze the data generally tend to ignore measurement error problems. This is not a healthy situation. The first step toward a remedy is the publication of measures of uncertainty together with the data. Actually, standard errors are not enough; we even need standard errors of the standard errors.

**Randomness on the Road to Chaos, with an Application to Economics.** Janet Myhre and Michael Rennie, *Department of Mathematics and Institute of Decision Science, Claremont McKenna College, Claremont, CA 91711, USA*

In recent years there has been significant progress in understanding the way in which non-linear deterministic systems can exhibit complex 'hard to predict' behavior. Typically the behavior in question is how the system evolves in time. Traditional tools allowed analysis if the system either converged to a steady state equilibrium or oscillated in a simple way. New tools, developed in the study of chaos, allow analysis of systems that exhibit more complex behavior. The problems that have received the most immediate benefit from these developments are those