

SOCIAL, BEHAVIORAL AND ECONOMIC SCIENCES**\$233,480,000**

The FY 2009 Budget Request for the Directorate for Social, Behavioral and Economic Sciences (SBE) is \$233.48 million, an increase of \$18.35 million, or 8.5 percent, over the FY 2008 Estimate of \$215.13 million.

Social, Behavioral and Economic Sciences Funding

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate	
				Amount	Percent
Social and Economic Sciences	\$99.86	\$100.42	\$107.49	\$7.07	7.0%
Behavioral and Cognitive Sciences	84.64	84.63	92.78	8.15	9.6%
Science Resources Statistics	30.04	30.08	33.21	3.13	10.4%
Total, SBE	\$214.54	\$215.13	\$233.48	\$18.35	8.5%

Totals may not add due to rounding.

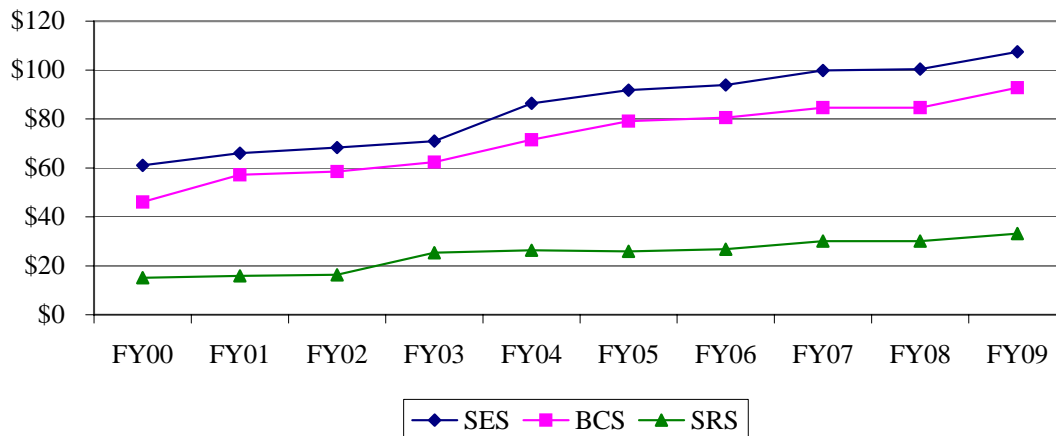
The SBE Directorate supports fundamental research and related activities that yield new knowledge of human cognition, social organization, and patterns of development and change. In recent decades, SBE research has resulted in new understandings of human development and social dynamics; of perception, memory, linguistic, and reasoning processes; of how people behave as individuals and as members of groups and organizations; and of key social institutions and indicators.

The core of SBE activity addresses the dynamics of cognition, behavior, and social interactions that are important to developing such understanding. SBE's growing program in the Science of Science and Innovation Policy (SciSIP) tackles the specifics of enhancing competitive processes in S&E. The data collections and analyses of the Division of Science Resources Statistics (SRS), the designated federal statistical entity with responsibility for the S&E enterprise writ large, are important for evaluating the progress of the American Competitiveness Initiative.

SBE participates in inter-directorate, interagency, and international research and education activities and encourages and supports many forms of transformative research. The portfolio includes novel connections among disciplines, contrarian research that challenges scientific orthodoxy, development or use of technologies such as functional magnetic resonance imaging (fMRI) and Geographical Information Systems (GIS), experiments with infrastructure for transformative research in the social sciences, rapid-response research on disruptive events, and engagement with urgent, real-world problems.

SBE Subactivity Funding

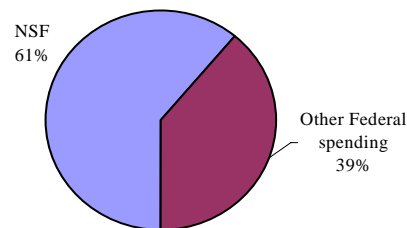
(Dollars in Millions)



RELEVANCE

SBE is a principal source of federal support for fundamental research on human cognition, behavior, social structures, and social interaction, as well as for research on the intellectual and social contexts that govern the development and use of science and technology. Overall, SBE accounts for 61 percent of federal support for basic research in the social sciences at U. S. academic institutions, excluding the psychological sciences. In some fields, including archaeology, political science, linguistics, and non-medical anthropology and sociology, SBE is the predominant or exclusive source of federal basic research support. SBE provides approximately one percent of federal support for basic research in the psychological sciences to U.S. academic institutions; from that small fraction, it provides predominant federal support for the social aspects of psychology.

Federal Support for Basic Research in the Social Sciences at Academic Institutions (excludes the Psychological Sciences)



Over the past decade, three key elements have caused research in the SBE sciences to undergo dramatic changes. First, new technologies, analytical techniques, and cyber capabilities have been critical. For example, fMRI techniques have enabled behavioral scientists to link behavior to brain activity, opening new channels for investigation, and the integration of GIS into existing and novel analyses has provided new spatial data and new insights, since why something happens is often a function of where it happens.

Second, these new analytical techniques and enhanced cyber capabilities have combined with more traditional technological change to create new approaches to shared infrastructure for the SBE sciences, making survey information and databases more broadly accessible and enabling linkages across datasets collected for different purposes. This new infrastructure yields finer resolution of phenomena and enhanced ability to explore complexity in human systems across a broad spectrum of research areas.

Simultaneously, NSF's strong emphasis on partnerships for exploring human and social dynamics has provided the third key element for progress in the SBE sciences. The Human and Social Dynamics (HSD) Priority Area focused on exploring the processes and implications of constantly changing systems, along with partners across NSF who share an interest in the way human and social behavior interacts with natural and built systems and mediates the interaction between basic research results and marketable technologies. While the Priority Area ends in FY 2008, the research activities it stimulated will continue to flourish through enhanced core programs, SBE emphases and participation in NSF-wide and interagency activities.

SBE is well positioned to contribute to major national challenges, including addressing human and social aspects of new technologies. SBE will continue to support government-wide activities such as the National Nanotechnology Initiative (NNI), the Climate Change Science Program (CCSP), and the Networking and Information Technology Research and Development (NITRD) program, and will continue to support the administration's programmatic priorities relating to homeland security. SBE will participate in the newly formed cross-Foundational Adaptive Systems Technology (AST) investment through research principally dealing with brain functions that yield insights into how nature provides models for engineered systems; it will make further investments in NSF's Cyber-enabled Discovery and Innovation (CDI) investment, focusing on the tipping points and emergent phenomena that permeate the human sciences and are characteristic of SBE work on complexity and interacting systems; it will maintain its support for Cyberinfrastructure related-activities; and will fund multi-directorate activities that investigate the human dimensions of environmental phenomena, such as climate change or water supply and quality, and the social and ethical issues that surround nanotechnology. Another multi-directorate partnership of recently funded research emerged from the HSD Priority Area, and it is NSF's first cross-directorate (SBE, BIO, and GEO) standing program – the Dynamics of Coupled Natural and Human Systems (CNH). Cross-disciplinary teams of scientists and engineers are brought together to discover the complex interactions between human and natural systems that drive the most pressing environmental problems for our Nation and the world.

Other topics of recently funded research include brain activity associated with the integration of thought and emotion, complex responses to stressors, and discerning truth from deception; scientific understanding of factors affecting low participation in science, technology, education, and mathematics (STEM); documenting endangered languages; the influence of fear on perceptions and decision making; agent-based and network modeling; and the effects of terrorist assaults and natural disasters on people directly affected as well as those removed from physical harm but emotionally engaged with the victims.

SBE's SRS Division conducts, analyzes, and disseminates survey results relating to R&D funding and facilities, the S&E workforce, and the education of scientists and engineers. SRS also gathers information on the international S&E enterprise and uses available information to describe the U.S. S&E role in a globalized economy. In FY 2009, SRS will develop a pilot data collection on postdoc activities; will implement a full-scale pilot of a major and much-needed redesign of the Survey of Industrial R&D, which has been renamed to the Business Research and Development Survey; and will support data extraction activities. SRS activities, products, and services provide critical benchmarking information on R&D, the S&E workforce, and the outputs of the S&E enterprise such as patents and scientific publications. SRS provides access to a variety of data on S&E through its website (www.nsf.gov/statistics) and online databases.

SBE has long contributed to addressing national challenges. In FY 2009, SBE is well positioned to make even more significant contributions in partnership with other agencies and with other NSF directorates.

Summary of Major Changes by Division *(Dollars in Millions)*

FY 2008 Estimate, SBE.....\$215.13

Social and Economic Sciences (SES) +\$7.07

Increased funding will strengthen core social science programs through targeted investments in potentially transformative research areas and will support SciSIP research contributing to design of new metrics of science and interdisciplinary collaborations. There will be a focus on data resources, analytical tools, mathematical applications, and increased theoretical engagement. Further investments in CDI will emphasize applications of complexity and systems thinking.

Behavioral and Cognitive Sciences (BCS) +\$8.15

Increased funding will strengthen the basic research enterprise and encourage transformative research in the behavioral, cognitive, anthropological, and geographic sciences through enhancement of the support provided to core; will increase fundamental knowledge about complexity and develop systems models of human thought and behavior; will contribute further to the CDI investment and SciSIP; and will advance understanding of the interplay among physical systems, brains, and human intelligence through the cross-foundational AST investment

Science Resources Statistics (SRS) +\$3.13

Increased funding will focus on SciSIP: implementation of a full-scale pilot of a redesigned Survey of Industrial Research and Development, (now renamed as the Business Research and Development Survey), and a pilot data collection on postdoc activities.

Subtotal, Changes +\$18.35

FY 2009 Request, SBE.....\$233.48

Summary of Major Changes by Directorate-wide Investments *(Dollars in Millions)*

FY 2008 Estimate, SBE.....\$215.13

Discovery +14.12

- *Strengthening the Core* (+\$6.96 million). SBE investments in fundamental research will continue to advance the frontiers of social, behavioral, and economic sciences by supporting research across traditional boundaries, encouraging interdisciplinary and international research at the frontiers of discovery across all its fields.
- *Science of Science and Innovation Policy* (+\$3.12 million). \$2.19 million will support interdisciplinary research collaborations that promote global and comparative understanding of the dynamics of science and technology, including funding for SciSIP-related interdisciplinary laboratories and data extraction research. \$930,000 supports fundamental research on improved and expanded science metrics, datasets, and analytical tools to assess the impacts and improve understanding of the dynamics of the Nation’s S&E.
- *Complexity and Systems Thinking in the Human Sciences* (+\$3.0 million). \$1.58 million will fund CDI work on complexity and systems models of human thought and behavior as well as

social organizations, institutions, and processes, bringing the FY 2009 CDI investment to a total of \$2.58 million. Such work promises to transform analysis and understanding by reconceptualizing fundamental behaviors and processes and by revealing the emergent properties of dynamic systems. System models of this sort seek to explain, for example, those “tipping points” where gradual, long-term patterns of change abruptly produce large-scale structural changes, such as the collapse of economic markets, transformation of languages, evolutionary changes, explosive scientific developments, stampeding crowds, riots or insurrections, and other disruptive events. Structural changes of this kind pose fundamental challenges to existing theories and create opportunities for fresh and insightful new thinking. Funding will also support work on human causes and consequences of environmental change, including short-term disruptive weather events and long-term climate change. This will encompass work on economic models, decision making, land use, and changes in water quality and supply.

- *Adaptive Systems Technology (+\$1.04 million).* This new multi-directorate investment seeks to develop new technologies based on a better understanding of biological and particularly neurological systems. In the SBE context, this involves applying and expanding what we know from cognitive and learning science, the central subject matter of our programs in Developmental and Learning Sciences; Perception, Action and Cognition; Cognitive Neuroscience; Linguistics; and the Science of Learning Centers.

Learning +\$0.16

Research Experiences for Undergraduates (REU)
 Support for the REU Sites increases by \$160,000, to a total of \$1.70 million.

Research Infrastructure +\$3.02

Funding will allow SRS to contribute to SciSIP by improving and expanding science metrics datasets, data extraction activities, and analytical tools from which researchers and policymakers may assess impacts and improve their understanding of the dynamics of the Nation’s S&E enterprise.

Stewardship +\$1.05

A number of activities are funded directly from NSF’s programs to advance NSF’s Stewardship goal. These include Intergovernmental Personnel Act appointments, NSF-wide studies and evaluations, and mission-related information technology investments. As is discussed further in the Stewardship chapter of this Request, in FY 2009 NSF has realigned IT investments to tie mission-related activities more directly to NSF’s programs.

Subtotal, Changes +\$18.35

FY 2009 Request, SBE.....\$233.48

NSF-WIDE INVESTMENTS

In FY 2009, the SBE Directorate will support research and education efforts related to broad, Foundation-wide investments in a number of areas including the Administration's interagency R&D priorities.

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate	
				Amount	Percent
Adaptive Systems Technology	-	-	\$1.04	\$1.04	N/A
Biocomplexity in the Environment	3.92	-	-	-	N/A
Climate Change Science Program	15.50	15.48	15.48	-	-
Cyber-enabled Discovery and Innovation	-	1.00	2.58	1.58	158.0%
Cyberinfrastructure	20.60	20.54	20.54	-	-
Human and Social Dynamics	31.87	31.40	-	-31.40	-100.0%
International Polar Year	3.01	2.00	-	-2.00	-100.0%
Mathematical Sciences	0.75	-	-	-	N/A
National Nanotechnology Initiative	1.67	1.67	1.67	-	-
Networking and Information Technology R&D	12.47	13.47	15.05	1.58	11.7%

Adaptive Systems Technology (AST): In relation to the agency's Adaptive Systems Technology goal "to generate creative pathways and natural interfaces between human and physical systems that will revolutionize the development of novel adaptive systems", SBE's initial investment of \$1.04 million will advance understanding about the interplay among physical systems, brains, and human cognition, with research focused on developing new collaborations, approaches, and imaging techniques to discover the brain mechanisms involved in the cognitive functions of language, perception, memory, and emotion.

Biocomplexity in the Environment (BE) and Mathematical Sciences (MS): With the conclusion of these priority areas in FY 2007 or FY 2008, key components of these investments are retained for core programs.

Climate Change Science Program (CCSP): Support for CCSP remains level with the FY 2008 Estimate at \$15.48 million. SBE's CCSP investments focus on the "Human Contributions and Responses" that explain how people (individually, in groups and communities, or through organizations) interact with natural environmental systems to influence or adapt to climate and weather changes. Work in this area will be strengthened by the CDI investments to develop complexity and system models of socio-ecological processes, by the reallocation of HSD resources supporting work on the environment, and by participation in the interdirectorate CNH program.

Cyber-enabled Discovery and Innovation (CDI): CDI funding increases by \$1.58 million, the same amount as NITRD (see below), bringing the FY 2009 investment to a total of \$2.58 million. CDI includes three themes for FY 2009, all of which are central to SBE goals: 1) From Data to Knowledge, 2) Understanding Complexity in Natural, Built, and Social Systems, and 3) Virtual Organizations. Funding for CDI will increase work on complexity and systems models of human thought and behavior as well as social organizations, institutions, and processes. Such approaches promise to transform analysis and understanding by reconceptualizing fundamental behaviors and processes and by revealing the emergent properties of dynamic systems.

Cyberinfrastructure (CI): Cyberinfrastructure support remains at \$20.54 million, level with the FY 2008 Estimate. Investments will be made in major social and behavioral science data collections and will address issues such as confidentiality protections and means for securing worldwide, user-friendly access. Breakthrough technologies, large-scale data capture, and the capacities of high performance computing will enable SBE sciences to grapple with and model complexity in ways that were heretofore impossible. Added investments will prepare scientists and educators to design, develop, and use cyberinfrastructure to enhance research in the social and behavioral sciences.

Human and Social Dynamics (HSD): With the conclusion of the HSD investment area, SBE will redirect its resources to core programs. HSD was designed to foster synergies across the social and behavioral sciences and with other fields of S&E by supporting multidisciplinary approaches to understanding the complex dynamics involving human and social systems and their environments, at scales ranging from cellular to global and from nanoseconds to millennia. HSD aimed to increase our ability to anticipate the complex consequences of change, to understand the cognitive and social structures that create and define change, and to help people and organizations manage profound or rapid change. Three of the productive areas emerging from HSD are work on the interactions between humans and environmental systems, work on complexity and systems thinking, and developing infrastructure. These areas will continue to be fostered by SBE investments through its core research programs.

International Polar Year (IPY): With the conclusion of IPY in March 2009, key components of this investment will be retained for core programs.

National Nanotechnology Initiative (NNI): Support for NNI is maintained at \$1.67 million and enables research and educational activities that focus on issues of nanotechnology R&D and societal consequences, on both a domestic and global scale.

Networking and Information Technology Research and Development (NITRD): NITRD funding increases by \$1.58 million, the same amount as CDI (see above), bringing the FY 2009 investment to a total of \$15.05 million.

QUALITY

SBE maximizes the quality of R&D it supports through the use of a competitive, merit-based review process. In FY 2007, the last year for which complete data exist, 98 percent of research funds were allocated to projects that underwent external merit review.

To ensure the quality of its processes for handling proposals and recommending proposals for awards, SBE convenes Committees of Visitors (COV) composed of expert external evaluators to review each program every three years. These experts assess the integrity and efficiency of the proposal review process and provide a retrospective assessment of the results of NSF's SBE investments. COVs are scheduled for both BCS and SRS Divisions in FY 2009 and the SES Division COV is scheduled for FY 2010.

The directorate also receives advice from the Social, Behavioral and Economic Sciences Advisory Committee (SBEAC) on the missions, programs, and goals that best serve the scientific community; the promotion of quality graduate and undergraduate education in the social, behavioral, and economic sciences; and investment areas for research. The SBEAC typically meets twice a year and its Chair regularly consults with the SBE Assistant Director. Members represent a cross-section of supported disciplines, with representatives from many sub-disciplines and members from academic institutions and

industry. SBEAC includes women, underrepresented groups, and people from all geographic regions of the U.S.

SRS has undertaken a number of activities to improve the quality, timeliness, accuracy and relevance of its data and analyses. Based on the recommendations of the NRC report *Measuring Research and Development Expenditures in the U.S. Economy* and the recommendations of the 2006 COV of SRS personnel data, the Division has undertaken a major effort to redesign a number of its surveys to improve their ability to depict the state of the S&E enterprise in the 21st century. SRS, as a federal statistical agency, also strives to implement the OMB quality standards for data collections, confidentiality, and dissemination. SRS has a set of quality standards that cover all stages of data collection, analysis, and dissemination.

PERFORMANCE

The FY 2009 Budget Request is aligned to reflect funding levels associated with the Foundation's four strategic outcome goals stated in the FY 2006-2011 Strategic Plan. These goals provide an overarching framework for progress in fundamental research and education and facilitate budget and performance integration.

Social, Behavioral and Economic Sciences By Strategic Outcome Goal

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate	
				Amount	Percent
Discovery	\$166.06	\$165.21	\$179.33	\$14.12	8.5%
Learning	9.82	9.27	9.43	0.16	1.7%
Research Infrastructure	35.58	36.85	39.87	3.02	8.2%
Stewardship	3.09	3.80	4.85	1.05	27.6%
Total, SBE	\$214.54	\$215.13	\$233.48	\$18.35	8.5%

Totals may not add due to rounding.

Recent Research Highlights

► **Producing a Bureau of Economic Analysis/NSF Research and Development Satellite Account with Methodological Improvements:** A research partnership of the Bureau of Economic Analysis, which is responsible for developing Gross Domestic Product (GDP) estimates, and Science Resources Statistics (SRS), the federal statistical agency at NSF responsible for producing research and development (R&D) statistics for the U.S., has resulted in the creation of an R&D satellite account. The satellite account treats R&D as an investment and recognizes it as a stock of intangible capital, paralleling the treatment of expenditures on structures and durable equipment as a stock of tangible capital. Incorporating R&D expenditures into the national accounts permits ready analysis of R&D in the context of GDP and its components and allows the construction of models to estimate the impact of R&D on GDP, productivity, and other macroeconomic aggregates. The effort required extensive statistical enhancements to the original R&D data to make them consistent with national accounting methodologies. (SRS)

► **Revealing Hominid Origins: Finding Lucy's Ancestors:** The Middle Awash research team in



Our Early Ancestors. Credit: Tim White.

Ethiopia's desolate Afar region is investigating a kilometer-thick deposit of sediments that accumulated over the last 6 million years. The team's latest discoveries of prehistoric fossils reveal a 4 million year-old African landscape inhabited by human ancestors much older than the famous "Lucy" specimen. The fossils illuminate the origin of the "ape-man" genus *Australopithecus* and represent an evolutionary link to the still-older remains of *Ardipithecus* found previously in the same area. The thirty fossils of ancient humans (hominids) include jaws, teeth, and skeletal parts that show that these hominids practiced two-legged locomotion. Micro-CT technology revealed that the cheek teeth were adapted to heavier chewing than those of earlier hominids. However, associated fossils of rodents, monkeys, and antelopes show that early hominids lived and died in well-watered, wooded habitats for millions of years in this part of Africa. This new evidence indicates that the long-favored "savannah" model of human evolution should be abandoned. (BCS)

► **International Integrated Microdata Series:** A

project to preserve and harmonize global census microdata and make it freely accessible to researchers worldwide is now the largest public-use population database in the world. The database includes microdata from more than 80 censuses, for 26 countries, and more than 200 million individuals and will grow at least 500 percent over the next decade. The infrastructure



Integrated Public Use Microdata Series (IPUMS). Credit: The National Science Foundation.

provides a data archive and translates all documentation into English, fully documents comparability issues regarding census questions, and codes the data consistently to facilitate international comparisons. Social and behavioral scientists use the census microdata to study large-scale transformational changes, such as urbanization, economic development, migration, and population aging. They also assess relationships of social and economic change to variations in climate, geography, and environment. Such data can be used to study the human consequences of social, economic, and demographic transitions in diverse areas such as family structure, economic inequality, cultural diversity, and assimilation. More than 2,500 social science researchers use the database, and 2,274 publications cite the database. (SES)

► **Understanding and Overcoming Social Psychological Barriers to Academic Development:**

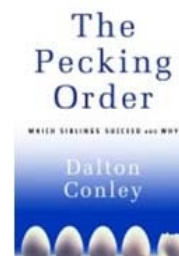


Stereotype vulnerabilities can occur in ordinary classroom settings. Credit: Courtesy of Richard F. Voss and Heinz-Otto Peitgen.

Cutting edge research in social psychology explains why women and underrepresented minorities have lower levels of achievement relative to men and majority group members, respectively. The reason is "stereotype vulnerability," and NSF-supported research shows how it impacts the performance of women and ethnic minorities within science, technology, engineering, and mathematics fields. It occurs when members of a group believe in negative stereotypes about their abilities, thereby lowering performance. New research identifies situations that give rise to stereotype vulnerability, the factors that moderate it, and its consequences for achievement. When stereotype vulnerability is removed, performance is no

longer impaired, and women and ethnic minorities perform at rates comparable to men and majority members. Research on stereotype vulnerability has led to important interventions that have raised the achievement and test scores of low performing women and minority students. (BCS)

► **The Pecking Order: Inequality and Family in the U.S.:** Fifty or more years of research into the pattern and dynamics of economic inequality in the U.S. has focused upon the influence of family origins on children's outcomes. The fundamental model held that the advantages of highly-paid professional work were generally conferred upon children, and empirical investigations focused on measuring the magnitude of influence, comparing effects for sons and daughters, for African Americans and Caucasians. But this research overlooked the inconvenient fact that there is much more economic inequality between siblings from the same family than there is between families of different origins. New research shows that growing up within a family is a different experience for different children, with materially different consequences for their lives. Genetics and birth order do not explain these differences. Instead, family size, family structure, and patterns of interaction within the family combine to create a pecking order within families that benefits some children at the expense of others. (SES)



The Pecking Order: Inequality and Family in the U.S. Credit: Dalton Conley.

► **The Role of Individual Decision Making in Influenza Vaccination Policy:** Researchers are using game theory to study how individuals' voluntary vaccination decisions influence the spread of infectious diseases. They tested whether subjects' vaccination choices correspond to those that maximize their individual advantage and whether voluntary vaccination decision-making results in a Nash equilibrium outcome - a societal outcome where no individual has anything to gain by changing his/her strategy unilaterally.



A Red Cross volunteer drawing blood to be tested for its concentration of antibodies during an influenza outbreak. Credit: Janet Astor of Centers for Disease Control and Prevention.

They examined the vaccination decisions of more than 600 subjects. They discovered that persons aged 65 and older are most likely to get influenza vaccinations, while immunization rates for the young were very low. Unfortunately, such decisions, made purely based on one's own self interest result in thousands or, in the case of pandemics, millions of deaths each year. The reason is simple: the young are disproportionately responsible for spreading infectious diseases and they are the ones choosing not to get immunized. A utilitarian policy that relied on community-wide programs to vaccinate younger members of the population would be more effective in reducing the spread of infectious diseases. This research

has implications for policy-makers and public health practitioners trying to plan and implement preventative health efforts to achieve the greatest societal benefit. (SES)

Other Performance Indicators

The tables below show the estimated number of people benefiting from SBE funding, trends in award size and duration, number of awards, and funding rates.

Number of People Involved in SBE Activities

	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
Senior Researchers	2,881	2,886	3,018
Other Professionals	487	490	517
Postdoctorates	189	192	212
Graduate Students	1,668	1,673	1,693
Undergraduate Students	1,431	1,436	1,450
K-12 Teachers	-	-	-
Total Number of People	6,656	6,677	6,890

SBE Funding Profile

	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
Statistics for Competitive Awards:			
Number	1,143	1,148	1,277
Funding Rate	27%	27%	27%
Statistics for Research Grants:			
Number of Research Grants	676	680	810
Funding Rate	22%	22%	24%
Median Annualized Award Size	\$93,851	\$94,000	\$95,880
Average Annualized Award Size	\$115,337	\$115,550	\$117,810
Average Award Duration, in years	2.5	2.5	2.5

SOCIAL AND ECONOMIC SCIENCES

\$107,490,000

The FY 2009 Budget Request for the Division of Social and Economics Sciences (SES) is \$107.49 million, an increase of \$7.07 million, or 7.0 percent, over the FY 2008 Estimate of \$100.42 million.

Social and Economic Sciences Funding

(Dollars in Millions)

	Change over				
	FY 2007	FY 2008	FY 2009	FY 2008 Estimate	
	Actual	Estimate	Request	Amount	Percent
Social and Economic Sciences	\$99.86	\$100.42	\$107.49	\$7.07	7.0%
Major Components:					
Research and Education Projects	99.86	100.42	107.49	7.07	7.0%

Totals may not add due to rounding.

About SES:

SES supports research and related activities, conducted within the U.S. and globally, to improve systematic understanding of political, economic, and social institutions and how individuals and organizations behave within them. It also supports research and other activities related to risk assessment and decision making by individuals and groups; the nature and development of the various sciences and technologies and their implications for society; methods and statistics applicable across the social, economic, and behavioral sciences; scholarly career development; and broadening participation in the social, behavioral, and economic sciences. Its programs include the established disciplines of economics, political science, and sociology, and such vibrant interdisciplinary fields as decision making and risk, law and social science, and science and technology studies. In many of its program areas, SES is the major (sometimes only) source of federal funding for fundamental research, and SES is a principal investor in the data resources and methodological advances that produce transformative research.

In general, 56 percent of the SES portfolio is available for new research grants. The remaining 44 percent is used primarily to fund continuing grants made in previous years. SES supports research and education through grants that range in size from small supplements for undergraduates to collaborate with faculty on research projects to multi-million-dollar survey awards such as the *Panel Study of Income Dynamics*, the *American National Elections Studies*, and the *General Social Survey*. These surveys are national resources for research and decision making that have become models for similar efforts in other societies.

SES is strengthening these surveys through investments in cyberinfrastructure that increase response rates, improve quality, and shorten the time required to design, field, and analyze questionnaire surveys. The Time-sharing Experiments for the Social Sciences (TESS) uses the internet as a medium for conducting survey-based experiments. Not only does TESS allow innovative research design, it also widens access to high-quality survey data and lowers the research costs for participating investigators.

SES leads Foundation-wide efforts to understand the ethical, legal, and social dimensions of science, engineering, and technology by coordinating the Ethics Education in S&E Program, by supporting (with other NSF directorates) the Online Ethics Center for Engineering and Science, and by managing the Centers for Nanotechnology in Society. These collaborative activities contribute to the education of scientists and engineers and shape the trajectory of research and development.

SES Priorities for FY 2009:

- Strengthen core social science programs through targeted investments in potentially transformative research areas. Data resources, analytic tools, mathematical applications, and opportunities for integrative theory and research are growing dramatically across the social sciences, and increases in core programs will be used to stimulate and sustain such activities. In particular, SES will increase support for research that creates or employs advanced qualitative and quantitative methods and for studies of the origin, shaping, and uses of science, knowledge, and technology.
- Support research in the Foundation-wide investment area of CDI, with particular emphasis on applications of complexity and systems thinking to the human sciences. Applications of computation and related cyber-technologies will open new vistas for the social and economic sciences by mining, analyzing, and aggregating behaviors and transactions that had been inaccessible. Social and economic phenomena are inherently complex, because they include patterns and structures that only emerge through the accumulation of individual decisions and actions that occur over space, time and populations. Complexity and interacting system have transformative potential across the spectrum of social and economic sciences, so support for such work will be integral to the development of those fields.
- Increase support for administrative activities essential for the division to achieve its strategic goals.

Changes from FY 2008:

Support for the SES Division increases by \$7.07 million to a total of \$107.49 million:

- \$5.01 million will strengthen fundamental research in core programs that has transformative potential for the social and economic sciences and will support SciSIP interdisciplinary research. SES will give particular emphasis to the development and application of advanced qualitative and quantitative methods and to research that addresses the origin, shaping, and uses of science, knowledge, and technology.
- \$1.50 million will fund research on complexity and interacting systems in the social and economic sciences. Of this, \$790,000 will increase support for SBE-related investments in CDI through programmatic funding for applications of computational and complexity thinking to the most challenging scientific problems in the human sciences, including the fundamental problems in economics, decision making, and methodology that underlie the human causes and consequences of disruptive weather events, long-term climate change, and the consumption of scarce natural resources.
- \$80,000 will provide additional support for REU Sites.
- \$480,000 will support administrative activities essential for the division to achieve its strategic goals.

BEHAVIORAL AND COGNITIVE SCIENCES

\$92,780,000

The FY 2009 Budget Request for the Division of Behavioral and Cognitive Sciences (BCS) is \$92.78 million, an increase of \$8.15 million, or 9.6 percent, over the FY 2008 Estimate of \$84.63 million.

Behavioral and Cognitive Sciences Funding
(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over	
				FY 2008 Estimate Amount	Percent
Behavioral and Cognitive Sciences	\$84.64	\$84.63	\$92.78	\$8.15	9.6%
Major Components:					
Research and Education Projects	84.64	84.63	92.78	8.15	9.6%

Totals may not add due to rounding.

About BCS:

BCS supports research and related activities that advance fundamental understanding in the behavioral, cognitive, anthropological, and geographic sciences. The division seeks to develop and advance scientific knowledge and methods focusing on human cognition and behavior including perception, thought processes, language, learning, and social behavior across neural, individual, family, and group levels. The division supports research and related activities that focus on human variation at the scales of society, culture, and biology as well as how these variations and related patterns develop over time scales ranging from milliseconds to millennia. The division also supports efforts to increase basic understanding of and capabilities to explore geographic distributions and relationships, with an emphasis on interactions of human, physical, and environmental systems on the Earth's surface. Strong core programs are complemented by active involvement in competitions that support collaborative and cross-disciplinary projects to advance knowledge and build capacity by bridging multiple fields.

In general, 71 percent of the BCS portfolio is available for new research grants. The remaining 29 percent is used primarily to fund continuing grants made in previous years. The BCS portfolio mainly supports research and education grants ranging in scope from dissertation and individual-investigator awards to larger group projects that span multiple disciplines and institutions. Major activities include:

- Understanding fundamental human processes including language, cognition, perception, reasoning, and action planning in relation to adult and childhood developmental processes;
- Providing fundamental understanding of human social behavior including attitude formation and change, social cognition, affective and motivational influences, and personality processes;
- Integrating qualitative and quantitative analyses to better understand cultures;
- Understanding human biological variation, adaptation, and ontology;
- Using a geographic framework for understanding social, political, and economic transformations;
- Facilitating research to address the complexity in human-environmental interactions;
- Using non-linear models to understand dynamics of human behavior;
- Documenting the world's endangered languages in order to preserve retrievable information about linguistic structures; and
- Creating platforms for annotating and archiving textual, audio, and video language samples, as well as accessing the material for analyses.

BCS will continue to place emphasis on integrating findings from multiple perspectives to elucidate how human beings think, learn, and behave as individuals and as members of various socially and culturally-defined groups. Through support of basic research, the behavioral and cognitive sciences are advancing knowledge about the relations between brain and thought processes, between individual differences and cultural contexts, and between human and environmental systems. As examples, BCS research is helping us to prepare for and mitigate the effects of natural and human-initiated disasters, to predict and address how people respond to stressors, to improve methods for effective learning, to enhance the quality of social interaction, and to respond to issues such as globalization, terrorism, and climate change.

Ongoing activities within BCS include documenting endangered languages, understanding child learning, studying human origins, and understanding the interplay between humans and the environment. Cyberinfrastructure investments will continue to provide significant opportunities for breakthroughs in cognitive and behavioral sciences. New methods are transforming how we understand the links between behavior, cognition, and their biological substrates. These advances are strengthening the core programs and their relations to each other.

BCS Priorities for FY 2009:

- Strengthen the basic research enterprise and encourage transformative research in the behavioral, cognitive, anthropological, linguistic, and geographic sciences through increased support to core programs that serve these critical research communities. In particular, BCS will emphasize additional funding in areas that are expanding in new directions and increasing cross-disciplinary interactions, such as social cognition, human-environment interactions, and SciSIP.
- Increase fundamental knowledge about complexity and develop systems models of human thought and behavior. Attention will be given to research that examines the full range of interactions that occur across scales ranging from synapses and cells through individuals and groups to global-scale phenomena, with special emphasis placed on surprising non-linear relationships.
- Advance understanding about the interplay among physical systems, brains, and human intelligence, with research focused on developing new collaborations, approaches, and imaging techniques to discover the brain mechanisms involved in the cognitive functions of language, perception, memory, and emotion.

Changes from FY 2008:

Support for the BCS Division increases by \$8.15 million to a total of \$92.78:

- \$5.07 million will strengthen core disciplinary research to enhance the number of transformative projects in areas that expand in new directions and increase cross-disciplinary interactions, including SciSIP-related research.
- \$1.50 million will fund research on complexity and interacting systems in the behavioral, cognitive, anthropological, and geographic sciences. Of this, \$790,000 will fund SBE-related investments in the CDI activity, and a portion will support environmental research for work on human causes and consequences of environmental change,
- \$1.04 million will support Adaptive Systems Technology research in cognitive and behavioral processes, including research on language, learning, social processes, cognition, and higher-order perception.
- \$80,000 will provide additional support for REU Sites.
- \$460,000 will support administrative activities necessary to enable BCS to achieve NSF's strategic goals.

SCIENCE RESOURCES STATISTICS

\$33,210,000

The FY 2009 Budget Request for the Division of Science Resources Statistics (SRS) is \$33.21 million, an increase of \$3.13 million, or 10.4 percent, over the FY 2008 Estimate of \$30.08 million.

Science Resources Statistics Funding

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over	
				FY 2008 Estimate Amount	Percent
Science Resources Statistics	\$30.04	\$30.08	\$33.21	\$3.13	10.4%

About SRS:

The legislative mandate for SRS as stated in the National Science Foundation Act of 1950, as amended, is "...to provide a central clearinghouse for the collection, interpretation, and analysis of data on scientific and engineering resources and to provide a source of information for policy formulation by other agencies of the Federal Government..." To meet this mandate, SRS, in its role as the federal statistical agency with responsibility to cover the S&E enterprise, provides policymakers, researchers, and other decision makers with high quality data and analysis for making informed decisions about the Nation's science, engineering, and technology enterprise. The work of SRS involves survey development, methodological and quality improvement research, data collection, analysis, information compilation, dissemination, web access and customer service to meet the statistical and analytical demands of a diverse user community, as well as preparation of the congressionally mandated *Science and Engineering Indicators (SEI)* and *Women, Minorities and Persons with Disabilities in Science and Engineering (WMPD)* biennial reports. The data collected by SRS serve as an important tool for SciSIP (including evaluating the impact of the ACI) and as the major component of the content of *SEI*.

The funding portfolio for SRS includes ongoing, cyclical surveys; reports and other products; and projects accomplished primarily through contracts and also a few standard grants. Funding is provided annually; SRS makes limited use of multi-year commitments. In FY 2009 SRS will:

- Continue to conduct surveys and engage in analytic activities that produce information for carrying out NSF's statutory mandate, for meeting NSF strategic goals, and for developing SEI and WMPD. SRS will also continue to undertake activities directed toward future improvements in the relevance and quality of the data it collects and the information it disseminates. Such activities will lead to ongoing quality improvements and additions to current activities in subsequent years.
- Publish data from the 2008 *Survey of Graduate Students and Postdoctorates in Science and Engineering*, which implemented the second stage of a significant redesign to improve the quality, timeliness, and accuracy of the data. Evaluations of the data improvements will be conducted and fed into further phases of the survey redesign. The FY 2009 redesign activities will be informed by user needs meetings held in FY 2008.
- Implement the results of prior methodological, analytical, and planning activities directed toward improving the quality, relevance, timeliness, and accessibility of all SRS products.
- In support of SciSIP, continue to hold numerous workshops with industry, R&D, and S&E workforce experts, data users, and innovation experts. These workshops will continue to inform and enhance the redesigns underway for the SRS surveys, analytical reports and *SEI*.

- Continue ongoing activities to improve information on the globalization of the S&E enterprise, through continued interaction with OECD, EUROSTAT, the UNESCO Institute for Statistics, and other international and national statistical agencies.
- Conduct pretests of a significantly redesigned Academic Research and Development Survey, reflecting needs of data users, as informed by numerous workshops, and to meet the needs of SciSIP and future *SEI* volumes. The redesigned survey will take into account the major changes that have occurred and are taking place in the academic sector as to how research and development are funded and conducted. The changes in the survey will reflect the complexity of how academic research is presently conducted and funded in a global knowledge economy.
- Work with the National Science Board on potential improvements and enhancements for *SEI* 2010 and 2012.

SRS Priorities for FY 2009:

- Continue to redesign the survey of R&D in the industrial and services sectors. The newly named Business Research and Development Survey will collect much needed data for the manufacturing and services sectors on the role of R&D in both the U.S. and internationally, R&D infrastructure, and the way R&D is currently conducted. The survey will collect data on crucial components needed to understand economic competitiveness. Data from the Survey will be in the 2012 *SEI*.
- Continue to develop and test strategies for gathering comprehensive data for the entire postdoc population. Postdocs are a crucial component of the science and engineering workforce yet they are rarely included in estimates of the size of that workforce. Only limited statistical data are available on the number and characteristics of postdocs and on their activities. Enhanced data about postdocs and their activities will be an important step in understanding the contributions of postdocs to the U. S. economy and competitiveness.
- Support a number of activities to determine how best to link important SRS statistical data sets with supplemental data on publications, patents, and innovation-related activities. In addition, SRS will enhance its work on harmonizing taxonomies of fields of science in order to more fully integrate its data sets both internally and with other national and international data. This activity will include support for international activities to encourage data comparability and usefulness in data collected and used by international organizations such as OECD, Eurostat and the UNESCO Institute of Statistics.

Changes from FY 2008:

Funding increase of \$3.13 million to a total of \$33.21 million is for work connected with SciSIP:

- \$1.21 million will enable SRS to implement in FY 2009 a full-scale pilot of the Business Research and Development Survey. Data from the redesigned survey will be available for inclusion in the FY 2012 *SEI*.
- \$1.17 million will enable SRS to develop a pilot data collection on postdocs based on feasibility activities undertaken in FY 2006 through FY 2008. The pilot will merge a number of developmental activities on how best to develop a sample frame for postdocs that includes in a comprehensive fashion those who do not have a research doctorate from a U.S. institution and how to obtain information about postdocs in non-academic institutions. Implementation of the pilot will take place in FY 2010.
- \$640,000 will support analytical and statistical activities related to data linking, extraction, and matching to better inform and enhance the success of SciSIP.
- \$110,000 will support administrative activities.