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NIH: Exploring New Approaches to Optimizing Peer Review

At the 106th meeting of the Advisory Committee to the Director (ACD) of the National Institutes of Health (NIH) on June 13-14, members heard a presentation from Principal Deputy Director Lawrence Tabak entitled, *Exploring New Approaches to Optimizing Peer Review*. According to NIH director Francis Collins, the goal of the effort "is to be sure that the way in which [NIH has] its IRGs (Initial Review Groups) and study sections organized to do peer review accurately reflects the way in which science is moving." Science, said Collins, "moves very fast."

Tabak began his presentation by reiterating how "important peer review is to the NIH mission." He emphasized that the agency's two-tiered peer review system is the "foundation upon which the

funding of extramural research is based." While this system is highly regarded throughout the world, Tabak stressed that the NIH feels "that it is vital for [it] to continue to innovate and optimize the process grant applications are reviewed." He explained that there is "activity already ongoing in this space," highlighting the enhancing peer review project initiated a number of years ago with the commitment "to continuously survey results of changes made at that time." He pointed to the recently released report that shows that people are satisfied or have "acculturated to the changes." According to the deputy director, researchers have different perceptions depending on whether they are funded or not. That, he stressed, is the challenge when assessing peer review. The previous day, the ACD heard from Roderic Pettigrew, director of the National Institute of Biomedical Imaging and Bioengineering and the Acting Chief Officer for Scientific Workforce Diversity along with Richard Nakamura, director of the NIH's Center for Scientific Review (CSR), regarding efforts associated with peer review as it relates to diversity efforts and the release of the aforementioned report.

Specific concerns, according to Tabak, have been raised over the years that the structure of the CSR's integrated review groups (IRGs) along with NIH's "dependence on normalized percentiling across IRGs might lead to funding of applications that are not of the highest priority." He explained that priority is defined as a "compilation of many things," including the "scientific quality of novelty," and the alignment of the core mission of the institute, center, or agency. He further explained that in theory, things like select pay or high/low program relevance could be used to address the issue.

The question, Tabak suggested, is, "Should a portion of NIH resources be redirected in a more systematic way to ensure [NIH] support of the 'best opportunities?'" Tabak emphasized that "best" means many things to different people. It is something the agency has to acknowledge, but "if the NIH wants to approach that, should the agency try to systematically evaluate the characteristics of the study section's 'performance?'" He pointed out that proponents for the current systems would say no based on their belief that the current system is great and there is a need for highly specialized experts at all levels because "they appreciate the nuances of a highly specialized focused field." Conversely, others will argue, who "is to say what field is more important than another." He acknowledged that this view has some validity. Nevertheless, he explained, the NIH has an IRG organization driven by the nature and the number of applications submitted. That raises the question of whether the NIH should be more proactive in attempting to identify emerging fields of science in order to "get a little ahead of the curve to ensure an optimal review of the freshest ideas."

Tabak reported that the NIH's Division of Coordination, Planning and Strategic Initiatives and the NIH's Office of Extramural Research were convened in January and given the task of overseeing development of methods that could potentially identify emergent highly active areas of science and others that may have become stagnated. This group was also assigned to recommend approaches to compare the state of the scientific field to how NIH organizes its study sections in order to produce a "more optimized dynamic system that is responsive to changes in scientific trends." He emphasized that the task becomes increasingly difficult as budget constraints become greater. The reflexive answer, of course, is peer review, he maintained.

Tabak indicated that the purpose of his presentation was to share some of the ideas that the group has been testing in order to get feedback. Quantitative approaches include analysis of so-called study section inputs, i.e., the number of new applications, the number of new awards, and the relationship between the two different study sections for their different sizes. He showed plotted data, de-identified and collected from 2008-2012. In describing the data, he noted that in one quadrant high rates of new applications with high rates of awards could suggest that these areas could represent IRGs that are more vibrant where new science has been proposed. Conversely, in another quadrant, lower rates of new applications could potentially mean some of the areas represented in the IRGs are potentially stagnating.

Meaning of Differences in Application Rates

What the agency does not know and what would be reasonable, is whether there are inherent differences in application rates among different types of science. For example, he said, the low award rate may mean the study sections, for whatever reason, gives low scores to a initial (A0) grant applications may represent that the study section is favoring the more established investigators. On the other hand, the high rates of award could man the study section is more open to new ideas or have a preference for new investigators. If there is not a "caring bias" (low award rate), it could mean the areas of new science that are proposed are not as meritorious. On the other hand, he noted, high award rates may mean there are areas that reviewers are particularly enthusiastic about. Other possibilities: if award rates are not accounted for by the percentile scores, then the area may be scientifically saturated; award rates are driven by variations that one observes in individual institutes and centers-- a study section may be providing their output to an institute or center that has a particularly poor pay rate for the fiscal year. He noted that any and all of these are possible but yet it is a source of information that with additional examination may begin to give NIH insight. An ACD member interrupted to say that "so many variables" were making him "very uncomfortable."

Tabak further noted that the agency is always asked how it finds an emerging field. Accordingly, he stated that NIH is testing a whole series of approaches including analyses of work, literature, or applications which can precede widespread adoption that "could indicate the emergence of a new area where you see people who have never been supported by NIH before." Then there is the universe of social media and the data mining of it.

The agency can also look at study section outputs, "the bibliometric history of publications or patents normalized by the field of the science attributed to funded applications that were reviewed by an IRG." Acknowledging that there are numerous reasons why "citation analysis has limitation," Tabak stated that "if done with control it might be possible that [NIH] might be able to derive some interesting information." He then shared the "potential approach" to get the ACD's reaction. Using citations per year versus journal impact factors as a function of time, he suggested that NIH "might be able to reveal the 'performance of a study section.'" He immediately noted that what he is not saying, "because it introduces an anaphylactic response in people...is absolute citations as a number." Tabak stressed that he is "not talking about journal impact factor per se," but an approach "that allows one to self-control for these types of measures that may provide [NIH] with some information about the performance of the study section as a function of time." He then shared preliminary data with the committee. Tabak's full presentation is available here beginning around 1:17:00.

Other types of qualitative analyses include an NIH-wide portfolio review to compare qualitative measures to quantitative assessments by experts. He acknowledged that it is much easier to compare performance within a single field and no one has been able to figure out how to compare different fields to one another because it is immediately confounded by value judgment about relative importance and alignment of one field versus the other. This is a problem, said Tabak, no matter which field is selected, and raises the question why that was field chosen. People become very upset, nervous, hysterical, etc., he concluded.

Collins thanked Tabak for walking the ACD through the process, "which will definitely expand in other analyses." He emphasized that this is a "really important issue especially in a time of constrained resources. We cannot afford to just look the other way if we are not getting the right balance in our portfolio," Collins stated. "Whatever metrics we can come up with that are not inherently biased in their own way are worth looking at," so that we can make corrections to achieve a balanced portfolio. The Committee will resume its conversation of the topic at its December meeting.

Labor Markets after the Great Recession

The National Bureau of Economic Research (NBER) held a forum on Labor Markets after the Great Recession at the National Press Club on June 14. A recording is available here. The opening panel

focused on Productivity, Sectoral Shifts, and Labor Force Dynamics and was moderated by David Wessel, *The Wall Street Journal*. John Haltiwanger, University of Maryland and NBER, discussed the labor market's reallocation dynamics during the Great Recession as compared to earlier periods. He explained that the U.S. typically has a high pace of both job creation and job destruction, which is associated with enhanced productivity (in other words, low productivity jobs are eliminated as high productivity jobs are created). During a typical recession, the pace of job destruction increases significantly and the pace of new job creation declines, but only slightly. This type of reallocation enhances overall productivity, as lower productivity jobs are eliminated in greater numbers while high productivity jobs are still being created, albeit at a slower rate than normal. However, this trend has not held during the Great Recession. Instead, while job destruction increased in a manner similar to previous recessions, job creation fell to unprecedentedly low levels and has not recovered. Haltiwanger noted that job creation by young businesses fell at particularly low rates. He also explained that the labor reallocation of the Great Recession seems to enhance productivity at a much lower rate than during previous recessions. This effect, too, is perceived more strongly in young firms.

Edward Lazear, Stanford University and NBER, presented the results of his research into why productivity did not drop during the recession, as might be expected. To try to answer this question, he and his colleagues measured workers' productivity for a single firm with sites located in areas experiencing varying levels of unemployment. They found that workers in areas with high unemployment became more productive than workers in low unemployment areas. A five percent increase in an area's unemployment rate resulted in a 3.4 percent increase in productivity. Lazear also discussed research into whether unemployment from the recession is structural (more workers available than a given industry can sustain) or cyclical (not enough overall demand for labor in the economy). Lazear explained that most of the rise in overall unemployment during the recession was accounted for by four industries: construction, manufacturing, retail/trade, and finance. In the years since the recession began, unemployment rates in those industries have declined (though not to pre-recession levels). This suggests that post-recession unemployment is a cyclical problem, not a structural one (otherwise, unemployment rates would have remained high in those four industries). Lazear concluded by pointing out that in the past, economists were able to track unemployment as the inverse of the employment rate. However, since the Great Recession, the unemployment rate has dropped while the employment rate has not risen accordingly (due to people dropping out of the labor force).

The second panel, on the changing role of the social safety net, was moderated by Catherine Rampell, *The New York Times*. Hilary Hoynes, University of California, Davis, and NBER, discussed the results of her research into how the various social safety net programs fared during the Great Recession. She explained that per capita spending on Temporary Assistance to Needy Families (TANF), which provides cash assistance to poor families, has decreased in favor of increased support for the Earned Income Tax Credit (EITC), which is financial assistance conditioned on (low-income) employment. However, because the EITC is only available to people who have a job, it is not very well designed to protect individuals from the shocks of a recession, when they are more likely to lose their jobs; this has magnified the impact of the recession on the very poor. The programs with the largest increases during the Great Recession, the Supplemental Nutrition Assistance Program (SNAP or food stamps) and Unemployment Insurance (UI), are historically the most responsive to downturns.

A final panel, moderated by Greg Ip, *The Economist*, focused on the social costs of unemployment. Lawrence Katz, Harvard University and NBER, discussed the fate of the long-term unemployed in the aftermath of the Great Recession. One of the lasting effects of the recession is unprecedented levels of long-term unemployment (over 26 weeks unemployed). Short-term unemployment spiked during the recession, but has pretty much fallen back to normal levels. However, for the first time ever, there was more long-term unemployment than short-term during the recession. At this point, about 40 percent of the unemployed are long-term, a number that would be even higher if those who dropped out of the labor market are taken into account. This spike can be seen across all age and education groups. Remaining unemployed for a long time can make it more difficult to find a new job; hiring managers are less likely to respond to applications from those with long gaps since

their last position. There are also long-term economic and health consequences (lower overall income and higher mortality and disability rates) that persist even after the period of unemployment ends. Katz concluded by noting that active labor market policies to help this population seem to be most effective during an economic recovery. He suggested that as the economy improves, policymakers should not forget about this group.

Joseph Altonji, Yale University and NBER, discussed the impact of the recession on graduating college students. He noted that during previous recessions, a four percent rise in the unemployment rate was associated with a decrease in graduating college students' initial earnings by about eight percent. Choosing "high-premium" majors (associated with higher post-graduation income) insulated students from this effect, while low-paying "low-premium" majors exacerbated it. However, during this recession, the wage effect was much greater; earnings were 26 percent lower, and major choice did not have any insulating effect.

COSSA Congressional Briefing Discusses Aging in Rural America

On June 20, COSSA hosted a congressional briefing to celebrate the release of a new book *Rural Aging in 21st Century America*, edited by Nina Glasgow, Cornell University, and E. Helen Berry, Utah State University, published by Springer. The briefing was co-sponsored by the American Sociological Association; Association of Population Centers; Population Association of America; Rural Sociological Society; Farm Foundation; Cornell Agricultural Experiment Station; Cornell Population Center; Department of Development Sociology, Cornell University; University of New Hampshire Carsey Institute; and Utah Agricultural Experiment Station, Utah State University. Howard Silver, COSSA's Executive Director, moderated the session and introduced the speakers. Presenters' slides are available here.

E. Helen Berry, Joachim Singelmann, Nina Glasgow, Douglas Gurak, Howard Silver, Kenneth Johnson

Overview of Rural Aging

Glasgow began the briefing with an overview of rural aging. She reminded the audience that population aging is a worldwide phenomenon and is accelerating in developed countries like the U.S. as the baby boom generation reaches old age. By 2030, 20 percent of the world's population (72 million people) will be over 65. Glasgow argued that it is important to pay attention to aging in

rural America in particular because that population is aging more rapidly than those living in urban areas (individuals over 65 comprise 16.5 percent of the population in rural areas, but only 13 percent of the total population). This means that the impacts of public policies that affect older people (for good or ill) will be magnified for the rural elderly. *Rural Aging in 21st Century America* aims to differentiate the experiences of aging in a rural versus an urban environment and to explain how population aging can change the nature of rural places. However, Glasgow cautioned against making sweeping generalizations about the older people in rural areas or about the rural environments themselves, since both the people and the environments are diverse.

Rural aging poses a number of challenges, Glasgow observed. The smaller population size and low population density of these areas make providing services more costly and less accessible. In addition, poorer infrastructure impacts the availability of services. Older people in rural areas also face economic disadvantages that persist over time, and projected labor shortfalls as the rural population ages will negatively impact the economies of these areas. Finally, minorities in underdeveloped rural areas are doubly at risk of being disadvantaged. However, Glasgow also saw areas of opportunity. The fact that people are living longer overall is a success story in itself. And older people in rural areas serve as community resources-they are active volunteers and social entrepreneurs, and many are eager to continue working as they age.

Rural Retirement Migration and Natural Decrease

Kenneth Johnson, University of New Hampshire, discussed rural retirement migration and natural decrease. He explained that rural areas comprise 75 percent of the land in the United States, but account for only 16.5 percent of the population, and furthermore, rural population growth has declined sharply. This change is accounted for by both fewer people moving to the area (net migration) and a decline in "natural increase" (the difference between the number of births and deaths in an area). The rural population is also aging, as longtime residents get older ("aging in place") and older residents move to rural areas (age-specific migration). And, reflective of a historical trend, young adults tend to move out of rural areas (which means that fewer young adults remain to have children). For many rural areas, the combination of these factors has led to "natural decrease," more people dying than being born. Deaths exceed births in 45 percent of rural counties.

To illustrate the complexity of rural America, Johnson used the example of retirement destination counties. These counties, which tend to appear in clusters throughout the U.S., are the fastest growing of any non-metropolitan counties (due to net migration). While these counties experience large inflows of older migrants, they are also attractive to middle-aged adults and their children. Johnson also noted that rural America is becoming more and more diverse. Minorities accounted for nearly three-quarters of rural population gains from 2000 to 2010. These minority populations also tend to be younger; minorities make up 18 percent of the adult population but almost 28.8 percent of the child population in rural areas. Johnson concluded by offering some suggestions for policymakers to consider when thinking about these trends. First, he reiterated that "rural is a simple term for a complex region," which is growing increasingly diverse. Policymakers should attempt to balance the needs of the aging and the younger populations and harness the human capital and expertise of older adults.

Elderly Immigrants in Rural America

Douglas Gurak, Cornell University, spoke about elderly immigrants in rural America. He noted that there has been a nationwide shift in the origin of U.S. immigrants away from Europe and toward Asia and Latin America. This trend holds for rural America, but it is happening at a slower pace. The origins of rural elderly immigrants tend to be different from urban areas. The largest Latin American groups in rural areas come from Mexico, Cuba, and Colombia; in metropolitan areas, the largest groups come from Mexico, El Salvador, Cuba, and the Dominican Republic. For Asian American immigrant groups, the largest populations in rural places are from the Philippines, Japan, and Korea, while in urban areas, they come from China, India, the Philippines, and Vietnam. The Indian, Vietnamese, Salvadoran, and Peruvian populations are also growing rapidly in rural America.

Gurak explained that Mexican immigrants tend to have different outcomes from other immigrant groups (including those from other Latin American countries). With the exception of Mexican immigrants, elderly rural immigrants tend to do better than their native-born counterparts across a number of different socioeconomic, assimilation, and disability measures (including average household income and percent with over four or more years of college). Where immigrants live is also associated with different outcomes. For example, 39 percent of rural Mexican elderly live in Texas, and 17 percent live in California. Thirty-six percent of those in Texas are below the poverty line, while only 19 percent of those in California are in poverty. Over fifty percent of rural elderly Mexican immigrants in the Carolinas live in poverty, while those in Nebraska, Oregon, and Colorado experience much lower poverty rates (under 10 percent). Geographic variations in socioeconomic status of elderly immigrants from other countries also exist but are less pronounced.

Place and Race: Health of African Americans in Non-Metropolitan Areas

Joachim Singelmann, University of Texas at San Antonio and former COSSA board member, shared the results of research he conducted with Marlene Lee, Population Reference Bureau, on the health of African Americans in rural areas. Using data from the 2009 American Community Survey, they found that rural Blacks had the highest disability rates compared to their urban and white counterparts, and African Americans in metropolitan regions still had had higher disability rates than whites in metropolitan regions. In addition, both African Americans and whites in the South had higher rates of disability than those who lived elsewhere. Singelmann explained that African Americans at middle age had the same rate of disability as whites aged 65-74. African Americans in the 75-79 age bracket had the same level of disability as whites over 80. For long-term white Southern residents, being female, married, and having at least a high school education are "protective" characteristics associated with decreased probability of disability. However, among African Americans, women actually had a *higher* probability of disability than men, and while education was still a protective factor, its effect was reduced. Singelmann argued that effective policies aimed at reducing disability rates must take these differences into account.

National Academies Committee on Law and Justice Forum on Reforming Juvenile Justice

On June 10, the Committee on Law and Justice of the National Research Council hosted a public discussion based on the new report, *Reforming Juvenile Justice: A Developmental Approach*. Robert Johnson, New Jersey Medical School at the University of Medicine and Dentistry of New Jersey, chaired the committee that prepared the report. Richard Bonnie of the University of Virginia was the co-chair.

Researchers and policymakers are beginning to understand the significance of new data surrounding adolescent brain development and neurobiological basis of adolescent behavior. These new findings are challenging the effectiveness of the current policies and procedures of the juvenile justice system as well as the practice of trying many juvenile offenders as adults.

Through the review of current juvenile justice policies from around the nation, as well as the new scientific data that been released, the report established the following three aims:

- **Accountability:** There are ways to hold juvenile offenders accountable for their actions without confinement. Courts can make juveniles accountable by giving them an opportunity to accept responsibility, make amends with victim(s), and participate in programs such as community service.
- **Preventing Reoffending:** Risk and need assessments can be used to plan and carry out appropriate interventions therapy based on personal history and needs. Community-based interventions such as aggression therapy significantly lower an individual's risk of reoffending.
- **Fairness:** In order to help the juvenile develop a strong value system during adolescence,

he/she should be treated with fairness and dignity at all times. They should be involved in their legal proceedings their input should be considered when discussing accountability.

In order to meet the above goals, the report also laid some specific recommendations for policymakers to consider in order to improve the juvenile justice system. The recommendations were separated for state/tribal governments and federal policymakers.

State and Tribal Government Recommendations:

- Create a bipartisan multi-stakeholder task force;
- Rely on knowledge about adolescent development when aligning laws, policies, and practices;
- Use evidence-informed programs and interventions; and
- Work to reduce the racial disparities within the system.

Federal Policy Recommendations

- Strengthen the Office of Juvenile Justice and Delinquency Prevention's (OJJDP) ability to carry out its core mission of coordinating federal activities related to juvenile offenders, sharing research, and assisting state and tribal entities in improving their juvenile justice systems.
- Including offenses such as possession of alcohol or tobacco to the definition of status offense.
- Do not allow youth to be confined for offenses which would not result in the confinement of an adult for the same offense.
- Modify the definition of an "adult inmate" to allow states to keep juveniles in juvenile facilities until they reach the age of extended juvenile court protection.
- Expand the statutory protections for all youth under 18 in pretrial detention, whether they are charged in juvenile or adult courts.

While acknowledging that progress can, at times, be slow and there is still more work to be done, committee members seemed optimistic that a renewed focus on data-driven juvenile justice will create a lasting impact on the lives of those who enter the juvenile justice system, as well as the communities in which they live.

NAS Committee on Law and Justice Holds Seminar on Cannabis: Legal and Policy Questions and Research Opportunities

On June 20, the National Academy of Sciences' Committee on Law and Justice held a seminar to address the evolving legal status of marijuana as well as areas in which additional research are needed in order to help policymakers make informed decisions. The decision of voters in Colorado and Washington to legalize marijuana possession has driven this session. As UCLA public policy professor Mark Kleiman noted, the policy formulation process for marijuana is unique for a litany of reasons, the most compelling of which is the fact that it simply has not been done before. While lessons can be learned from regulation of alcohol and tobacco, the cannabis regulation process has presented many new challenges. Few people are more familiar with these challenges than Deputy Attorney General for the state of Colorado office David Blake.

Blake was appointed by the Governor of Colorado to the Amendment 64 Implementation Task Force which is in charge of setting the new regulations that meet the requirements of the voter mandate while also ensuring the health and safety of the residents of Colorado. In addition to the lack of support or direction from the United States Department of Justice, Blake lamented that staggeringly little amount of research data that is available on many marijuana-related questions ranging from user behavior to the health effects of various consumption methods. Kleiman added that while Colorado and Washington have made plans to fund this type of research, the funding will not be

made available until the states receive revenue from taxed sales of marijuana.

University of Virginia professor Richard Bonnie focused on the addressing the broad health concerns that are associated with the legalization and regulation process. One of his primary concerns was that a lot of new research data shows that many young adults' brains do not develop completely until around 22 years of age. That data, along with the availability of the drug for young people created a sense of urgency to gain a better understanding of the possible effects of marijuana on brain development among young users. Beau Kilmer, a senior policy researcher at the RAND Corporation, noted that states that have experienced enormous growth in marijuana usage in the last few years (California, Colorado, Oregon, etc.) are past the point where appropriate data can be collected on the effects of increased usage because the increase has already occurred. He recommended that research be conducted in other states where marijuana legalization may occur in the next few years (Arizona and Rhode Island).

All of the panelists seemed to agree that much of the data that is necessary to create informed and responsible public policy is either outdated or simply nonexistent. Researchers are having difficulty finding the funding to conduct the necessary research. Furthermore, they cannot legally obtain the marijuana to conduct some of the studies. State and local policymakers are stuck in a position where any regulation that they try to make is in direct contradiction with federal law. The panelists asked for help from the Academies in finding funding for, at very least, behavioral research to better understand user habits.

Congressional Neuroscience Caucus Briefing on Advancing Innovative Neurotechnologies for Brain Research

On June 12, the Congressional Neuroscience Caucus hosted a briefing to discuss the BRAIN Initiative. The BRAIN Initiative is a part of a new Presidential focus aimed at improving our understanding of the human brain (see Update, April 15, 2013). More specifically, it is targeted at creating new technology that will accelerate the rate at which we can conduct brain research. Doctors and researchers believe that this technology will allow us to understand and visualize the 100 billion neurons and 100 trillion connections that are still somewhat of a mystery.

National Institute of Health (NIH) Director Francis Collins spoke of the current crisis that the scientific community is facing as a result of uncertain budget allocations. In addition to private organizations, the BRAIN initiative is receiving funding from the NIH, Defense Advanced Research Projects Agency (DARPA), and the National Science Foundation (NSF). All three government agencies are struggling to lay out budgets for FY 2014. That being said, Collins said that his agency will operate off of President Obama's budget while they wait for an agreement to be reached. While recognizing that this project is not a cheap undertaking ($110 million from public funds and $122 from private funds), the BRAIN initiative will account for less than one percent of the $5.5 billion that NIH will spend on neuroscience research this year. Furthermore, this research may lead to advancements in treatment for many brain disorders including Alzheimer's, Parkinson's, autism, schizophrenia, epilepsy, and post-traumatic stress disorder (PTSD). Similar to the Genome Project (also partially funded by NIH), the BRAIN initiative is looking to lay down a base for scientific technology and understanding to be shared and built upon.

Director of the National Institute of Neurological Disorders and Stroke (NINDS) Story Landis further explained the potential of the BRAIN initiative to improve the understanding and treatment of brain disorders. Recent breakthroughs in optogenetics have allowed scientists to identify and even control neurons of just one type while leaving other neurons unaltered. This process, which uses specially targeted pulses of light, offers incredible opportunity to target the parts of the brain that are responsible for specific disorders while avoiding parts of the brain that are functioning properly. The optogenetics process can be substantially enhanced if researchers can better understand specific neurons and connections. The BRAIN initiative is working to help researchers with that goal.

Unlike the Genome Project, the BRAIN initiative does not have a specific endpoint or outcome. The possibilities for advancement in neuroscience are practically endless and the new information gained through this process will undoubtedly change the way we study, understand, and treat neurological disorders.

Arts and Sciences Academy Produces Report on Humanities and Social Sciences

"These times are so uncertain/There's a yearning undefined"
Don Henley, *The Heart of the Matter*

"We'd forgive most things if we knew the facts."
Graham Greene, *The Heart of the Matter*

"We must ensure that the humanities and social sciences continue to be an integral part of American education and that their value to our nation, and to America's place in the world, is recognized and fully supported."
American Academy of Arts and Sciences, *The Heart of the Matter*

The American Academy of Arts and Sciences' Commission on Humanities and Social Sciences released its report, *The Heart of the Matter*, on June 19. The 54-member commission, co-chaired by Don Rowe, retired Chairman and CEO of the Exelon Corporation, and Richard Brodhead, President of Duke University, was responding to a request from Sens. Lamar Alexander (R-TN) and Mark Warner (D-VA) and Reps. David Price (D-NC) and Tom Petri (R-WI) to examine the state of these disciplines, similar to the examination of the physical sciences and engineering that produced the *Rising Above the Gathering Storm* report in 2005.

Among those serving on the Commission were College Presidents Francisco Ciguerroa of the University of Texas System, Carolyn "Biddy" Martin of Amherst, Drew Gilpin Faust of Harvard, Amy Gutmann of the University of Pennsylvania, John Hennessy of Stanford, Rev. John Jenkins of Notre Dame, Steven Knapp of George Washington, Donna Shalala of Miami, John Sexton of NYU, and David Skorton of Cornell. Other members included Robert Hauser, Executive Director of the National Academies' Division on Behavioral and Social Sciences and Education (DBASSE), Kathleen Hall Jamieson, Director of the Annenberg Public Policy Center at the University of Pennsylvania, former Supreme Court Justice David Souter, and Pauline Yu, President of the American Council of Learned Societies. Finally, the Commission was stocked with folks from the arts world: George Lucas, Ken Burns, Emmylou Harris, John Lithgow, and Yo Yo Ma.

The report strongly argues for a comprehensive liberal arts education, noting that although education, funding, and infrastructure in the physical and biological sciences have been critical to extraordinary advances of the past century, "the humanities and social sciences are just as essential for the inventiveness, insights, career flexibility, and personal fulfillment of the American people."

The Commission also takes on the view of education as training for specific jobs in the economy, declaring: "the ability to adapt and thrive in a world certain to keep changing is based not on instruction in the specific jobs of today but in the developing of long-term qualities of mind: inquisitiveness, perceptiveness, the ability to put a received idea to a new purpose, and the ability to share and build ideas with a diverse world of others." Thus, we also need a nation that is literate, because "the spoken and written word remains the most basic unit of our interactions, the very basis of our humanity."

The report takes notice of the recent attacks on the socials sciences stating that these disciplines have recently become the subjects of ongoing political pressure, as lawmakers at the state and federal levels have questioned peer-reviewed, curiosity-driven basic research. As with many previous reports they call on humanities and social science scholars to better connect with the

larger community and "help it feel the interest of their subjects and the power of their analyses."

The report acknowledges that increasing federal funding for research and training in these subjects in the current budgetary environment is tough. They therefore endorse "public private partnerships to ensure the future benefits of humanistic and social scientific activity and support innovation in all fields."

The Commission also criticized recent budgetary decisions regarding international education and foreign language training. They proclaimed: "Even as we recognize that we live in a shrinking world and participate in a global economy, federal funding to support international training and education has been cut by 41 percent in four years." Furthermore, "Now more than ever, the spirit of international cooperation, the promotion of trade and foreign investment, the requirements of international diplomacy, and even the enhancement of national security depend in some measure on an American citizenry trained in humanistic and social scientific disciplines, including languages, transnational studies, moral and political philosophy, global ethics, and international relations." Therefore, the report calls for increasing funding for the Fulbright Program and the Department of Education's Title VI international and language programs.

The Commission also supports the importance of the social sciences and humanities to "address major global challenges such as the provision of clean air and water, food, health, energy, universal education, human rights, and the assurance of physical safety." Humanists and socials scientists, the report argues, are particularly well suited to consider: a) the ethical questions attending the adoption of new technologies; b) the social conditions that provide context for international policy decisions regarding the environment, global health, and human rights; and c) the cultural differences that aid or hinder global security.

The report concludes: "A fully balanced curriculum-- including the humanities, social sciences, and natural sciences-- provides opportunities for integrative thinking and imagination, for creativity and discovery, and for good citizenship. The humanities and social sciences are not merely elective, nor are they elite or elitist. They go beyond the immediate and instrumental to help us understand the past and the future. They are necessary and they require our support in challenging times as well as in times of prosperity."

Rising Above the Gathering Storm has had an important impact on policymaking since its publication and gets quoted by members of Congress and others. It was the driving force behind the America COMPETES legislation enacted in 2007 and renewed in 2010. Whether this *Heart of the Matter* report has a similar impact depends on the seriousness of those who pledged at the release on June 19th to work to ensure that it does more than sit on a shelf.

NSF Wants Proposals Assessing Impacts of Changes in Federal Science Policy

The National Science Foundation's (NSF) Social, Behavioral, and Economic Sciences directorate has promulgated a Dear Colleague letter seeking to inform the community about funding opportunities for proposed research projects or workshops that will gather data on the implementation and impacts of recent science policy changes. This new opportunity takes places within the SBE's Science of Science and Innovation Policy (SciSIP) program whose next submission deadline is **September 9, 2013.**

Myron Gutmann, Assistant Director for SBE, notes that the new science policy initiatives include an Office of Management and Budget announcement of plans to implement a policy of public access to data and scientific publications and the creation of a shared, voluntary researcher profile system to facilitate the preparation of research bio sketches. The Science Experts Network Curriculum Vitae (SciENcv) program is scheduled to begin a pilot project later this year. Not mentioned in the letter is the change coming to NSF's political science program as a result of the Coburn Amendment restricting proposal topics.

According to the letter, NSF is especially encouraging proposals that will:

- Develop new, or improve existing, analytical frameworks for evaluating the impacts of federal science policy initiatives;
- Explore different agencies' approaches to the implementation of particular policies to examine how variations in approach affect the achievement of intended policy outcomes;
- Collect case-study or quantitative data that facilitate identification of best practices in science and innovation policy implementation.

Investigators are encouraged to contact the SciSIP program officer, Joshua Rosenbloom, jlrosenb@nsf.gov or (703) 292-8854, to discuss prospective topics. In addition, for projects that require time-sensitive data collection, investigators may also consider submitting proposals using the Rapid funding mechanism. For full details of procedures for RAPID submissions investigators should consult: http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_2.jsp#IID1.

Strategies for Building a Diverse Scientific Workforce: A Congressional Briefing

On June 6, the Collaborative for Enhancing Diversity in Science (CEDS) held a Congressional briefing, *Innovative Strategies for Building a Diverse Scientific Workforce*, to officially release and highlight the accompanying recommendations in its report of the May 2012 workshop, *Enhancing Diversity: Working Together to Develop Common Data, Measures, and Standards* (See Update, June 12, 2012; Executive Summary/Full Report). Sponsored by **CEDS** in conjunction with Rep. Eddie Bernice Johnson (D-TX), the briefing was also cosponsored by an array of diverse organizations.

Sally Hillsman, Erich Jarvis, Kellina Craig-Henderson, Roderic Pettigrew

Welcoming attendees and representing the collaboration of scientific professional associations across the spectrum of science, moderator Sally Hillsman, American Sociological Association, shared the history of CEDS which has been focusing on ways in which these groups, as leaders of the scientific community, can enhance the diversity of the scientific workforce. "There is no doubt, as I am sure you agree, about the importance of the American scientific enterprise to the well-being of our country's population, to the competitiveness of the United States in the global economy, and also to the successful delivery of the many benefits of modern science to the world's population," Hillsman said.

"We are committed to this collaborative effort across science because there is no doubt that diversity and excellence have always been keys to science, to the advancement of science, to creativity and innovation, and to productivity. Diversity in science has long been recognized as a key to encouraging variability in theoretical, methodological, and substantive perspectives that are

vital to the advance of science," Hillsman continued. She pointed out that it took somewhat longer for "us to recognize that diversity and excellence in science also require that we not only tap all the talent available by broadening the community of scientists to include those from diverse backgrounds, but that we acknowledge that such inclusiveness is fundamental and vital to the excellence of science and to the steady advancement on behalf of our communities." That perspective, Hillsman emphasized, "is a little newer."

Studies of the U.S. scientific workforce repeatedly and consistently show that racial and ethnic minorities remain underrepresented across all scientific disciplines. Recognizing that finding solutions to this problem is part of our responsibilities, CEDS, then an interdisciplinary group of professional associations and scientific societies began to work on the issue in 2007. The goal was not only to draw attention to the problem, Hillsman explained, but to pursue strategies to address it. Led by COSSA, the organizations that comprise CEDS are themselves diverse, spanning the scientific and higher education communities.

The group's steering committee is made up of the founding members: COSSA, the American Association for the Advancement of Science (Centers for Careers in Science and Technology), the American Educational Research Association, the American Sociological Association, the American Psychological Association, the Association of American Medical Colleges, the National Association of Social Workers, and the Society for Research in Child Development. Hillsman noted that the group's first task was to engage our own community and seek its wisdom. Accordingly, in 2008, CEDS held a leadership retreat on the role of professional associations and scientific societies in enhancing diversity in science.

The retreat highlighted that one of the key problems is the lack of basic scientific tools to understand, monitor and change our development of the scientific workforce. There is a need for relevant metrics and more standardized data across a broad spectrum of education institutions, including elements needed to evaluate the efficacy of diversity programs, comprising both individual and group efforts, and the numerous programs aimed at effectively mentoring and retaining individuals throughout their scientific careers. In addition to the need for common data and measurement, new approaches are also necessary for tracking rates of participation in the sciences of underrepresented racial and ethnic minorities at different career stages, the population that, among others, represents the future of American science, Hillsman pointed out.

To address this need, in May 2012, CEDS organized a follow-up workshop to the leadership retreat which was made possible by both the sponsorship and the participation of the National Institutes of Health (NIH) and the National Science Foundation, and private foundation partners who care deeply about diversity in the sciences - the Alfred P. Sloan Foundation, the Robert Wood Johnson Foundation, and the William T. Grant Foundation.

Hillsman highlighted the three overarching recommendations in the *Enhancing Diversity: Working Together to Develop Common Data, Measures, and Standards* report:

Overarching Recommendation No. 1: Establish a federal interagency working group of federal science agencies and the Department of Education to examine and define common data elements that all federally supported programs and individuals would be required to collect for tracking and evaluation purposes. The White House Office of Science and Technology Policy (OSTP) should take the lead and the National Institutes of Health (NIH) and the National Science Foundation (NSF), the primary supporters of federal research and training, should serve as co-chairs of this interagency working group, similar to their collaboration on the STAR Metrics program.

Overarching Recommendation No. 2: Develop a permanent central web-based repository for data

on diverse populations in the science pipeline, as well as publications focusing on this issue.

Overarching Recommendation No. 3: Launch a new set of fellowships focused on increasing diversity in the scientific workforce using a public/private partnership and taking into account recent research and practice on the structuring of fellowships and training experiences.

Rep. Eddie Bernice Johnson (D-TX)

Rep. Eddie Bernice Johnson (D-TX), Ranking Member of the House Committee on Science, Space and Technology (SS&T) and co-chair and founder of the Congressional Diversity and Innovation Caucus, congratulated CEDS and thanked the group for its leadership in this area. Johnson said that this issue concerned her even before she came to Congress. Noting that 2013 was her 21st year as a member of Congress, she emphasized that the issue remains important to her because "we continue to need to encourage much more diversity in these fields... And now it has come to a period where that is the majority population. And we cannot afford as a nation not to continue to reach out vigorously to be more inclusive, not just for the sake of being inclusive, but for the sake of making sure we can stay on the competitive stage of the world," she concluded.

Erich D. Jarvis - A Personal Perspective of Becoming a Scientist

Erich Jarvis

Erich Jarvis shared his personal perspective of becoming a scientist and his hope to "impart" to the Congressional audience the importance of diversity in science. Jarvis is a neurobiologist and a tenured faculty member at Duke University Medical School, and since 2008 an investigator of the Howard Hughes Medical Institute. Born in Harlem, he originally trained as a dancer at the High School for the Performing Arts, the Joffrey Ballet and the Alvin Ailey Dance School. He received a B.A. from Hunter College with a double major in biology and mathematics. While at Hunter he was accepted to the NIH's National Institute of General Medical Sciences' (NIGMS) Minority Biomedical Research Support (MBRS) and the Minority Access to Research Career (MARC) programs. He attended graduate school at the Rockefeller University in New York where he received his Ph.D. in molecular microbiology and animal behavior in 1995. In 2002, he was the recipient of the Alan T. Waterman Award, the highest award given by the NSF to a promising young researcher. In 2005, he received the NIH Director's Pioneer Award providing five years of funding to scientists pursuing innovative approaches to biomedical research. At Duke, he leads a team of researchers who study neurobiology of vocal learning, which is a critical behavioral substrate for spoken language.

Jarvis shared that his first passion in life was not really to be a scientist, but a magician, the next Houdini. Deciding he wanted to do something a little more tangible, he thought he would dance. He auditioned and was accepted in the High School of Performing Arts. Responding to his mother's encouragement to "do something that is going to have a positive impact on society, on this planet," he thought that he could fulfill that challenge "better as a scientist than ...as a dancer." His longtime fascination with science and his mother's advice to "always said do something that you love" came together for Jarvis in his career as a scientist. He noted that he worked as hard as he did as a dancer, applying his artistic training to his science. As an undergraduate, he was co-author on five major scientific papers which made him competitive when he applied to graduate school. He was accepted to nine of the ten schools to which he applied. His "scientist" role model at Hunter College was Rivka Rudner, who he calls his Jewish mom because she was his "mother scientist trainer."

He stressed that lots of types of training in other kinds of careers can prepare individuals for becoming scientists. Many people from underrepresented backgrounds do not realize this, Jarvis explained. He pointed out that they can start out somewhere else, and they can transition later in life to become a scientist.

Jarvis also noted that he "could not have achieved what he has so far without the help of Affirmative Action programs." He realized this when he was supported by MARC and MBRS as an undergraduate student because they provided him with a stipend and a laboratory to do research along with a budget. He reflected on how students at Hunter and Rockefeller would tell him how when they graduated, their parents bought them a car for graduating or sent them to Paris. "You know, this didn't happen to a kid like me coming from the Bronx," said Jarvis. He acknowledged that his experience is not limited to persons of color, but nevertheless, there is a high proportion of people of color in that kind of situation.

A student at Rockefeller accused Jarvis being admitted because of quotas. He remembered feeling that, out of "all of these great people, all these great scientists, and that they picked me, why?" Observing that there were not that many people his color at Rockefeller; he began to question the purpose of these programs: Is it because of the color of my skin or because I am really qualified? Even after publishing all of those papers, he had these questions. Is there an unfair advantage? This always comes up in these affirmative action or diversity programs, whatever name you want to give them, he acknowledged.

What he concluded by listening to the experiences of his colleagues who had not had the kind of upbringing that he did is that "these programs are advantages that offset disadvantages that many people didn't realize they had." This, he pointed out, "was part of his psychological growing up and becoming a scientist from a diverse background." To illustrate further, he noted that in the process of interviewing at Duke and multiple other universities, he learned that Duke has a tuition reimbursement grant program for faculty children. The program pays 75 percent of the tuition for the children of Duke faculty to any college in the world. If they go to Duke, it will pay 100 percent of the tuition level. Acknowledging that he had never heard of anything like this before, he relayed that he later learned that people of his color were not allowed to be students at Duke or be a faculty member until around 1964 to 1968. Accordingly, his parents, grandparents, or great grandparents would not have had the advantage of "that affirmative action type of program that existed back then." For him, accepting Duke's offer "washed away generations of oppression." Now his children have an opportunity that he didn't have, that others didn't have for many generations in his family. "And that is what I think these programs do," he explained.

Jarvis says that he has determined "that the color of his skin, as well as gender, is rarely neutral in any walk of life, including the sciences. It is either a disadvantage or an advantage." Consequently, this has led him to the recognition that he has two jobs. One is to become the best scientist he can be, like everybody else, and the second, reflecting his participation in the briefing, "is to try to help cure society's disease - the disease of using color and gender and so forth as a criterion to unconsciously or consciously bias whether or not you can be successful in this particular career or not." The equal playing field "does not really exist," Jarvis contended. Therefore, he has chosen to lead by example-- becoming a leader in his field.

In becoming a leader, however, there "are some cultural things, let's say uncomfortable things you have to adapt to that you don't realize you have to adapt to," said Jarvis. For example, he shared his transition from New York City, mostly from the Bronx, Harlem, and Queens, quite diverse neighborhoods, to Duke in the middle of the South in 1998. He found "the demographics . . . quite striking." Jarvis related that he "actually felt like [he] was in the middle of Europe" when he interviewed. It was something that struck him "as odd and a little uncomfortable." He has learned that as a faculty member diversity is an issue. It is an issue in science as well as an issue in lots of different walks of life, he contended.

"Diversity Breeds Success"

Jarvis posed the question: Why do we need to enhance diversity? One reason is fairness and a second is because we are forced to. But for him, "what's most important is diversity breeds success." He shared that he has actually done some genetic testing and did a lot of oral history with his family. His appearance, says Jarvis, looks as if he is "mixed with a bunch of different things and [he] is." What he has found is that he can try to learn to appreciate all those pieces of who he is. Similarly, in his laboratory, Jarvis noted that he has people from all walks of life as his students, post-docs, technicians, and support staff. Accordingly, what he has found that is that different people from different, diverse cultural and ethnic backgrounds "bring in novel ideas that lead to new science that you would not have discovered otherwise."

To illustrate, he shared a small snippet of his research. Collaborative versus individualistic ways of thinking in science comes from a cultural perspective, he explained. People from different backgrounds or different ethnic groups are more collaborative and that can affect how you do your science. He showed a picture of the organization of the bird brain versus the organization of the human brain that reflected the thinking of Western scientists in the early 1900s, who argued that the brain evolved in a manner that led up to the development of European men. By bringing multiple people together from diverse backgrounds, scientists in the recent past, however, have revealed that the bird brain actually has a lot of cortical tissue. It is just organized differently, and this is why birds can produce sounds like speech. His lab, as well as others, say Jarvis, has discovered that there are certain structures that you can find in parrots and song-learning birds that match similar pathways in humans for speech. And even though we are separated by 300 million years from the common ancestor, we have evolved these similar brain pathways.

The take home message of the "little bit of science" Jarvis discussed during his presentation comes about by diverse people coming together to create new ideas. "Diversity breeds success. The equation of success is: Talent + Opportunity = Success. So when one is missing you can't have success," he concluded.

NIH - "Increasing the Diversity of the NIH-Funded Workforce"

Roderic Pettigrew

Roderic Pettigrew, director of the National Institute of Biomedical Imaging and Bioethics and Acting Chief Officer for Scientific Workforce Diversity at NIH, described the strategy that the agency is taking to address the problem laid out earlier by Hillsman. He stressed the NIH is working to do a better job than it currently does in diversifying the scientific research workforce.

Pettigrew began his presentation with a picture of children who participated in the NIH Take Your Child to Work Day. The "eager young faces" of the children, he noted, were diverse and were intently focused on an illustration of the scientific advance that allows people who cannot speak or move to communicate by thought. The children "are fascinated by this. Those are the bright young minds from diverse segments of the population that we are trying to capture and retain in the educational pipeline," he declared. "We hope they will become scientists, like Erich and others who make the next generation of discoveries based on scientific understanding that enables us to solve the challenges that we face in this country."

He asked, How do we retain this diverse group? The NIH, Pettigrew explained, has undertaken a program and a strategy, called *Increasing the Diversity of the NIH-Funded Workforce.* The overarching goal is to catalyze a systemic change in the biomedical research culture that will have sustained and long-lasting impact on developing scientists from underrepresented groups. According to Pettigrew, to do this, the NIH is planning initiatives that will stimulate and support transformative approaches to unify and strengthen the institutions and faculty in these institutions that have a particular interest in and dedication to recruiting, retaining, and developing diverse

scientists.

He noted the August 2012 Ginther, et. Al. Science paper, reporting a study undertaken by NIH to look at its funding data as it relates to diversity and racial groups from 2000 to 2006. The paper revealed racial bias in the process. The paper's bottom line, Pettigrew explained, is that if you are an African-American Ph.D. and applied for an NIH grant, your probability of securing that grant was ten percentage points lower than if you were white. This was independent of the tier of the institution in which you were employed or worked.

At the undergraduate level, he continued, the problem is even worse when we looked at diversity and training. He showed a graphic depicting that underrepresented minorities comprise approximately 33 percent of the general population, yet the group earns only 17 percent of baccalaureate degrees in science and engineering, and even worse, only seven percent of Ph.D.s in science and engineering. "There is a leak in the pipeline as it regards minorities," Pettigrew maintained. The strongest mediator of retention in the pipeline is having a mentored research experience, being exposed to research and mentored to do research at an early age, the kind described by Jarvis, he pointed out.

The agency began to address the question by looking at the diversity programs that already exist at NIH, he explained, noting that there are a number of them. An example of a successful NIH-supported program is the Minority Opportunity and Research program at California State University in East Los Angeles (Cal State LA). The students that participated in the program improved in academic performance and went on to graduate degrees at the master's and doctoral levels in greater numbers not reflected broadly across the U.S.

To put it simply, we are missing a large part of the brain power of this country, Pettigrew insisted. How do we address this problem, what do we do about it? It is a question that has been taken up by the NIH "at the highest levels over the last two years or so," he noted. He also pointed out that the NIH director put the challenge to the NIH advisory committee to the director (ACD) (see Update, June 25, 2012). The ACD submitted a report in June 2012, and recommendations were made in four broad areas: pipeline issues, infrastructure, mentoring, and peer review.

The ACD's recommendations have been received by NIH and have been converted into action items: (1) The NIH Building Infrastructure Leading to Diversity (BUILD) Program; (2) The National Research Mentoring Network (NRMN); (3) Coordination and Evaluation Center; and (4) Increased Engagement by all NIH Leadership. The agency intends to leverage the programs to have a broader and more integrated impact.

The BUILD program is designed to offer support to undergraduate students and to faculty at undergraduate schools. The support for students will be in the form of tuition scholarship for up to two years and will require a mentored research experience in a laboratory during the summer. Support will be given to faculty address the challenge that many have at small schools: huge teaching loans, lack of time to do research, and consequently lack of time to engage students in their research activities. This help is intended to free faculty up, by providing support to them to develop their own research interests and laboratories, as well as the opportunity to have innovation space where they can come up with new ideas about how to train and encourage these students to stay in science.

The support, he continued, goes to categories of institutions, including primary and collaborative ones. Primary institutions are so designated if they have less than $7.5 million in NIH funding - relatively under-resourced institutions that have a demonstrated large body of students from disadvantaged backgrounds and with at least 25 percent of the students having Pell grants. These institutions, however, can partner with virtually any institution, he explained.

Pettigrew closed his presentation with a discussion of the creation of a national mentoring network. The network, he explained, will have nationwide scientists in it that are established and known mentors. Each of the students that receive BUILD funding and become BUILD scholars will be

mentored by someone in this national mentoring network. Students, however, who are not part of BUILD can also to take advantage of the network. He also noted the creation of a center that will evaluate the performance of these programs.

This is a long-term initiative, Pettigrew noted; NIH will provide ten years of funding, roughly $50 million, on average, each year, for a total level of $500 million over ten years. "I hope that this underscores the seriousness with which the NIH takes the challenge we have before us and that is making better use of the human capital that we have represented in diverse segments throughout this country," Pettigrew emphasized. He concluded by acknowledging that "we need to capitalize on the creativity, the interest, the natural intellect that you saw in the bright young minds in that first slide I showed you. We recognize that they exist in all segments of society. And the fact that we have many segments of our society that do not participate in research and science, using these talents to solve the problems we face is an issue we really care about," he concluded.

NSF - "The Science of Broadening Participation"

Kellina Craig-Henderson, Deputy Division Director of the Social and Economic Sciences Division in the Social, Behavioral and Economic Sciences Directorate at the National Science Foundation (NSF) followed with an overview of the ongoing efforts by the agency to get a handle on answers to questions that are relevant to some of the questions raised by Pettigrew.

Kellina Craig-Henderson

Craig-Henderson acknowledged that she was not familiar with the MORE programs at Cal State LA but noted that it has been successful. The question remains, she pointed out, what distinguishes this program from many others that we support that have not been as successful.

The science of broadening participation is an effort that has been underway at NSF for the last few years aimed at providing support for research that answers those kinds of questions: why does the MORE program at CSULA actually work?

Craig-Henderson provided data and examples of some of the questions that have been addressed by the research already supported by NSF. She made the plea that this kind of work needs to continue.

She pointed to the National Academies report, *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads*, published in 2010 (see Update, October, 11, 2010). The report, she noted, points to the urgency of the need to expand the numbers of people in the U.S. who enter STEM (science, technology, education, and mathematics) fields. "It paints a particularly sobering account of what we can expect in the future workforce if we don't do something now," Craig-Henderson contended. One of the things we know we can do now is increase the number of people who have historically not been represented in science. There are a number of recommendations in the report, she said, and pointed out that she used the report as a starting point because she thinks that "it really does wake us up." It causes us to realize that "we are on the path to losing our prominence as a nation within STEM."

Citing data from the NSF's National Center for Science and Engineering Statistics, she noted that the representation of underrepresented minorities earning degrees, are all fewer than 20 percent, regardless of the level. She noted, however, that we have made "quite a bit of progress in many fronts with respect to women's representation in the STEM workforce relative to men, but where we have not is in the fields of computer science, engineering, among others, including physics and economics. Those are the areas where we know that the number of women is very low and they continue to be low."

When the NSF talks about broadening participation, it is talking about the obvious groups which

include racial and ethnic minority persons in the U.S. but also people with disabilities, recognizing that they represent an unused or underused talent within the STEM workforce, she explained.

She pointed out that the NSF has quite a bit of evidence across a diversity of research fields that provides information about the experience of underrepresented groups in STEM fields across the workforce. And that research tells us that it is not easy. We know that there are certain things that can be done to make the experiences like Dr. Jarvis spoke about be representative for greater numbers of people, she declared.

There is quite a bit of research that focuses on the construct of implicit bias, for example - bias that occurs and operates below our levels of consciousness that influences the way we interact with prospective job applicants or prospective students, or people in your own office, she pointed out. These biases, she explained, are usually driven by feelings that we are not necessarily in touch with about people who are different from us. "There is a wealth of information that we have and that we know can inform strategies aimed at diversifying student populations or the workforce." She noted that there is a lot of work that has looked at the impact of letters of recommendation, for example. We know that as you move through the academic pipeline, you are asked repeatedly to furnish letters of recommendation. They become a part of your package. She explained that there is a fair amount of research that talks about the ways that these letters can disadvantage people from underrepresented groups. "And this is often done unconsciously," she pointed out, noting that there are a number of different bodies of research that can inform us when we want to think about and consider the experiences of underrepresented groups within the STEM fields.

What is the Science of Broadening Participation?

Craig-Henderson provided the audience a sense of what "the science of broadening participation" refers to, noting that many agencies, including NSF, have been committed to broadening participation, "but this is to be distinguished because it is not the science of broadening participation." She stressed that we are talking about a line of inquiry, a scientific pursuit that is aimed at bringing empirical evidence for explaining questions about what works and what doesn't work to expand participation. "It is not just gut instincts or intuition." We are talking about applying the rigor of the scientific approach to uncovering answers to those kinds of questions or conundrums that we face, Craig-Henderson maintained. She added that one of the nice things about the science of broadening participation is that the NSF has supported it at all levels of analysis - individuals, as well as organizations. "So we are looking across levels of behavior and levels of analysis," she emphasized.

According to Craig-Henderson, the science of broadening participation provides a useful place for collaboration between researchers within the physical and natural sciences with those who are in the social sciences, because the science of broadening participation includes research questions that social scientists have been asking for 20 to 30, sometimes 40 years. This information can inform the activities of researchers who are in labs or in settings where they may not really have a sense of what the literature says about integrating or expanding participation.

Johnson, Hillsman, Jarvis, Pettigrew, and Craig-

She also shared an example of research by Linda Babcock, a researcher at Carnegie Mellon, supported by several programs at NSF. It is a situation that many women in positions previously occupied in large numbers by men often came in with starting salaries that were substantially. The question arose as to why. The answer is that women were not negotiating as well for themselves as men did upon entering a job or a position. This, she pointed out, put them at a disadvantage across the job cycle because they could never quite catch up. She related that the solution by, well-intentioned people was to put women through assertiveness training. But the reality is, based on empirical research, women who

do negotiate for themselves in the same way that men do are at a disadvantage. People tend not to like them very much, said Craig-Henderson. In order to come up with a way that advantages or at least equalizes the playing field for women, we have to come up with other strategies.

She closed by drawing attention to a "Dear Colleague letter," a mechanism for inviting members of the research community to submit proposals to NSF. This is usually the process for establishing an actual standing program of research within NSF. The science of broadening now has an active Dear Colleague letter inviting proposals to come in to standing programs within the SBE Directorate as well as the Education and Human Resources Directorate that supports education-related research. The Dear Colleague letter invites participation researchers across the different fields within the social sciences and within the educational research world to submit proposals to expand participation in the scientific talent pool.

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