

# Technology, Psychology, and a Coming Revolution in the Study of Decision Making

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## Elizabeth Phelps

*Technological development can drive changes in science. For psychological science, the growth in technologies that monitor behavior or facilitate human interactions will lead to powerful, novel tools to aid our research. My guest columnist this month is my colleague, Paul Glimcher, who is a leading figure in the emerging discipline of neuroeconomics. He discusses how these new technologies may transform investigations of judgment and decision making. This emerging relationship between technology and psychological science will also be the topic of a Presidential Cross-Cutting Theme Program at the 26th APS Annual Convention, to be held May 22–25 in San Francisco, California. We will bring together industry leaders from Silicon Valley and scientists to discuss our mutual and growing shared interests in psychological questions.*

**-Elizabeth A. Phelps**

The past decade has seen an interdisciplinary revolution in the study of human and animal decision making. Before the year 2000, the study of decision making was the province of nearly a dozen overlapping subfields that had little or no interaction. Psychologists, economists, animal anthropologists, and even neurobiologists were all struggling to understand this most fundamental and impactful aspect of our behavior — but each discipline struggled in near total isolation. During the last decade, however, that has changed. Interdisciplinary studies of decision making are flourishing, and the impact of this sea change in our understanding of the mechanisms, causes, and impacts of behavior is only just beginning to be felt. Whole new disciplines, like neuroeconomics, which sweeps from single neuron studies through traditional psychology to economic theory, have emerged. Economic models of decision making, and neurobiological measurements of brain activity during decision making, have begun to

appear in top-tier psychology journals. Today, the study of decision making sweeps down from its psychological roots towards neuroscience and upwards to economics — sometimes in single laboratories.

A technological sea change is just beginning that may, however, have an even greater impact on the psychology of judgment and decision making: the emergence of what is often called “big data.” Over the past few years, a number of centers around the world have begun to pull together massive databases cataloging the detailed behavior of human subjects at unheard of scales. And it now seems possible that these same datasets — sculpted appropriately — might allow for entirely new kinds of psychological research into the domain of decision making. The City of New York, for example, now offers a catalog of nearly 1 billion taxi-cab rides. For each of these rides, one can observe the tipping behavior of the rider and the race, ethnicity, age, or gender of the taxi driver. What better place to examine the role of social group in human generosity?



**Paul Glimcher**

To take another example, databases are now available that could be used to relate daily crime statistics to environmental stress. Databases exist that allow for detailed studies of the effects of traditional psychological-dependent variables like sleep deprivation, cold, and wealth levels on phenomena related to everything from working memory to risk attitudes — and at simply unprecedented scales. Data sets like these exist today and should be utilized by psychologists seeking to understand human decision making, because these kinds of datasets offer us at least four unique advantages as psychologists:

- They are truly huge datasets that make it possible to detect small effects.
- They offer data on a highly diverse population — often the population of interest to psychologists — rather than being uniquely about college students who form the backbone of most studies of our decision making.
- They offer persistent measures that often follow individual decision makers for months at a time.
- They allow the assessment of what could be considered natural experiments as the urban environment undergoes planned and unplanned changes.

Admittedly, these databases also pose new and important challenges that have yet to be resolved. Massive behavioral datasets may provide very limited subject categorization and offer minimal control

over the conditions of study, and they are often opportunistic in nature. But despite these limitations, big data is here to stay, and it offers an additional tool to any psychologist looking for insight into human behavior.