**FABBS**
Federation of Associations in
Behavioral & Brain Sciences

**COSSA**
Consortium of Social Science Associations

**COPAFS**

# National Science Foundation
## Social and Behavioral Sciences

### *Talking Points*

- NSF is the nation's principal federal agency for funding **fundamental (basic) science** research across *all* **disciplines**. Fundamental research spurs scientific progress by supporting the best and brightest scientists in the pursuit of research questions that may not be linked to a particular mission or outcome, but yet may yield significant discoveries with broad transferability. **Fundamental research, across all the sciences relies on federal support, which dropped from 62% to 55% from 2004-2011.**

- **Science includes the study of social and behavioral phenomena**. The discoveries made **through SBE-funded research** often have profound impacts on people's lives. As a result of this research, we are learning: how to respond to disasters; enhance teaching and learning in education, including STEM Ed; improve the safety of our troops in combat areas; reduce violence among our youth; improve public health; auction the airways efficiently; model water planning to enhance sustainability; improve the effectiveness of the criminal justice system; and help paralyzed people communicate. **Scientists funded by SBE are trained in a wide range of disciplines and contribute substantially to the knowledge that benefits the U.S. taxpayer.**

- NSF provides funding for 24% of all federally-supported basic research in U.S. colleges and universities. **The Social, Behavioral, and Economic Sciences (SBE) Directorate** — one of seven directorates at NSF — **funds *55%* of the university-based social and behavioral sciences research in the nation. Yet, it remains the smallest of the directorates, accounting for only 3.7% of the entire NSF budget in FY 2014**. This funding not only advances science, but is contributing to the local economies.

- **Science is a process of inquiry involving hypothesis generation, model development, systematic data collection, and testing of hypotheses and models, and is central to the social and behavioral sciences**. In addition, the social and behavioral sciences have pioneered the development of scientific methodologies, measurement, modeling, and statistical analyses used by all fields of science.

- The world is changing rapidly, and this requires a deep understanding of humans, our social systems, and how we interact with the world around us, including how humans interact with the technologies that are developed. Without this science —**without an understanding of the fundamental nature of who we are**— policy making on major national issues cannot be based on evidence and billions of dollars is wasted.  NSF's SBE Directorate is the leader in funding the research that helps us understand the human element of almost every major public policy issue we face.

- The collaboration of scientists across fields as well as the support of research ideas by multiple NSF Directorates is needed to address a number of questions; however, **this research cannot replace the fundamental advancement of knowledge through *each* of the Directorates, including SBE**. Basic science research supported through the SBE Directorate is essential to answering fundamental questions about human nature that are critical to addressing national challenges.

- No one knows where the next big discovery will occur, or the path of small discoveries that keep science moving forward, but the **U.S. system of merit review by independent scientists remains the best method to date for selecting the top proposals** to advance knowledge across all areas of science. While the system is the gold standard around the world, NSF leaders remain committed to ensuring accountability in its operations and recently launched a review of the organization's processes for defining research priorities and objectives at all stages of merit review. The focus on continuous improvement will help ensure that the best proposals are funded and taxpayer dollars are spent wisely. A second level of review by NSF staff requires an **analysis of these top proposals within a broad portfolio of funded research** to optimize the chance of identifying the best across a range of research areas.

- NSF's SBE Directorate maintains the **National Center for Science and Engineering Statistics**. Staffed by scientists trained in the social and behavioral sciences, the Center collects, interprets, analyzes, and disseminates data on the U.S. science and engineering enterprise. The data provide information to policy makers regarding employment in STEM fields; achievement among women and minorities; patterns of innovation; and investment in research and development over time.

# Contributions of SBE-Funded Research

The following pages include summaries of social and behavioral science projects funded by the Social, Behavioral and Economic (SBE) Sciences Directorate at the National Science Foundation (NSF) that have yielded important, and at times groundbreaking, results for national security, public health and safety, and the economy.

## National Resource Management

NSF-supported researchers provided the Federal Communications Commission (FCC) with its current system for apportioning the airwaves via a fruitful, practical application of **game theory and experimental economics**. Since their inception in 1994, **FCC "spectrum auctions" have netted over $60 billion in revenue for the federal government**.  As wireless communication blossomed in the early 1990s, the FCC received a concomitant increase in requests to use the limited commercial frequencies of the electromagnetic spectrum. The upsurge rendered the FCC's lottery-based licensing method inadequate, but economists Paul Milgrom and Robert Wilson of **Stanford University**, and collaborator Preston McAfee had a solution: an auction system based on their research.  The team's NSF-funded studies had already documented conditions under which the proposed spectrum auction was expected to perform well, and experiments in NSF-supported labs run during the FCC's decision-making process provided additional evidence that the new system surpassed the proposed alternatives. The U.S. system of partitioning airwaves is now emulated in several other countries around the world, resulting in total worldwide revenues in excess of $200 billion

*Excerpted from: Bringing People Into Focus: How Social, Behavioral and Economic Research Addresses National Challenges, National Science Foundation (NSF 13-62)*

## Public Safety

NSF's support of the National Center for Geographic Information Systems and Analysis in the mid-1980s spearheaded the development of what is now a multi-billion dollar **Geographic Information Systems** (GIS) industry. These systems are now applied by states, counties, and localities to address issues ranging from urban planning to public safety. Crime mapping activities based upon GIS have played an important role in **reducing crime** over the past two decades.

*Excerpted from: Association of American Universities, https://www.aau.edu/WorkArea/DownloadAsset.aspx?id=14695*

## Public Health

To **address the high demand for kidneys and the challenge of finding a donor**, economists have developed algorithms to facilitate kidney matching for patients who have willing but biologically incompatible donors. Based on their knowledge in **game theory and market dynamics**, Alvin Roth of **Harvard University**, Tayfun Sönmez of **Boston College** and M. Utku Ünver of the **University of Pittsburgh** developed powerful match-making software that optimizes the process of identifying an appropriate live donor match with compatible blood types and antibodies. This system creates kidney exchanges that match an incompatible donor-patient pair with a similarly incompatible pair so that each of the patients receives a kidney from a compatible donor. The medical programs that use this software have already saved many lives nationwide. The researchers are now investigating the increased efficiency between two-way and three-way matches, as well as more extended transplant chains. **Alvin Roth was a co-recipient of the 2012 Nobel Prize in Economic Sciences for his research on the practical applications of matching theory.**

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# Collaborative Initiative to Advance Social and Behavioral Science

## National Security

To ensure the safety of [U.S. ports], a reliable process to inspect the millions of shipping containers that pass through U.S. ports each year is required. While several types of tests are available to inspect cargo and detect dangerous or illicit substances, including nuclear materials, developing a system that maximizes inspection efficiency while minimizing costs is a challenge. Researcher Fred Roberts and colleagues at **Rutgers University** considered these factors in developing **new algorithms to improve port safety**. These algorithms identified optimal decision-making for shipping container screening by analyzing types of inspection tests and shipping manifests. These tools not only have the potential to increase cost-effective methods of hazardous materials detection, they also can **benefit decision-making in other areas such as public health**.

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## Understanding the Brain

Frank Guenther and colleagues worked for years to create a model of how the brain encodes speech. Now that research is being used to help profoundly paralyzed individuals communicate. The researchers used the model to develop a brain-computer interface that allows paralyzed individuals to create synthetic speech sounds as they think about producing those sounds.  An electrode implanted in the brain picks up signals from nearby neurons that are activated when the paralyzed individual is thinking about speaking. The neural signals are then transmitted to a computer and translated into vowel sounds.  The scientists also created sophisticated computational techniques for a software decoder that would rapidly translate neural signals into coherent sounds.

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## Public Health

James Holland Jones and Marcus Feldman of **Stanford University investigated methods to prevent the spread of flu-like infectious disease in school settings**. Every student, teacher and staff member of one high school was outfitted with a credit card-sized wireless sensor to monitor contact for one whole school day and model social networks. The resulting models simulated how influenza infection would spread through the community based on real-world contact. The models also allowed researchers to explore strategies for efficient disease management such as vaccinations and school closings. Most vaccination strategies were no more effective than random vaccinations in preventing the spread of disease. However, **social distancing strategies** in which schools were intermittently closed (e.g., two days open, two days closed) interrupted the contact network, and were nearly as effective as a complete three-week school shutdown. These findings provide useful insight for school administrators and public health officials into the development of effective prevention strategies.

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## National Defense

Hillary Anger Elfenbein of **Washington University in St. Louis** and collaborators investigated **emotion recognition using nonverbal cues** such as facial expressions, vocal tones and body language. Based on this research, the **Army Research Institute now incorporates education on nonverbal communication into soldier training**, thereby assisting troops in understanding cross-cultural, nonverbal communication with non-English speaking citizens with whom they interact

overseas. Thus, this research has the potential to provide human solutions in military situations. Enhancing troops' interpersonal skills can enable them to anticipate and diffuse conflict, as well as facilitate cooperation, negotiation and compromise.

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## Public Safety

Tony Grubesic of **Drexel University**, William Pridemore of **Indiana University** and Alan Murray of **Arizona State University** developed **spatial models to help manage the location of sex offenders**. Their research addressed concerns regarding the impact of sex offender residency laws on a community, as their end results are often unknown. They considered important factors such as whether residency restrictions lead to high concentrations of offenders in specific areas, distribute the risk across a community equitably, and keep sex offenders from living near minors. **These modeling techniques can provide legislators, law enforcement and public policy officials with the unique ability to make informed decisions about new policies prior to their actual implementation.** Thus, improving the development and evaluation of sex offender residency policies in advance of any legislation will allow public officials the opportunity to consider the resulting distribution of offenders in terms of local residents, better meeting the needs of communities.

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## Natural Resource Management

Elinor Ostrom of **Indiana University** challenged conventional wisdom and long-held theories on how best to **manage common natural resources**. She explored the role of **cooperation among people and the impact on overall economic benefit**, especially during a time of increasing global population and subsequent strain on available resources. Ostrom investigated efficient management of shared community resources such as forests, fish and water. She found that cooperative management of these resources by individuals, compared to outside agencies such as governments or private companies, can be highly efficient, resulting in greater sustainability and mutual economic benefit. **Ostrom is the first, and thus far only, woman to be awarded the Nobel Prize in Economic Sciences (2009)**.

*Excerpted from: Bringing People Into Focus: How Social, Behavioral and Economic Research Addresses National Challenges, National Science Foundation (NSF 13-62)*

## Public Safety

With support from NSF, a team of anthropologists, criminologists, and mathematicians at the **University of California, Los Angeles** created a mathematical computer simulation model of **crime pattern formation**. The model revealed that additional policing in certain crime "hot-spots" resulted in two alternate responses: relocation of the criminal activity to different areas or complete disbanding of the activity. In 2010, those **researchers collaborated with police departments** in Santa Cruz and Los Angeles to map crime hot spots in those cities. Their findings are helping police predict when crime can be suppressed by intensified police actions and when crime might merely be displaced to other neighborhoods. **As a result of this research, burglaries in Santa Cruz declined by 19% over a six-month period**. In 2011, *Time* magazine included predictive computer modeling as one of its *50 Best Inventions* for that year.

*Excerpted from: Association of American Universities, [https://www.aau.edu/WorkArea/DownloadAsset.aspx?id=14695](https://www.aau.edu/WorkArea/DownloadAsset.aspx?id=14695)*

# Collaborative Initiative to Advance Social and Behavioral Science

## Improving Decision Making

Daniel Kahneman's (**Princeton University**) pioneering work in **behavioral economics** addressed how people make decisions when presented with potential risks and uncertain outcomes. He challenged standard economic theory that depicted people as largely rational and logical decision-makers in these situations. Kahneman demonstrated that the way information is presented can strongly influence people's decision-making. Such information framing is also referred to as "anchoring." Kahneman is known, too, for his work on prospect theory, in which he and collaborator Amos Tversky investigated how people make decisions, especially with respect to finances, when presented with alternatives that have known outcomes regarding gain or loss. They found that people often make predictably irrational decisions, due in part to a disproportionate aversion to losses compared to their level of desire for gain and a tendency to deny true risks that carry the potential for negative outcomes. **Kahneman received the Nobel Prize in Economic Sciences in 2002**, the first psychologist to win the award in economics.

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## Building Vibrant Democracies

In January of 2010, the **University of Michigan** and **Stanford University** received a total of $10 million as part of the **American National Election Studies** (ANES) project to inform explanations of **election outcomes**. [The] goal is to support the legitimacy and vibrancy of American democracy by producing credible measures of individuals' relationship to their government and to their country. For over 60 years, researchers have used this data to clarify many important aspects of how people feel about past actions of government, and how such feelings affects their willingness to contribute to society in a range of different ways, from the workplace, to the ballot box, to a range of volunteer organizations. The ANES is used by tens of thousands of scholars, teachers, journalists, and citizens around the world to not only better understand the current state of American democracy, but to compare the present to the past. This work is used by many agencies of the U.S. government as well and was explicitly solicited by the Department of Homeland Security to help it achieve its important tasks. Moreover, the ANES studies are **considered a benchmark for election surveys around the world**. In established democracies and new democracies, National Election Studies support governmental legitimacy by providing powerful and valid measures of the factors that affect citizens' feelings about, and contributions to, the nations in which they live.

*Excerpted from: Out of Focus: A Critical Assessment of the Senate Report, "The National Science Foundation: Under the Microscope," A Staff Report by the Democratic Staff of the House Committee on Science, Space, and Technology,* [http://democrats.science.house.gov/sites/democrats.science.house.gov/files/coburn%20memo%20with%20cover.pdf](http://democrats.science.house.gov/sites/democrats.science.house.gov/files/coburn%20memo%20with%20cover.pdf)