

**Division of Behavioral & Cognitive Sciences (BCS)
Committee of Visitors (COV) Final Report**
September 2015

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1. KEY FINDINGS OF THE COV

- ❖ The Division and its Programs are managed thoughtfully and well.
- ❖ The components and the results of the review process seem thorough and fair.
- ❖ The experiments with new review processes have been largely successful, but there have been some unintended consequences.
- ❖ Discrepancies remain in the implementation and use of the Broader Impacts review criterion.
- ❖ There are exciting opportunities for research in and across the fields supported by the Division.
- ❖ It is difficult to communicate effectively with the relevant and potential research communities.
- ❖ BCS should leverage its strength to lead broadly cross-cutting research initiatives beyond the Division and Directorate.

2. OVERVIEW OF THE EVALUATION PROCESS

2.1. Preparation and review before the meeting

The COV process for evaluating the BCS Division within the Social, Behavioral and Economic Sciences (SBE) Directorate consisted of (a) recruiting a chair, two co-chairs, and a team of evaluators for each of the 10 Programs, (b) providing the evaluators with access to key summary documents and to 1,000 individual proposals, their external reviews, and NSF's actions, and (c) convening a series of discussions among the evaluators in Arlington, VA at the NSF on August 19-21, 2015.

The Appendix lists the names, titles, and affiliations of the Committee members. Dr. Harrington, who chaired the COV, is a member of the SBE Advisory Committee, to which the COV formally reports. In addition to co-chairs Aslin and Turner, there were two members charged with close inspection of each of the ten standing Programs in the Division (three for Geography and Spatial Sciences (GSS), because of the number of proposals and actions to be inspected).

Before meeting, these 24 external evaluators were briefed on NSF's Conflicts of Interest (COI) policy and declared all potential COIs. All had access to several background documents¹, and to 1,000

¹ The COV evaluators were provided with many documents, including:
NSF Strategic Plan for 2011-2016
2015 summary of each Program's activity for FY 2012-2014
COV 2012 summary report and individual Program reports for FY 2009-2011
2015 response to 2012 COV report from the Division and from each Program
2015 SBE report on "Robust and reliable science"
2015 NSF report on public access to research findings.

securely stored electronic jackets of proposals, reviews, and explanation of NSF's actions regarding each proposal. NSF staff had used a randomized process to select these from 6,774 proposal actions across the Division during FY2012-FY2014. Division and Program staff were available by e-mail and telephone to answer questions or provide additional information.

2.2. Agenda of the meeting

The full COV met in Arlington, VA for three days (Dr. Aslin participated by telephone). The agenda included a briefing on COIs and confidentiality, nine hours of meetings in teams focused on individual Programs (with Program Officers (POs) present for some parts of those meetings, 7½ hours of meetings of the COV as a whole, and 2 hours to present and discuss findings with (first) the leadership of the Directorate and (second) the leadership and staff of the Division. Division and Program staff provided additional information if and as the Committee or Program teams requested. During this time, each Program-focused team prepared a written review of the Program's operations and opportunities.

2.3. Report preparation

The chair and the two co-chairs of the COV were charged with coalescing the opinions of the evaluators about the performance of the BCS Division in two fundamental areas:

1. Assessments of the quality and integrity of Program operations and Program-level technical and managerial matters pertaining to proposal decisions.
2. Forward-looking comments pertaining to emerging issues and areas of support, as well as new opportunities for advancing science and infrastructure, at both the Program and division levels, and in interdisciplinary settings.

Section 3 of this summary report presents evaluation of the first area and was guided by a series of four topics laid out by the NSF in a COV template for each program:

- Quality and effectiveness of the program's use of the merit review process (Section 3.1 below)
- Selection of reviewers (Section 3.2 below)
- Management of the program (Section 3.3 below)
- Portfolio of research (Section 3.4 below).

Section 4 of this summary report presents evaluation of the second area, which focused on future directions at the Division level, guided by a series of three topics provided by the Division:

- Emerging issues/lines of inquiry
- Replicability, reproducibility, and generalization
- Data-sharing and public access.

A final request from the NSF was for the present COV report to evaluate the responsiveness of the POs to the recommendations contained in the 2012 COV report.

This report contains 22 Recommendations for NSF's consideration. In addition, the phrase "Please respond" appears four times, when the co-chairs discuss an issue that should be addressed in the formal response to this report.

3. INTEGRITY AND EFFICIENCY OF PROCESSES AND MANAGEMENT

This section corresponds to Sections I-IV of the “Core Questions and Report Template” provided by the Division (referred to as “the Template” below). Some of the responses below focus on the operation of Programs within the Division (though the responses in this overview report do *not* contain the rich detail of the reports of each team of COV members focused on the individual Programs); some of the response focus on operation of the Division as a whole.

3.1. Quality and effectiveness of the Programs’ use of the merit review process (corresponds to Section I of the Template)

3.1.1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?

All COV Program-focused teams concluded that the review methods were appropriate. The COV was particularly interested in those programs that had experimented with alternative panel mechanisms during the current COV review cycle (2011-2014). These include experimentation with virtual panels, “Plus One” review cycles per year in Geography and Spatial Sciences (GSS), the 8-month cycle of the Biological Anthropology Program, the separation of the Doctoral Dissertation Research Grant (DDRG) panel from the senior panel in Linguistics, and the College of Reviewers used by Documenting Endangered Languages (DEL). Given the data available, COV members felt that each of these changes had positive effects on the program.

However, COV members also noted that these changes had unintended consequences. For example, in Linguistics, the separation of the DDRG from the senior panel led to a reduction in the number of individuals on the senior panel and may have had an effect on the review process. A consequence of the change of the Biological Anthropology panel from 6 to 8 months meant that co-reviews with programs on a six- month cycle were more difficult. Additionally, members of the research community were often confused about the schedule. The COV discussed the generalizability of a College of Reviewers and came to the conclusion that the utility in different programs might be limited. Some programs felt that it was an idea worth exploring, while others felt it was not needed. There was a general feeling that additional data might be useful before a final decision on the utility of these changes was made.

Recommendation 1

In those Programs that have made important changes in review schedule or process, conduct a [sample] survey of Principal Investigators (PIs) who submitted proposals during an appropriate period of time, to help assess the changes.

Recommendation 2

NSF programs should use the body of knowledge that has been built regarding virtual meetings. (Under what circumstances have virtual meetings been shown to work well, with what sorts of equipment, with versus without video, for what issues, for what duration, of how many people, who do or do not already know each other, held how often....)

Recommendation 3

Program or Division staff should estimate the actual cost and time saved from major changes in the review process, for use in assessment and in considering changes in other Programs.

3.1.2. Are both merit review criteria addressed in individual reviews, in panel summaries, and in Program officer review analyses?

All Program-focused teams felt that both criteria were addressed in individual reviews, panel summaries and in the PO review analysis. There was a general feeling that intellectual merit was

always adequately addressed. There remained lingering concern over Broader Impacts (“BI” hereafter). Some teams felt that BI were only addressed tangentially, while other teams felt that BI were exaggerated and went beyond the scope of what might be necessary. Some COV members felt almost as if there were an “arms race” in terms of BI. There was considerable discussion also about what to do when the research itself had an inherent BI. How were these to be articulated separately from the research itself? And if BI were already inherent to the proposal, how much more was necessary from the PI? There was a general feeling that BI remained a criterion that needed further elaboration. COV members suggested some training for reviewers and panelists on what was appropriate for BI. COV members suggested examples that would help train reviewers on BI.

Recommendation 4

Within the Division, develop training (e.g. background information, examples, and *assessment criteria*) regarding BI and data management (DM) plans. Provide this training for members of review panels and “colleges of reviewers” (for Programs using them).

Recommendation 5

Some level of NSF (the Foundation, the Division, or the programs) should re-establish an online link to examples of BI components or dimensions.

Recommendation 6

While each proposal must be assessed on the basis of (and reviewers must address) NSF’s two review criteria, recognize that awards may be made that are assessed more highly on one criterion than another. It is important that the *portfolio* of awards in each Program contribute strongly to both criteria.

3.1.3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?

Yes, overall the Program teams judged the individual reviews of proposals to be comprehensive and helpful in pointing out strengths and weaknesses. However, the level of detail contained in individual reviews varied considerably, and the reviewers’ use of the rating scale did not always conform to the content of their reviews. Thus, POs should explore the possibility of providing reviewers with further information about the preferred level of detail, perhaps by providing a redacted set of “ideal reviews” to serve as models, and to clarify how the rating scale should be used, especially for newer reviewers. One program felt that the diversity of sub-disciplines did not allow for adequate coverage when the number of panelists was small (suggesting that a larger number of panelists would be beneficial). Finally, one Program team felt strongly that the reviews from a proposal that was not funded, but revised and resubmitted, should be available to the current reviewers, thereby helping to contextualize the changes made to the resubmitted proposal. [Note: technically, NSF does not designate proposals as resubmissions, so this policy would have to be changed at the Directorate level.]

Recommendation 7

POs should create a library of “ideal reviews” (appropriately redacted) for access by new reviewers, enabling them to calibrate the expected level of detail and use of the rating system.

3.1.4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?

Yes. However, the panel summary itself is often very brief. In at least one program, assigning the duty of crafting the Panel Summary to a panel member other than the Primary or Secondary

reviewer seems to work well by offering the PI a more “objective” assessment of the panel discussion and one less prone to simply repeating the written reviews.

3.1.5. Does the documentation in the jacket provide the rationale for the award/decline decision?

Yes, all of the required information is provided in the eJacket.

Recommendation 8

Program materials and POs should make it clear that PIs can initiate contact with the PO after their proposal has been acted upon, to obtain more nuanced feedback than may be provided in the written reviews and panel summary.

3.1.6. Does the documentation to the PI provide the rationale for the award/decline decision?

There was consensus across program teams that the POs do a very good job of communicating the process and implications of the individual reviews, including the panel discussion, to the PI. The POs also do a good job of following up, as requested, with additional information in cases where further nuanced feedback would be useful to the PI or where the individual reviews are diverse and therefore the final outcome requires justification by the PO. This feedback from the POs is often more complete and helpful than the Panel Summary itself,

There was also consensus that the POs do a good job of providing the rationale to the PI for funding decisions, including any nuance in the Panel discussion and any discrepancy between reviewers’ scores and the final recommendation. However, there was some concern expressed about the timeliness of feedback to PIs for proposals that would require a rapid turnaround to meet the next submission deadline. Finally, there was a suggestion to consider a system whereby POs could refer to specific criteria for recommending (or not) a revision and resubmission (e.g., a 3-point check-list), especially for proposals that are unlikely to be sufficiently competitive upon revision. This may reduce future efforts of the PI and of the reviewer pool.

Some POs go the extra mile in providing further information to PIs, especially those whose proposals were not funded so that a decision about resubmission can be encouraged (or not). Many PIs, especially at the junior level, could benefit from this further feedback from the PO, and so a mechanism should be put in place to trigger the process of obtaining this further feedback rather than relying on the initiative of the PI.

In some cases the Review Analysis provides further information that would be useful for the PI. Is there a way to provide some of that information to PIs, when POs feel it would be helpful?
Please respond.

3.1.7. Additional comments on the quality and effectiveness of the Program’s use of merit review process.

COV members consistently made two assessments: (a) permanent POs are better for the review process than rotating POs, and (b) the definition and criteria for Broader Impacts is in need of further clarification and more consistent evaluation.

Two new review procedures were judged to be effective and worthy of consideration by other programs: (a) a College of Reviewers (senior experts who agree to review up to three proposals per year), and (b) a streamlined triage process whereby the bottom third of proposals are not discussed in detail at the Panel meeting.

COV members raised some concerns about the potential of implicit bias in the review process. For example, in Social Psychology there was gender disparity in awards even though panelists were primarily female. COV members in the Biological Anthropology program did an analysis of gender of those receiving awards in comparison to the number of male and female reviewers and found a bias toward male PIs when reviewers were primarily male. The POs were

encouraged to keep track of the gender, race, and ethnicity of proposal PIs and report back to the Division level once enough data have been amassed to determine if such biases are affecting funding decisions.

Recommendation 9

Training modules are available for recognition and discussion of implicit bias. The division should investigate these and determine whether they are potentially useful for POs, panelists, and frequent *ad hoc* reviewers.

3.2. Selection of reviewers (*corresponds to Section II of the Template*)

3.2.1. Did the Program make use of reviewers having appropriate expertise and/or qualifications?

The COV was impressed with the quality of the reviewers and felt that the POs made appropriate use of the expertise and qualifications of members of the research community.

3.2.2. Did the Program recognize and resolve conflicts of interest when appropriate?

All COV members felt that conflicts of interest were appropriately resolved. The review process routinely follows COI procedures (i.e., early identification of COI's, recusal of panel members from the discussion by leaving the room, and not disseminating any written review identified as a post-hoc COI to other panel members).

3.2.3. Additional comments on reviewer selection.

Three suggestions were offered: (a) extend the College of Reviewers concept to other programs, (b) tap into past NSF awardees and past NSF graduate fellowship awardees as potential reviewers, and (c) solicit reviews from junior and/or under-represented groups of researchers to provide useful training in the review process. We suggest that Programs make these decisions, using their best judgment.

3.3. Management of the Programs (*corresponds to Section III of the Template*)

3.3.1. Management of the Programs.

There was broad consensus that the POs do an excellent job of managing their programs, especially given limited resources. Not only do POs manage the review process, but they also seek to leverage the use of resources across programs to enhance the overall funding of research relevant to their program.

COV members expressed concern about administrative turnover at the PO level, with nearly half of all BCS programs headed by rotating (i.e., not permanent) staff. We do not judge this turnover, if appropriately balanced and timed across programs, to be a fatal flaw in the administrative structure of BCS. Rather, it can be beneficial for rotators to join the other permanent POs to inject new enthusiasm and expertise to the BCS division. "Permanent" POs provide experience, internal connections, and external connections (to other agencies, to scholarly organizations, and potentially to minority-serving institutions) that are useful to NSF as a whole and to their programs and research communities.

Several programs have instituted new and/or trial evaluations of review and management systems (e.g., College of Reviewers, One-Plus, Springboard – a reduced award for pilot data, usually to a junior PI - and separate research and training grant panels) that indicate a dedication by the POs to enhance their advocacy of science within their discipline.

Recommendation 10

Whenever possible, each Program should have a “permanent” PO.

3.3.2. Responsiveness of the Programs to emerging research and education opportunities. The POs do an excellent job of keeping abreast of new trends in research (both content and methodology) and promoting avenues for educational training. A variety of new calls for research proposals are announced on an ad hoc basis, but in many cases these announcements come very close to the submission deadline. Greater lead-time should be provided to enable the broadest possible participation by potential proposal submitters.

One particularly fruitful mechanism for leveraging new initiatives is joint program funding (e.g. INSPIRE), which should be fostered as a Division-wide model going forward. There also may be higher-level cross-funding opportunities with other agencies beyond the NSF. Despite the limited time available to program staff for out-reach, it is important for these staff to provide tutorials at disciplinary conferences in an effort to inform and educate potential PIs (especially junior faculty and postdocs).

The COV thought that NSF could make better use of its website in alerting members of the research community to funding opportunities. The traditional “Dear Colleague Letter” (DCL) might not be reaching all members of the community. Programs should have, develop, and use multiple modes and opportunities to communicate new, upcoming, and special opportunities broadly across their scholarly communities. The DCL is important, but it and its usual distribution channels are not sufficient.

Recommendation 11

Create a web-based alert system to which current and prospective PIs could register and automatically receive all relevant program announcements.

3.3.3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

In general the POs conduct an on-going evaluation of their program’ portfolios of research funding and continually attempt to fine-tune programs’ mission to fund the best research in their fields. Given fiscal constraints that are unlikely to abate, this is a challenging endeavor and one that the POs do well. Some Programs face a potential overlap problem with the NIH, and it is important for POs of these BCS programs to make it clear, both via the web and presentations at professional conferences, how their mission differs from that of NIH. A key point of discussion by the COV was how to balance funding of the many components of each Program (e.g., graduate training, basic research, CAREER awards, longitudinal designs and data archiving, conferences and workshops, among others). It might prove useful for each program to conduct an annual survey of researchers to obtain their views on this question of portfolio balance.

Some of the portfolio-balance needs and strategic planning are key at the *division* level. This would allow the Programs some leeway to maintain portfolio mixes that respond to disciplinary needs and annual vicissitudes.

Recommendation 12

The Division should develop a longer-term (e.g., 9-year) strategic plan, to be assessed at the Division-wide level, every three years. By necessity, such a long-term plan would need to be schematic, emphasizing broad attributes of the desired portfolio (distribution of size and length of awards, geographic distribution of proposals, distribution of researcher and institution attributes).

3.3.4. Responsiveness of Programs and Division to previous COV comments and recommendations.

In general, the individual programs within BCS were very responsive to the previous COV recommendations from 2012. However, several of those responses were in the form of a disagreement with the COV recommendation. Some of these disagreements were well justified and carefully explained. A few, however, were not and consisted of statements about why something could not be done because it conflicted with higher-level NSF policies. While we understand these constraints, we would prefer to see a more global response that expresses a desire to tackle these higher-level constraints rather than viewing them as insurmountable.

3.4 Portfolio of research (*corresponds to Section IV of the Template*)

3.4.1. Do the Programs' portfolios reflect the disciplines and subdisciplines of the field, and is the Program responsive to developments within relevant scientific communities?

The COV felt that in general, programs attempted to address the breadth of their respective fields.

3.4.2. Are awards appropriate in size and duration for the scope of the projects?

Yes, although all of the Program teams expressed frustration with the low levels of overall budget allocation to BCS programs. This renders funding rates no better than 10% and limits both new initiatives and the provision of long-term funding for longitudinal and data archiving projects. Co-funding across Programs and with other directorates beyond BCS mitigates these issues to some extent, but there is a general concern that young investigators (despite the CAREER and RUI award mechanisms) are being discouraged from continuing in the field. Fortunately, the INSPIRE and EAGER initiatives provide an infusion of small amounts of funding for high-risk studies that otherwise would never be funded via the regular NSF program mechanisms.

The COV spent considerable time discussing the balance of awards, specifically big and small awards. There was a suggestion that large awards should align with the mission of the division and that there should be a mechanism beyond counting journal articles for assessing the impact of funded projects. The COV also suggested that a three-year cycle for funding for large awards did not align with the realities of setting up a large field research project. There was a suggestion that a longer cycle with review during the cycle might be useful for large field projects. On the other hand, COV members recognized that science proceeds both by transformative projects, but also by incremental steps and, in fact, these incremental steps form the basis for transformative ideas and projects. The COV felt that balance should be measured at the division level and not necessarily at the level of the individual Program. This might better provide better balance at the Division level.

3.4.3. Does the Programs' portfolios demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

There was considerable discussion concerning the geographical distribution of PIs and diversity in the types of institutions receiving support. In most programs, most proposals and awards reflected institutions on the East and West Coasts.

POs generally tried to keep in contact with their research communities by attending meetings. Several POs attempted to further reach out to the community by visits, but some of these have been curtailed by funding restrictions.

3.4.4. Do the Programs' portfolios demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Most Programs reported approximately equal success rates among female and male PIs or co-PIs, but most Programs reported substantially fewer proposals from female than male researchers – generally a smaller proportion of women in the proposal pool than the proportion of women in the research or university-faculty pool. The same pattern was reported for PIs who are members of under-represented minority (URM) groups, but in almost every Program, the numbers are very small.

The success rates for new (first-time) PIs are lower than for repeat proposers: this could reflect the prestige of successful researchers, and could also reflect the learning that results from repeated submissions and reviews.

The COV shares NSF’s concern for soliciting proposals from the widest possible universe of researchers across U.S. institutions, reviewing them fairly, and making awards that invest in a broad range of researchers and institutions. Toward these ends the COV discussed several ideas:

- Supplement funded projects to involve/employ undergrads or post-baccalaureate students in projects, especially in fields that require technical research experience before grad school.
- Is it possible to provide supplements to employ high school students?
- Provide support for POs to get to institutions that are underrepresented (given their size and academic programs) among proposals and/or awards, and institutions that serve high proportions of students underrepresented in BCS fields.
- Is there a way for the Division to link to or benefit from NSF’s efforts to support research by faculty of minority-serving institutions, community colleges, and tribal colleges?
- Encourage Programs to seek proposals that include organized mentoring of students underrepresented in BCS fields.

Please respond.

Recommendation 13

NSF has hosted workshops and has funded research projects to add to “the science of broadening participation.” Findings to date from that work should be identified and used to inform (a) Division practices (reviewer and PO recruitment, proposal solicitation, publicity of funding opportunities) and (b) the assessment of proposals submitted to the Division’s Programs.

Recommendation 14

Consider establishing a Division fund (budget) for projects that explicitly broaden participation (through mentoring, students’ involvement, or grants to scholars from under-represented groups).

3.4.5. Do you have additional comments about the Division’s portfolio and the projects the Division’s programs support?

The COV noted disparity between programs in the number of proposals received and the funding available for Programs. The range in annual expenditures by programs is noticeably less than the range of number of proposals received by the Programs. (There are many ways to measure this. As an example, 7 of the 11 funding programs² had FY14 expenditures in the \$6-9 million range, yet the number of senior proposals received in those 7 Programs that year ranged from 87 to 233.) Does this lead to higher rejection rates in some Programs? Is the mean or median award size very different across Programs? If so, do the differences reflect the differences in proposals’ budget requests?

² Eleven, because Archaeology and Archaeometry expenditures were tabulated separately in the Division’s Overview Report.

The same is true for mortgage rates. Some Programs have much higher mortgage rates, which means that they are funding longer term projects. Other Programs have less or very little money devoted to mortgage—are these Programs not funding longer term projects or is money available from other sources for longer term projects? *Please respond.*

The COV conceptualized awards along distinctions of size, duration, and infrastructural nature. In addition to large versus small awards, the COV recognized that there is a special case of large awards—these include awards for long-term, field-based projects and for longitudinal studies. These projects represent considerable investment by NSF. They include significant infrastructure and are used by scientists in various disciplines. These projects take years to set up and often do not yield results for several years. Many of these projects are funded by special initiatives and can lead to transformative results in many disciplines. The COV felt that it was important to recognize this as a special category of award. *Please respond.*

4. EMERGING ISSUES AND AREAS FOR POTENTIAL SUPPORT (*corresponds to Section V of the Template*)

The second charge to the COV was to generate ideas for how Programs in the BCS Division should steer their respective portfolios in the next 5-10 years to maximize the impact of their resources and to take advantage of new advances in their respective disciplines. Here we summarize a lively discussion that generated innovative responses to these issues.

4.1. Emerging issues/lines of inquiry

The 5 emerging issues or lines of inquiry described below were discussed by the COV as a whole and were presented orally to SBE and BCS leadership on 21 August 2015. In addition, the teams which focused on specific Programs discussed emerging issues among themselves. Those discussions are summarized in the Program-specific reports.

(i). Emerging Methodologies.

An emerging theme was the relationship between new methodologies and research. Some of these advances allowed programs to move beyond the laboratory and take methodologies into the field, thus adding a new dimension to the research. The question that could be answered is does laboratory analysis really reflect human variation. This question has resonance for linguists, cognitive neuroscience, documenting endangered languages, cultural anthropology and biological anthropology. For example in cognitive neuroscience new analytical methods work to bridge spatial scales allowing researchers to relate non-invasive research at large scale within the brain to invasive research on small areas within the brain. There are new analytical methods to allow more causal rather than correlative research in for example, the areas of memory and cognition that are important for multiple disciplines.

(ii). Defining human behaviors.

Different disciplines all study fundamental human behaviors. Some of these behaviors include altruism and aggression. Social psychologists are engaged in this study. Archeologists are interested in cooperation of unrelated individuals in deep time. Other disciplines including biological anthropology and cultural anthropology could contribute to an interdisciplinary examination of these behaviors.

(iii). Evolution and behavioral genetics.

Discussion was directed at a strong view that U.S. funding has missed opportunities to deploy current genetic methods to study uniquely human characteristics and determine their underlying genetic mechanisms.

(iv). Climatic events effect on human populations in the present and the past. Many studies have detailed the effects of humans on climate change. However little information is available on the way in which human societies manage extinctions, climatic events and long term climate change. Examples can be found throughout the world and through deep time. This would ground climate change studies in the behavioral sciences. This research could include the use of super computers to model climate, behavior and social economic systems.

(v). Connectivity of humans and the natural world in the present and in the past. Several disciplines look at natural events, such as disasters and try to understand the human response to these events. Emerging disciplines such as urban cultural anthropology try to understand the relation between urban systems and human behavior. Language changes in relation to changing environments. Human development is altered by natural changes. Evolutionary theory has profound predictive power that can be used not only to understand the past but also the future.

More broadly than these 5-10 year prospects, the behavioral and cognitive sciences research issues that relate to scientific issues supported throughout the Foundation.

Recommendation 15

BCS should lead some big, cross-disciplinary questions and get other divisions (across the Foundation) to participate in special opportunities.

4.2. Infrastructure

Question 1 of Part V of the Template had two parts, regarding likely emerging issues and regarding infrastructure investments needed for the research that the Division supports. Our discussions included two infrastructural elements: large-scale, long-term field sites and data archives.

Recommendation 16

The Division (or perhaps the Directorate) should develop a system of support for large-scale field science that is more sustained and requiring participation (over time) from different research areas. Investment in a field locality should reap benefits across individual studies. (NSF-funded Long-Term Ecological Research sites were mentioned as an example.)

Recommendation 17

NSF and its directorates should create incentives to individual institutions, or collections of institutions, to develop data archives that will meet the requirements of NSF's Public Access Plan and DM expectations. Clearly, this will be easier for electronic data sets than it would be for physical data (e.g., artifacts).

4.3. Replicability, reproducibility, and generalization

The COV agreed that these attributes of "robust science" are vital. NSF has several ways to influence robustness:

- Insist on clarity of key elements of research design.

- Encourage reviewers to concern themselves with the statistical power of pre-proposal pilot studies, and that the proposed research is likely to achieve; make it clear to research communities that statistical power is of concern.
- Ecological validity of the proposed research is key to its generalizability.

Replication requires transparency of methods and procedures; NSF should encourage reviewers to look for transparency in research conducted with prior NSF funding.

Replication requires clear metadata, assured data storage, and data access. Infrastructure is essential to accomplish these goals. There should be clear expectations of researchers and the researchers should be aware of where the resources will come from in order to accomplish these goals.

4.4. Data-sharing and public access

Discussion among Program-specific teams and the COV as a whole suggested that data sharing has already become much more accepted and expected, but that standardization of data management (DM), meta-data, and the availability of long-term archiving still pose problems. There is a concern that data management and archiving need clearer guidelines, including both how to organize such systems of remote storage and access and how to request funds from NSF to accomplish these goals.

Recommendation 18:

NSF, BCS, or individual Programs should develop exemplars of DM-plan components (meta-data, level of data to be made available, software or technical specifications to be made available, human-subject concerns), for dissemination to their research communities. Given the heterogeneity across Programs, the program level may be the best level for this. NSF as a whole may be the correct level for publicizing the long-term archival resources available to PIs.

Recommendation 19:

While our communities are still developing the use of data management, data archiving, and data sharing, POs may need to work with PIs to improve their DM plans before a potential award is finalized. [In other words, don't reject a really strong proposal because of a less-than-sterling DM plan.]

Recommendation 20:

NSF and its directorates should encourage PIs to actively manage their datasets in a manner that makes them easily citable. This might be as simple as creating a digital object identifier (doi) number for electronic datasets or the electronic metadata associated with physical data. This serves several purposes: (a) provides "credit" to the investigator and (indirectly) NSF when the data are cited, (b) allows a method to search for the data, and (3) potentially provides recognition of the data archive.

Recommendation 21:

Projects' final reports should be checked to insure that the DM plan and BI actions have been undertaken.

Recommendation 22:

Reviewers should check the "Results of Prior Support" section of proposals for data management.

5. OTHER TOPICS

5.1. Comments on any program areas in need of improvement or gaps within program areas

No comments in this summary report.

5.2. Comments on performance in meeting Program-specific goals via non-Program methods

No comments in this summary report.

5.3 Agency-wide issues that should be addressed by NSF to help improve the programs

There was considerable discussion of the NSF website. The website could be better configured to supply information on resources. The issue is not the amount of information available, but finding relevant information.

5.4 Other issues

According to Table 4 of the “Overview of the Division of BCS Report for the 2015 COV,” the total number of senior proposals received across the standing Programs was 1686 in FY12, 1437 in FY13, and 1343 in FY14: annual declines of 15% and 6%, for an overall decline of 20%. Over the timespan, the number of senior proposals declined in 10 of the 11 standing Programs: 7 of them saw declines of >10%, and 3 saw declined of >25%. Six of the 11 Programs had annual declines in FY13 and in FY14. *Please comment.*

5.5. Comments on how to improve the COV review process

This year, POs were encouraged to contact the COV members focused on their Programs, before the COV convened on-site. This was good and should continue. Some Program-focused teams may not have any questions or issues to raise in advance, but providing the opportunity shows the willingness of the Program staff to be helpful.

Make the Division’s and the programs’ overview reports for the *previous* COV available to the COV, to provide longer-term context. (These were added for the current COV, and were helpful to some Program-focused teams.)

There was a suggestion to provide the next COV with data (i.e., frequency distributions) of panel ratings, funding decisions, and new/resubmitted proposals. In addition, there was a suggestion to provide the next COV with a summary of any COI’s and how they were handled (e.g., by soliciting additional reviewers or by reducing the number of reviews).

There was a suggestion to provide time on the agenda for the entire COV to meet with the POs as a group, before the COV generates its findings and recommendations.

APPENDIX 1.

MEMBERS OF THE 2015 COMMITTEE OF VISITORS, NSF BEHAVIORAL AND COGNITIVE SCIENCES

CHAIR

James W. (“JW”) Harrington

Professor of Interdisciplinary Arts & Sciences
Professor of Urban Studies
University of Washington, Tacoma
<http://faculty.washington.edu/jwh/>

CO-CHAIRS

Richard (“Dick”) Aslin

Director, Rochester Center for Brain Imaging
William R. Kenan Professor, Brain and Cognitive Sciences and Center for Visual Science
University of Rochester
http://www.bcs.rochester.edu/people/faculty/aslin_richard/

Trudy Turner

Professor, Department of Anthropology
University of Wisconsin - Milwaukee
<http://uwm.edu/anthropology/people/turner-trudy-r/>

ARCHAEOLOGY/ ARCHAEOOMETRY

Catherine (“Cathy”) Cameron

Professor, Department of Anthropology
Associate Curator, Anthropology Section, University Museum
University of Colorado, Boulder
<http://anthropology.colorado.edu/directory/faculty-bios/catherine-cameron/>

Curtis Marean

Professor, School of Human Evolution and Social Change
Arizona State University
<https://webapp4.asu.edu/directory/person/332669>

BIOLOGICAL ANTHROPOLOGY

Richard Bribiescas

Deputy Provost for Faculty Development & Diversity,
Professor of Anthropology, Biological Anthropology
Yale University
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Anne Grauer

Professor and Chair
Department of Anthropology
Loyola University Chicago – Lake Shore Campus
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COGNITIVE NEUROSCIENCE

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Aina Puce

Eleanor Cox Riggs Professor
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CULTURAL ANTHROPOLOGY

Donald (“Don”) Brenneis

Professor of Anthropology
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Eduardo Brondizio

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DEVELOPMENTAL & LEARNING SCIENCES

Amy Booth

Professor, Communication Sciences & Disorders
The University of Texas at Austin
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Peter Ornstein

F. Stuart Chapin Distinguished Professor and Director of Developmental Psychology
Department of Psychology
University of North Carolina-Chapel Hill
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DOCUMENTING ENDANGERED LANGUAGES

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Andrew Garrett

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GEOGRAPHY & SPATIAL SCIENCES

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Maria Carmen Lemos

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Thomas (“Tom”) Mote

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LINGUISTICS

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Maria Piñango

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PERCEPTION, ACTION & COGNITION

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APPENDIX 2. COMPILATION OF INDIVIDUAL PROGRAM COV REPORTS

FY 2015 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

Date of COV: August 19-21, 2015
Division: Behavioral and Cognitive Sciences (BCS)
Directorate: Social, Behavioral, and Economic Sciences (SBE)
Number of actions reviewed: 1208 Awards: 581 Declinations: 614 Other: 13 (includes proposals withdrawn and funded elsewhere [DEL awards funded by NEH])
Total number of actions within the Division during period under review: Awards: 1792 Declinations: 5258 Other: 635 (includes 202 supplement award actions, as well as continuing grant increments on previous awards, PI or institutional transfers, withdrawn proposals and proposals returned without review)
Manner in which reviewed actions were selected: Sample Pool: The initial pool of actions sampled for each program included all competitive awards, declines, withdrawn proposals for FYs 2012-2014. In order to prevent oversampling of collaborative projects, lead proposals were included but sub-proposals were not (although the non-lead collaboratives are linked to the leads and made available within the eJacket module). Non-competitive actions, such as continuing grant increments of multi-year awards, and transfers between PIs or Institutions were excluded. Random Sampling Method: Using a random integer function, all proposals in the sample pool were randomly assigned a number. Lists were then sorted and the first 45 awards/ 45 declines were selected, for a total of 90 actions per program. <u>Exceptions:</u> Geography and Spatial Sciences and Cultural Anthropology programs have much higher proposal loads than other BCS programs, so their samples are larger. GSS's sample is also increased to accommodate for the additional evaluation of not only the program itself, but the one+ review mechanism. For programs that consider a large number of doctoral dissertation research improvement grants (DDRIGs), those actions were sampled separately from the regular/ senior proposals. The relative percentages of DDRIGs included in the sample are in proportion to the number of DDRIGs handled by those programs, on average. COIs: for sampled actions in which a relevant committee member had been a PI, or had an institutional conflict of interest, the action was removed and replaced with the proposal assigned the next highest random number.

ARCHAEOLOGY & ARCHAEOOMETRY

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review

process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>In the Archaeology Program DDIG are not handled by a panel. While this may be unusual, we find it effective. Moving to a panel system would have the effect of increasing the time to completion of the Ph.D.</p> <p>RECOMMENDATION: The Archaeometry panel currently meets to discuss proposals virtually. Many archaeology grants represent long-term investments in infrastructure and therefore the stakes are quite high in this investment. Therefore, the Program might consider moving to an in-person meeting format.</p> <p>RECOMMENDATION: We recommend that the PO’s asks panelists to consider the PI’s prior productivity with regard to previous NSF funding in preparing for their participation in the panel.</p>	yes
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews?</p> <p>b) In panel summaries?</p> <p>c) In Program Officer review analyses?</p>	Yes

<p>Comments:</p> <p>By asking archaeologists to articulate the broader impacts of their work there has been a noticeable positive change in that more archaeologists are making an effort to do their work and articulate their work in a way that has a positive impact on society.</p>	<p>Yes</p> <p>Yes</p>
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>Yes, the majority of the time the reviewers provide fair and helpful comments.</p>	<p>yes</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: Yes, more or less. Most panel summaries were brief. Some only mention the criticisms of the reviewers. Some focused on panel discussion but there should be more emphasis placed on panel discussion. The “Review Analysis” by the PO was generally much more complete than the Panel Summary.</p> <p>Panels have an enormous amount of work to do in a short time. In an ideal world, one might ask for more details from the panel summary. However, in most cases the panel summaries were adequate to the task of informing the proposer of the reasoning behind the result.</p> <p>RECOMMENDATION: Since panels seem rushed to provide a summary, we recommend that the panel members be asked to prepare draft summaries of the reviews before the meeting and then edit them during the discussion to better reflect the overall views of the panel.</p>	<p>yes</p>

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments: All elements of the proposal are included. The reviews are available and the panel summary and PO's review analysis are good summaries of the reviewer's critique of the proposal. The reasons for award/decline are spelled out here.</p>	<p>Yes</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments: The Panel Summary and Review Analysis are somewhat redundant, with the Panel Summary almost always being the more complete document. Seems unwise not to have a Panel Summary completed at the time of the review, however.</p>	<p>Yes</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p>We think the NSF process is the gold standard. People may not always be happy with the result, but we think it is fair.</p>	

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: Yes, without doubt the reviewers are very well-chosen. We are impressed with the number of reviews submitted for senior proposals. We suspect this reflects the level of respect scholars have for NSF and the Archaeology Program’s PO in particular. The response to the 2012 Archaeology COV Report noted a 50% response rate for reviewers so it is clear that the PO puts enormous effort into finding reviewers for each of the 100’s of proposals that come in during a three year period.</p>	YES
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: It is hard to know because if reviewers did have a COI, they would have been removed and we wouldn’t see a review from them. The Archaeology State of the Program report has a good explanation of how COI’s are avoided and it seems sufficient.</p>	YES
<p>Additional comments on reviewer selection: No additional comments.</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the program.

Comments: We second the comments of the 2012 COV about the excellent management of the Archaeology/Archaeometry Program. As noted in 2012, this is largely because of the knowledge and energy of the PO who adeptly manages the many facets of the Program and still takes time to propose and implement new initiatives.

2. Responsiveness of the program to emerging research and education opportunities.

Comments: Two initiatives developed by the PI were evident during review and this suggests that the PO is active in seeking emerging research and education opportunities.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments: We agree with the 2012 Archaeology COV report that the PO has done an excellent job of planning and prioritizing in developing the Archaeology Program portfolio. His selection of reviewers and panelists has insured that high quality, cutting edge work is funded, furthering the goals of 21st century archaeology.

NSF currently encourages the management of data collected using NSF funds. For archaeology, these data include artifacts. We feel that the Archaeology Program should, where appropriate, encourage the use of existing collections to address important archaeological questions. Furthermore, in the United States it is widely recognized that there is a “curation crisis” – large amounts of excavated material are stored and not being studied, and there is little space to store more. Again, we consider it important that some effort be made to encourage PIs to include these collections in their studies.

RECOMMENDATION: We recommend that PIs explain in their proposals to excavate why the collection of new field data is needed and existing collections are not adequate to answer the research questions they seek to understand.

4. Responsiveness of program to previous COV comments and recommendations.

Comments: The Archaeology Response to the 2012 COV was very proactive. Suggested recommendations were either addressed with a clear set of steps to achieve the goals or the PO explained clearly why the recommendation really didn't further the goals of the Archaeology Program. The PO's knowledge of the program, the current financial picture at NSF, and the possibilities for improvement were clear.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

1. Does the program portfolio reflect the disciplines and subdisciplines of the field?
 - 1.1. Is the program responsive to developments within relevant scientific communities?

Comments: Yes. Certainly for scientific archaeology, NSF covers the ground admirably, funding projects with a wide variety of temporal, geographic, and topical goals. There is a great deal of work going on in archaeology currently that is not explicitly scientific (or perhaps is explicitly not scientific) and there are few proposals that fall into this arena.

We recognize several emerging areas in archaeology that could be productive areas for growth. Proactive support for these areas will help assure that the United States continues to do cutting-edge research in archaeology.

The blending of field and laboratory methods

Field and laboratory methods in archaeology continue to improve, though the latter are making faster progress than the former. We think this is due to an unfortunate culture in fieldwork that operates to maintain conformity to standards that are peculiar to particular regions and time periods of investigation. This would very difficult to change.

As archaeologists excavate, they remove sediment, sample that sediment, and retain the artifacts and ecofacts that are extracted from that sediment. They use various techniques of recording to capture the details of context of what was destroyed during the excavation process. From these sediments they then send out for analysis various "samples" for study. These can include dating samples, samples for identification, and samples for geochemical analysis. For a variety of reasons, information and particularly resolution is lost in this process.

However, there is currently a revolution occurring in the geochemical realms that increasingly reduces this separation of sample from field context. It is now possible to conduct geochemical analyses directly

on sediments and *in situ* samples in the field. This closes the gap in context, but also allows the excavator to see patterns and answer questions on the fly in the field. This is a powerful advance in archaeological science. It would be beneficial if NSF incentivized these advances, and the Archaeometry program could be a good place for that process.

RECOMMENDATION: The Archaeology program should consider ways to stimulate growth in the development of field archaeometric techniques, perhaps in the Archaeometry program.

Dating methods

Archaeological observations are for the most part not useful unless contextualized with an age estimate. This has been understood since the beginnings of archaeology and much effort has been devoted to improving our abilities to estimate the ages of sediments, finds, and context. There are two issues that need to be addressed. One is that there are a series of new methods being developed that need investment. And the second is that, for the most part, the United States is not a leader in these developments and that should change.

The importance of new dating methods cannot be overestimated. As an example, in the last 10 years geologists have developed an approach called cosmogenic isotope dating. This approach has revolutionized geomorphology in that geomorphologists now have a way to actually date the set of processes that have driven the end product of landscape morphology. The new thrust toward earth system processes and their understanding has been substantially pushed forward by this ability.

In archaeology for many years we have relied on radiocarbon dating and to a lesser extent argon-argon dating applied to questions about deep time. There are a new series of techniques being developed, particularly using the uranium-thorium-lead chain (widely known as uranium series or U-Th and U-PB) and cryptotephra. Cryptotephra opens the possibility of correlating sites at weekly or even daily levels of precision. The United States is lagging behind on these, and continues to lag behind in all the luminescence dating approaches.

RECOMMENDATION: NSF should incentivize the development of labs conducting development of new dating techniques and dating techniques underrepresented in the United States specifically for archaeological purposes.

Advanced computer modeling

The rise of social science computer modeling has been ongoing for the last 10 years, and much of this often falls under the catchall term “Agent Based Modeling (ABM)”. Archaeology has embraced this approach wholeheartedly. This is not surprising as archaeologists often run quickly to new approaches that offer fresh theoretical perspectives, and while ABM is technically a method, it offers a pathway to testing theory that was in the past beyond the ability of archaeologists to engage in productively. This work leads naturally to collaborations with quantitative social science and geography, and that is already happening at several universities. This is good and we see no real need for intervention here.

The relationship between climate change, environmental change, and human societies has been a focus of interest of archaeologists since the beginning of the discipline. For this reason archaeologists have been very active, even taking leadership roles, in the study of paleo-archives of climate change – pollen, charcoals, speleothems, etc. More recently archaeologists have begun to experiment with quantitative climate models. These models allow the analyst to predict past climate conditions, allowing predictions of rainfall amounts, wind speeds, and temperatures among other things. Such models can then be used

to drive vegetation models and thus help build-out reconstructions of past environments. In a classic recursive structure, these model outputs can then be tested with field and lab collected paleoarchive data. This is increasingly useful for model validation, which is crucial for testing a model's ability for forecast future climate change.

Several problems exist in these studies. First, most archaeologists at this stage are using very simple global climate models and their output. While these can be useful, in most cases there are regional models available that perform much better and at higher resolution than these global models. However, these models typically require "super computers" and thus are not readily available to archaeologists.

The United States has a fabulous supercomputer (=high performance computing) infrastructure with excess capacity that is available for scientists to utilize. In order to access high performance computing, scientists can go to the "Extreme Science and Engineering Environment" (XSEDE, <https://www.xsede.org/>). Using these systems, archaeologist could utilize regional climate models more appropriate to their questions. An added benefit is that these systems could also take a relatively simple ABM, designed to run on a laptop, and scale it up in complexity to a more complex and realistic system and couple it to climate and vegetation models, allowing complex modeling experiments to study how climate change may impact human societies. Archaeologists are unaware of the availability high performance computer systems.

RECOMMENDATION: NSF take steps to encourage the use of high performance computing by archaeologists and other social scientists.

2. Are awards appropriate in size and duration for the scope of the projects?

Comments: Yes, in general. While we think incremental research is valuable and that small proposals should be funded, we think NSF needs to fund large, transformative projects.

In our opinion archeology's primary contribution to social science will still derive from outstanding discoveries made in the field and analyzed with state-of-the-art laboratory techniques. An added benefit is that these are the results that excite the public about archaeology. While field technique has improved significantly, that same technological improvement has in most cases slowed the pace of excavation - that what was once accomplished in one season now takes three, and the costs of operating a field project have risen. Ramping up a new field project is expensive in both resources and time. Developing a world class new field project takes an enormous investment of time and funds, and such projects normally do not start to show productivity at least 5-7 years after it begins. Such projects may peak in their research output only after a 10 year research arc.

The funding of field projects by the Archaeology program is too short for these sorts of projects. Archaeology typically funds field projects for two to three years, and these are typically for a single site of excavation. Many field archaeologists commit themselves to a locality (a zone of many archaeological sites such as a particular valley), and need to excavate at a locality for a prolonged period of time. To be productive, many field projects require years of support, well beyond the 2-3 years that is typical in the normal NSF award. Some field localities prove to be highly productive, while others prove to be less so. NSF needs to make sure that productive field localities, and the teams assembled to study them, can operate for the long term. Five to ten years of funding is more appropriate.

RECOMMENDATION: We recommend that NSF examine ways to fund some projects beyond 2-3 years. One option is to shift toward a model that follows the “lab investment” model present in Archaeometry. Here, there appears to be a long-term commitment to a lab that produces important product. A large field project is essentially a lab in the field, with gear and personnel working to produce information. Projects would apply for 5 years of funding, and then at the end of that funding cycle would seek a renewal that would be based more on their results, which might not even be published yet. The evaluation process for such a renewal may very well differ significantly from a typical proposal, and might very well include a substantial report beyond what is currently requested, a report that is peer reviewed, and site visits by a panel of experts.

3. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments: The Archaeology Program report includes a map that shows a fairly good distribution of awards across the country. It also notes the NSF-wide EPSCoR program that funds proposals in states that rarely get NSF funds. Clearly more populous states submit a larger number of proposals and gain a larger number of awards. Graphs in the report show that most proposals come from research intensive Ph.D. granting institutions (including the vast majority of archaeometry awards), but that doesn't seem surprising or problematic, as smaller institutions focus more on their teaching mission.

4. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments: The PO includes considerable discussion of these issues in the Archaeology Report. He notes that new investigators have lower success rates compared to those who have previous NSF experience. As the PO suggests, this likely reflects the experience it takes to write a successful proposal and is not a cause for concern. He also notes that the numbers of non-White applicants is too small for meaningful conclusions. The lack of diversity in archaeology as a field is a long-term problem and the statistics concerning proposals to NSF simply reflects that sad reality. With regard to gender disparity, the PO has identified a persistent gender disparity in awards, with male PhD applicants consistently receiving more awards than female PhD applicants. He has developed an initiative to study and perhaps affect this disparity.

5. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

Archaeology has data management requirements that differ from the other sciences in BCS. Archaeologists create collections of materials during excavation, and the curation of these require effort and expense. The curation plan for excavated materials needs to be included in the data management plan.

RECOMMENDATION: We recommend that archaeology proposal data management plans include a specific statement as to how the artifacts and other materials collected will be curated and how the costs of curation will be funded.

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

One of the most pressing issues in archaeology in the next ten years may be the contributions of our field to public policy. This will be especially true if the U.S. continues to experience the current adverse attitude toward science. People who control budgets in the U.S. will want to know what we are contributing. Some archaeologists are already investigating climate change, resilience in the face of environmental difficulties, and sustainability. Broad regional programs, such as the “North Atlantic Biocultural Organization Cyberinfrastructure Project” are being developed. NSF’s Archaeology Program may want to highlight what can be learned from archaeology that will help us in today’s world.

As we learn more and more about the human genome, there will be enormous scientific evidence that is revealed that may be surprising and even disturbing to the general public. We already know that there are genes that have introgressed from Neanderthals and Denisovans into the modern human genome, these are differentially distributed among the world’s populations, and they have real adaptive significance. There has been an enormous amount of genetic selection since the development of agriculture, and since agriculture is so recent, this has resulted in significant population-level differences. There are two areas where BCS needs to aggressively engage studies of the human genome.

First, there needs to be a concerted effort for BCS to engage in genetic research across disciplinary boundaries. The best labs in the world, and those producing the highest profile research, rarely have social scientists involved in the analyses. This is low-hanging fruit for breakthrough scientific research that could and should be led by the United States.

Second, we need to be prepared to communicate this information to the public, and social scientists need to be involved in that communication.

RECOMMENDATION: We strongly recommend that NSF BCS devote significant investments to the study of the human genome and its behavioral implications. The NSF STC program would be a good vehicle to jump-start this effort. It should recruit the best scientists in the world crossing over the social, biological, and genetic disciplines to tackle evolutionary behavioral and biological genetics.

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

During long careers in archaeology we have often been appalled at well-funded scholars who continue to excavate and often amass enormous collections of archaeological data over many decades but who produce little or nothing in the way of adequately published results. We teach our students that documentation of archaeological excavations should be precise enough that we can “replicate” the site back in the lab. It is certainly possible to selectively publish interesting aspects of an excavation, but that often leaves the vast majority of the stratigraphy and architecture unreported. This is an ethical problem that believe think NSF could address by asking the panel to assess the PIs publication of site reports of previously funded NSF projects for evidence of adequate reporting of detailed descriptive results.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

While we believe it is important that data produced by any NSF funded project be made available to the broader scientific community and the public, we have no specific steps to recommend.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

In the pages above we have identified some areas for improvement.

2. Please provide comments as appropriate on the program’s performance in meeting program-specific goals and objectives that are not covered by the above questions.

None identified

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

In the discussions of all COV members, there was much discussion about the value of funding large versus small projects. Many COV members were concerned that taking funds from the program budgets to fund large transdisciplinary projects would damage the ability to fund younger researchers and smaller incremental science. There needs to be a balance between investments in large versus small science, and we think that BCS has failed to attain this balance, and this may be a function of the natural tendency of programs to defend their budgets. However, this process functions to stymie large transformative research, and the social sciences in particular has suffered from a lack of big vision and large science. One way to advance to a more balanced distribution of funds between large and small science is to make the investment in large science less painful by taking chunks of future budget increases and allotting them to a centralized fund devoted to big transdisciplinary science.

RECOMMENDATION: NSF BCS should take 50% of all budget increases and contribute those funds to a central BCS budget to fund large, transdisciplinary BCS research.

4. Please provide comments on any other issues the COV feels are relevant.
5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

The Committee of Visitors is part of a Federal advisory committee. The function of Federal advisory committees is advisory only. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the Advisory Committee, and do not necessarily reflect the views of the National Science Foundation.

SIGNATURE BLOCK:

X /s/ Curtis Marean _____

X /s/ Catherine Cameron _____

For the Archaeology _____ Program

BIOLOGICAL ANTHROPOLOGY

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>We conclude that the review methods are appropriate and work well. While there are few substantive issues to be raised, we concur with the previous COV that in-person panels are crucial and provide the opportunity for significant feedback that would not necessarily be evident in virtual panels or reviews. While we recognize that the technology will improve in the future and is likely to facilitate in-person panels, we see no compelling reason to move in this direction despite the inherent cost savings. We believe the inherent value of in-person reviews outweigh the fiscal benefits, although it is appropriate to revisit this issue in the future as the technology and methods evolve.</p> <p>The present review schedule (an 8-month cycle) was enacted recently in response to fiscal and workload limitations of NSF staff. However this has not been without cost. Graduate students are now disadvantaged by only having the opportunity to re/submit DDIGs once per year in some years and then twice during others. The review cycle for senior projects becomes unsynchronized with most other sections within BCS; which may compromise interprogram collaborative efforts. And lastly, the implementation of an 8-month cycle results in submission deadlines changing every year. Senior researchers and students must now plan ahead carefully and be vigilant about impending deadlines. This, in part, may be the reason why submissions of senior proposals fluctuate considerably year to year and appear to be generally lower in the last year under this review.</p>	<p>yes</p>

<p>We therefore RECOMMEND that reviews revert back to the original six month schedule.</p> <p>Implicit bias against women and underrepresented minorities has been shown to affect the outcomes of reviews at other grant funding agencies, peer review of journal submissions, and other areas of academia. We therefore recognize that implicit bias may affect the funding of women and historically underrepresented minorities by NSF. Not only is this a threat to fair assessment but also potentially compromises the ability of NSF reviewing bodies to effectively assess proposals based on scientific merit. Using data on the gender composition of review bodies and award outcomes within biological anthropology, we observed preliminary evidence of gender bias.</p> <p>We therefore RECOMMEND 1) that a more thorough analysis is performed to determine the presence of gender bias in biological anthropology review bodies; 2) that all NSF program directors and review bodies receive training to make them aware of this hazard and to mitigate the chances of implicit bias affecting proposal reviews. While detecting implicit bias against underrepresented minorities (URM) has also been shown to compromise reviews at other funding agencies and other areas of academia, the relatively low number of URMs in biological anthropology make the assessment of implicit bias against these members of the scholarly community more challenging. Nonetheless, NSF and the biological anthropology section should be vigilant of this potential bias.</p>	
<p>3. Are both merit review criteria addressed</p> <p>d) In individual reviews?</p> <p>e) In panel summaries?</p> <p>f) In Program Officer review analyses?</p> <p>Comments:</p> <p>a) Individual reviewers do a good job of keeping review criteria at the center of their efforts. However we recognize that confusion and inconsistency between reviewers might occur regarding the definition and deployment of Broader Impacts. Hence, the COV RECOMMENDS that reviewers be provided with additional guidance allowing them to more effectively assess broader impacts in proposals containing inherent broader impact themes within the overall scope of their project compared to proposals that embed Broader Impacts mostly, or solely, within the BI section.</p> <p>b) Given the often limited time frame of a panel review, we find that panel summaries do an admirable job of deploying and summarizing review criteria.</p> <p>c) The COV found the PO review analyses to be informed and constructive.</p>	<p>a) Yes b) Yes c) Yes</p>

<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>Reviewers appear conscientious and diligent in providing in-depth feedback and rationale for their assessment. However we are concerned that these comments are not made available to future review panels. While we recognize the potential for biasing future reviews with past comments, we believe the overall benefit to funding excellent science outweighs the bias risk. Indeed, it should be remembered that subsequent panels are at liberty to agree or disagree with the comments made by previous reviewers. One strategy to mitigate the risk of bias or identification of earlier reviewers is to provide panels and ad-hoc reviewers with the panel summary of the previous review. In this way, the efforts and insights of previous reviewers could be leveraged for more efficient and thorough assessment of the scientific merit of the proposal.</p> <p>The COV RECOMMENDS that ad hoc reviewers are provided panel summaries of previous reviews for resubmitted proposals.</p> <p>The last COV (1999-2012) recommended creating more structured questions that reviewers could address to help standardize the level of reviewer input. This continues to merit consideration and implementation. This is especially vital given the ever increasing competitiveness of grants, increased burdens on reviewers, panels, and directors, as well as the need to insure consistency and fairness.</p>	<p>yes</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments:</p> <p>Panels and Directors continue to provide noteworthy service in the face of limited time during panel reviews, competing responsibilities at their home institutions, and the need to provide robust and detailed feedback. Rationales are nonetheless clear and concise. Summaries that have to address a lack of consensus are inherently challenging. However panels and directors continue to provide robust and fair feedback. Continued vigilance and review should be the norm to make the process more efficient so that panels are not rushed at the eleventh hour at the end of the panel review to generate summaries. While no specific recommendations are provided here, panels should always be solicited for feedback on ways to make the panel summary creation process more effective, less arduous, and clear.</p> <p>The COV RECOMMENDS that POs remind panel reviewers to plan accordingly and not schedule return travel to conflict with the final duties. It is unfair to reviewers who</p>	<p>yes</p>

<p>remain and who have planned accordingly. It also compromises the final review process.</p>	
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments:</p> <p>The documentation was very comprehensive and useful. One area of interest is data on gender of reviewers, panelists, and applicants. The rationale is that implicit bias is a major concern that that has been shown to influence the outcomes of peer review processes and proposal reviews at other funding agencies. We therefore conclude that this merits significant vigilance NSF wide, not simply within biological anthropology.</p> <p>We therefore RECOMMEND that future COV panels be provided with demographic data on gender and diversity composition of ad hoc and panel reviews, as well as applicants and those that are recommended for funding, in order to assist in determining that reviews are conducted fairly and that ad-hoc and panel reviewers are trained to be aware of the dangers of gender and diversity based implicit bias.</p>	<p>yes</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments:</p> <p>The documentation that is provided is consistently adequate.</p>	<p>yes</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</p>	

<p>The role of the section director is vital to the success of the review process. Biological Anthropology has had several directors in the last ten years. The present director Dr. Rebecca Ferrell has performed admirably in her initial year. However we find it unfortunate that just when directors are gaining the experience necessary to flourish and advance the review process, they are replaced. Such is the case with Dr. Ferrell who is scheduled to step down at the end of this year after only two terms of service. While we acknowledge and recognize the utility of bringing in fresh perspectives through the rotation of directors, we find the term of two years to be too short.</p> <p>If this policy cannot be readily changed, we RECOMMEND the extension of Dr. Ferrell’s appointment. In addition, we RECOMMEND that the position become permanent or that directors are rotated less frequently, perhaps 3-5 years instead of 2.</p>	
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II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>Reviewers selected to serve on panels and serve as ad hoc reviewers were well qualified to evaluate the proposals. While the specific areas of expertise at times varied from proposal to proposal, this is in large part due to the extremely diverse nature of the field and the limited number of reviewers capable and appropriate to serve as a reviewer. Selection of panel reviewers for DDRIG proposals pose particular challenges, as conflicts of interest, along with the fewer number of panelists, results in reviewers evaluating DDRIG proposals that might not be directly within their area of expertise. However, the COV believes that since DDRIG proposals are more developmental than senior research proposals, individuals serving on DDRIG panels are well qualified to determine the promise and integrity, and thus merit, of student proposals. WE RECOMMEND that the program director continue to carefully invite and select ad hoc reviewers for senior research proposals and DDRIG proposals to in ensure that each proposal receives rigorous and appropriate review by qualified reviewers.</p>	<p>yes</p>

It would also be useful to remind ad hoc and panel reviewers that their task is to evaluate the proposal (both DDRIG and senior) based on its scientific merit, not on the personal research interests of the reviewer. While each reviewer will certainly have their own opinion of what is “interesting”, this should only inform the review, not guide it. This is a constant and difficult challenge. However, this is a topic of discussion that merits continued attention.

Based on data provided in the random sample of jackets available for evaluation, the COV sought to determine if bias was present in the reviewer selection process. Specifically, the COV explored whether the gender of the reviewers reflected the gender balance within the discipline (biological anthropology) as a whole. The COV believes that women constitute a substantial proportion (>50%) of student and professionals actively engaged in biological anthropological research. A cursory overview of the proportion of women biological anthropologists providing ad hoc proposal reviews compared to those provided by men does not reflect women’s engagement in the discipline. Our preliminary examination indicated that ad hoc reviewers were composed of 61% men and 39% women. The COV also explored whether there was a recognizable pattern in the gender constituency of ad hoc reviewers, the gender of the PI, and the recommendation for funding. Based on the random selection of jackets available for evaluation, the COV reviewed proposals that had an equal number of women and men as ad hoc reviewers, and those that had a preponderance of one gender submitting reviews. The COV noted that proposals submitted by women appear to have been funded consistently regardless of whether an equal number of women and men served as ad hoc reviewers of the proposal, or more women, or more men, served as reviewers. Proposals submitted by male PIs, however, were ranked highly and eventually funded twice as often when the preponderance of ad hoc reviewers were men.

Gender of PI	Proposals w/equal m-f ad hoc reviewers	Proposals w/ more female reviewers	Proposals w/more male reviewers
Female	6	13	13
Male	9	9	18
Unknown			2
Total			33

While data and information available to the COV did not allow for determining the cause or source of potential bias, peer reviewed and robust analyses of similar findings at other funding agencies and modes of assessment within science and academia suggest that implicit bias is a likely cause. We therefore provide our recommendation based on the historically and scientifically supported assumption that the possibility of implicit bias merits serious consideration within the biological anthropology section and potentially throughout NSF.

Thus, the **COV RECOMMENDS that the PO continues to gather data and monitor the gender of the reviewers for each proposal, the gender of the proposer and the success of the proposal in getting funded, as a means to ensure that the diversity within the discipline is replicated or matched in the review process, and that high quality proposals are being funded without bias for or against the gender of the PI, and irrespective of the gender of the reviewers. This, we believe will serve to reduce**

<p>unintentional implicit bias in proposal funding.</p> <p>The COV RECOMMENDS that ad hoc and panel reviewers, as well as POs, participate in training to reduce the risk of incorporating unintentional implicit bias in the review process. This will ensure that high quality science will be funded irrespective of the gender of the PI and/or gender of the reviewers.</p> <p>Within the small random sample provided to the COV for evaluation, it appeared that some ad hoc reviewers are selected repeatedly within a three-year period. It is the experience of the COV that some professionals are more willing to serve as ad hoc reviewers, and generously offer their time and expertise as service to their profession. The generosity of the ad hoc reviewers, however, may lead to unintentional bias, as one reviewer could potentially play a key role in the funding or denial of many proposals within a year or years. As a means to maintain sensitivity to and provide remedy for unintentional bias in the reviewer selection process, the COV RECOMMENDS that data be collected and evaluated on the number of ad hoc reviews provided by a single reviewer, and that efforts are made to limit the number of ad hoc reviews one reviewer provides.</p>	
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>The PO has been especially sensitive to issues involving COI. Reviewers asked to participate in the process are fully aware of situations that constitute conflict of interest, and the PO actively seeks to avoid soliciting invitations from reviewer that have direct AND/OR PERCEIVED conflicts of interest.</p>	
<p>Additional comments on reviewer selection:</p> <p>None.</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the program.

Comments:

We conclude that the overall management of the program is quite good, especially in light of constant fiscal challenges and constraints. In particular, Dr. Rebecca Ferrell has been an effective leader and administrator considering her last minute appointment, budget and personnel constraints, and other challenges. Our primary concern over the management of program is the continued lack of investment in personnel support. This has compromised the biological anthropology review process. As an example, the motivation to move away from a six month review cycle was budget driven. While the COV is cognizant of fiscal constraints, the review cycle change merits strong reconsideration.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

The program relies on a partnership with scholars and scientists for recommendations on emerging research and education opportunities. It would appear that most of these opportunities are severely constrained by existing funding resources. As the second lowest funded program, the challenge is not a shortage of ideas for opportunities, or the responsiveness of the program, but the resources necessary to pursue opportunities when they emerge. Biological Anthropology is unique among its discipline cousins due to its focus on deep time, evolutionary biology, applied methods, comparative biology, and the overall understanding of a predominant species on the planet. While NIH does an admirable job of supporting contemporary health initiatives, only biological anthropology addresses questions related to the time dimension of human biological diversity. In short, the responsiveness of the biological anthropology program is severely compromised by a vacuum of resources and the lack of a long term commitment to program leadership.

The COV is well aware that fiscal constraints will continue for the foreseeable future and that biological anthropology competes with the needs of other well deserving and compelling areas of research. However the COV reminds the NSF leadership that given the extremely small budget of the biological anthropology section, as well as the historically impactful research that has emerged from biological anthropology in the past, even modest increases could have a significant impact.

Therefore, for the record, the COV RECOMMENDs increasing resources and funding to biological anthropology

We reiterate our RECOMMENDATION to invest in a long term commitment to program leadership, explore strategies to demonstrate the resonance and importance of biological anthropology research, and investment in resources.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

Program planning and prioritization process (internal and external) has been adequate in biological anthropology. There should however, be continued vigilance for new areas of research and collaborative opportunities with related fields such as evolutionary biology, archaeology, and other behavioral sciences. In particular, we are concerned with the one sided co-review relationship with biology, which finds the biological anthropology program contributing funds to support biological research, while the biology program does not assist with funding for biological anthropology projects. While we recognize the inherent challenges with forging such relationships, the overall benefit to biological anthropology (and biological sciences as a whole) merits continued attention.

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

Overall, the previous COV comments and recommendations have been addressed. The rationale for the response is concise and provides a sufficient amount of detail.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

6. Does the program portfolio reflect the disciplines and subdisciplines of the field?
6.1. Is the program responsive to developments within relevant scientific communities?

Comments:

Currently, the program tends to offer a greater number of funding opportunities for paleoanth research, as IPG, the archaeology program AND bioanth funds were available for fossil-related research during the 2009-2011 review cycle. It has come to the attention of the COV that both the number of submissions and awards (senior and DDRIG) for research in bioarchaeology and human biology appears proportionally smaller than the proportion of bioarchaeological and human biology research published in flagship journals.

While this trend might be an artifact of the sample jacket selection process, **the COV RECOMMENDS that the PO continues efforts to inform and invite researchers from underrepresented disciplines within biological anthropology, making specific effort to inform researchers of prospects of interdisciplinary research and the scope that "Broader Impacts" might include in proposals.**

The importance of curation and archiving of materials and data associated with the field of biological anthropology is also of concern. While not strictly hypothesis driven, these initiatives are critical to successful and transformative scientific research.

Hence, **the COV RECOMMENDS that the PO set aside a small proportion of allocated funds for projects that center on the curation and archiving of materials and/or data. These proposals must clearly describe how the work will be transformative for the scientific and/or public, and must contain specific steps that the proposer will take to make the data/materials available to the greater community.**

7. Are awards appropriate in size and duration for the scope of the projects?

Comments:

Yes, awards vary appreciably in size and duration, reflecting the scope of the projects. The caveat, however, is that the program budget is one of the smallest in the division, which severely limits the number and scope of funded projects. Currently, senior projects must be severely limited (<\$300) in order to maximize the actual number of awards allocated. It is clear that projects requiring data collection, analysis and interpretation that might extend past three years and/or require a disproportionate amount of allocated funds within the program are neither solicited, nor supported.

This has the potential to limit truly transformative research.

The COV RECOMMENDS that the PO advocates for greater funds over the next years in an effort to allow transformative research to be conducted.

The COV RECOMMENDS that the PO explore options for researcher funding that extend beyond the boundaries of biological anthropology program and develop interdisciplinary initiatives that address the potential for collaborative work between programs.

8. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments:

Yes, the program portfolio demonstrates great geographical diversity of principle investigators and institutions. There are noticeable geographical regions where few, if any, proposals have been submitted and awards distributed. These areas include the Great Plains and some southern states.

The COV RECOMMENDS that the PO continues efforts to respond to the needs of potential proposers in less represented states and for institutions that are not Research I. In particular, remaining available for communication between senior researchers and students (or student groups).

9. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments:

The program portfolio is reasonably diverse given the demographic profile of professional biological anthropologists and students in the discipline. The number of proposals funded, as a function of the number of proposals received, reflects a commitment on the part of the program to be inclusive and diverse. It is clear, however, that the number and proportion of proposals submitted by women does not represent the proportion of women actively engaged in research in biological anthropology. Overall, women submit proposals at 50-80% of the rate as men, in spite of the fact that the field of biological anthropology contains a substantially greater proportion of women to men.

The COV RECOMMENDS that the PO continues efforts to encourage women and underrepresented groups to submit proposals and remains sensitive to the effects of implicit bias within the review system.

10. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

The Future of Human Evolution: Given the current changes in climate, demography, migration, and ecological resources, research that would inform the future of human evolution would be vital to basic science for guiding policies that would benefit humanity. These are issues that are inherent to our field and could be effectively addressed by biological anthropology research. As a discipline, we are uniquely positioned to address the evolutionary, applied, social, and ecological factors that are sure to impact the future of our species, especially in light of the rapid changes that are currently impacting vulnerable and developing populations.

Archiving of human and comparative biological samples for future technologies: A few decades ago, it would have been unthinkable to have the ability to assess genetic questions with degraded and ancient organic material. Today, it is a reality. Without the archiving and maintenance of specimens that were collected decades ago, many questions related to human evolutionary biology would have remained unanswered. It is the responsibility of NSF to support and facilitate the archiving and maintenance of physical material for future generations of scientists.

Behavioral evolutionary biology and contemporary leadership: It is well established that decision making and access to leadership positions is influenced by factors that have been the focus of behavioral evolution research. Specifically, variation in decision making and access to leadership has led to women becoming disenfranchised and often excluded from leadership positions as well as decision making processes. Given that men are disproportionately represented in political, economic, and social leadership positions, the behavioral biology of men disproportionately affects humanity. As biological anthropologists, we are uniquely positioned to address this issue through the lens of evolutionary behavioral biology.

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

Greater emphasis and effort could be placed on soliciting and recording information from funded researchers on publications resulting from NSF funded research. The role of the PI should be elucidated, the impact of the journal, and the overall impact of the project on the discipline should be provided to

future COVs.

Replicability, reproducibility, generalizability, requires the storage, archiving, and maintaining of research material. While much data is in digital form that require server space, within biological anthropology there is still, and for the foreseeable future, continues to be, a robust need to archive and maintain physical material, both biological and non-biological. Replicability can/may be done with existing data, but reproducibility often needs original material.

We therefore RECOMMEND the investment in infrastructure that would archive and maintain biological and non-biological material for future research.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

Within biological anthropology, and likely other disciplines, the issue of data-sharing and public access affects different scholars in different ways. For example, data-sharing and public access can disproportionately impact untenured faculty in a negative manner in regards to professional development compared to senior tenured faculty.

The COV therefore RECOMMENDS that policies related to data-sharing and public access should be mindful of the particular vulnerabilities of early career scientists. The possibility of data embargoes of various durations should be considered, not only to protect the professional development of early career scientists, but also insure that the raw data is accurate and ready for dissemination. Raw data is not necessarily or informatively accurate data. It often takes substantial time to determine and confirm the validity and utility of raw data.

Although the spirit and goals of data-sharing and public access are to improve science and public engagement, it should be noted that raw data without context can be of limited utility. Of greater concern is the potential for misguided conclusions being drawn from raw data that is made available without context. Therefore any plans for data-sharing and public access should be mindful of these risks.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.
2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

A topic of conversation that merits considerably more attention is the assessment of the impact and success of funded proposals. The COVs are aware that progress and final reports are required from funded projects. However these reports were not made available to the COVs. It is vital to assess whether 1) projects are attaining the research goals of their proposals; 2) the overall impact of the funded project on their discipline and science as a whole. For example, it would be useful and informative to review the peer reviewed publications that resulted from funded projects.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

Greater awareness and training to mitigate the risk of implicit bias against women and underrepresented minorities should be an agency-wide priority. This is 1) relatively budget neutral; 2) increases diversity and inclusivity; 3) leads to better science since compelling and robust research has shown that intellectual diversity leads to better science, decision making, and policy outcomes. If women and underrepresented minorities are subject to implicit bias, then intellectual diversity and by extension, scientific research, is inherently compromised.

4. Please provide comments on any other issues the COV feels are relevant.

5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

The COVs found the process of saving report drafts to thumb drives and manually transferring them to a designated laptop computer is inefficient. The biological anthropology COVs would venture to guess that other COV members probably share this criticism. In an era of cloud based computing and storage, web based forms, and other digital tools that facilitate collaborative work on documents, this could be easily addressed and is pretty low hanging fruit.

The Committee of Visitors is part of a Federal advisory committee. The function of Federal advisory committees is advisory only. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the Advisory Committee, and do not necessarily reflect the views of the National Science Foundation.

SIGNATURE BLOCK:

X [signed] Anne L. Grauer

X [signed] Richard G. Bribiescas

For the Biological Anthropology Program

COGNITIVE NEUROSCIENCE

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review

process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: All proposals were reviewed using both <i>ad hoc</i> reviewers and panel members. At least 3 reviews were obtained for proposals relevant for the Cognitive Neuroscience panel. For proposals seeking funding across different programs in the division, additional reviews were available from the other programs.</p> <p>The Cognitive Neuroscience panel met to evaluate proposals exclusively via face-to-face meetings at NSF. In cases where there were conflicts of interest, panel members and the program director left the room when the proposals with conflicts were discussed. In those cases, review analyses and Panel summaries were generated by program directors from other programs.</p> <p>For the randomly sampled proposals provide in the eJacket, in the unlikely event that a conflict of interest was detected late in the process, appropriate procedures were implemented.</p>	<p>YES</p>

<p>4. Are both merit review criteria addressed</p> <p>g) In individual reviews? Unfortunately, not all Reviewers chose to comment on these criteria in their reviews in the proposals that were available in the eJacket. Having said that, other Reviewers did make an effort to deal with the merit review criteria, even when the PIs submitting the proposal did not do so. Perhaps this is an artifact of proposals being submitted to the NSF after being submitted to the NIH? The format for some proposals (specific aims etc.) appeared to align with the format for NIH submissions.</p> <p>However, the CoV noted considerable variability in length and detail across reviews, with the ad hoc reviews in particular tending to be short, some bordering on cursory. Furthermore, in several instances there was a mismatch between the substance of the narrative review and the reviewer’s rating of the proposal.</p> <p>We recommend that review guidelines explicitly address the importance of an accurate and explicit mapping between the substantive review to the final rating. We further recommend that the review template is formatted to contain multiple sections, such that uploading a review is not possible if all sections are not completed. We also recommend that reviewers be able to complete a brief on-line training session to help improve the degree of accord between the narrative portion of the reviews with the chosen final proposal score. This training module could also be used to make sure reviewers are familiar with the goals of the Cognitive Neuroscience program.</p> <p>h) In panel summaries? Overall, panel summaries did succinctly address both merit review criteria. They were very effective at integrating over the heterogeneity of individual reviews so as to generate a coherent synthesis. Note that this process includes the incorporation of different sources of expertise amongst the reviewers.</p> <p>i) In Program Officer review analyses? Overall, program officer review analyses did succinctly address both merit review criteria. Note, however, that the CoV does have concerns about the breadth of domains that are considered appropriate as Broader Impacts for Cognitive Neuroscience. We will address this in detail further along in this report (under Portfolio review question 5).</p> <p>Comments: Some thought might be given to editing the submission guidelines for NSF proposals to stress to PIs submitting proposals that they deal appropriately with merit review criteria. {This is an issue that is not unique to the Cognitive Neuroscience program – and has also been noted in the previous COV report in a number of programs.} We recommend that proposals be screened prior to review, and triaged if these criteria have not been suitably addressed. This would streamline the panel review. Given that the Cognitive Neuroscience program receives a large number of submissions that</p>	<p>Mostly YES</p> <p>YES</p> <p>YES</p>
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<p>might be competitive scientifically, this might give the Program Director the ability to better select proposals to be awarded, because they not only are excellent scientifically, but also meet the objectives of the NSF.</p>	
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: Overall, the Reviewers have provided comments that detail the proposal’s strengths and also weaknesses. In the most part these have been clearly articulated. As noted above, there are a fair number of reviews (often by ad hoc reviewers) for which the alignment between rating and the narrative review is not clear.</p> <p>On a number of rare occasions, unreleasable reviews were seen. These reviews had no uploaded content. It is not clear why this was the case. In these instances there were additional reviews, ensuring that at least 3 complete and releasable reviews were available to the PIs.</p> <p>The rating system for proposals seems to be challenging to use for some reviewers – sometimes there is a mismatch between the rating and the Reviewer’s comments. These mismatches could go in either direction. In some instances, the rating for a proposal tends to be more positive than the reviews, which clearly articulate the proposal’s weaknesses. In others, the negative rating seems to be out of proportion to the largely positive content of the narrative review. Indeed, on a number of occasions the Program Director’s review analysis included an explanation of a potential mismatch between a Reviewer’s rating and the substantive content of the Reviewer’s critique. Notably, this was more likely to be the case for proposals for which the funding decision would appear to be at odds with at least some of the reviewer ratings. We also note that in the majority of such instances, the summary of the panel review included mention of how the panel discussed and resolved the “mismatch”.</p>	<p>Mostly YES</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: Overall, panel summaries provided a clear a succinct summary of the relative strengths and weaknesses of a proposal. In the random sampling of proposals provided in the eJacket, the panel summaries reflected panel consensus in virtually all proposals.</p> <p>Some cross-disciplinary proposals were reviewed by the Cognitive Neuroscience panel and other panels in the Division, and in some cases panel ratings could be disparate – reflecting the relevant scientific expertise required for proposals that cross disciplines.</p>	<p>YES</p>

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments: The rationale for the award/decline decision was clearly provided in the Program Director’s review analysis. As noted above, in many cases this included an explanation/rationale for why the funding decision may have deviated from the tenor of at least one of the reviews.</p>	<p>YES</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments: The rationale for the award/decline decision was clearly provided in the Program Director’s review analysis. As noted previously, on a number of occasions this required justification of the final decision to award a proposal in proposals that are judged to be Competitive, but lacking in one or more respects, and it was often the case that the point of concern was satisfactorily addressed via back-and-forth between the Program Officer and the PI.</p>	<p>YES</p>
<p>7. Additional comments on the quality and effectiveness of the program’s use of merit review process:</p> <p>The CoV is concerned about the vagueness of the resubmission process, the problem being that there is nothing to stop a PI from repeatedly submitting a noncompetitive proposal, perhaps after making only superficial changes. This creates an unnecessary burden for the program, as well as for reviewers, who are required to spend valuable time re-reviewing proposals in which their original recommendations were not followed, and where only incremental revisions were made.</p> <p>We therefore recommend adoption of the “3-point checklist” that was recommended in the 2012 report by the CoV for the Program in Developmental and Learning Sciences (Question 7 in the Quality and Effectiveness of Merit Review section, 2012 CoV Report).</p>	

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: Appropriate experts in each field were selected to provide reviews for proposals. Importantly, their reviews showed overlap particularly with respect to articulating weaknesses in the proposals.</p>	YES
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: Conflicts of interest for Panel Members and the Program Director were recognized and handled appropriately. In the random sample of proposals provided in eJacket, in one instance a conflict of interest for the Program Director that was discovered late, necessitated the selection of additional Reviewers and new review analysis by a Program Director from another program. The earlier reviews and panel summary were deemed unreleasable due to the discovered conflict of interest.</p>	YES
<p>Additional comments on reviewer selection:</p> <p>One current concern with the Cognitive Neuroscience program is the difficulty enlisting qualified reviewers. One strategy that we recommend is for the program to mine its own data for lists of past NSF awardees, including graduate student fellowships. Many currently active, productive investigators were once beneficiaries of an NSF graduate fellowship, and this might be used as moral suasion when it comes to recruiting panels.</p> <p>Furthermore, we also recommend, that the Cognitive Neuroscience program assemble a “College of Reviewers”, similar to what has been implemented by the PAC program. This could consist of a group of 30-40 individuals who would make a commitment to review around 3-4 proposals/year.</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the program.

Comments:

Since its inception, the Cognitive Neuroscience program has experienced a high level of turnover in the Program Director position. The first Director served from 2001-2003, the second from 2003-2005, the third from 2005-2006, the fourth fifth from 2006-2007, the fifth (two individuals) from 2007-2009, the sixth (same individual as second) from 2009-2012, the seventh from 2012-2014, and the eighth from 2014 through the present time; an average rate of a new Director once every 22 months! This high turnover rate for the Director position is problematic, from several perspectives. First, for the community of scientists and other constituencies, it creates an impression of instability in the program and its goals. At best, the NSF's priorities for Cognitive Neuroscience are seen as being a moving target, at worst, institutional commitment is questioned. The high turnover rate also raises practical complications for investigators. For applicants, it can mean a change of Director between initial submission and revision, and for funded projects, it almost guarantees a changeover of Program Director during the active life of each project. At a less tangible level, it erodes the credibility of the program, because it raises questions in the minds of investigators about what must be the factors that produce so high a rate of turnover in the Director position. Finally, the current state of affairs hinders the productivity of the leadership of a critical NSF program. These concerns echo those that were raised in both the 2009 and the 2012 CoV reports.

We strongly recommend that the Cognitive Neuroscience program implement a position for a permanent Program Director, given the ever increasing rate of submission for grant proposals.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

The program has been responsive to methodological changes in cognitive neuroscience. It has been quick, for example, to begin supporting research with such techniques as TMS, tDCS, and ECoG. The program has also been nimble and responsive with regard to supporting interdisciplinary work, such as that pairing Cognitive Neuroscience with Computer Science and Engineering, and Decision and Risk Management. With regard to scientific focus, however, the CoV's view is more equivocal, as will be detailed in Section IV: Questions about Portfolio.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments: In terms of internal aspects of program planning and prioritization, the CoV feels that the PD should be proactive and aggressive about the development of a portfolio that emphasizes a rigorous understanding of the healthy human cognition and brain function. Therefore, proposals whose primary motivation is clinical and/or translational would be triaged before even going to panel review, either by the Program Director, or members of the College of Reviewers. **We recommend** using Broader Impact statements to evaluate suitability of proposals for NSF. If this recommendation were to be implemented, it should be communicated to the Cognitive Neuroscience research community via several initiatives, including: presentations by the Program Director at scientific conferences, Program-organized workshops on questions and methods that are important to the Program's mission.

From an external point of view, portfolio composition will be reflected by the nature of proposals being submitted for consideration. In this regard, strong adherence to the updated program guidelines will be crucial. This will be accomplished by the PD's effectiveness at reaching out to the research community.

A second external factor is that of the reviewers: the extent to which they are applying NSF-specific criteria in their evaluation of research proposals. (That is, strongly theoretical, mechanistic research programs that address fundamental questions of healthy human brain function and behavior.) **We recommend** that the Program develop an on-line reviewer education tutorial that each reviewer must complete prior to undertaking proposal reviews.

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

Where practical, overall, the program was generally responsive to previous COV recommendations, with respect to streamlining the review process and seeking a wider portfolio of reviewers – including senior scientists.

However, with respect to program management, the main recommendation to add a permanent Program Director for the Cognitive Neuroscience program was not adopted. This remains a significant concern to the current CoV.

With respect to other funding mechanisms, such as EAGER and INSPIRE, an effort has been made by the Program Director to inform the research community about these options.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

11. Does the program portfolio reflect the disciplines and subdisciplines of the field?

11.1. Is the program responsive to developments within relevant scientific communities?

Comments:

In many ways, the Cognitive Neuroscience program is unique within BCS, because NSF is not the largest source of support for cognitive neuroscience research in the United States. Indeed, its budget is relatively modest in comparison to those of the many National Institutes of Health institutes that also support cognitive neuroscience research. This state of affairs could be seen as an opportunity, in that the Cognitive Neuroscience program need not “feel obligated” to support the broad spectrum of cognitive neuroscience research. Indeed, the CoV feels that for the Cognitive Neuroscience program to be maximally impactful, having a clearly articulated set of priorities, and a highly discriminating set of selection criteria, is important. The CoV is concerned that portions of the current portfolio seem to reflect a tendency of trying to cover the 'full spectrum' of cognitive neuroscience research. Some of the funded projects are judged to be “mainstream”. The concern is that these tendencies may dilute the impact of the program. As an example, many of the projects listed under Portfolio Characteristics as relating to “relatively unique or understudied areas” strike the CoV as perhaps better conforming to the “spirit” of the NSF’s overall mission. Similarly, many of the EAGER awards look very promising.

It is important to consider these comments in the context of high rate of turnover at the level of PD of the Cognitive Neuroscience program. For example, the 2012 CoV report articulated very similar concerns, and the 2012 Response was, in our view, indirect and incomplete. The 2015 Update of the Program’s response, on the other hand, demonstrated a very effective response to this concern: It documented that a series of initiatives has already been undertaken, including outreach presentations at several major cognitive neuroscience conferences; publication of a new program description emphasizing the unique nature of the NSF’s Cognitive Neuroscience Program; and speeding up efforts to accelerate the review process.

12. Are awards appropriate in size and duration for the scope of the projects?

Comments:

Budgets for CAREER awards are generally appropriate, but many of those for larger projects led by more senior researchers are small and short. Cognitive neuroscience is a biologically based science. Experiments often depend on medical imaging equipment that is expensive to acquire and maintain. Furthermore, the field is coming to grips with the fact that many studies carried out over the past 25 years, since the birth of the field, were statistically underpowered. Consequently, the current trend is toward ever-larger sample sizes, and, therefore, ever-larger research budgets. The Cognitive Neuroscience program at the NSF is at an inherent disadvantage relative to analogous programs in BIO,

because the Cognitive Neuroscience budget is scaled to research programs in the social sciences, which typically have lower costs for experimentation. This is yet another factor that impels the program to develop a highly focused portfolio. An ongoing problem that the program currently faces is that of mortgages created by commitments to currently funded, ongoing projects. This leads to a further limitation for funding incoming excellent cognitive neuroscience.

13. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments:

For the brief period for which this CoV was given data, 2012-2014, the geographical apportioning of awards was heavily biased in favor of California and the Northeast states. The CoV also obtained data on the geographical distribution of submitted cognitive neuroscience proposals, and it is the case that there is also a “coastal bias” in the distribution of submissions. Nonetheless, the bias in geographical distribution of awarded proposals is still present even when this base rate is taken into account. The West Coast, for example, accounted for roughly 25% of the submissions, but for nearly 35% of awards. The same pattern is true for the Northeast. **We recommend** that a concerted effort be made to “improve the performance” of “non-coastal” institutions with a two-pronged approach. First, outreach to cognitive neuroscientists to encourage submission of their best ideas to the NSF. Second, outreach to institutions from these “non-coastal” regions to encourage a more formalized system of internal vetting of grant applications before these are submitted to the NSF. This is particularly important for proposals from junior investigators.

14. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments:

For the brief period for which this CoV was given data, 2012-2014, diversity was lacking along several dimensions. The overall ‘number of actions’ for underrepresented minority groups, particularly Black/African American and Hispanic, was very low, and only one award was made to an investigator in these categories during this time span! Clearly, a proactive effort is needed to generate more interest, and ultimately success, from these groups.

With regard to underrepresented minority groups, there is clearly a “pipeline problem”, in that there is simply a very small number of proposals being submitted to the Cognitive Neuroscience program. In view of this, **we recommend** that the Program consider partnering with other branches of the NSF to develop a mechanism whereby PIs of funded awards can apply for supplements that would support the recruitment of laboratory staff and trainees drawn from these underrepresented groups. The logic here is for the development of the careers of these individuals, who might subsequently establish laboratories and begin applying to the NSF for research support. In particular, the postbaccalaureate years can be critical, when a young person has obtained his/her undergraduate degree, but needs a few years of experience in a successful laboratory in order to become competitive for admission to a top graduate training program.

Among white applicants, although the funding rate was relatively balanced between men and women, the former outnumbered the latter by a factor of greater than two. With respect to gender balance,

applications from female PIs made up roughly 35% of applications to the Cognitive Neuroscience program. In view of this, the CoV looked at the breakdown by gender of CAREER awards. The CoV was heartened to see that overall success rate for securing CAREER awards was, if anything, higher for women (31%) than for men (6%) (a fact qualified by a success rate of 20% for “unknown”). The hope is that such patterns at the early career stage will lead to a larger number of applications from female applicants to the Cognitive Neuroscience program in future years.

We recommend that future CoVs be given data that affords an assessment of the impact of CAREER awards on subsequent proposal submission and success rates, as a function of applicant demographics.

15. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

The CoV realizes that Cognitive Neuroscience, as a program category, presents unique challenges and unique opportunities for the NSF. One of the challenges is that the category of “cognitive neuroscience” can be seen as “crosscutting”, or orthogonal to other programs within BCS. That is, cognitive neuroscientists study the neural bases of many of the same classes of behavior that are housed in other programs, including Biological Anthropology, Development and Learning Sciences, Geography and Spatial Sciences, Linguistics, Perception, Action and Cognition, and Social Psychology. This is a challenge that BCS and the Cognitive Neuroscience program seems to have handled admirably, with, for example, many instances in the portfolio of interdisciplinary projects the Cognitive Neuroscience supports in collaboration with other program both within and outside of BCS.

A second challenge has also been highlighted elsewhere in this report, and that is the potential for overlap with the mission of the NIH. Whereas the CoV appreciates that, at some level, almost all cognitive neuroscience research can be construed as having implications for human health, broadly defined, it is felt that the Cognitive Neuroscience program’s portfolio could be better focused on truly cutting-edge research with a basic science orientation. To raise just one specific example, the Summary Overview provided to the CoV states that “Many of the broader impacts of the funded projects include the possibility of improving the lives of individuals with age-related cognitive decline and clinical disorders such as autism and traumatic brain injury.” The CoV suggests considering an explicit policy of deemphasizing projects for which the broader impacts are primarily health-related.

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

One emerging line of inquiry that has been evolving, and the CoV believes will continue to evolve over the next 10 years, is that of understanding how multiple areas of the healthy brain (making up a network) interact with one another to produce flexible, goal-directed behavior. Brain structural connections (structural connectivity) form a scaffold for these processes, but transient connections driven by current sensory input and required action (functional connectivity) appear likely to be at the core of flexible goal-directed behavior. Consideration of both structural and functional connections (effective connectivity) is also needed to characterize these brain-behavior relationships.

Methods for studying brain connectivity typically use two types of data. One data type consists of taking indirect measures of brain activity (such as blood flow signals typical in functional magnetic resonance imaging). This method is already being fairly extensively in studies of connectivity. Direct measures of brain activity (non-invasive EEG, MEG and invasive ECoG) form the second type of dataset.

On the analytic side, there are increasingly sophisticated models of network-level dynamics, such as graph theoretical analysis, dynamic causal modeling, granger causality, mutual information theory, and so on. An important goal for the next decade is to link these analytic methods with the aforementioned measures of connectivity.

In a related vein, an important area of future development will be analytic tools for studying oscillatory synchrony with noninvasively acquired data. Intracranial studies in both nonhuman and human primates indicate that long-range oscillatory synchrony is a fundamental principle underlying the control neural function. To apply these principles more broadly, it important to develop and validate analytic techniques that enable the measurement, estimation, and analysis of such factors as directionality of causation, phase-amplitude coupling, and spike field coherence, with the noninvasive acquisition methods (EEG, MEG, fMRI) that are used by the vast majority of cognitive neuroscientists.

Additional emerging issues identified by the CoV include:

Mechanisms underlying brain stimulation methods. Although transcranial stimulation (TMS, TDCS, TACS) is widely used in various experimental settings, little is known about their underlying mechanisms of action. What are the cellular-, circuit-, and systems-level effects of these methods?

The use of more “ecologically-valid” brain activation tasks and data acquisition procedures is becoming possible due to recent developments in monitoring devices and computing.

The study of individual differences versus the more traditionally used evaluation of datasets by group averaging.

Applying high-field MRI to study mechanisms underlying healthy brain function and behavior at ever smaller scales of spatial resolution.

Brain-machine interface/Brain-computer interface. Neuroscientists are using BMI/BCI as a tool to, in effect, reverse-engineer the neural code.

Optogenetic manipulation of targeted circuits. This approach is beginning to be translated from the rodent to the nonhuman primate; will it be safe/feasible to ever translate this approach to the human for basic scientific studies?

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

The field of cognitive neuroscience is, in the view of some, among those that is facing challenges of replicability, reproducibility, and generalization. To some extent, this is perhaps to be expected of a field that is young, and is still maturing. For example, only recently have multivariate analytic techniques “caught up” with a basic fact that, at some level, scientists have known for decades, which is that neural processing is massively parallel, distributed, and dynamic. What this means is that the interpretations of many studies carried out just 5-10 years ago with the univariate tools that were the first to be applied to neuroimaging signals have had to be re-interpreted. With regard to replicability and reproducibility, then, one strategy that BCS in general, and the Cognitive Neuroscience program in particular, might consider, is encouraging the use of “old” paradigms in order to a) demonstrate replicability of an established result, and also then b) demonstrate how its reanalysis with the newer method can lead to different, or perhaps richer, interpretation. Implementation of the old paradigm could be also be used as a scaffold for new experiments that are conducted in the same data collection session. The ultimate success of this, or a similar approach, of course, will require considerable outreach to, and cooperation of, scholarly journals. However, the current atmosphere is such that many journals are adopting radically new publishing models, and so such an initiative, with an effective boost from the NSF, might gain traction.

On a somewhat different topic, it is also important for the NSF to emphasize that the rapid growth of new techniques places special responsibilities on PIs, and this is an area in which the Cognitive Neuroscience program, and perhaps BCS more broadly, can take a leadership role. In particular, of late there have been corrections/retractions of papers due to either sloppy or dishonest practices in a number of disciplines, including cognitive neuroscience. Often, the problem has been traced to a graduate-student or post-doctoral trainee who was primarily involved in the hands-on aspects of data collection and analysis. The causes can be manifold, perhaps due to perceived pressure to be the first to publish with a new technique or to find and publish results that fit a preconceived model or pattern in the data. Ultimately, however, the responsibility must rest with the PI. In cognitive neuroscience, in particular, it can often the case that newer methods require specific skills or knowledge that the PI simply does not yet possess. Thus, the PI is literally far removed from the data that s/he is not able to evaluate the validity and the integrity of the analyses. An additional issue is the increasing complexity of the collected raw data and analyzed data. Even individuals who are au fait with these complex new methods may not be able to check the integrity of the analyzed data because many current tools offer a black-box analysis approach.

Another way to address both classes of concern – replicability and shoddy science – is through data sharing, as will be briefly considered in the next section.

With respect to generalizability, the CoV has considered the white paper “Research Reproducibility in the Social, Behavioral, and Economic Sciences”, with particular attention paid to Recommendation 5, which was developed specifically to address concerns about the validity of meta analyses of fMRI data: “Effect sizes should be reported in online materials for all relevant tests, not simply for effects that reach statistical significance in NSF-funded research.” The CoV is concerned that this recommendation is of limited relevance for neuroimaging research as it is practiced currently, and moves into the future. In particular, this recommendation relates to meta-analyses of the results from univariate analyses of fMRI data. The growing consensus in the field, however, is that analyses of fMRI data need to take into account the distributed nature of neural computation, and the importance of connectivity between regions. Furthermore, at a more general level, the pace of innovation in data analysis is accelerating, and so any meta-analyses that use the results of statistical tests as their primary input are very likely to be “out of date” the moment that they were performed.

The CoV feels that the most effective way to increase statistical power in neuroimaging data analyses, and thereby address issues of reproducibility and generalizability, is to perform re-analyses on raw data using state-of-the-art analysis tools. The CoV acknowledges that this is a complicated proposition from several perspectives: logistical; financial; and social (with regard to communication and cooperation among investigators in the field). This approach would require widespread data sharing (see comments in the next section of the report). Therefore, the CoV **recommends** that the Cognitive Neuroscience program consider convening a panel of experts to consider the most effective and practicable way to meet the exigencies of the NSF’s Public Access Plan in a manner that will most effectively contribute to the advancement of our science.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

If there were a requirement that all data sets generated with NSF support had to be made publically accessible to any and all users, with perhaps a moratorium for uploading data to allow investigators to publish their findings, this might have felicitous effects for both of the concerns raised under the previous point – replicability and shoddy science.

And a broader impact, particularly important for cognitive neuroscience, for such an initiative would be that expensive, technology-intensive datasets would become available, for both scientific and teaching purposes, to smaller institutions and investigators who would not otherwise have such access. This would create additional training opportunities at both the graduate and undergraduate level. Further, research community-organized data analysis and training events, e.g. ‘Hackathons’ and analysis methods workshops, could also benefit from these shared data. We **recommend** that the Cognitive Neuroscience PD be actively involved in the organization and dissemination of information regarding these events. Perhaps, workshops on data analysis could be organized to address particular topics in data analysis.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

We have already touched on this issue in our report.

2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

The Division should consider revamping the NSF website to be more user-friendly and more contemporary. The addition of links to each program-specific website that allow investigators to access current and recent award and program information could keep the research community more informed about new program developments and announcements.

4. Please provide comments on any other issues the COV feels are relevant.

Research results from cognitive neuroscience appear in the media (newspapers, Web, popular culture) on a daily basis. Often the implications of these studies are incorrectly portrayed. The CoV proposes that a "broader impact" of the Cognitive Neuroscience program might be implemented to prompt PIs on how to take a leadership role in educating science journalists so that the information that is finally disseminated to the general public more accurately represents our science. One way in which this might be accomplished could be to provide NSF-organized short courses, workshops or webinars dealing with these topics.

5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

Future CoVs would greatly benefit from additional program statistics from previous CoV periods, so that the current program period that is being reviewed can be put into a better perspective. Rather than having access to previous CoV reports, it would be beneficial to plot various measurement metrics on data such as funding levels, application rates and PI demographics reaching back 10-12 years in single display items, so that trends can be better visualized. In many instances, the effects of an initiative taken by a Program Director might not be visible until several years later, or not be seen at all when not situated in the context of data from previous years.

The Committee of Visitors is part of a Federal advisory committee. The function of Federal advisory committees is advisory only. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the Advisory Committee, and do not necessarily reflect the views of the National Science Foundation.

SIGNATURE BLOCK:

X /s/ Aina Puce

X /s/ Bradley Postle

For the Cognitive Neuroscience Program

CULTURAL ANTHROPOLOGY

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review

process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>Yes! The program has developed an appropriate and systematic set of procedures initial screening, compliance, selection of reviewers, composition of panels, and evaluation of reviews and construction of feedback to proponents.</p> <p>The twice/year schedule of face-to-face panel meetings for both senior and DDIG proposals has been working effectively and reflects the reality of training and research in Anthropology.</p> <p>The POs have been careful in selecting panelists and reviewers to reflect both specific areas of expertise and flexible readings/evaluations of emerging topics and approaches in the field.</p>	Yes
<p>5. Are both merit review criteria addressed</p> <p>a) In individual reviews?</p> <p>b) In panel summaries?</p>	Yes

<p>c) In Program Officer review analyses?</p> <p>Comments:</p> <p>Yes.</p> <p>The POs are careful in instructing and following up with reviewers and panelists on the importance of assessing NSF criteria. There are variations at the level of individual reviews, but these variations are contextualized effectively in the panel summaries. These issues tend to appear mostly in terms of Broader Impact (briefly addressed, variability in interpretation of the criteria).</p>	
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>In line with the reputation of the CA program as providing fair and thorough reviews, reviewers are generally careful in writing constructive and informative reviews to proponents.</p> <p>However, length and level of detail of reviews vary across reviewers.</p>	Yes
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments:</p> <p>Yes. Panel summaries usually add information that complements and contextualizes written reviews. The level of detail varies based on the need to complement written reviews.</p>	Yes

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments:</p> <p>Yes. One has access to all components of the proposal, to individualized reviews, panel summary and review analysis, as well as email exchange relevant to the proposal. There is enough detail to understand the ranking and pool of proposals available for PO decisions.</p>	<p>Yes</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments:</p> <p>Yes. In all cases examined in the subsample, PIs were provided with individualized reviews and a summary of the panel discussion. The length/detail of this document varies as expected.</p> <p>The POs are pro-active in instructing reviewers and panelist on the importance of providing specific information, such as reasons that led to a decline. The POs are also available to communicate with proponents when explanations are required.</p> <p>The CA program has consistently recruited a high numbers of reviewers for senior proposals (4 to 6, and in some cases 8), which provide proponents with diverse perspectives on the proposed topic and feedback.</p>	<p>Yes</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p>The CA program has developed an effective review system, responsive to different NSF criteria. The program is known for carefully assessing a proposal's research design and its contribution to the field and more broadly. POs consistently evaluate the Data Management Plan requirement.</p>	<p>Yes</p>

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: The CA program has a high rate of reviewer acceptance. The number of reviewers for senior proposals is consistently above the minimum. The sub-sample of proposals analyzed shows careful selection of expertise to reflect subfield, topical area, methodologies, and regional expertise.</p> <p>Program officers dedicate time to contact ad hoc reviewers as needed to cover specific areas of expertise; no “cold” contact is made, but initial inquires which increases the chance of reviewers’ acceptance and allows for an early check of COI.</p>	yes
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: The subsample of proposals analyzed did not indicate problems regarding COI. The POs have clear procedures for explaining and acting on potential COI.</p>	Yes
<p>Additional comments on reviewer selection:</p> <p>The POs should be commended for their pro-active role in interacting with reviewers and for their diligence in recruiting reviewers reflecting their proposal portfolio and emerging topics.</p> <p>Expanding the size of both panels to 12 members has been important for the program to manage workload and to reflect the diversity of proposal submitted. This also enables the panel to evaluate and address emerging topics.</p>	Yes

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the program.

Comments:

The program could be considered a model for other programs at NSF and other agencies. The POs form a collegial and complementary team, not only efficiently managing the program, but also directly contributing to the management of other programs at NSF. The POs have created a culture of efficient management, close interactions with other NSF programs, interactions with reviewers, and effective panels.

The POs have participated in virtual panels and experimented with a full virtual panel (DDIG), but find that face-to-face meetings promote more robust, focused, and collaborative reviews.

The management of the CA program has been proactive in aligning the program's goals with that of the BCS, such as promoting and supporting cross-program collaboration, while ensuring the program's mission to advance knowledge in the discipline.

On a number of measures/indicators the program fares within and usually above expectations, including: review time, mortgage rate, portfolio diversity, and diversity indicators for reviewers and awardees. Program figures indicate that diversity-related indicators for panelists and reviewers are in line or above that of the national association (AAA) figures for the discipline.

The CA program has the lowest budget of the division (except for DEL), but has been extremely efficient in leverage funding in collaboration with other programs.

The POs have been proactive in promoting the program to stakeholders across the discipline (association newsletter, workshops, intensive outreach to campuses, and visits to research centers).

The success of this program also demonstrates the value of two fulltime non-rotating POs. This arrangement has made it possible to develop long-term working relationships with POs in other programs within and beyond BCS, to establish an effective and continuing management culture, to maintain strong relationships with panelists, reviewers, and applicants, and to contribute to the management of other NSF functions (for example, GRFP, IRB, EEID, and others). The POs have clearly learned the ropes and are using this expertise to further program, division, and NSF goals.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

The three pillars that constitute the CA program research priorities have mapped well into the range of topics from which awards were made during the review period. The CA portfolio further reflects well the diversity of research topic within the discipline as well as frontiers of research and emerging topics, such as related to urban, infrastructural, energy, health, and political change and conflicts, among others.

One hallmark of the current CA program is the imaginative energy with which it encourages systematic and innovative research design; it does so in ways that both reflects diverse approaches and methodologies and makes possible the exploration of new strategies. The POs have been concerned and proactive in encouraging application reflecting a wider range of methodological perspectives and new forms of integration of qualitative and quantitative methods within the discipline.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

The POs have a system in place to set proportionate goals for funding senior and DDIG submissions. There is, as noted above, a quite limited budget relative to other programs and number of applications. One successful strategy for supporting program priorities has been the emphasis on effective partnering with other programs for funding research.

This strategy aligns with NSF priorities for encouraging interdisciplinary and crosscutting initiatives. Finding the right balance between cross-program leveraging and sustainable single program base funds is an on-going challenge. The POs have been careful in maintaining a low 'mortgage rate' so they have reserves in case of year-to-year fluctuation.

A further continuing challenge has to do with decisions concerning the proportion of funds reserved for DDIG. The CA program has the lowest success rate among those SBE programs that fund graduate research. This is further complicated by the necessity of providing for Indirect Cost for DDIG proposals. Due to differential institutional rates of indirect cost, the POs are concerned about possible skewed distribution of funds. The consequence of limited funding is that the program has to decline strong proposals.

It is also clear that the POs are continuously thinking about cost/benefit of specific funding categories and how to maximize outcomes.

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

The POs have been proactive in aligning the goals of the program with that of BCS and NSF.

The POs have addressed broad and specific recommendations from the 2012 COV, for instance: - increase in DDIG award (in spite of a new policy to include IC in DDIG grants), -experimenting with virtual panels, and - expanding the pool of reviewers so that 80% of senior proposals now have at least 2 ad hoc reviewers. The POs have also increased further an emphasis importance and constituent elements of the Broader Impacts merit criteria, which aligns with one of the recommendations of COV 12.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

16. Does the program portfolio reflect the disciplines and subdisciplines of the field?

16.1. Is the program responsive to developments within relevant scientific communities?

Comments:

The portfolio of grants includes senior and DDIG research, training-related, conference and workshops, and contributions to the CAREER and REU programs, among others. We support the POs in their plans to continue the current distributional strategy.

The portfolio reflects well different specialties and emerging topics within the discipline and more broadly, and embodies BCS' goals for interdisciplinary and cross cutting research.

The portfolio reflects well the tradition of the discipline in international research.

The proportion of funding dedicated to training-related grants seems reasonable, given the principled commitment of the program to supporting systematic and rigorous research across competitions. The POs are currently considering possible alternative strategies, including collaboration with the national association (AAA) to refine and extend the kinds of training funded. We support this exploration and also suggest possible consultation with the Society for Applied Anthropology (SfAA).

We think that allocating some of the budget to support forward-looking workshops defining emergent topics and opportunities for collaborations will help sustain the program's timeliness and transformative capacity.

The three-core program research priorities articulated in the CA report (-Research on cultural and social variability; -Transitions, transformations, and change; -Support for improvement of anthropological sciences) provide a framework that captures the current and emerging research landscape of the discipline. In pursuing these priorities, CA should play a catalytic role in supporting impactful research informed by the particular insights CA brings to the examination of those transforming interactions of narratives, values and behavior evident in such phenomena as: -the social dimensions of disasters; - the social and political implications of and solutions to global environmental and climate change; -the dynamic coupling of urban and rural spaces; -social underpinnings and consequences of migration due to natural and political changes; -the nexus of water, energy, food security and sustainability; -connectivity and social networks; and, - developing new constellations of research tools and approaches.

17. Are awards appropriate in size and duration for the scope of the projects?

Comments:

The duration of most senior projects (2-3 years) and DDIG (9-18 months) is reasonable.

Average award for senior has been declining compared to previous review cycle. This aligns with most kinds of anthropological research grants, but necessarily makes it challenging to support larger research teams and specially the inclusion of funded student participation.

Average award for DDIG has been increasingly in response to previous COVs, which is a very positive trend. This reflects the cost of yearlong fieldwork. However, when compounded by obligations to cover institutional Indirect cost this limits the number of awards that can be made.

18. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments:

The program is doing well relative to BCS as a whole. One strategy for doing even better in this regard is for BCS to support outreach, a crucial component of attracting applicants from across a diverse geographical range and those types of institutions, including those, which have not participated in the program.

19. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments:

Looking at a very small sample, the number of submissions from senior minority PIs remains limited, but it has increased during the last 3 years. The data on minority and gender has gaps (large number of unknown), which makes it difficult to interpret patterns.

As noted in our previous response, the adequate support of outreach on the part of POs is essential to enhance diversity across age and social demographics. Program figures show that diversity-related indicators for applicants and recipients are above the composition of the field as reported by the American Anthropological Association (AAA).

20. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

The CA report articulates well the paradox of the size of the discipline and the limited number of senior submissions. The program has been very active in doing outreach, and providing training workshops to faculty and students, such as those during the annual anthropology meeting. The CA report gives sound reasons for the importance of these activities to increase the number and diversity of submissions (and topics as noted in the report), thus restoring NSF funds to these activities.

The CA program has the smallest annual budget of the division, excluding DEL, thus flat funding amid increasing costs of submissions. This has implications for the ability of POs to maintain the diversity and richness of the program's portfolio.

Partnerships with other programs have been crucial to CA's budget, but it has been more effective with other fields than across anthropology's subfields. Initiatives to promote collaboration across anthropology's subfield could have a significant impact in the disciplines and directly contribute to anthropology departments' efforts to increase collaborations across subfields.

Given the quality of the pool in our reading of the sample (E-Jackets), it is clear that more projects could appropriately be funded than is presently possible.

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

The BCS division should aim at taking a leadership role in developing crosscutting programs at NSF. Here we echo the advice of COV 12 and strongly encourage reflection on how such leadership might most

effectively be realized. This process should draw upon the experience and knowledge of the POs and their familiarity in working across programs. The division has a crucial role in supporting and advancing initiatives coming from the POs.

A number of new areas and research frontiers are outlined as part of the COV15 report. We would like to emphasize that crosscutting these areas are technologies and methodologies in regard to which BCS programs have a crucial stake. BCS programs also have the kind of expertise that should be helping to set the agenda for how these new tools and resources might most effectively be used. BCS should be proactive in seeking funding in areas such as related to 'big-data'.

Given the nature of contemporary research, it is crucial that BCS is very active in pursuing and supporting international agreements.

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

Traditional understandings of replicability and reproducibility do not match the nature of complex societal problems and crosscutting research today. This requires rather a broad gauge and reflexive consideration of what constitutes robust research and the tailoring of research design and analysis that reflect the often dynamic and variable phenomena under study.

The social sciences are challenged with developing more robust epistemic fit between studying conditions of accelerated changes and the scientific methodologies used to analyze them, including for example clear articulation of levels of analysis. Perhaps more important criteria than traditional definitions of replicability, reproducibility, and generalization are such standards as the clarity of conceptual frameworks informing research projects, the clarity of sample design, and the provision of primary data as appropriate for subsequent reanalysis, which links directly to question 3 below.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

Current NSF policies related to data management are contributing to create a culture of meta-data development and data sharing, but the mechanisms/venues to make data available in useful and accessible format are uneven across fields. It is clear that this is an area in which one size does not fit all. In both CA and DEL for example the nature and sensitivity of some data preclude their public availability.

Developing a sustainable infrastructure for data sharing and public access requires high level, long-term investments coordinated at the level of NSF (and other agencies) with the active leadership of BCS. BCS should reflect on and explore the possibility of participation and leadership in efforts such as the recently developed proposal for implementing Social Observatories in the United States.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

The BCS should reflect on whether the guiding questions articulated in its report (BCS overview report 2012-14, page 1) offer a sufficient framework for the program to address and engage with emerging issues. How about questions about ways of studying these issues? Should broader societal questions be framed to address global transformations? How can these questions offer benchmarks about achievements in knowledge in these areas?

2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

The BCS overview report 12-14 presents a diverse set of programs to reflect interdisciplinarity and cross-cutting research areas implemented as a response to the 2020 vision plan and the previous COV report. There is however limited information about the outcomes of these programs, lessons learned, and their evolution.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

Several of the issues noted in this report require coordination at the level of NSF across disciplinary programs. NSF should recognize and encourage BCS to take leadership on new calls that address cross-cutting questions and promote the development of new methodologies. Issues of data infrastructure cannot be dealt with at the division level, requiring also coordination between NSF and other agencies.

4. Please provide comments on any other issues the COV feels are relevant.

Recommendation 7 of the 2012 COV report remains important, i.e., encouraging proponents to present a clear connection between framing research questions and [relevant] broader impact. As noted in the BCS response, this may not be appropriate for all types of BI but is still relevant in connecting specific/foundational research to broader questions.

Recommendation 17 regarding evaluating/assessing the impact of funded research remains important, but should consider differences across programs (disciplinary particularities) and consider ways of assessing BI, which may not come from standard academic metrics, for example, citation rates.

Better publicity of findings and advances from funded research is noted in the previous COV report. There is limited information on the division report to assess advances in research dissemination.

1. NSF would appreciate your comments on how to improve the COV review process, format and report template.

Division reports could be more reflexive on the impact of various activities and programs implemented in previous years. For instance, the report lists an impressive list of crosscutting interdisciplinary programs implemented in collaborations within BCS and across NSF, but there are limited comments on the outcomes of these initiatives, reflections on their evolution, lessons learned, and how they may affect the revisions of strategic plans.

The BCS report could offer more information on budget trends across programs over long time period, for example the last 10 years to help contextualize assessments and recommendations.

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SIGNATURE BLOCK:

X Donald Brenneis

X Eduardo S. Brondizio

For the Cultural Anthropology Program

DOCUMENTING ENDANGERED LANGUAGES

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review

process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: The process appears to function very smoothly. The ad hoc reviewer response rate is comparable to that across BCS in general. While we recognize that the process would benefit from a higher positive response rate, the number of reviews is appropriate across the proposals. The 2012 report noted that given the small size of the potential reviewer pool for DEL, it would be beneficial to reduce the COI time limit down from 48 months; while we recognize that this is not within the purview of the DEL program, we submit that it would be worthwhile to consider at a higher level.</p>	YES
<p>2. Are both merit review criteria addressed</p> <p style="padding-left: 20px;">a) In individual reviews?</p> <p style="padding-left: 20px;">b) In panel summaries?</p> <p style="padding-left: 20px;">c) In Program Officer review analyses?</p> <p>Comments: Both criteria are generally addressed admirably at all three levels. In a few cases, we observed that the PI’s exposition of broader impacts is weak, with the gaps filled in by the expectations of the panel; sometimes the broader impacts are articulated more</p>	YES (to all)

<p>clearly in the panel summaries and review analyses than in the proposal itself. An imbalance may thus be created in practice (if not in principle) between the two criteria, and also may risk bias in favor of established scholars. While the potential for broader impacts of DEL projects is clear, since the work relates to communities of speakers, we recommend that PIs be expected to articulate the broader impacts in full detail, and that panels evaluate proposals accordingly.</p>	
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: Nearly all proposals we considered had at least two fairly substantive ad hoc reviews, and many had three or more. Some reviews (especially ad hoc) are highly detailed and well thought through.</p>	<p>YES</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: These are in almost every case extremely well put together. They frequently include important insights that were not fully brought out in the reviews themselves.</p>	<p>YES</p>
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments: The documentation provides a detailed and appropriate rationale in virtually every case we considered.</p>	<p>YES</p>

<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments: The documentation provides a detailed and appropriate rationale in virtually every case we considered.</p>	<p>YES</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p>The process seems to be very transparent and efficient.</p>	

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

<p>SELECTION OF REVIEWERS</p>	<p>YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE</p>
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: The choices of reviewers appear consistently very appropriate with respect to topics and regions. The 2012 recommendation for increased outreach to younger reviewers is being addressed by BCS. We note that there are good reasons to make use of both areal specialists and specialists in relevant theoretical and methodological domains, and that in general the reviewer pool does draw on both areas; we feel that it is important to continue to take this approach. In some cases, the reviewer pool could possibly be expanded by drawing on more non-North American reviewers; however, we also noted that in some cases review requests sent abroad were turned down. In at</p>	<p>YES</p>

<p>least one case we observed that all three ad hoc reviews came from people with the same affiliation (SIL); we recommend that the program strive to maintain a balance of reviewers with different institutional affiliations.</p>	
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: We observed no cases of CoIs, indicating that all had been dealt with appropriately in the early phases of the process.</p>	<p>YES</p>
<p>Additional comments on reviewer selection:</p> <p>(None.)</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

<p>MANAGEMENT OF THE PROGRAM UNDER REVIEW</p>
<p>1. Management of the program.</p> <p>Comments: We reiterate the view of the 2012 COV that the separation of DEL from Linguistics is crucial. In addition to the 2012 COV’s observations that specializations, urgencies, methods, and criteria for DEL and Linguistics are different, we would add the following comments:</p> <ol style="list-style-type: none"> 1) DEL has inherent connections to other disciplines, such as the biological sciences, cultural anthropology, archaeology, musicology, etc. (see below and III.2), that make DEL projects’ results of wide relevance to other fields. This relevance underscores the overall value of DEL projects for science. 2) DEL plays a crucial role in ensuring the replicability of analyses in a variety of fields, most notably linguistics and anthropology – documentary corpora provide a record of raw data that can be leveraged to evaluate analyses and test hypotheses. In the cases where a language has no remaining speakers, these corpora provide the major record of the language for posterity. 3) DEL has considerable potential to engage the attention of the public, which speaks to the broader impacts of the program. PIs are getting better at articulating such impacts, but there is still room to make these arguments more clearly and compellingly, both on the part of PIs and by the DEL

program. This could also be done at a higher level by coordinating press releases between NEH and NSF.

With its intrinsic connections to other programs in BCS and elsewhere in NSF, DEL is particularly well positioned to make BCS even more robustly interdisciplinary than it is currently. DEL could build on its complementary strengths with respect to other BCS programs, thereby strengthening BCS and hence SBE. We recommend that BCS, and NSF more broadly, foster new collaborative seed grants focusing on interdisciplinary research that involves a linguistic documentary component. For example, a grant to study the flora and fauna of a particular ecological zone could greatly profit from the involvement of a linguist's interaction with local indigenous populations with extensive traditional ecological knowledge (TEK). For many (or most?) native community members with relevant expertise, a fine-grained understanding of TEK is encoded solely in their native language.

We strongly recommend that DEL have a permanent program officer. The rotators have been excellent, but since DEL has only one program officer, each one has had to learn the ropes afresh in a complex bureaucratic environment, leading to a steep learning curve at each transition, which also directly precedes the program's yearly grant deadline. Having a permanent program officer is also likely to lead to more effective and long-term engagement with the multiple scholarly, governmental, indigenous, and other communities that are relevant to an intrinsically interdisciplinary program like DEL. For example, the interdisciplinary work that DEL should sponsor (see III.2 below) will involve interaction with NSF programs outside BCS, e.g. Environmental Biology, as well as other federal agencies such as the Administration for Native Americans (in DHHS), NEH, and perhaps the Institute for Museum and Library Services (IMLS, in connection with archiving); this interaction involves building relationships with other POs and administrators across these agencies, which requires considerable time and experience. Furthermore, unlike almost every other NSF grant program, DEL requires POs to interact regularly with prospective PIs from outside academia (such as tribal educators, teachers, language specialists, etc.); this hands-on mentoring requires a major investment of time and energy on the part of POs. For Native American communities, long-term relationships are essential in sustaining productive and efficient interchange between prospective PIs and DEL POs.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

Research supported by DEL is often inherently interdisciplinary, since it documents language across many different domains of use. For example, linguists can work together with natural scientists such as botanists and zoologists to arrive at detailed understandings of local flora and fauna, their interactions within local ecological systems, relevance to human subsistence, etc.; linguists can also work with ethno-astronomers to learn more about local practices of navigation and wayfinding, tracking of seasons and natural phenomena, etc. Linguists can also collaborate productively with anthropologists and other social scientists to investigate e.g. verbal art and the association between genres like ritual discourse and other forms of ritual practice, among many other topics. We observe that some DEL projects involve collaborations of this sort, but that they could be exploited much more than they are currently. We recommend that program officers explore possibilities for inter-program and inter-divisional collaboration, and ways of encouraging proposals of this kind (e.g. by specific solicitations, targeted workshops, etc.). We note that such interdisciplinary research highlights DEL's contributions to a range of scientific fields.

We also note the considerable potential for collaborative projects involving tribal colleges and other educational entities, such as TCUP within NSF. We applaud the current effort to promote collaborative proposals between TCUP and DEL that was recently initiated under the previous PO. We also recommend that this and comparable efforts be made more visible through targeted outreach activities, such as Dear Colleague letters (for example, addressed to tribal institutions and to scholars working with Native North American communities). We note that such DEL collaborations with educational initiatives can be an important way to highlight the broader impacts of the DEL program (see further discussion in IV.5 below).

Outside NSF, we encourage DEL to build relationships with other federal agencies, such as the Administration for Native Americans within DHHS and the Institute for Museum and Library Services (IMLS), which would leverage limited federal resources and create significant synergy across programs. As noted above (section III.1), building long-term interaction of this kind would proceed more effectively with a permanent DEL program officer.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

We recommend a shift from one to two proposal deadlines per year, parallel to other BCS programs. If the NEH collaboration imposes constraints relating to an early fall deadline, then the second deadline (e.g. in January) could prioritize proposals that are less likely to be of interest to NEH. Having a second deadline would be likely to increase the overall number of proposals submitted, especially the proportion of DDRIG proposals (see IV.4 below). This is because many field linguists are doing field research over the summer and are therefore unable to prepare proposals in time; this is especially true for graduate students, who often are ready to begin the grant application process at the beginning of their 5th semester, so the current DEL September deadline is too early to be a realistic option for many of them. As an alternative to two full deadlines, DEL could adopt the 'Plus-One' model currently followed by GSS (with a spring deadline reserved for revise/resubmit decisions and DDRI grants). A change to two deadlines would also lead to a significant reduction in dwell time for DEL (because borderline proposals could be declined and resubmitted rather than held onto over several months until funding is fully distributed). In the worst case, if the program persists in maintaining a single deadline, this should come later in the fall.

A second recommendation concerns data management. We applaud NSF for emphasizing the necessity of archiving/preserving language data, and in particular we praise the DEL program for requiring that PIs provide a letter of support from an archive, and for allowing archiving costs to be included in the budget. Nevertheless, we find that some proposals do not present a plan of appropriate quality (e.g. material should be archived in an accessible format and in a permanent repository). Moreover, the current NSF data management requirements do not involve any procedure for verifying follow-through. The outcome of the data management should be made a mandatory part of the final project reports. We also recommend that the PI's prior record in managing and archiving data be considered in the proposal review process; for example, PIs could be expected to discuss data collected through prior projects (whether funded by NSF or not), where the data is housed and in what format, and to provide links to archived collections that could be verified by reviewers.

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

We find that the program has been very responsive, and that many steps have been taken to meet the 2012 recommendations. We particularly applaud DEL's funding of the series of outreach videos, which provide excellent resources for potential PIs who would like to apply to DEL, especially those coming from tribal and other non-academic backgrounds. We also applaud the DEL-TCUP collaborative initiative, and emphasize the importance of publicizing it widely (cf. section III.2 above).

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

1. Does the program portfolio reflect the disciplines and subdisciplines of the field?
Is the program responsive to developments within relevant scientific communities?

Comments:

The portfolio does reflect the disciplines and subdisciplines of the field: projects address a wide range of language families and geographic regions, and address different theoretical, historical, and typological questions. The range observed is representative of areal breadth in work done by scholars in US institutions and in linguistics departments. We noted that a large proportion of DEL projects involve comprehensive documentation (i.e. a study encompassing the sound system, grammar, texts, etc. of a particular language), and that some more theoretically specialized projects dealing with endangered languages were funded through the Linguistics program. We feel such projects would also be good candidates for DEL funding, because the field of language documentation would benefit from more explicit engagement with theoretical questions.

We concur with the 2012 note that DEL has been responsive to the need for developing larger corpora of various genres, which are essential for current quantitative research initiatives. Some excellent proposals in the last three years along these lines have been funded. However, we observe that a higher proportion of project proposals dealing specifically with culturally relevant genres (such as oral narratives, songs, conversation, etc. – which are often more highly endangered) are submitted by tribes or other representatives of native communities, as opposed to academic institutions; as we note below (IV.4), such proposals are declined at a higher rate because the PIs often lack the relevant grant-writing expertise. Therefore, the kinds of academic-tribal collaborations that we encourage in section IV.4 below might also help broaden the portfolio of speech genres documented through DEL funding.

2. Are awards appropriate in size and duration for the scope of the projects?

Comments:

We concur with the 2012 COV comment that some language documentation projects involve many years' work, and that developing a rich record of a language can require a long-term investment of time. In an ideal world, DEL would have ample funding to support long-term projects as well as more focused research. However, in light of the limited amount of funding available, we feel that the awards in the portfolio are of reasonably appropriate size and duration.

3. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments:

In general funding appears to be distributed across a range of states and institutions, and EPSCoR funding is strategically leveraged to broaden this diversity. However, we note two patterns of gaps in the geographic distribution of awards: One is in the southeast, which presumably reflects the relative paucity of both researchers in the DEL field and speakers of endangered Native North American languages. The other is west of the Mississippi and includes a number of states with relatively few DEL researchers but many speakers of Native North American languages, as well as tribal entities and colleges. This second gap could be alleviated by more concentrated outreach and the fostering of collaboration between tribal entities and mainstream academic institutions in the preparation of competitive proposals.

Furthermore, as noted in the DEL program report, most DEL awards are made to research intensive, PhD institutions. We concur with the DEL report that many MA level students, especially at institutions with historically higher proportions of Native American students, could be strong and motivated participants in many aspects of documentation, such as the video recording of conversations and other texts, curating and creating metadata for legacy materials, archiving, and documentation of culturally salient aspects of the lexicon (such as flora/fauna, basketry, etc.). DEL could set aside funds to support a small number of awards, e.g., a total of four \$40,000 awards, to support projects of this kind involving students at non-PhD institutions. We recommend that the program consider promoting this concept through a Dear Colleague letter.

Finally, we note that at least two competitive proposals were ultimately denied funding because their host institutions did not conform to NSF financial requirements; we hope that alternative strategies can be developed to deal with such situations, which are perhaps more likely to arise with tribal institutions than with mainstream academic hosts.

4. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments:

The DEL portfolio is quite diverse along several dimensions, including gender and race/ethnicity, particularly with respect to Native American representation. However, we observe several areas where portfolio diversity could be improved.

With respect to gender, the rates of acceptance for male and female PIs are virtually identical (35% and 36%, respectively); however, we note that significantly more submissions are made by men than by women (possibly for childcare reasons). We encourage the DEL PO to think creatively about this issue.

With respect to race/ethnicity, while proposals submitted by Native American PIs are accepted at approximately the same rate as proposals submitted by White PIs (33% vs. 37%, respectively), we feel that there is untapped potential for increased submissions by Native American PIs, most notably from those states with high Native populations but no funded DEL grants (see IV.3 above). We also noticed that many unsuccessful proposals came from PIs who were not affiliated with research institutions and may have been inexperienced in the process of academic grant writing. This situation could be addressed by increased outreach and by encouraging collaborative proposals between researchers at tribal institutions and mainstream academic institutions. Such collaborations can draw on joint funding initiatives such as the new DEL-TCUP partnership and could also coordinate with the ANA in some cases (see III.1 above). We also emphasize that collaborations of this kind provide excellent opportunities for maximizing both intellectual merit and broader impacts.

One area where we see a very striking discrepancy between the DEL portfolio and those of other BCS programs is in the proportion of DDRIG submissions/awards, which is extremely low (and has been low for at least the last six years). We strongly recommend instituting procedures that will increase the number of DDRIG submissions. A principal reason for the low submission rate is likely to be the fact that DEL has only one deadline, which occurs early in the fall semester; for many graduate students – especially those who are doing fieldwork in the summers – this schedule does not leave them enough time to prepare a competitive proposal. It is possible that some DEL-eligible proposals are currently submitted to the Linguistics program for their January deadline, but many DEL projects are not appropriate for Linguistics. We feel that having two deadlines per year would be the best solution (and would also have other benefits; see III.3 above).

5. Do you have additional comments about the program portfolio and the projects the program supports?

We would like to emphasize that NSF, in particular DEL, is the main worldwide funder of research on the Native languages of the United States; moreover, NSF is the only federal agency that funds scientific research on Native American languages (as opposed to educational programs and humanistic research, which are supported by ANA and NEH). Support for documentation, research, and revitalization of Native American languages is an important national priority, as recognized for example by the Native American Language Act passed by Congress in 1990, the President's Generation Indigenious (Gen-I) initiative, and the Native American Languages Summit to be co-sponsored by the White House in September 2015. Native Americans (including Native Hawaiians and Pacific Islanders) are an important and underprivileged population group in many parts of the US, and language documentation research can be an important ingredient into educational and scientific outreach involving those populations.

DIVISION LEVEL DISCUSSION

- 1 Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

An important development within the DEL field is the closer engagement with other scientific documentation fields, for example ethnobotany, astronomy (see III.1-2 above). It is much more common now than 10-20 years ago for language documentation work to be done hand in hand, in mutually enriching ways, with other types of scientific fieldwork. We recommend that BCS and other NSF divisions collaborate effectively in promoting interdisciplinary field work of this type. Program officers could consider soliciting collaborative proposals as well as facilitating interaction among PIs doing related research in DEL and other programs.

With respect to infrastructure, we recommend that DEL, BCS, and NSF pay particular attention to the need for sustainable, accessible archiving of field data in secure, long-term repositories. We encourage strategic thinking about allocation of resources to support this goal. In some cases this will require allocating funds within individual research grants (for archiving data); in others it will require directly funding data repositories themselves (as well as developing tools to allow researchers to identify their contents). The importance of sustainable data archiving cannot be underestimated; language documentation research done 50-100 years ago remains accessible insofar as paper records are well curated in permanent repositories, but the digital era presents particular challenges that have not been fully addressed at the level of the field as a whole.

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

DEL plays a major role in creating infrastructure that allows for replicability of linguistic, anthropological, ethnobiological, musicological, and other kinds of analyses. Many of the advances made in other disciplines rely crucially on data accumulated in language documentation research. For many endangered languages, it is precisely the work supported by DEL that ensures that such data will be accessible in the future. BCS should recommend (and could require) that funded research relying on data resulting from DEL and similar projects include specific citations of the data source, including the repository where data is accessible to other researchers.

Language documentation (including fieldwork itself, the creation of a documentary corpus, and subsequent data management and sustainable archiving) is a significant intellectual endeavor, involves a major investment of time and effort over many years, and ideally results in resources that will benefit the scientific community for decades. For these reasons, it is crucial that colleges and universities recognize the creation of

large datasets through language documentation as a full-fledged scientific activity so that, for example, younger scholars can receive recognition that allows them to progress in their careers. DEL as a program has already helped to promote this goal by providing a venue for federally funded language documentation grants; we encourage NSF to think creatively about other ways of encouraging academic recognition for research that yields accessible datasets.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

As discussed above (V.1-2), we emphasize the importance of large datasets and their maintenance over long time periods. It is important to encourage open access to scientific data (such as data accumulated through DEL grants). At the same time, in the case of anthropological and language documentation, it is crucial to recognize that access to culturally sensitive material must be negotiated on a case-by-case basis depending on the requirements of the indigenous communities, which often have a history of difficult relations with outsiders interested in their cultural patrimony.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

The DEL program is a successful NSF program that has made a major impact in the field. Our most important recommendations above were (1) the institution of two deadlines per year, (2) a permanent program officer, (3) considering PIs' track records in data management when evaluating proposals, (4) prioritizing and publicizing various cross-program and cross-agency initiatives (such as the DEL-TCUP coordination), and (5) doing outreach and other activities that will encourage more competitive proposals from tribal entities.

2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

(None.)

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

For BCS and NSF as a whole, we have emphasized above the potential for synergies between DEL and other programs. We encourage BCS and NSF to think strategically about ways to promote these synergies (through targeted solicitations, cost-sharing, and other mechanisms).

4. Please provide comments on any other issues the COV feels are relevant.

(None.)

5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

The review process generally worked well and was effectively run. It would be wonderful if we could get access to jackets in one fell swoop (for example, by downloading one big zip file) without having to navigate back and forth.

SIGNATURE BLOCK:

X Patience Epps

X Andrew Garrett

For the DEL Program

DEVELOPMENTAL & LEARNING SCIENCES

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: We commend the standing Program Director (PD) for the following recent improvements to the review process.</p> <p>The current two-phase review process by which proposals receiving low ratings from ad-hoc reviewers are declined prior to panel appropriately balances the need for fair review with demands on panel members. This approach has the added financial benefit of reducing the size and length of panel meetings. It should be noted, however, that in order to ensure that all applicants receive adequate feedback, the PD has committed herself to personally reaching out to the authors of all proposals that are declined prior to panel review. Thus, this approach puts greater strain on an already heavily burdened PD.</p> <p>Establishing a standing ‘College of Reviewers’ who have agreed to regularly provide up to three ad-hoc reviews prior to each panel meeting is beneficial to the PD, the panel members, and the applicants. Less time is lost to recruiting reviewers than would otherwise be the case, and reviewers who are engaged across multiple cycles have the opportunity to build up expertise with the NSF review process and thus can provide better reviews to applicants.</p> <p>Assigning a member of the panel to serve as ‘scribe’ who is not also serving as the</p>	<p>Yes</p>

<p>primary or secondary reviewer is also seen as a positive change to the review process. Because this individual has not otherwise read the proposal or ad-hoc reviews, he or she can play an important role in ensuring that the panel discussion is thorough and clear and that the written summary accurately reflects that discussion.</p>	
<p>6. Are both merit review criteria addressed</p> <p>j) In individual reviews?</p> <p>k) In panel summaries?</p> <p>l) In Program Director review analyses?</p> <p>Comments: Although there is some variability in the degree to which individual reviews focus on Broader Impacts, both merit review criteria are universally addressed. The panel summaries and Program Director review analyses uniformly address both merit review criteria at an appropriate level of detail.</p> <p>We note, however, that four of the five elements (e.g., qualification of the PIs, available resources, transformative nature) that reviewers are instructed to apply to evaluation of the two merit review criteria are not routinely addressed with respect to Broader Impacts at any level of review. This is likely because they do not seem particularly relevant to this review criterion. We recommend that an explanation of how to apply each element to the BI should be added, or the instructions should be revised to emphasize different elements for each review criterion.</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: Yes, in the vast majority of cases, individual reviewers provide detailed justifications for their comments.</p>	<p>Yes</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: Yes, all panel summaries provide justification for panel ratings. However, the quality and content of panel summaries varies widely. Recent changes to the procedure by which panel summaries are generated (i.e., by having a member of the panel who was not a primary or secondary reviewer serve as scribe) have had a positive impact on the usefulness of the summaries.</p>	<p>Yes</p>

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), Program Director review analysis, and staff diary notes.]</p> <p>Comments: Yes, the jacket as a whole offers sufficient justification for the award/decline decisions.</p>	<p>Yes</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the Program Director (written in the Program Director Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments: Yes, standard review documentation is generally thorough and is thoughtfully supplemented by PD comments when necessary to ensure a clear justification for the funding decision.</p>	<p>Yes</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p>In the evaluation of proposals, the Program makes effective use of the dual criteria of Intellectual Merit and Broader Impacts. The reviewers, members of the panel, and the Program Director consider seriously each research proposal's scientific merit and the broader implications. However, the same cannot be said for all PIs. Indeed, there is wide variability across proposals in terms of the degree to which the Broader Impacts of a proposed research program are addressed. This variability may stem from underlying confusion among some PIs concerning the range of factors that may be seen as the Broader Impacts of a proposed study. Inconsistencies in how Broader Impacts are treated in reviews and panel summaries likely also contribute to confusion among PIs.</p> <p>A revised guideline (2013) describes the criterion of Broader Impacts (BI) in some detail, but samples of BI statements are not provided. As such, PIs seem to react to the task of describing the BI of their work in various ways, and in terms of the proposals submitted to the DLS Program, one or more of the following types of BI are</p>	

often described: (a) the conceptual implications of the work that is being proposed (e.g., the implications of understanding children’s arithmetic skills for the development of a mathematics curriculum); (b) the education or training of individuals (e.g., research assistants) who may be members of minority groups; (c) outreach efforts to the broader community (e.g., presentations for parents and teachers) and; (d) the development of research infrastructure (e.g., the creation of a platform for coding video data). Each of these BI can be seen as linked directly to the research that is proposed by a PI. However, in some cases, activities are proposed that are clearly beneficial (e.g., a summer camp program for youngsters) but not driven by (or even linked to) the research.

We recommend providing more guidance to the DLS research community concerning the BI of a piece of work, with an emphasis placed on Impacts that can be seen as inherent in the proposed scientific enterprise. Some BI, for example, will fall naturally from the conceptual framing of the project. These will highlight how the research will contribute broadly to our understanding of how children perceive, think, learn, and interact with the physical and social world and might specify potential applications in real-world settings. Other BI will fall naturally from the process of implementing the proposed research project. For example, given that most research projects with DLS support are labor-intensive ventures, PIs should be able to detail the benefits that student assistants receive for taking part in the research. Moreover, as a consequence of carrying out this research in family, school, and community settings, there are clear benefits to parents, teachers, and members of the community to be gained by effective communication from the PIs. Finally, depending on the nature of a given study, contributions to research infrastructure in a field (as e.g., in a coding system) may be expected byproducts of the work.

We emphasize that each of these examples involves a BI that stems directly from the proposed work. Indeed, each example can be seen as falling within the scope of carrying out a well conceived, organized, and executed research project. We recommend that PIs be told that these types of BI are to be expected and that it is not necessary to mount large-scale activities that are not linked to the research per se. We also recommend that PIs, panel members, and ad hoc reviewers should be given information concerning the ways in which the Intellectual Merit and BI of a proposal are to be weighted. Our personal view is that Intellectual Merit is critical, and only when outstanding Intellectual Merit has been established should Broader Implications be considered. Although admittedly a big departure from current practice, we would go so far as to recommend that reviewers/panelists merely rate the Broader Impacts as ‘adequate’ vs. ‘inadequate,’ leaving it to the Program Director to determine which of the ‘adequate’ proposals, in aggregate, will meet programmatic goals regarding Broader Impacts of the portfolio as a whole.

Although we recognize that this is not a decision that can be made at the Program, or even the Division level, we recommend that the data safety component of the Data Management Plan be eliminated and instead left to the oversight of local Institutional Review Boards. In the absence of such action, we recommend that the Program Director provide clear guidance to reviewers regarding the degree to which they should focus on the different elements of the DMP, as well as the degree to which it

should be weighed in their evaluation. In our opinion, like the BI, the DMP should be evaluated by reviewers with an 'adequate' vs. 'inadequate' designation, leaving it to the PD to help PIs shape 'inadequate' DMPs from otherwise strong proposals into more acceptable forms.

Summary statements provided by individual reviewers vary radically in quality and content. Sometimes they are completely absent and sometimes they contain the entire review. We recommend that the PD provide reviewers with more explicit direction (perhaps with specific examples) regarding the intended content/purpose of this component of the review.

Although we recognize the value of considering the magnitude of a proposal's overall significance/impact, we question whether the 'transformative' criterion is sufficiently concrete to be useful in the review process. We note that some "incremental" projects that build meaningfully upon existing research and theory can potentially be equally significant/impactful as projects that turn the field on its head. This is true with respect to the depth of knowledge gained as well as opportunities for replication and generalization of established findings. Again, recognizing that this is not a Program-level decision, we recommend that the usefulness of the 'transformative' criterion be revisited, and perhaps eliminated in favor of a more explicit emphasis on overall significance/impact of the project within the context of the core merit review criteria.

In light of the above points, we recommend instituting a more formal training process for members of the College of Reviewers and panel reviewers through which goals and standards can be more thoroughly explained. Other review bodies (e.g., American Speech and Hearing Association) that have already implemented this type of training might be consulted in this process.

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: Reviewers are generally high stature experts in the area of inquiry addressed in their assigned proposals.</p>	Yes
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: Yes, conflicts of interest are routinely resolved by recusal and by having in-conflict panel members leave the room during discussion of proposals of concern. COIs identified after a review has been submitted are handled by not releasing that review to the panel/PI.</p>	Yes
<p>Additional comments on reviewer selection:</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW
<p>1. Management of the program.</p> <p>Comments: The current management of the program is exceptionally strong. As already noted, the current Program Director has made a number of changes to the review process (e.g., two-phase review, committee of visitors, third-person scribe) that have benefitted applicants and reviewers/panelists alike. The PD has also volunteered to review one-page summaries of proposals in advance of submission. This generous feedback will be particularly helpful for new investigators or those moving into new areas of study. Other special efforts have been made to increase support for young investigators through conversation hours at conferences, revisions to website guidance, and special treatment of CAREER proposals. The PD is also highly proactive in seeking co-funding through both targeted initiatives and other standing programs to maximize the number of high quality proposals that the program can support from both junior and senior PIs.</p> <p>As recommended above, however, it would be helpful to enhance the education of panelists and members of the College of Reviewers regarding how to evaluate and weigh the Broader Impacts, Data Management, and ‘transformative’ elements of each proposal. We also recommend enhancing the education of PIs regarding the expected content of the Broader Impacts, as well as the ways in which these expectations differ from those of other funding bodies such as the NIH.</p>
<p>2. Responsiveness of the program to emerging research and education opportunities.</p> <p>Comments: New initiatives launched by the PD in support of data sharing/archiving are admirable, and we are very interested in seeing the degree to which these pay off in terms of new projects that successfully make use of data from completed projects. It would perhaps be useful to add a training component so that emerging researchers will take full advantage of these data.</p>
<p>3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.</p> <p>Comments: A reasonable balance of funded proposals focusing on cognition, perception and language (63%) and social development (21%) is evident in the portfolio. The Program Director highlights the relatively low (10%) funding rate for social proposals as of potential concern. Although considering possible reasons for this is worthwhile, we question whether this approach to characterizing proposals is appropriate, given that categories are often ill-defined (e.g., ‘social’ could include studies of Theory of Mind, face perception, and language) and that many proposals will likely span traditional boundaries.</p>

4. Responsiveness of program to previous COV comments and recommendations.

Comments: The DLS Program Directors have made revisions to the review process and other operating procedures to address all previous COV recommendations for which a potential solution was possible. They have revised the review process to reduce the burden on panel members while also ensuring a minimum of 3 reviews per proposal. They have created a standing board of ad hoc reviewers (the College of Reviewers) to maximize the efficiency and quality of the review process. They have enhanced communications with reviewers regarding the two merit review criteria and with PIs whose proposals received the most negative reviews. They have further eliminated any mention of 'revise and resubmit' language from communications with PIs to be consistent with the absence of a formal resubmission procedure at NSF. They have also enhanced outreach efforts aimed at increasing the submission of proposals focusing on adolescence and have convened a special review panel for CAREER awards with the intention of providing feedback and support tailored to young investigators.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

1. Does the program portfolio reflect the disciplines and sub-disciplines of the field? Yes
Is the program responsive to developments within relevant scientific communities? Yes

Comments: We applaud recent attempts to increase the number of submitted proposals focusing on adolescence. Although we also recognize the important contributions of the neuroscientific perspective to our understanding of development, we are concerned that funding this expensive approach could easily swamp the DLS budget. We therefore recommend caution regarding award decisions in this area and encourage the pursuit of collaborative funding opportunities with other programs whenever possible.

2. Are awards appropriate in size and duration for the scope of the projects?

Comments: Yes, awards are generally of an appropriate size, but we share the Program Director's concern regarding the increasing size of awards. Indeed, we recommend that a greater proportion of the DLS budget be directed towards smaller projects that could be particularly helpful to young PIs in launching their careers and successfully meeting promotion milestones. We also recommend judicious support for larger scale longitudinal projects, perhaps utilizing a phased funding mechanism whereby continuous support is determined based on period review. The PD should continue actively seeking co-funding from other Programs and Directorates to support these more expensive endeavors.

3. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments: Yes, the distribution of awards across geographical regions is acceptable, but if promoting research contributions from central states that are currently underrepresented in the portfolio is seen as a priority then an outreach program could be implemented. However, we recommend that diversity issues be addressed primarily at the Division level.

4. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments: The balance between awards to new investigators and experienced PIs is appropriate, although as indicated above, we recommend consideration of a small grants initiative to help young PIs launch their research careers.

With respect to gender, there is admittedly a differential in the success rates of male and female applicants. The rate of funding for male PIs (22%) is somewhat higher than that for female investigators (16%), but the reasons for this discrepancy are unclear. We suggest monitoring this differential rate of funding to determine if it emerges at the level of panel and PD recommendations, or if it reflects gender differences in submitting proposals that align with current priorities. However, at present, this difference in funding rates for male and female PIs does not seem to be large enough to be of concern.

There is good representation of PIs across race/ethnic groups, in general, although Hispanic PIs evidence lower rates of funding than do members of other groups. Given the low number of proposals that are submitted by Hispanic PIs, it is difficult to interpret this lower funding rate. Outreach effort to Hispanic researchers (e.g., through the Hispanic caucus at the Society for Research in Child Development) may prove useful in increasing both the number and quality of submissions from this group of investigators.

5. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

In the last 10 years, there has been a renewed interest in the study of learning that is situated at the intersection between developmental and educational psychology. Moreover, in recent years we have seen the emergence of an important research focus on children’s learning in informal contexts – that is, in settings outside of the classroom. For example, researchers have focused on learning in after-school programs and clubs; camps; and museums. Newer lines of inquiry that we feel should be supported include the study of children learning individually – in contrast to group settings – through independent exploration of information available on the internet and the use of computer apps. An additional area of inquiry that merits support is on the attitudes, interests, and motivation that collectively serve as a driving force for learning.

In addition, there is a nascent movement in developmental cognitive neuroscience that holds great promise for contributing to our knowledge of learning and cognitive development, along with successful adaptation in school. Whereas cognitive neuroscience is an established area in cognitive psychology, the study of developmental cognitive neuroscience is in its infancy and should be supported by DLS. However, as noted above, this line of work is very costly and could easily take up the bulk of the DLS budget, and, as such, we recommend that the Program Director seek commitments from other NSF Programs (e.g., Cognitive Neuroscience; Perception, Action, and Cognition) for joint sponsorship of proposals in this important area.

Areas of biology other than neuroscience are also coming to be quite important in the study of developmental change. For example, the study of genetics and epigenetics, on the one hand, and immunology and endocrinology, on the other, are likely to be central in the coming years to an understanding of development and leaning, and for this reason should be supported by DLS. Moreover longitudinal studies that include rich measurement of these biological factors in combination with detailed examination of the social context (e.g., the family caretaking environment) are particularly worthwhile for shedding light on children’s adaptation in learning contexts.

Longitudinal explorations that focus on biological factors as predictors of developmental outcomes are important in that they can be seen as contributing to our understanding of key processes that underlie both performance at any one point in time and developmental change over time. In a similar way, studies of adult-child communicative interactions (at home in the form of parent-child conversations; and at school in the form of teachers’ language of instruction) provide insights into the socialization processes underlying cognition communication and social interaction. Thus, they can help explain development,

rather than merely describe it.

In terms of infrastructure for the DLS community, efforts to support broad use of extant data – after PIs feel comfortable with sharing – should be encouraged. In addition, given that analyses of learning and development are interdisciplinary at their core, DLS support to enable students and investigators to gain the skills of an allied discipline would be very worthwhile.

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

Efforts towards promoting data sharing, as discussed below, will likely have a positive impact on this goal by enhancing opportunities for reanalysis and replication. Heightening awareness and expectations regarding sample size and composition through education of both applicants and reviewers could go a long way towards ensuring the replicability and generalizability of results.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

Some efforts within BCS are already having an impact on these goals. DLS, for example, has devoted significant resources to supporting the development of a data repository for developmental research. Not only has the infrastructure become a reality, but efforts towards ensuring participation by the research community are in full swing. We caution, however, that a blanket requirement for data sharing might be impractical given the constraints of individual institutions and types of data. We recommend that researchers be given leeway within reasonable limits to determine the time frame over which they release data to the research community.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.
2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

While the DLS Program Director is doing an excellent job and has initiated a number of important changes to the review process and general management procedures, she has done so by taking on substantially more work herself (in the form of pre-review, greater communication with PIs, outreach). Given the number of proposals processed by DLS, we are concerned that this additional burden on the Program Director might not be sustainable in the long run. Although we recognize that budgetary constraints are an issue, we strongly recommend that a second Program Director be hired to support the DLS program. Even a second professional who could be assigned to the DLS on a part-time basis

would be of immense help, as has been demonstrated over the course of the last review cycle by the addition of half-time Program Director.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

Concerns regarding the definition and evaluation of Broader Impacts were raised by both prior COVs. Considerable confusion remains in this area among both PIs and reviewers. We recommend that the agency continue to work towards promoting clarity and uniformity in interpretation and evaluation of Broader Impacts. Similarly, we recommend that the agency reconsider the utility of evaluating the 'transformative' nature of proposals in contrast to general impact/significance. Finally, we recommend eliminating the data safety component of the Data Management Plans. These are seen as substantially increasing the burden on proposal preparation and review in a way that is redundant with negotiations between PIs and their Institutional Review Boards. Although we addressed all of these issues in the context of program specific recommendations, we recognize that these are likely decisions to be made at higher levels within the agency.

4. Please provide comments on any other issues the COV feels are relevant.

For PIs whose work falls under the umbrella of DLS in particular, there are often questions regarding the most appropriate program to which they should direct their submissions. The DLS Program Director's willingness to read 'one-page' summaries surely helps with this, and she notes that POs routinely advise in these situations. However, many PIs will rely on on-line program descriptions in deciding where to submit their proposals, and these are not always clear. We recommend that explicit guidelines that will enable an individual PI to make this decision be developed and made easily accessible on line. This could include the recommendation to consult with Program Directors in the event of uncertainty.

5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

SIGNATURE BLOCK:

X Amy Booth

X Peter Ornstein

For the DLS Program

GEOGRAPHY & SPATIAL SCIENCES

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: The program uses ad hoc reviewers and panels to review all proposals. Since 2012/2013, the program has experimented with a Plus-One review process for regular proposals in which there is one full panel held at NSF in the Fall and a virtual smaller panel in the Spring for resubmitted proposals invited back. This is the first evaluation of Plus-One model. The model has resulted in an increase in funding rate of the Spring panel, as well as a modest overall increase in the funding rate of the program. Although there have been some modest cost savings, the biggest advantages have been optimizing the likelihood of success for proposals and the time savings for reviewers.</p> <p>GSS program officers are enthusiastic about the new review process. The approach gives potentially competitive proposals a second chance in the competition by inviting proposers to revise them in response to reviewers and panel’s comments, The Plus One model encourages “informed persistence,” especially among proposals that have the potential for higher significance (long-term, large-scale impact) but need some improvement to increase the likelihood of success. Although future evaluations may need more data (especially from participant proposers, reviewers and panelists, we believe that this has been a positive change and that the continuing success of the Plus One model will hinge on the quality of the advice proposers get from the panel and on the program officers’ ability to communicate them clearly and thoroughly.</p>	<p>YES</p>

<p>Two potential issues need to be taken into account as the program evolves. The first is the decrease in the number of competitions for new proposals from two to one per year thus reducing the total number of opportunities. The second is the potential for proposers who are invited to resubmit to overestimate the chances at re-competition. However, we find that these issues do not detract from the advantages of the Plus-One model.</p> <p><u>Recommendation</u>: Program officers should clarify the funding rates in resubmission round under the Plus-One model and remind applicants that the process remains competitive despite a smaller pool.</p>	
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews? Yes</p> <p>b) In panel summaries? Yes</p> <p>c) In Program Officer review analyses? Yes</p> <p>Comments: The panel summaries and program officers’ reviews carefully addressed and considered both merit review criteria in funding decisions. There has been some level of unevenness in the attention given by ad hoc reviewers to the broader impacts criterion, although this unevenness is not reflected on the panel reviews or funding decisions. While GSS provides remote training to panelists (though a webinar) that stresses the importance of both criteria in funding decisions, ad hoc reviewers receive a lengthy invitation email detailing these guidelines.</p> <p>In addition to the two criteria, GSS has adopted the use of two new categories of assessment, one focused on long-term and large-scale (intellectual/theoretical scope) significance and another focused on the likelihood of success. They appear to have been useful in the decision making for invitation for resubmission.</p> <p><u>Recommendation</u>: Program officers should seek means to stress the importance of both funding criteria to the ad hoc reviewers. Current invitation emails may be too lengthy to achieve the goal of clarifying the importance of both criteria.</p>	<p>YES</p>
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: Generally, the reviews were productive and on occasion outstanding, providing meaningful and actionable advice to proposers. Still, a few reviews were more cursory and added little in terms of either explaining their assessments or providing helpful comments.</p>	<p>YES</p>

<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: The panel summaries improved during the three-year period both in terms of the quality of assessments of weaknesses and strengths of the proposals and in terms of the rationale of decisions provided to proposers. The program officer notes and phone calls to proposers invited for the Spring competition indicate an additional level of feedback as a result of the Plus-One system. We were impressed with the quality of information in the review analysis documents, which provided clarity to the process leading to funding decisions. We wonder if there is a way for more information from the review analysis to percolate to the proposers both for declined and awarded proposals?</p>	<p>YES</p>
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments: Overall the documentation is adequate, but the most insightful documentation appears in the program officer review analysis.</p>	<p>YES</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments: Overall, the rationale should be clear to the proposers. In the cases we examined, panel summaries were often inferior to the review analyses provided by program officers, limiting the amount of information provided to proposers whether or not they were successful.</p> <p><u>Recommendation</u>: Program officers should encourage proposers to make personal contact for additional information regarding funding decisions.</p>	<p>YES</p>

<p>7. Additional comments on the quality and effectiveness of the program’s use of merit review process:</p> <p>We found the program to have overall high quality in the reviewing process and to represent the breadth of interests across the geographic community. The program officers have offered a number of innovations, such as the Plus-One model and the introduction of two new categories of assessment for proposals (significance and likelihood of success), which seem to be functioning well. In addition, GSS has started requesting a letter of support from the advisors for DDRI proposals so as to improve quality and accountability. We believe this change should prove appropriate and effective and that the next COV should evaluate the impact of this new requirement.</p>	<p>YES</p>
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II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

<p>SELECTION OF REVIEWERS</p>	<p>YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE</p>
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: When the proposals are considered as a whole, this is certainly the case. In a few cases, it was noted that there has been unevenness in the expertise of some ad hoc reviewers for the regular proposals.</p> <p>For the DDRIs, a smaller, dedicated panel is used with the addition of experienced remote reviewers, who review around 5-7 proposals. In a few cases, when specific expertise not covered by the panel is needed, ad hoc reviewers are invited. These changes appear to be a productive response to the 2012 COV recommendation to improve the DDRI review process.</p>	<p>YES</p>
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: We did not identify any concerns regarding conflicts of interest. We believe GSS has given careful attention to potential conflicts.</p>	<p>YES</p>

<p>Additional comments on reviewer selection:</p> <p>The addition of remote and special ad hoc reviewers for DDRIs has been a useful innovation both in terms of reviewing load and fit of expertise.</p>	
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III. Questions concerning the management of the program under review. Please comment on the following:

<p>MANAGEMENT OF THE PROGRAM UNDER REVIEW</p>
<p>1. Management of the program.</p> <p>Comments: As with the 2012 COV review, we find that the GSS program continues to be well managed. The Springboard awards, success of the One-Plus program, and the additional metrics on likelihood and significance have all been successful innovations led by GSS program officers. We find that the program officers’ efforts to support DDRIs have been particularly laudable and have had a positive impact on young scholars and the broader community in Geography and Spatial Science. We hope that these awards will continue to be available.</p>
<p>2. Responsiveness of the program to emerging research and education opportunities.</p> <p>Comments: The program is leveraging its resources well with other units and has a high degree (roughly half of funded proposals) of co-funding with other programs. While individuals who submit proposals co-reviewed by other programs may have some trepidation, GSS has demonstrated significant success in co-reviewing and co-funding.</p>
<p>3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.</p> <p>Comments: Consistent with their strategic plan, the program officers use the 2009 NRC report “Understanding the Changing Planet: Strategic Directions for the Geographical Sciences” to establish the broad range of subjects for which GSS funding is appropriate. In the past five years, the program officers have revisited the strategic plan and judged that it still reflective of the broader community. The program</p>

officers have avoided further defining funding areas so as to remain as inclusive and open as possible to interesting new research themes. They have instead relied on the breadth of expertise in the review panels to represent the geographic community in prioritizing funding of relatively high-ranking proposals.

4. Responsiveness of program to previous COV comments and recommendations.

Comments: The program officers were responsive to the 2012 COV and provided clear responses. The committee has noted that the three initiatives noted in the 2012 COV report have been successfully implemented. We noticed that while GSS has funded few proposals under the RAPID and EAGER category, they have successfully awarded smaller grants under the Springboard category to seed support innovative proposals that otherwise would not be funded.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

1. Does the program portfolio reflect the disciplines and subdisciplines of the field?

1.1 Is the program responsive to developments within relevant scientific communities?

Comments: Yes, the program reflects the breadth of the discipline and is responsive to new developments. Program officers look for exciting proposals with potential for long-term significance in the discipline to highlight new areas of scholarship. Although the program officers noted a higher funding rate within the biophysical area, the awards represent a mix of the major subdivisions of GSS. The high level of involvement of GSS with Cross-cutting Programs at NSF places it in a good position to participate and respond to emerging and potential transformative themes within Geography and related areas.

2. Are awards appropriate in size and duration for the scope of the projects?

Comments: We noted several instances where the program officers have advised the proposers on appropriate length and budget for proposals, including requests to lengthen the duration of the awards in order to successfully complete the work. In response to the 2012 COV recommendation that GSS program should fund at least three \$400k awards per year, GSS program officers noted that in the past three years an average of nine projects each year exceeded that amount.

3. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments: There is a reasonable geographic distribution of principal investigators. The EPSCoR program had a noted impact on provision of awards, particularly for the DDRIs. GSS awards were made to a mix of institutions. We noted a significant number of awards (71 of 349 total awards) to non-research intensive institutions, representing the reach of the discipline across a range of institutions.

4. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments: The GSS program provided a comparison of the demographics of proposers to the AAG membership. Roughly 4.4% of PIs identified themselves as members of underrepresented groups compared to 5.6% of AAG membership. The program officers noted that women and Hispanics are better represented among GSS proposers than in the AAG membership as a whole. We noted the success of women among the CAREER awards in GSS. We find that a healthy proportion of awards are made to new investigators. Further, we find that proposers from underrepresented groups have success rates comparable to the broader pool. We urge the program officers to continue to seek ways in which to engage underrepresented groups and encourage applications to the GSS program.

5. Do you have additional comments about the program portfolio and the projects the program supports?

Comments: We appreciate the broad view of the discipline that extends beyond what might be traditionally considered social and behavioral science. We also noted a healthy success rate among new awardees.

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION	
<p>1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?</p>	<p>What are the human consequences of environmental change and behavioral adaptation to the global bio-physical system? We need a re-conceptualization of human-environment relationships, starting from human (political, economic and social) processes as the primary focus – rather than starting from the natural sciences. Potential ideas that this effort could explore are: (1) the impact of shocks or abrupt changes to vulnerable coupled systems, including political/institutional collapse, extreme weather and climate events and conflict; (2) the acceleration of connections between systems as a result of globalization; and (3) the emergence of “telecoupling” of social-ecological systems (SES), in which the cause and effect of threats to SES are spatially disconnected and politically complex. Examples are land and water grabbing and extreme events driving migration and refugees. In this context, the acceleration and synchronicity of negative environmental change and their effects of human and social systems and the potential for identifying thresholds and drivers for change (positive and negative) could critically inform solutions to decrease this vulnerability.</p>
<p>2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?</p>	<p>One of the dilemmas of the geographical research is that you are often concerned with the context as defined in space. In many cases, reproducibility in GSS becomes conducting similar research in the same kinds of places and generalization is building up across spaces, which is a different understanding of validity from some other fields. Program differences loom large when promoting research practices that focus on replicability and reproducibility.</p>
<p>3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?</p>	<p>In many cases, research supported under the auspices of GSS makes use of public data sources. There do not appear to be unique concerns specific to GSS in regard to data sharing and public access. Overall GSS review process is careful in considering data management plans and has encouraged proposers to curate and store their data in institutionally support infrastructure.</p>

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

The program is doing a great job at improving diversity of applicants and balancing awards between first time applicants and returning proposers. While this is commendable, we wonder if more effort should be placed in further debunking the impression still persisting among many scientists, especially in the non-biophysical areas of Geography, that rates of success are excessively low for first time applicants and young scientists.

2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

The program appears to be fulfilling its strategic plan goals, and has revisited the strategic plan and finds it continues to be relevant.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

4. Please provide comments on any other issues the COV feels are relevant.

5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

It is difficult to answer some of the questions, particularly ones about the reviewing process, without better information about, for example, panel composition and background, distribution of proposals across different categories (regular, career, etc.), and some categorization about the areas or sub-fields of research represented by the proposals as a whole and over the evaluation period. Access to such information would make for better-informed impressions about the status of programs.

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SIGNATURE BLOCK:

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For the GSS Program

LINGUISTICS

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review

process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>The combination of <i>ad hoc</i> and panel reviews continues to work well for the Linguistics program as it allows for the selection of knowledgeable reviewers across a diverse set of subfields.</p> <p>The previous COV recommended splitting the DDRIG proposals off to a separate panel, and the program has adopted this change whole-heartedly. This split has been positive for the DDRIG panel, substantially reducing its costs. However, an unintended consequence of the splitting of the review panels between DDRIG and regular grants has been the drastic reduction in the size of the panels, based on NSF guidelines for panel sizes given the number of proposals received. Consequently, the regular grant panel is now smaller, and that has had two consequences: (1) there are now more reviews that are written by panelists from a different subfield, and (2) any COIs on the panel can substantially lower the level of discussion of the proposals.</p> <p>Although the program does an excellent job getting ad hoc reviews to ensure at least three reviews on the proposal, given the vulnerability that the split has created, the panel discussion would benefit substantially by a small increase in the number of panelists beyond the usual guidelines. That is, we recommend some additional flexibility in setting the panel size in order to ensure adequate coverage of the sub-</p>	<p>YES</p>

disciplines on the panel, extending for example the panel size from 7 to 9 members, at the discretion of the program officers.	
<p>7. Are both merit review criteria addressed</p> <p>d) In individual reviews? YES</p> <p>e) In panel summaries? YES</p> <p>f) In Program Officer review analyses? YES</p> <p>Comments:</p> <p>It remains the case (across many programs) that broader impacts are treated as secondary to intellectual merit considerations by both PIs and reviewers. There are still too many cases where the broader impacts seem to be an afterthought in the proposal. Part of the reason could be that the two criteria are perceived to be fundamentally disconnected. Accordingly, we recommend that program-specific examples of good broader impact statements be made available (ideally through the program’s website) to prospective PIs and to reviewers and panelists. Especially useful would be examples where intellectual merit and broader impacts are well-integrated.</p>	
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals? YES</p> <p>Comments:</p> <p>The Linguistics program makes substantial use of ad hoc reviews, and we believe that this is very beneficial and useful to the panels and to the PIs.</p> <p>As noted above, the reduction in the size of the panels has led to an increase in the number of reviews from panelists from different subfields of expertise. These reviews in general tend to be less detailed and less valuable to the panel discussion and to the PIs. Allowing somewhat larger review panels would readily alleviate this issue. We therefore recommend additional flexibility in setting the panel size.</p> <p>The previous COV recommended modifications to the Fastlane system to allow reviewers to edit their reviews (which sometimes contain factual or typographical errors). We continue to recommend this change.</p>	
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)? YES</p> <p>Comments:</p>	

<p>In general we felt that the panel summaries did provide the rationale for the panel recommendations, and that the summaries did indicate differences of opinion when they existed. In addition, when the panel recommendation was less consistent with the scores given by the individual reviewers, the panel summaries were generally longer and provided sufficient justification for the panel’s recommendation.</p> <p>The panel summaries are also generally clear and helpful regarding encouragement to resubmit, we recommend that the program track resubmissions from proposals where the panel summary encouraged resubmission as a way of further measuring the impact of the reviews.</p>	
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments:</p> <p>The Linguistics program seems to have very few cases where the PO recommendation differs substantially from the panel summary; in fact we noticed none in the sample. Such discrepant cases would be the most important ones to assess the importance of the jackets as distinct from the panel summaries.</p>	<p>YES</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments:</p> <p>In general the documentation to the PI from the Linguistics program does provide the rationale for the award or decline decision.</p> <p>Our main concern with the process is the timeliness of the notification of the PI, especially in cases that would benefit from timely resubmission from the PIs. There are three such cases:</p> <p><i>DDRIG submissions</i>, where the doctoral student has a deadline for completing the PhD work. Proposals from this group that do not receive funding often need to</p>	<p>YES</p>

<p>be resubmitted in the next cycle in order to meet the dissertation timeline. Consequently, we recommend that declines in this category be processed as quickly as possible, at both the program and division levels.</p> <ol style="list-style-type: none"> 1. <i>Regular proposals that are declined with revision encouraged.</i> Likewise, we recommend that these decisions should be processed quickly at both the program and division levels in order to give PIs the best opportunity to revise their project proposals responsively. 2. <i>Proposals that panels recommend for funding with low priority, especially those considered during the Fall panel meeting.</i> We understand the difficulty in providing information to the PIs in these cases, some of which are held over into the next cycle for possible funding near the end of the fiscal year. We recommend that this aspect of the grant review process (i.e., that sometimes the review process can, for reasons of funding availability, carry over the next cycle) be better communicated to PIs, maybe as part of the general information provided to all prospective PIs. 	
<p>7. Additional comments on the quality and effectiveness of the program’s use of merit review process:</p> <p>The Linguistics program continues to do a very good job of recruiting a diverse set of panelists and reviewers across many different diversity criteria (subfield, gender, geography, etc.)</p> <p>Other programs have set up standing “colleges of reviewers” whose members agree to potentially review a number of proposals each cycle. The effective use of ad hoc reviewers in Linguistics alleviates the need for such a college. However, COV members from other fields pointed out that the official recognition of appointment to a college of reviewers at NSF was useful to faculty members in documenting their service activities for merit review. We recommend that the Linguistics program consider such a mechanism, which could encourage additional young researchers to participate in proposal review.</p>	<p>YES</p>

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>The Linguistics program makes extensive use of ad hoc reviews, which has the positive effect of ensuring that proposals are reviewed by researchers with the appropriate expertise and qualifications. Likewise, the program makes very effective use of co-reviews and co-funding, which we applaud.</p> <p>As noted above, the panels for regular grants have decreased in size, due to the splitting of the panels between DDRIG and regular grants (as recommended in the previous COV). This has had the effect of rendering the second panelist reviews less effective generally, as the second panelist is now more likely to represent a different sub-field. We therefore reiterate our recommendation to increase the flexibility in the size of the panel as a mechanism to increase the usefulness of the second panelist reviews.</p>	YES
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>The Linguistics program seems to have recognized and resolved all COIs they encountered. In general, this information is not easy to find in the COV documents, so if handling of COIs is perceived to be a problem for NSF, then we recommend tracking the number and content of COIs more closely and providing summaries for COV reviews.</p>	YES
<p>Additional comments on reviewer selection:</p> <p>We recommend that the Linguistics program explore the “college of reviewers” concept from other BCS programs, or any other equivalent system primarily as a mechanism for recognizing the dedication of competent and reliable reviewers, including in particular junior reviewers.</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW
<p>1. Management of the program.</p> <p>Comments:</p> <p>We find that the management of the Linguistics program continues to be excellent. The program was particularly responsive to the previous COV recommendation to split DDRIG and regular proposals into separate panels. We recommend that decisions be conveyed to PIs as soon as possible for declines with resubmission encouraged, especially for DDRIG proposals, which are often constrained by doctoral program timelines. We understand that implementation of this recommendation will require coordination with the Division signoff on decisions.</p>
<p>2. Responsiveness of the program to emerging research and education opportunities.</p> <p>Comments:</p> <p>The previous COV identified several emerging areas of research in Linguistics and BCS: experimental approaches to semantics and pragmatics, individual differences, evolutionary approaches to language, and big data approaches.</p> <p>In the present COV period, the Linguistics program received 27 proposals in experimental semantics and pragmatics, and funded 8, for a funding rate of about 30%. We find this record of proposals and funding very responsive to this emerging area of the field.</p> <p>Also in the present COV period, the Linguistics program received 16 proposals examining individual differences, and funded 5, for a funding rate over 30%. We find this record of proposals and funding very responsive to this emerging area of the field.</p> <p>In contrast, the program has seemed to receive very few proposals exploring evolutionary approaches to language. We recommend that the program engage in additional outreach to this community of researchers, perhaps in conjunction with the biennial meeting of the international EVOLang conference, to be held in the US (New Orleans) in 2016.</p> <p>The program’s approach to big data proposals (co-review and co-funding with other programs) seems to have been an effective response to the use of big data in Linguistics, which tends to involve collaboration with researchers outside Linguistics, and where the proposals are larger than the average for proposals funded by the Linguistics program itself (\$100K/year); a positive impact all around.</p>

New emerging research areas. We support the increased blurring between so-called experimental and theoretical approaches to linguistic research; in particular we support the funding incentives for the use, alongside standard field methods, of other experimental methods (e.g., eye-tracking, ERP) outside the lab. This contributes to the emergence of new questions and fostering of collaboration across normally disconnected constituencies within the field (e.g., language variation and sentence processing) and between linguistics and other related disciplines (e.g., cognitive psychology). Accordingly, **we recommend** that this continue to be a welcome focus of funding support by the program.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

The balance in the portfolio between larger (CAREER) and smaller grants and among DDRIG, conference and regular grants has been largely stable for some time, and generally seems to be an effective balance for the field. The previous COV recognized a tension between Division and Foundation incentives for larger awards, with the Linguistics Program perspective that smaller average awards have been very effective in promoting excellent research. The present COV reflected a similar tension in its discussion of \$1M awards (a single such award would be more than 17% of the Linguistics annual budget).

We continue to **strongly recommend** the maintenance of the DDRIG awards within the Linguistics program. They are one important first step in the training of young researchers into the grant application process, including the review process and are in general very likely to result in publications.

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

The Linguistics program has been very responsive to previous COV recommendations, implementing various changes in their proposal review and outreach.

1. *DDRIG.* The previous COV recommended splitting the panel into two, one for reviewing DDRIG proposals, and the other reviewing regular proposals. The Linguistics program implemented this recommendation immediately and completely. Unfortunately, this had the unintended consequence of reducing the size of the panels, due to NSF guidelines on the relation between the size of the panel and the number of proposals received. This has meant a reduction in the diversity of the panel with respect to the sub-disciplines, which has meant an increase in the number of second panelist reviews from panelists whose expertise lies in a different sub-discipline. While this problem is alleviated somewhat by the extensive use of ad hoc reviews by the program, having another panelist with relevant expertise would be very beneficial. The panel would not need to be increased that much, and we recommend increased flexibility from NSF in the establishment of the panel sizes.
2. *Broader impacts.* The previous COV asked the Program to increase PI and reviewer awareness and understanding of the broader impacts merit criterion. The Program has been responsive to this, with outreach efforts to various groups and conferences. Similar issues were raised by other BCS programs, and it was suggested that programs identify example proposals that had particularly

strong, relevant and integrative broader impact statements. We agree with this suggestion and **recommend** that the Linguistics program also identify and lead PIs to examples of awarded proposals with particularly clear, strong and relevant broader impact statements, especially those that integrate broader impacts with intellectual merit.

3. *Fastlane editing of reviews*. The operation of Fastlane is obviously a Foundation-wide issue. We continue to **recommend** improvements to the Fastlane system which would allow reviewers to edit their reviews, at least for factual and typographical errors.
4. *Junior reviewers*. The Program has been very pro-active in recruiting junior reviewers, and the extensive use of ad hoc reviews is an excellent way to introduce junior researchers to grant review.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

1. Does the program portfolio reflect the disciplines and subdisciplines of the field?

Comments:

Yes, the submissions and funded proposals reflect the diversity of the field across the various sub-disciplines (sociolinguistics, descriptive & historical, syntax/semantics/morphology, phonology/phonetics, language acquisition, psycholinguistics, and computational linguistics).

1.1. Is the program responsive to developments within relevant scientific communities?

Comments:

As noted above, the previous COV identified four areas of recent development of interest—experimental semantics and pragmatics, individual differences, evolutionary approaches to language and “big data”. The program has been very responsive to experimental semantics and pragmatics and to individual differences, receiving 43 proposals in these areas, and funding more than 30% of them. **We continue to recommend** funding support to these and related initiatives as they are increasingly a source of innovation and transformation in the field. (A contributing factor is the program’s practice to support smaller, 2-3 year focused proposals, which we continue to support.)

The program strategy of co-review and co-funding for “big data” and high-risk, high-reward projects seems appropriate given that the teams of researchers on such proposals not only usually include researchers from outside Linguistics but also focus questions that are of relevance to other sister disciplines. The program seems to have received very few proposals in

the area of evolutionary approaches to language which could be due to lack of outreach, so we **recommend** some additional outreach to this community of researchers.

As noted above, we anticipate an increase in project proposals that combine experimental and theoretical approaches to linguistic research, and the conduct of experiments “in the wild” was a theme shared across other programs in the general BCS COV discussion. We **recommend** that the program keep track of such proposals and their outcomes.

2. Are awards appropriate in size and duration for the scope of the projects?

Comments:

Yes. The average award is about \$100k per year, up very slightly from the last COV period (\$95K/year). In keeping with the practice of maximizing the financial opportunities across the field but increasing the opportunity to develop the ideas more deeply some proposals might even benefit from longer awards without more money (slower burn rate) and from incentivizing smaller (\$50K/year) focused (but higher-risk) research initiatives (e.g., exploration of a novel application of a method) that could potentially lead to a bigger interdisciplinary proposal.

3. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments:

Yes. It remains the case that states without a history of strong programs in Linguistics have a small number of awards. The map of awards is very similar to the map of submissions, showing that there is no significant geographic bias in the review process.

Research-intensive institutions continue to receive the most funding, as is true historically and throughout the Foundation.

4. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments:

In general, the grant submissions and awards do demonstrate a stable balance of diversity of awards across investigators, with respect to demographics, under-represented groups and new and established investigators.

During the current COV period, new investigators were funded at a rate of 19%, essentially at the same rate as the previous COV (20%), and remaining about half the rate of funding for established researchers (40%). Consequently, we also continue to recommend that the program explore mechanisms within its purview to help young researchers. New researchers are submitting more proposals (163) than established researchers (133), but they are not being as successful in receiving funding. We believe that young researchers would benefit from seeing additional successful proposals, so continuing to recruit more young reviewers should help improve their own grant proposals. As noted above, some other BCS programs have had success with the “college of reviewers” as a mechanism for increasing participation

of young researchers in the grant review process. **We also recommend** that the Linguistics program investigate mechanisms that could foster better grant submissions from young researchers, such as more specialized calls or dear colleague letters, or the establishment of a defined category of smaller grants (perhaps of about \$50K/year) targeted at innovative (but focused) initiatives perhaps with a cap on facilities and administration costs, which would represent an incentive to junior investigators.

5. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

Methodological growth leads to connections to other disciplines and innovation within the field, including experimentation “in the wild”, further increasing the relevance of linguistic research to the social sciences. Co-reviewing, co-funding and support for emergent research initiatives are excellent practices to foster these trends, and we **recommend** the continuation of the Programs excellent efforts in co-review and co-funding.

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

As noted above, we anticipate and support the increased blurring between experimental, computational and theoretical approaches to linguistic research; in particular we support the funding incentives for the use, alongside standard field methods, of other experimental methods (e.g., eye-tracking, ERP) outside the lab (“in the wild”). Such projects contribute to the emergence of new questions and also foster increased collaboration across normally disconnected constituencies within the field (e.g., language variation and sentence processing) and increased collaboration between linguistics and other related disciplines (e.g., cognitive psychology). Accordingly, we recommend that this continue to be a welcome focus of funding support by the program, and by other programs within BCS.

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

We see data-sharing and public access (point 3, below) as the main conduit to robust research within Linguistics. If data and methods are made widely available to other researchers, then their ability to replicate, reproduce and extend the results will be greatly enhanced.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

Linguistics as a field is ahead of the curve on data-sharing and public access. Language corpora, such as those held in CHILDES, LDC, BNC, etc. have been available now for decades. This has been a pervasive, lasting and positive change for the field, so much so that we sometimes take the existence of these resources for granted. Thus, the success of such corpora can be taken as an example and model for the rest of the field. Accordingly, we encourage efforts to develop systems to share experimental designs, analytic methods and data among researchers. This is becoming increasingly important as the methodologies cross-over between sub-fields, meaning that researchers more often want to employ methods they are unfamiliar with. Sharing efforts will encourage best practices and will lead to more robust research results.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.
2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.
3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.
 1. *Panel size guidelines.* We **recommend** additional flexibility in the size of panels beyond a simple calculation based on the number of proposals. Linguistics is a diverse field, and adequate representation of the subfields on panels is crucial to ensure fair and complete evaluation of proposals.
 2. *Dwell time.* Decisions about proposals that are declined with revision encouraged need to be conveyed to the PIs as soon as possible. We **recommend** that the Division revise its procedures to reduce the delay in signoff time for such decisions.

3. *Low fund purgatory.* We **recommend** increased flexibility in the ability of the POs to inform PIs about the status of their proposals when they are being held over into the next cycle for funding consideration (a fate many “low fund” proposals suffer).
 4. *Fastlane editing.* We continue to **recommend** that the Fastlane system be modified to allow reviewers to edit their reviews in order to correct factual and typographical errors, which otherwise causes extra work for the panel (to address the errors in the panel summary) and takes away from the time available to discuss the merits and deficiencies of the proposal itself.
4. Please provide comments on any other issues the COV feels are relevant.
 5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

We **recommend** that the Programs track the relative success of new investigator submissions from researchers who had/had not previously reviewed proposals for the program.

Regarding the actual COV meeting, **we recommend** that COV members from Linguistics, DEL, DLS, PAC and CogNeuro, get explicit opportunities to meet during the three-day meeting to discuss common interests such as cross-disciplinary emergent research lines and methodologies (cross-over and novel) and possible ways in which the respective programs can support them through the funding process.

SIGNATURE BLOCK:

William Idsardi

Maria Piñango

For the Linguistics Program

PERCEPTION, ACTION & COGNITION

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review

process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: Yes. There was a mix of ad hoc and panel reviews which covered the needed expertise. The new system of a College of Reviewers works well – very much like an editorial Board and probably is a good thing for annual reviews by the members. The new streamlined system also works well.</p>	Yes
<p>8. Are both merit review criteria addressed</p> <p style="padding-left: 20px;">g) In individual reviews?</p> <p style="padding-left: 20px;">h) In panel summaries?</p> <p style="padding-left: 20px;">i) In Program Officer review analyses?</p> <p>Both merit criteria are addressed at all levels of review although intellectual merit almost always seems to be weighted more heavily than broader impacts. What counts as broader impacts varies considerably in scope.</p> <p>Recommendation: Provide more guidance to PIs and reviewers on how to evaluate and weight broader impacts.</p>	Yes

<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: In most cases the reviewers provided substantive comments though the level of detail varies considerably.</p>	<p>Yes.</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: The panel summaries provide a comprehensive assessment of the strengths and weaknesses of the proposal as well as a sense of the level of enthusiasm for the proposal. They put the different reviews in context and carefully considered outliers.</p>	<p>Yes</p>
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments: It is clear from reading the reviews of individual proposals why the decisions were made. The program officer seems to have considerable leeway to recommend reward/decline using the panel summary and ad hoc reviews as advisory. This discretion was used judiciously in the sample of proposals reviewed.</p>	<p>Yes</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments: Taken together the documentation provides sufficient information for the PI to understand the rationale for the award/decline decision.</p>	<p>Yes</p>

<p>7. Additional comments on the quality and effectiveness of the program’s use of merit review process:</p> <p>Comments: Two relatively new aspects of the review process seem to work well and should be continued: One, the use of a College of Reviewers for obtaining quality ad hoc reviews in a timely manner and two, the use of a streamlining procedure based on at least three ad hoc reviews to determine which proposals are reviewed by a panel.</p>	
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II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: Care was taken to solicit high quality reviews. Instituting the College of Reviewers seemed to help considerably in this regard. The College of Reviewers seemed to provide a means of calibration for evaluating the proposals and therefore increased level of consistency in the reviews across proposals.</p>	Yes
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: There was consistent and considerable attention to COI at all stages of the process. Any issues of COI were dealt with expeditiously.</p>	Yes
<p>Additional comments on reviewer selection:</p> <p>We could not think of any other issues.</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW
<p>1. Management of the program.</p> <p>Comments: The program officers managed the program very effectively. They instituted a new review procedure to increase the quality and timeliness of the review process. They were quite successful in leveraging their funds along with other programs in NSF to increase the number of proposals and size of grants that could be funded. PAC seems to be a scientific and intellectual hub with natural connections to many other programs. Taking advantage of these connections is only possible because two program officers are assigned to PAC.</p>
<p>2. Responsiveness of the program to emerging research and education opportunities.</p> <p>Comments: The program officers take advantage of the increasingly interdisciplinary nature of the research enterprise and are proactive in working with other programs within NSF to fund proposals. Two examples are taking the leadership role in INSPIRE projects and initiating a cross-directorate panel in Computational Cognition.</p>
<p>3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.</p> <p>Comments: The program takes a multi-year perspective on composition of the portfolio, which is driven by the nature of the proposals. However, there are some areas of priority that are identified as special initiatives, for example, 'Dear Colleague' letters.</p> <p>Recommendation: Announcements of funding initiatives should be disseminated more widely. This relates to our recommendation that the web site be improved.</p>

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

There was only one recommendation by the previous COV which was to add a science assistant to assist with the increasing clerical workload. Program officers agreed with the recommendation but indicated that funds for such a position were not likely to be available.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

1. Does the program portfolio reflect the disciplines and subdisciplines of the field?

1.1. Is the program responsive to developments within relevant scientific communities?

Comments:

The portfolio is quite varied covering numerous aspects of both experimental and computational research in PAC. There are three increasingly important areas related to perception, action, and cognition that did not seem to have sufficient coverage by this program. (1) Individual differences in perception, action, and cognition are playing an increasingly important role in normal (and non-normal) cognition and this is beyond the issues covered in neuroscience. (2) There is also emerging research in the role that genetics plays in perception, action and cognition and the program did not seem to have any coverage in that area. (3) For years, psychology seems to have relegated the study of emotion to social psychology and that also seems to be the case with PAC, but the study of emotion is more and more important to all the of the issues covered by this program and the officers might consider making it more of a priority for the portfolio.

Recommendation: The program officers should keep these areas of study in mind when making funding decisions and should consider developing initiatives focused on these areas.

2. Are awards appropriate in size and duration for the scope of the projects?

Comments:

Given budgetary constraints the size and duration of awards seems appropriate.

3. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments:

The distribution is quite limited.

Recommendation: Develop creative ways to increase proposals from diverse geographies.

4. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments:

The mix of new and senior investigators seemed pretty good. The percentage of proposals funded for men and women seemed comparable although the number of proposals submitted seemed substantially lower for women.

Recommendation: Take creative action to track these data and consider ways to increase the submission rate for women.

5. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

No.

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

There are several increasingly important areas related to perception, action, and cognition that did not seem to have sufficient coverage by this program. (1) Individual differences in perception, action, and cognition are playing an increasingly important role in normal (and non-normal) cognition and this is beyond the issues covered in neuroscience. (2) There is a need to extend the research portfolio in perception, action, and cognition to encompass real-world settings beyond the laboratory. (3) There is also an emerging area of the role that genetics plays in perception, action and cognition, again, beyond the domain of neuroscience. The program did not seem to have any coverage in that area. (4) For years, psychology seems to have relegated the study of emotion to social psychology and that also seems to be the case with PAC, but the study of emotion is more and more important to all the of the issues covered by this program and the officers might consider making it more of a priority for the portfolio. (5) Support the development of multiple imaging techniques used in combination with sophisticated behavioral, genetic, and psychometric testing.

Crucial to the support for all the above is the infrastructure required to enable large-scale collaborative networks of individuals working on a common problem. NSF should support the building of these networks.

The goal of this program and division seems to be balanced between funding the next 'new-new thing' and doing hypothesis-driven, in-depth research to understand a phenomenon even if the work might seem rather pedestrian on the surface. Both are important to the science and should be kept in mind going forward.

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

As noted above, we recommend that the Division recognize the importance of doing hypothesis-driven, in-depth research to understand a phenomenon. This will involve built-in replications in systematic series of experiments. Parametric research, done well, is critical in specifying theoretical constraints and boundary conditions.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

Recommendations:

1. Work with the relevant scientific communities to define what is meant by “data” in a given domain.
2. Work with the relevant scientific communities to develop the infrastructure necessary for secure and convenient data sharing.
3. Develop data-sharing protocols that are sensitive to the needs of specific research areas and types of research. Some projects will involve numerous scholarly outputs from the project and it might be appropriate to release the data only after all analyses have been completed.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

This program offers many opportunities for research of different types and scales and the program is proactive in working with other programs within NSF to fund new initiatives. But those opportunities are not always communicated effectively to the scientific community. This is a difficult problem due to limitations of personnel and finances.

The Division’s web pages are in some cases user-unfriendly, have outdated designs, and have out of date information. Some of the information on these sites pertained to initiatives long expired and list employees who have left NSF.

Recommendation: The program should use every opportunity to disseminate information to potential PIs and to modernize the NSF web pages and keep them up to date.

2. Please provide comments as appropriate on the program’s performance in meeting program-specific goals and objectives that are not covered by the above questions.

None.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

None.

4. Please provide comments on any other issues the COV feels are relevant.

5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

The process has been conducted quite well. Getting access to the materials early and in an organized way was very helpful.

The Committee of Visitors is part of a Federal advisory committee. The function of Federal advisory committees is advisory only. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the Advisory Committee, and do not necessarily reflect the views of the National Science Foundation.

SIGNATURE BLOCK:

X Randall W. Engle

X Joanne L Miller

For the PAC Program

SOCIAL PSYCHOLOGY

INTEGRITY AND EFFICIENCY OF THE PROGRAM’S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program’s use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: Because the vast majority of proposals are submitted by university scholars, the methods of assessment are almost without exception a review panel plus appropriate <i>ad hoc</i> reviewers. Panelists represent a broad mix of expertise and experience. Ad hoc reviewers provide more in depth specific knowledge. Although at times during the review period proposals received 3 reviews, in the last year under review, proposals have received numerous (between 4 and 7) thoughtful reviews consistently, including at least 2 from the panel, buttressed with ad hoc reviews. Program officers serve in a role that is akin to a journal editor in weighing these various forms of input, moderating discussion, and rendering judgments. In cases of a conflict of interest, panelists and or POs left the room and other staff filled in for the PO. For some proposals, no review is provided and POs have been judicious in evaluating these. The program has wisely used the review process as a way to expose junior scholars to NSF procedures.</p> <p>Review time has exceeded the goal of 70% of proposals being acted upon within 6 months of submission. For each of the three years reviewed, 87%, 91.5%, and 90% of proposals have been acted upon within 6 months. On average, proposals have been processed in just over 5 months. The program officers have done an outstanding job processing proposals in a timely fashion.</p> <p>Recommendations:</p>	<p>YES</p>

<p>The current procedures may require high levels of effort but they appear to be working very well and serving the interest of the social psychological community. We do not recommend any large changes to the current procedures.</p>	
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews?</p> <p>b) In panel summaries?</p> <p>c) In Program Officer review analyses?</p> <p>Comments:</p> <p>Both criteria appear in panel summaries and analyses consistently. The intellectual merit criterion is consistently addressed by reviewers across all three years. This aspect of the review is of very high quality nearly without exception.</p> <p>The inclusion of broader impacts in reviews was inconsistent for the earlier cycles examined. However, in the most recent panels both review criteria have been consistently addressed by reviewers, perhaps because the format for reviewing requires it.</p> <p>It is important to bear in mind that reviewers are, foremost, experts in the scientific merit of the proposal. As such they may feel unqualified to comment on the broader impacts of the proposal. Moreover they may view broader impacts as inextricably tied to the scientific merit of the work. For instance, many proposals in social psychology involve the broader educational impact of including undergraduates from a broad range of backgrounds in research. However, of course, exposing students to science lacking in intellectual merit is not an optimal outcome. In addition, reviewers who are generally basic researchers may not see the broader impacts as more than simply pipe dreams.</p> <p>Nevertheless, overall, there has been a positive trajectory such that in the most recent evaluation year, the vast majority of reviews included both criteria. Changing the wording of the prompt to reviewers has led to greatly improved feedback on broader impacts.</p> <p>Recommendations:</p> <p>Both investigators and reviewers should be provided with examples of excellent broader impact statements to use as anchors in their assessments.</p> <p>Additionally, it may be useful to have reviewers provide a rating of broader impacts separate from intellectual merit. This could be done on a trial basis simply to address the empirical question of whether these aspects of proposals diverge or converge and to see how these two different assessments relate to funding decisions.</p> <p>We recommend that the program implement more training for the field about what</p>	<p>YES</p>

<p>broader impacts are and why they are important. For instance, a roundtable or symposium at the SPSP conference focused on broader impacts might be helpful. Such a session might involve NSF staff but also perhaps investigators who have produced research that is particularly high in broader impacts. Materials shared could be archived and made available widely.</p>	
<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: With very few exceptions (literally fewer than 5 in the entire sample), reviewers provided deep, thoughtful commentaries on the intellectual merit of proposals. During the period under evaluation there was one case of a reviewer attacking a proposal in an unprofessional manner. The PO did an excellent job of negotiating this difficulty, gleaned what was useful from the review and redacting the rest. Relative to their coverage of intellectual merit, reviewers provide much less feedback on broader impact. Commentary on broader impact may be important to investigators as such feedback can be encouraging. This kind of feedback can be especially important to individuals whose proposals were not discussed.</p> <p>Recommendations: POs are encouraged to continue to choose the type of outstanding reviewers they have to date.</p> <p>The value of commentary on broader impacts should be reinforced with reviewers.</p>	<p>YES</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: Generally the panel summaries do provide accurate assessment of the written reviews as well as the discussion that led to the final evaluation of the proposals. When some reviewers provided ratings that were inconsistent with the ultimate ratings, the PO provided rationale for how this input was weighed. Panelists whose ratings are at odds with the group are not required to change their ratings but are given the option to do so. PO comments then are used to contextualize the ratings. Overall, this system appears to be a satisfactory and transparent way to convey the consensus of the group without creating a sense of false consensus.</p>	<p>YES</p>

<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>Comments: Overall, the information provided in the jacket was sufficient to garner the rationale behind the decisions, particularly for the most recent year of evaluation. However, at times some additional justification of ultimate decisions might have been warranted. In addition, a bit more information about proposals declined with encouragement to revise would be helpful.</p> <p>Recommendation: POs should consistently provide sufficient information in PO comments, Diary Notes, and Review Analysis to justify decisions and provide data for COV evaluation.</p>	<p>YES</p>
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>Comments: The information provided to PIs is generally informative of the rationale behind decisions. Particularly in the most recent cycles, PIs whose proposals were not discussed have nevertheless received voluminous, thoughtful reviews that make very clear the strengths and weaknesses of the proposed work.</p> <p>The communication with PIs about proposals receiving a “declined/revision encouraged” is not consistent. This may be because the actual enthusiasm for some revisions is not as high as for others but this is difficult to ascertain from the materials provided. The sample of proposals provided may not be representative, however, from these it appears that revised proposals had a much better chance of being funded. For some of these proposals, the initial submission was also included demonstrating how effectively the review process worked to improve the science proposed.</p> <p>Recommendations: PO comments should be used consistently to provide feedback to investigators whose proposals were not discussed.</p> <p>POs are encouraged to consider creating templates (“boiler plates”) that address common issues with noncompetitive proposals to reduce the amount of time required to provide feedback on proposals not discussed.</p>	<p>YES</p>
<p>7. Additional comments on the quality and effectiveness of the program’s use of merit review process:</p> <p>From the standpoint of the process of merit review, the Social Psychology has done an excellent job of providing investigators with numerous thorough expert reviews;</p>	

<p>relevant feedback about funding decisions; and doing so in a timely fashion.</p> <p>Recommendations: Future program COVs should be routinely provided with frequency distributions of the panel conclusion ratings as well as information about the percentage revisions that are resubmitted (separated by demographics if possible).</p>	
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II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments: The scholars on the panels represent very well the breadth of areas encompassed in social psychology. Panelists serve up to 3 years. Panelists are generally tenured faculty, although untenured faculty members are occasionally given the opportunity to serve once, filling in when a regular panelist must be absent. The program officers select knowledgeable panel members, with specific expertise but also broad interests. Membership on the panel rotates so that there is always some continuity in panel membership while a few new panelists join each meeting.</p> <p>The POs should be praised for their efforts in insuring that panels reflect the diverse composition of our science. The panels have generally been diverse in terms of institution type and seniority. They are also demographically diverse. However, there appears to be a pattern in recent years towards over representation of women on the panels. Beginning with the most recent panels, the gender breakdown has been: 3 men/6 women; 2 men/9 women; 2 men/10 women; 4 men/10 women. Earlier panels reflected greater gender balance.</p> <p>Recommendations: Until recently, the Social Psychology program has been characterized by very little stability at the level of PO. In this sense, it has been panelists, rather than POs who have provided the institutional memory for the social psychology program. Hopefully whatever led to this instability will not happen again in the future. In any case, it might be wise to plan the rotation of panelists such that some substantial number is always</p>	<p>YES</p>

<p>holdovers from a previous panel.</p> <p>Given the recent issues with replicability (highlighting the importance of statistical power), the POs might consider having a panel position or two that are reserved for experts in the area of replicability/quantitative psychology.</p> <p>Reviewers should be given a tutorial on issues of replicability and power. Reviewers should be reminded of the potential value of large N studies and the importance of well-powered pilot studies. Concerns for replicability may lead to proposals with fewer but better powered studies.</p> <p>POs should be cognizant of the relative lack of men on panels. A concern is that having so few men as panelists may lead to more (particularly junior) men (rather than women) being included as ad hoc reviewers. To the extent that this role is thought to serve an educational and socialization function it ought to be distributed evenly.</p>	
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments: COIs are consistently documented. Panelists and POs with conflicts left the room during discussions of proposals with COIs. When the Program Director has a COI, the proposal is assigned to a different Program Director to manage the process, including seeking reviews, running the panel discussion during the meeting, writing the review analysis, and making the final recommendation. Rarely, a COI is discovered during the discussion and that panelist's review is not included in the funding decision. Review of the materials relevant to these instances suggests the program officers have done an excellent job of detecting COIs and eliminating their influence on the review process.</p>	YES
<p>Additional comments on reviewer selection:</p> <p>Reviewing can provide a valuable experience, especially for more junior investigators, so it would be good to involve more junior scholars from underrepresented groups when possible.</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the program.

Comments:

The previous visitors expressed the strong opinion that a system including one permanent program officer and one rotating officer be instituted. Their recommendation was beyond the purview of the program. Clearly, the recommendation made by the previous visitors must be considered prescient, given the tumult that occurred in the intervening years (i.e., the unusually high level of turnover in the POs; the brief period in which only one PO was left to handle all social psychology proposals). However, given that the current system is unlikely to change, how has the social psychology program managed? The answer is surprisingly well. The POs have done an outstanding job of constructing panels that are generally diverse in terms of expertise, experience, and demographics (but see Section 2 Question 1 above). POs are also experts in their fields and very conscientious. They have delivered fair and reasonable decisions in a timely fashion.

The POs have done an excellent job of working with other programs to obtain and share funds, bringing in funds from other sources of support including \$2,521,651 from the BCS division and the SBE directorate supporting interdisciplinary science or the science of broadening participation; and \$1,032,425 as co-funds from other programs (such as SES/Sociology, SES/Political Science, and SMA/Cross-directorate activities and programs).

The POs work with individual PIs to negotiate budgets with the goal of funding more highly competitive projects without compromising science. Generally, the Social Psychology program does a great deal with very little money and a very large constituency. They have been outstanding stewards of the available resources.

Recommendation:

The previous COV recommended that the budget for the Social Psychology program be increased to support more and larger projects. We agree that the program could do much more with an increased budget.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

The program does an excellent job at pursuing educational activities. RUI programs are funded at a rate of 22%, which is outstanding. Funding of the SPSP Summer Institute for Social Psychology, and the 2013 Black Graduate Conference in Psychology, as well as several other interdisciplinary workshops, is also

impressive.

Recommendation

It may be wise to more highly publicize these types of funding opportunities especially in geographical areas where there seem to be few funds spent.

POs might look for opportunities to fund emerging research—not so much “big science” as “big data,” much of which could involve large archival or existing datasets. Perhaps consider workshops or grant opportunities targeted at increasing understanding and use of big data.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

The program has done an excellent job of staying in touch with the field and portfolio reflects the interests of social psychological science for the most part (see Section IV Question 1).

There did seem to be few proposals that are not standard submissions (workshop, conference proposals totaled four). This was mentioned in the last review as well.

Recommendations:

POs should more broadly publicize opportunities for workshop and conference proposals, as investigators may be unaware of these possibilities and that communicating directly with the PO is required before submission. Relevant communication between POs and those proposing a workshop should be documented, as it is unknown from the narrative report how many investigators contacted the PO but were discouraged from submitting.

Funds could also be directed at convening workshops designed to directly address problems faced by the Social Psychology program, for example, how to increase applications from women and racial minority investigators (see Section IV Question 4).

4. Responsiveness of program to previous COV comments and recommendations.

Comments:

Some recommendations from the last COV were simply beyond the purview of the program. Others simply amplified what were the current practices at the time. And a few appeared to be well-intentioned but unlikely to enhance the process. Overall, the program took a wise and balanced approach to these recommendations, as outlined below.

MERIT REVIEW PROCESS

- The program did not institute the Consulting Committee (CC) as suggested by the previous COV. We agree with program that the goals of diversifying the reviewer pool and providing this valuable opportunity to junior scholars are a high priority and are not met by a standing

CC. In addition, the current system maximizes flexibility for the POs in identifying ad hoc reviewers with specific expertise.

- COV recommended identifying reviews for the PI as to whether they were ad hoc vs. panelist reviews. We concur with program that such information is not necessary or likely to be helpful. Reviews from other co-sponsoring programs are identified for PIs and this is important to retain.
- The previous COV recommended that more detailed descriptions of broader impacts be provided. This was implemented to excellent effect. We recommend that this be broadened to include samples of outstanding broader impact statements.
- The previous COV recommended requiring independent ratings for intellectual merit and broader impacts criteria. This change was not implemented. While it is true that intellectual merit is likely weighed more heavily than broader impacts, this differential weighting may be wise, because without strong intellect merit the broader impacts of the work may be absent (see Section I Question 2).
- The previous COV recommended making specific categories of broader impacts. These categories are included in a general way in the evaluation instructions but are not separated out as suggested. We noticed that reviewers' assessment of broader impacts was enhanced when the wording of the prompt was changed to solicit more evaluative feedback. This demonstrates the benefit of providing explicit instructions for the broader impacts criteria.
- The previous COV recommended adding additional ratings on "a) deepens existing knowledge; b) produces potentially transformative knowledge; c) represents interdisciplinary work; d) is innovative in terms of complexity science; e) advances infrastructure." Although these themes are now represented in the review process/instructions, the program did not implement separate ratings and we concur with that decision.
- The previous COV recommended changes to eJacket to provide information about the actual content areas of proposals. This change was not within the capacities of program. There is still appeal to this idea from the perspective of the COV and perhaps in the future investigators can be asked to simply check (or provide) topic key words.
- The previous COV recommended that reviewers be provided with funding decisions. This change was not implemented. We concur with this choice because funding decisions are public information. Previously the program also published this information in *Dialogue*, but that publication is no longer produced. POs might work with SPSP to publicize decisions in some alternative way.
- The previous COV emphasized prioritizing "big science" by increasing the budget for Social Psychology. The program's response was that they had no control over the budget. Nevertheless, it is exciting to observe currently funded projects (for example, those submitted by Paluck and Saturn) that fit with the previous COV's description of big science as "large in scope, particularly innovative, and potentially transformative" in the portfolio.

PROGRAM MANAGEMENT

Recommendations by the previous COV in this area were generally amplifications of what was already in place or were issues beyond the purview of the program.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

PORTFOLIO REVIEW

1. Does the program portfolio reflect the disciplines and subdisciplines of the field?
 - 1.1. Is the program responsive to developments within relevant scientific communities?

Comments:

This is difficult to judge based on the information provided in the system. It appears that a substantial proportion (26%) of proposals concern the mainstream social psychological topics of prejudice, stereotyping, biases, and social identity, followed by social behavior (e.g., altruism/aggression/conflict reduction, 18%), close relationships (10%), and cognitive processes (10%). There were relatively few on other areas including emotion, emotion and cognition, self and emotion regulation, and personality and individual differences. Certainly the emphasis on prejudice and various social biases is appropriate as this research fits both with the main emphasis of the field as well as the goal of increased participation.

A hallmark of social psychology is its inherent relevance to important societal events. The Social Psychology program has made excellent use of RAPID funds to provide timely support for social psychological inquiries into such events as they unfold. Such research could provide information more quickly that could test and enhance the generalizability of social psychological theory to real world events.

Another strength of the portfolio is the representation of collaborative research. For example, one project paired a developmental personality psychologist with an experimental social psychologist, both studying the same topic from very different perspectives. Another paired a male senior investigator at a large research institution with a female junior investigator at a smaller institution, to combine their expertise in developmental psychopathology and parenting and evolutionary social psychology to study risky sexual behaviors among adolescents. These are examples of the Social Psychology program fostering innovative and potentially transformative collaborations.

Such collaborations require effort that goes beyond doing science together and that effort is worthwhile because it improves not only science but the scientific community. Some collaborative proposals appear to represent pre-existing relationships among co-investigators, which does not go as far to meet the goal of fostering new connections. Excellent science by longstanding collaborators should be treated like any other excellent science but should not get an extra boost for being “collaborative.”

Recommendations:

The RAPID mechanism for funding should be more widely publicized so that investigators do not miss opportunities to conduct research on these events as they unfold.

Emphasis should be placed on new and innovative collaborations and especially those that cross disciplinary, geographical, and/or demographic lines.

To broaden the scope of the portfolio, POs might consider reaching out to other professional societies (e.g., International Society for Research on Emotion, Association for Research in Personality, International Society for Self and Identity).

Emphasis should be placed on research that combines methodological tools, employs large samples, and includes behavioral outcomes. Such research is challenging and complex, so reviewers and panelists should be advised to consider proposals that include these qualities in the context of those challenges, balanced with the enormous value of those features for science.

Some researchers may be interested in forming collaborations with researchers in the non-psychology areas they are trying to serve (e.g., STEM, health care, police work, etc.). Other program such as the Gender in Science and Engineering program fund collaborations between social scientists and engineers (FIRE). The Social Psychology program could communicate such opportunities more broadly to investigators.

2. Are awards appropriate in size and duration for the scope of the projects?

Comments:

Overall, yes. The POs have done a magnificent job of making due with the finances available. A great example is the efforts that have been made to fund young investigators. Although only one CAREER award was funded during the period of interest, numerous junior scholars received funding through standard and RUI grants. Given the very high cost of the CAREER awards drawn from the program budget, keeping these to very few (and truly outstanding) proposals appears to be an excellent solution, allowing more junior scholars to receive support.

The POs should be commended for their efforts to prioritize young investigators and work with investigators to keep budgets low, which allows them to fund more proposals.

Recommendation:

New investigators should be more clearly identified in the eJacket system.

3. Does the program portfolio demonstrate diversity with respect to geographical distribution of principal investigators and types of institutions?

Comments:

Overall, the majority of awards (73%) are going to research intensive institutions, followed by non-research intensive Ph.D. institutions (18%), which seems appropriate. Reviewing the geographical representation of the states submitting proposals and receiving awards indicates that areas with the least activity are those with fewer research intensive institutions. The diversity of awards geographically is

representative of the diversity of the submissions.

Recommendations:

The Social Psychology program might increase participation of individuals in geographical areas with fewer research intensive institutions through non-standard mechanisms such as the RUI, conferences, and workshops.

Greater publicity for these non-standard grant mechanisms might target the areas lacking in research intensive institutions.

Fostering collaborations across institution types could also increase the diversity of the portfolio in this regard.

4. Does the program portfolio demonstrate diversity with respect to balance of awards to new investigators, demographics of principal investigators, and participation of underrepresented groups?

Comments:

Generally the funding rates are balanced and appropriate between new and prior investigators, and funding is balanced between new and more senior scientists. However, we were concerned about demographic diversity of submissions and awards. First, with regard to gender, the number of submissions from women has declined. In 2012, submissions were higher ($N = 165$) than in other years, and submission rates were essentially equal for men (45%) and women (46%). In 2013, submissions were lower overall ($N = 140$), but the rate of submissions from men (46%) remained the same whereas the rate of submissions from women dropped (40%). In 2014, submissions were again lower ($N = 132$), but the rate of submissions from men (52%) increased whereas the rate of submissions from women again dropped (36%). In sum, the percentage of submissions from women dropped by ten percentage points from 2012 to 2014. Although there are individuals not reporting gender, even in the unlikely event that all the individuals not reporting gender were women, that would not reduce entirely the gender discrepancy in submissions in 2014.

Funding rates are lower for women than men (ranging from a 3-4% difference across the three years). In years when the submission rates were relatively equal, such a small difference was of little consequence. But when there was greater discrepancy in the number of submissions from men and women (as in 2014), men received nearly twice as many awards as women.

We considered that the gender discrepancy in funding may be due to women being less likely than men to revise and resubmit an initially declined proposal. However, records indicate that an equal percentage (54%) of men and women eventually resubmitted proposals that were rated "not competitive/revision encouraged".

Discrepancies in submissions and awards are also apparent by race/ethnicity. In 2013 and 2014, there were no awards to African American or Hispanic investigators, out of 21 total submissions from investigators in these groups.

Recommendations:

There is a need to develop new and innovative avenues for connecting with women and minority scholars. These might range from actively soliciting proposals from investigators from these groups, to developing

funding opportunities targeting these women and minority investigators. Other initiatives to diversify faculty (e.g., the ADVANCE program) have already developed useful strategies to broaden the pool of applicants for university positions, and the POs might think about how these strategies might be adapted to broaden the pool of social psychology applicants.

The Social Psychology program should ensure that individuals from underrepresented groups are included in the review process (e.g., as ad hoc reviewers and panelists) to provide them exposure to the Social Psychology program (being mindful that female and minority scholars are often tapped for many service and committee assignments).

5. Do you have additional comments about the program portfolio and the projects the program supports?

Comments:

Support for young investigators is one of the strengths of the social psychology portfolio. However, more attention might be given to additional, on-going support to ensure success, perhaps in the form of reaching out periodically to young investigators post-award and providing prompt and detailed feedback on their annual reports (particularly if activities are not commencing as planned).

V. Questions for Division Level Discussion. Please provide comments on both scientific and management aspects of the following division-specific questions:

DIVISION LEVEL DISCUSSION

1. Looking forward over the next 10 years, what are the likely emerging issues/lines of inquiry within the various BCS disciplines that we should pay attention to? Are there particular avenues of inquiry that BCS programs should consider prioritizing? If money were no object, what type of infrastructure investments would be needed to support the future of BCS?

We found the following themes that emerged in the discussion of the COV as a whole to be particularly exciting:

- Research centered on seminal human behavior (e.g., prosocial behavior), particularly from a multidisciplinary perspective that includes “actual behavior.”
- Exploring the important individual differences and variations in the general principles that have emerged from social science.
- Articulating the differences between studying behavior in the lab vs. “in the wild” and the implications of these differences for knowledge.
- Workshops that bring together scholars from different disciplines to explore different topics/themes. These could involve: 1) invitational meetings of PIs from differing programs selected for their potential synergy; 2) meetings that develop from a call for proposals; 3) inviting all PIs from selected programs (potentially from different directorates).

2. Issues of replicability, reproducibility, and generalization have been the focus of extensive discussion within the SBE directorate and across the foundation. Noting that these issues are more relevant to some disciplines than others, what might BCS as a division do to support efforts to promote research practices that improve the reliability and validity of scientific findings?

These issues have been a central focus in social psychology over the last few years. Numerous major efforts have been undertaken to assess replicability.

The strongest likely predictor of the replicability of a scientific finding is the quality of the methods that produced it. As such, proposals that are well-powered (not simply sufficiently powered but truly well-powered) should be encouraged. In addition, PIs ought to be informed that well-powered pilot studies are a likely feature of strong proposals. Reviewers and panelists might be socialized to expect proposals with fewer (but better quality) studies. Investigators might be encouraged to consider deeply the generalizability (and hence replicability) of their findings: Are they attempting to show what can happen vs. what does happen (usually)? Studies that focus on the latter goal are clearly more likely to replicate.

With regard to generalizability, proposals that are high in ecologically valid should be prioritized.

The replication process requires researchers to report their methods in a sufficiently transparent and thorough manner. NSF should encourage investigators to make their methods publically available even when not reported fully in publications (see below).

Finally, we caution that although they can be useful, online crowd-sourced data collection services (e.g., Amazon Mechanical Turk) cannot entirely address the sample size issue that plagues some experimental research.

3. A related issue is one of data-sharing and public access. What steps should BCS take, if any, to encourage a climate of data-sharing within its scientific communities?

A long term goal should be that all funded projects must provide public access to data. It is important, though, to consider the nuances that must be dealt with prior to implementing a hard and fast rule. Relative to more senior researchers, junior scholars are more likely to have been socialized in “data-sharing climate.”

The issue of data sharing and public access is one that is vital to social psychology. However the field lacks specific guidelines about the logistics of data sharing and ready information about access to appropriate repositories. NSF might take the lead in helping to develop such guidelines, perhaps in partnership with professional societies (such as the American Psychological Association). Developing a clearing house of acceptable repositories would be especially helpful to investigators. Additional relevant issues include:

- Propriety over the data (e.g., does the originator of the data warrant authorship on future publications? Must users of the dataset inform the originator of planned analyses?)
- De-identification issues (e.g., if data come from particular institutions/organizations)
- Are complete (an entire corpus) or incomplete (only what has been published) datasets required?
- Repositories for experimental artifacts (e.g., “raw data” such as videotapes of participants/targets/ etc.; stimulus materials; videos of manipulations; copies of computer programs that run studies; etc.) should also be considered in discussions of this issue.

OTHER TOPICS

1. Please comment on any program areas in need of improvement or gaps (if any) within program areas.

We do not observe any obvious gaps or areas in need of improvement.

2. Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

Nothing to report.

3. Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

Basic research on group communication and small group discussion and the differences between virtual and in-person panel discussions should be consulted and incorporated any decisions about changes in format. It is vital that these format decisions be evidence-based and not simply a matter of subjective assessments of the logistics or ease involved. Whether in-person or virtual panels lead to the same quality of decisions is an empirical question with important implications for the science being considered.

4. Please provide comments on any other issues the COV feels are relevant.
Racial/ethnic diversity is somewhat lacking in the BCS COV (across programs). Attempts to increase diversity in future COVs should be a priority.

5. NSF would appreciate your comments on how to improve the COV review process, format and report template.

The COV would be greatly improved if more data were supplied to the visitors. More detailed data about the entire corpus of proposals over the various cycles might include frequency distributions of panelist ratings and summary conclusions; the demographic breakdown of reviewers and panelists presented in a single table; and the reliability of reviewers' ratings. Data on the tracking of resubmissions would also be helpful. Ultimately, questions of fairness in the review process would be best answered by a regression equation predicting funding decisions from features such as PI demographics, review panel make-up, etc. Project outcomes (as described in the annual and final reports) ought to be included in some way in the COV process because these are relevant to the question of whether funding decisions were the right ones.

SIGNATURE BLOCK:

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X Laura King

For the Social Psychology Program