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To: "Dr. Baruch Fischhoff - Chair, National Academy Committee on Improving Intelligence"
<baruch@cmu.edu>

From: Lloyd Etheredge <lloyd.etheredge@policyscience.net>

Subject: 139. Reinventing Statistics and Econometrics: A Powerful Idea?
Friedman on "Really Unusually Uncertain . . ."; Faster Learning via Parallel
Breakthroughs with Computational Biology

Dear Dr.Fischhoff and Colleagues:

By now, your National Academy of Sciences panel may have concluded that the solutions America needs are not in the current literature, databases, and analysis methods. (At least, this is my view.) Thus, your panel might want to recommend a Reinventing Statistics project.

The Need to Reinvent Statistics

Classic statistical analysis thinks about sampling from fixed, physical universes. For example, drawing balls from an urn.

But imagine - instead - that we are in a period of systemic social, political, and economic change. The world that we (and DNI analysts) face, model, sample and analyze data from, and try to forecast is a world of changing, complex, adaptive systems.

This meta-diagnosis could explain why there have been so many major, and sometimes catastrophic, recent failures of forecasting. The unexpected global financial catastrophe. The new era of global communications and the rise of new trans-national networks for jihadist terrorism (and drugs).<1> The unexpected end of the Cold War is a positive example. The collapse of the Soviet bloc. Even - to take a recent example - the unexpected failure of the DNI's sophisticated risk threat/profile equations to predict the characteristics of the individual who (apparently) acquired and released 91,000+ secret documents,.

The comfortable (and wrong) answers are: 1.) Everything about current knowledge, databases and statistical analysis methods were fine - except that a couple of *ad hoc* variables [a crazy US housing market module] in the standard estimating equations may have been missing; and/or 2.) We need yet another new [smarter, tougher] DNI with even more centralized authority. The better answer - my strong, competing hypothesis that I hope you will recommend testing - is that we are drawing observations from N-dimensional spaces [where "N" is unknown] in a changing world with complex, adaptive systems. Thus, we need to rethink fundamentals about both our planned observations and the data analysis methods by which we draw inferences, forecast the change/adaptation processes, make our own adaptive policies, and attach assessments of confidence/uncertainty for Presidents.

Ronald Fisher's Advice and Rapid Learning

Ronald Fisher remains the best guide. He said that the fundamental contribution of the professional statistician, engaging the practical world, was to provide the post-mortems. A good

statistician could explain how an experiment went wrong and how to plan observations to yield reliable results in the future.

Thus, the first deliverable of a Reinventing Statistics project will be recommendations for the new DNI, across a range of fields and urgent global problems: How can we plan observations for rapid learning and high performance systems?

Faster Economic Recovery as an Initial Project?

One initial Reinvention project might be national/global economic recovery, where key institutions still have not assembled the resources and behavioral science leadership for fast discovery about a complex, adaptive global system. Learning could be highly beneficial and cost-effective.

Today, about the only reliable prediction that we can make - in Fisher's spirit - is that the US government cannot learn more reliably until we plan the new observations that make the DNI's yottabyte [10 to the 24th] database interpretable.

We can do a lot better.

Many people - economists/behavioral scientists and others (if asked to think about the problem, as part of a high-profile project) - will have their own ideas. I was struck, yesterday, by President Obama's metaphor of recovery from an illness - with a gradual increase in strength each day - and his fusion of ideas about mutual rebuildings of confidence (consumers become a bit more confident, then businesses observe slightly increased consumer spending and become more confident and begin to rehire, then . . .). These "psychological paradigm" competing theories may not add explanatory power to normal-times GDP growth, but they could be profoundly insightful - and consistent with our knowledge of fear and human psychology - about complex recovery processes from unexpected and alarming recessions. They suggest new kinds of measures/observations and - possibly - policy tools that could be more effective, more quickly, than just giving confident and reassuring public speeches. For a small fraction of the DNI's \$75 billion/year, there is a world of new observations/times series data (including, comparative data) potentially available.

There should be more competition and innovation: It is crazy to rely solely upon familiar econometric analysis and coefficients based on the historical analysis of time series data, with quarterly observations, if there could be rapid structural change and novel/complex combinations of fear (from vividly dramatized events) and other circumstances in the global economy.

I have attached (below) an introductory excerpt from Tom Friedman's recent "Really Unusually Uncertain" column about other hypotheses/lines of investigation - e.g., about structural problems that "take time" - a diagnosis that may be impressionistic, ad hoc, and wrong (or, alternatively, give deep insights that allow US leadership to be deployed more effectively.)

Reinventing Statistical Analysis Methods: NIH Links

The rigorous mathematical challenges to Reinventing Statistics and sampling, analyzing data, and forecasting from N-dimensional complex adaptive systems could be solved more quickly through a joint project with the Institute of Medicine/NIH. Harold Varmus is returning to NIH to lead a major (not yet announced) Obama Administration initiative against cancer, using the new (huge) national (eventually, international) research databases given by electronic health records with genomic, cellular, protein, environmental (etc.) data. We need to merge a new universe of biological data and analysis/knowledge-cumulation methods with the observations that we get from randomized clinical trials. [The human body, including the human body afflicted with an illness, also is a complex adaptive system and the improvement of medical care includes an analysis of which combinations of drugs to give, in what sequences, to which patients. It's the same kind of generic problem as macro-economic recovery and other areas of global policy.]

Here is a brief excerpt re Friedman's (untested, competing) hypotheses . . .

Best wishes!

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Really Unusually Uncertain

By THOMAS L. FRIEDMAN [8/17/2010. The New York Times]
Berlin

Over the past few weeks I've had a chance to speak with senior economic policy makers in America and Germany and I think I've figured out where we are. It's like this: things are getting better, except where they aren't. The bailouts are working, except where they're not. Things will slowly get better, unless they slowly get worse. We should know soon, unless we don't. It is no wonder that businesses are reluctant to hire with such "unusual uncertainty," as Fed chief Ben Bernanke put it. One reason it is so unusual is that we are not just trying to recover from a financial crisis triggered by crazy mortgage lending. We're also having to deal with three huge structural problems that built up over several decades and have reached a point of criticality at the same time.

And as Mohamed El-Erian, the C.E.O. of Pimco, has been repeating, "Structural problems need structural solutions." There are no quick fixes. In America and Europe, we are going to need some big structural fixes to get back on a sustained growth path – changes that will require a level of political consensus and sacrifice that has been sorely lacking in most countries up to now . . .

<1> In an earlier period political psychologists found that abnormal psychology or individual psychopathology explained many acts of individual political terrorism. However the phenomenon has changed: NATO's recent reviews show that today's recruits to jihadist terrorism do not have abnormal individual psychopathology but become involved by sequences

of social pathways and specific influences that can operate (for example) on young people.