Reorganization of Peer Review for the Neurosciences at the Center for Scientific Review (CSR): A Retrospective Evaluation[1]

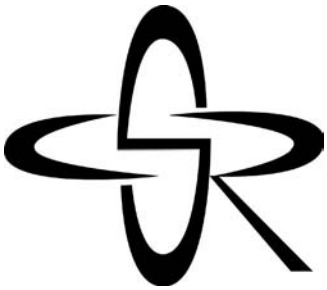

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Table of Contents

Executive Summary

History and Overview

In 1992, Public Law 103-321 transferred the research components of the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) to the National Institutes of Health (NIH). The three (former) ADAMHA institutes affected by this legislation were the National Institute of Mental Health (NIMH), the National Institute on Drug Abuse (NIDA), and the National Institute on Alcohol Abuse and Alcoholism (NIAAA).

In developing this law, Congress recognized that each of the ADAMHA Institutes conducted its own peer review and that peer review was vital to their respective missions. To facilitate a thoughtful and cooperative transition, the law offered wide latitude regarding the process and timing of integrating peer review for the ADAMHA Institutes into the NIH peer review system.

CSR in partnership with the affected NIH funding Institutes determined early on that the peer review committees from the former ADAMHA Institutes would not simply be transferred to CSR, nor would the applications referred to those Institutes be "shoehorned" into the existing CSR review structure. Rather, a process was developed that included input from extramural scientists and completely reorganized the CSR peer review structure for 1) neuroscience, 2) behavioral and social science, and 3) Acquired Immunodeficiency Syndrome and related research. The core goal of this reorganization was to "*Insure quality peer review that identifies the most meritorious science for each Institute to consider for funding*."

The first phase of reorganization involved the peer review structure for the review of neuroscience applications. Ultimately, 21 new CSR neuroscience study sections organized under three Integrated Review Groups (IRGs) were created to review neuroscience grant applications. These new IRGs and their component study sections included Brain Disorders and Clinical Neuroscience (BDCN) with six study sections (BDCN-1 - BDCN-6); Integrative, Functional, and Cognitive Neuroscience (IFCN) with eight study sections (IFCN-1 - IFCN-8); and Molecular, Cellular, and Developmental Neuroscience (MDCN) with seven study sections (MDCN-1 - MDCN-7). Beginning in February 1998, neuroscience applications were referred to these new CSR study sections, which then began meeting for the first time starting in June of 1998.

CSR initiated several efforts to examine the outcomes of its reorganization activities. Since neuroscience was the first scientific area reorganized, it was the first area evaluated. CSR's evaluation of its neuroscience review reorganization, which is presented in this document, consists of three major components:

1. **CSR Advisory Committee ad hoc Working Group observations**

   Reports from ad hoc Working Groups of the CSR Advisory Committee studying the neuroscience IRGs and the actions CSR took in response to these observations are summarized. Observations for these IRG Working Group reports took place in the summer of 2000. The reports represent the first systematic external analysis of CSR's neuroscience review operations since component study sections of CSR's neuroscience

IRGs began meeting in June 1998. The IRG Working Group report for MDCN was presented to the CSR Advisory Committee on September 25, 2000 and IRG Working Group Reports for BDCN and IFCN were presented the this committee on January 23, 2001. Common themes among all IRG Working Reports were discussed at the CSR Advisory Committee meeting on January 28, 2002.

2. Surveys of Applicants and NIH Program Staff who have experience with CSR neuroscience review

The results of two surveys expressly done for this evaluation form the bulk of this report.

The first survey, administered to 1758 scientists who recently submitted grant applications that were reviewed in the reconfigured neuroscience study sections, was conducted in October 2001. All applicants who submitted a new or competing renewal R01 application between June and November 2000 were queried about their satisfaction with the review of their applications and their perceptions regarding how well reviewers seemed to understand various aspects of their proposed research. The subset of these scientists who had also applied for R01 research grants in the year preceding the reorganization of neuroscience review also were asked to judge how the review of their applications had changed (if at all) and the possible reasons for this change. These surveys were administered either by hard copy or online (via the World Wide Web).

The second survey was administered to 103 program staff in the NIH Institutes who had applications assigned to the neuroscience study sections between June and November 2000. This survey was also administered in October 2001 and sought staff views on the functioning of the review process both overall and for specific fields and subgroups. When appropriate, the questions were constructed to parallel those asked of the applicants.

3. Analysis of Internal Data: Institute captivity and study section scoring behavior

One of the operating principles of the reorganization of the neuroscience study sections was that applications being considered by a study section should be determined by the scientific focus of the research, rather than by the professional affiliation of the principle investigator. Another operating principle of the neuroscience reorganization was to allow flexibility in review so that the range of scientific expertise of study sections overlaps. An expected outcome of reorganization based on these principles was a substantial decline in "captive" study sections. A study section is commonly defined as captive at NIH if the percent of applications that the study section reviews for any one Institute or Center (IC) is 80% or greater. Thus, one aspect of this evaluation was to examine the captivity of the neuroscience study sections.

A hallmark of fair peer review is that no particular group of applications is disadvantaged or, for that matter, advantaged in a study section. For example, grant applications should be reviewed without regard to their IC assignment. This part of the evaluation analyzed the scoring behavior of the neuroscience study sections for applications sorted by the IC to which they were referred. Application scores were sorted based on the primary IC where they were considered for funding and the percentages of R01 applications ranked at or below the 10th and 20th percentiles were calculated. The percentages of unscored or "streamlined" applications were also

calculated. While trends of high or low scoring patterns for applications referred to individual ICs may warrant further examination and continued monitoring, it also is appreciated that such trends may not be the result of a flaw in peer review, but rather may result from any number of factors, such as differences in the maturation level of different scientific areas, etc.

Summary of Findings

1. Working Group Observations

The neuroscience IRG Working Groups assessed a number of factors contributing to the function of the neuroscience IRGs and their component study sections. These factors have been streamlined into three categories for this report: 1) scope and breadth of science reviewed, 2) appropriateness, qualifications and stature of the reviewers, and 3) meeting management. Key Working Group observations and CSR actions in response to these observations are summarized below.

Scope and Breadth of the Science Reviewed

The BDCN IRG Working Group expressed concern that several study sections in the BDCN IRG (BDCN-1, BDCN-4, BDCN-5, and BDCN-6) were reviewing research areas that might be too broad or not optimally coherent. As a remedy, the Working Group recommended collapsing BDCN 1-5 into three study sections and keeping BDCN-6 as a separate study section. This recommendation was not followed since there is no clear way to collapse BDCN1-5 into three study sections that would review research areas narrower in scope than in the present five study sections.

The IFCN Working Group recommend reviewing vestibular grants in IFCN-5 rather than IFCN-6 since this would be scientifically appropriate and would help balance the workloads of these study sections. In response to this comment, applications relating to vestibular system involvement in sensorimotor reorganization were moved to IFCN-5.

Study section referral/review guidelines were modified in the MDCN IRG in response to MDCN IRG Working Group recommendations to reduce the heavy workload of MDCN-2. MDCN-1 now handles applications focused on glycolipid/glycoproteins and MDCN-5 now handles applications focused on mitochondria. This shift in review is designed to net MDCN-2 a workload reduction of 10 to 30 applications per round.

Appropriateness, Qualifications and Stature of the Reviewers

All three neuroscience IRG Working Groups generally acknowledged that reviewers serving on neuroscience IRG study sections were mostly appropriate and provided fair reviews. However, one common concern among all three Working Groups was reviewer experience and the need for more senior reviewers who can set examples and provide broad perspective. This concern is not limited to the neuroscience IRGs. In response to this concern, CSR is implementing a "senior reviewer" pilot during the June 2003 review round.

Meeting Management

A common concern among all three neuroscience IRG Working Groups was orientation or training of reviewers and/or Chairs. Training of reviewers and Chairs is a long-standing concern for CSR. In a recent effort specifically addressing training, CSR established a committee to suggest "recommended practices" for training reviewers and Chairs and to develop materials to facilitate the training process. The committee presented its recommendations and materials to the CSR Advisory Committee in September 2002 and the committee is now finalizing materials and recommendations for publication on CSR's Internet and Intranet sites as appropriate. While the committee carefully considered the possibility of specific training meetings for new reviewers and Chairs, it was felt that this would be an additional burden on reviewers and potential barrier to service and therefore did not recommend instituting training meetings.

Another common concern among the three neuroscience IRG Working Groups was the review of fellowship applications in study sections where the focus was review of R01 applications. CSR now reviews most fellowship applications (all neuroscience fellowship applications) in dedicated fellowship study sections to help ensure proper emphasis on the training opportunity and to provide a clear separation from the review of R01 applications.

2. Surveys of Applicants and NIH Program Staff

Response Rates and Other Basic Data

Response rates for the surveys of both applicants and NIH program staff were high (85% and 74% respectively). For applicants, there were no differences in response rates between those mailed a hard copy survey and those emailed a link to take the survey online. All NIH program staff members were asked to take the survey online.

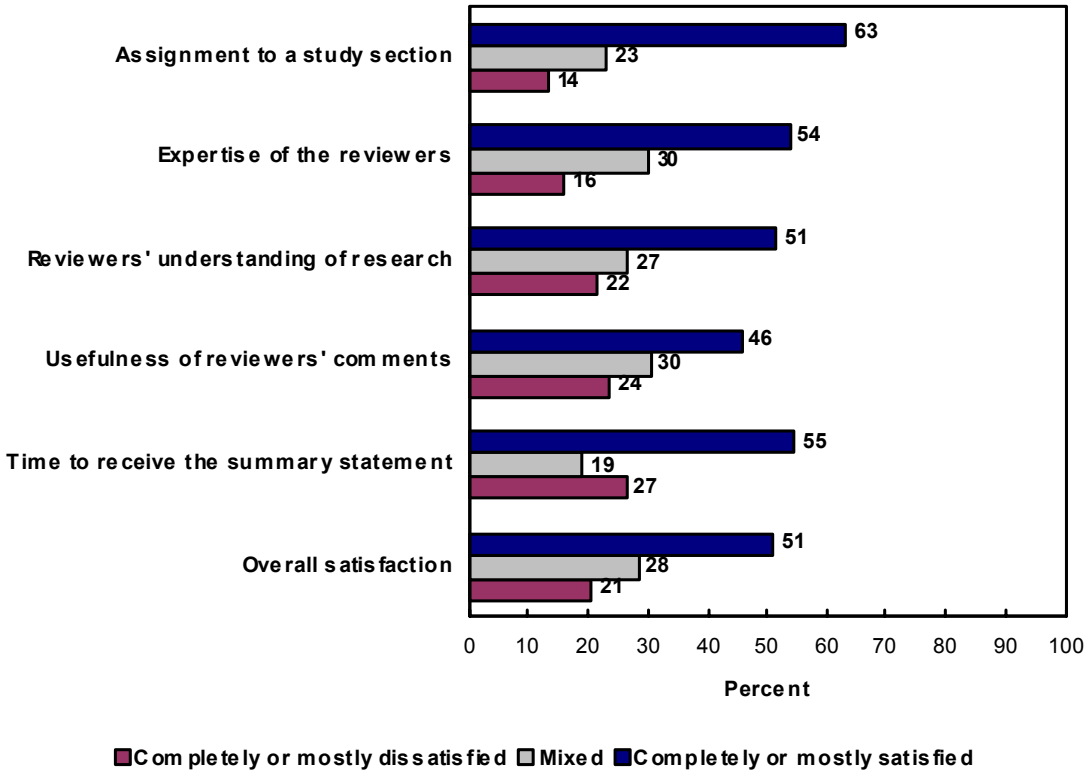
Of the 1,410 applicants who responded to the survey, slightly over three-quarters (79 percent) were male, and 5 percent self-identified as underrepresented minorities. The large majority of those responding to the applicant survey (75 percent) were PhDs, 11 percent were MDs, and another 11 percent held both degrees. The remaining 3 percent were mostly other types of dual-degree holders (e.g., DVM and PhD).

Among the 62 program officials who completed the survey 21 percent were from the NIMH, 19 percent were from the NIDA, and 19 percent worked in the NINDS. The NIA, NIDCD, and NICHD each accounted for between 9 and 11 percent. The remaining 10 percent of program staff members were employed by one of four other Institutes. In general, this distribution mirrors that of all program staff members who were eligible to complete the survey, with one exception. Although 26 percent of those approached to take the survey were NINDS staff, they accounted for only 19 percent of respondents.

Study Section and Reviewer Expertise

Between 51 and 54 percent of applicants reported that they were mostly or completely satisfied with reviewers' expertise and understanding of their proposed research (See Figure 1). Not surprisingly, these judgments were clearly influenced by award status. Whereas 80 percent of funded applicants were satisfied with the expertise of reviewers, this was true for only 39 percent of those investigators whose applications were not awarded funds.

Figure 1
Applicant Satisfaction with Selected Features of the Review Process



Another indicator of applicant views concerning reviewer expertise involves how useful applicants perceived the comments of the reviewers. Overall, 46% of applicants expressed satisfaction with the usefulness of reviewer comments (see Figure 1). But differences between funded and unfunded applicants were once again clear. Where 72 percent of funded applicants expressed satisfaction with the usefulness of reviewers' comments, only 31 percent of unfunded applicants indicated they were satisfied with this same feature of review.

In general, large majorities of NIH program staff regarded study section membership appropriate in terms of scientific breadth, experience, and depth. From 28 to 31 percent also felt that these factors were improved subsequent to the reorganization. In addition, nearly three-quarters of staff indicated that appropriate disciplinary perspectives, needed to judge the quality of the science reviewed in the neuroscience study sections, were represented among reviewers on the neuroscience review panels and 46 percent felt this representation had improved compared to before reorganization.

Reviewer Understanding and Application of Review Criteria

Investigator assessments of reviewers' understanding of NIH review criteria differed substantially, depending on the facet of review considered. Nearly two thirds (65 percent) believed reviewers' judgments about the adequacy of applicants' institutional resources reflected that they understood this criterion "a great deal." Substantially lower proportions (between 41 and 44 percent) provided high ratings of reviewer ability to judge an application's potential for advancing the field, the relevance of preliminary data, and appropriateness of collaboration with

other scientists. Overall, applicants were the least positive with regard to the reviewers' understanding of the conceptual framework, the innovativeness of the project, and the planned use of new methods and technologies. Based on the way review criteria were applied, between 36 and 38 percent of respondents felt that the reviewers understood their proposal "a great deal." Again, funded applicants gave distinctly higher marks to the application of review criteria as compared to unfunded applicants.

Program staff assessments of reviewer application of review criteria generally fell in-between those of funded and unfunded applicants. For example, whereas 38 percent of unfunded applicants, and 78 percent of funded applicants, cited that reviewers understood "a great deal" about how their research addressed an important problem, this opinion was shared by 48 percent of staff respondents.

Review for Different Groups and Research Areas

Data obtained in the applicant survey show differences among basic biomedical, behavioral, and patient-oriented researchers in terms of overall satisfaction with the review process, satisfaction with individual features of review, and judgments of reviewers' understanding of review criteria. Patient-oriented researchers typically expressed lower levels of satisfaction with the review process, particularly as compared to behavioral scientists. This is somewhat expected, given that the proportion of funded applicants (27 percent) was lower for this group of respondents; the corresponding figures for basic biomedical and behavioral science applicants were 38 and 40 percent, respectively. Once the impact of funding status was taken into account, these disparities in views disappeared. Respondents who received research funds judged the review process similarly, regardless of their research field or even the IRG in which their application was reviewed.

Institute staff members were most confident in study section functioning for the review of basic research. Nearly three-quarters (74 percent) indicated that the neuroscience study sections were either excellent or very good at evaluating basic research. The proportion of program staff members giving excellent or very good ratings to the review of patient-oriented research was lower, although it still was a majority (56 percent). Furthermore, 43 percent of program staff viewed review of patient-oriented research improved since the reorganization--the largest improvement among research areas. Only 36 percent of program staff indicated that the neuroscience study sections were either excellent or very good at evaluating behavioral science research, and one-third believed review had worsened, which was the largest "worse" percentage reported for this category. Finally, 44 percent of program staff members rated the review of research from new investigators as excellent or very good. However, 43% of program staff indicated that the review of research from new investigators has become substantially or somewhat worse subsequent to reorganization.

Changes in the Review of Research Grant Applications

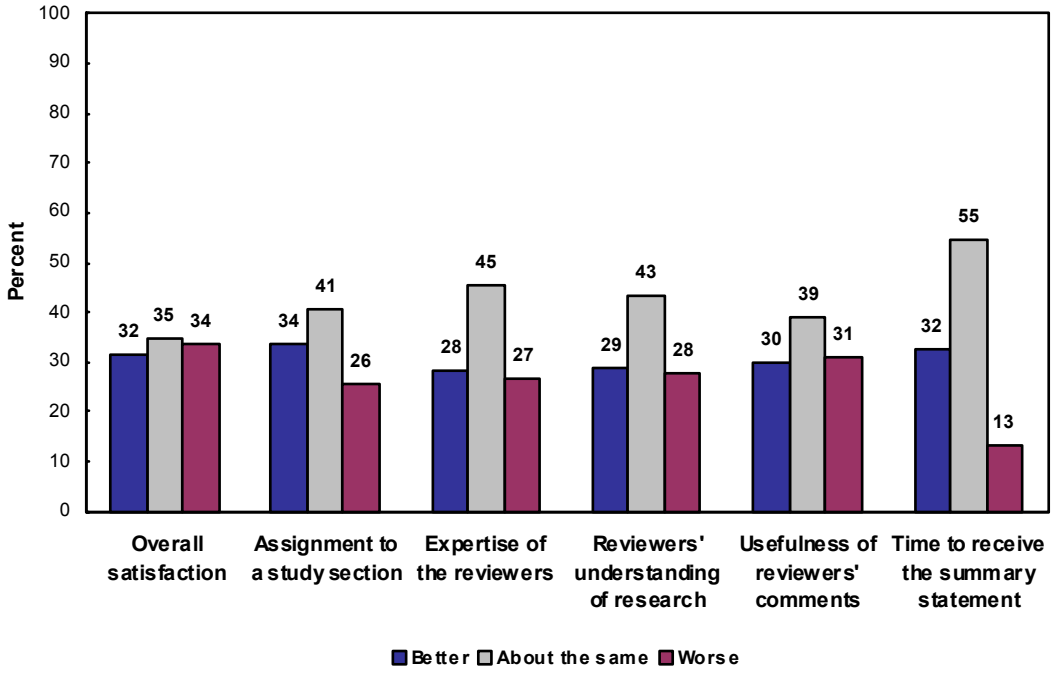
Among neuroscience applicants who submitted R01 applications both prior and subsequent to reorganization, there was no clear consensus or predominant view about the extent to which the review process was different since review reorganization (see Figure 2). Approximately one third indicated that their overall satisfaction with their most recent review was better, while similar fractions indicated that it was about the same or worse. Concerning reviewer qualities including expertise of the reviewers, reviewer understanding of the proposed research, and usefulness of reviewer comments, between 39 and 45 percent felt no real change had occurred, while nearly equal percentages indicated that these factors were either better or worse.

A notably large percentage of these respondents felt that the time to receive summary statements was about the same or better following the neuroscience reorganization (87%). This may reflect CSR efforts that were not limited to the neuroscience study sections.

The views of applicants were compared with the results of a prior customer satisfaction survey conducted in 1997 before the neuroscience reorganization had occurred. For every aspect of the review process, satisfaction levels were significantly higher among neuroscientists who responded to the 2001 survey. After controlling for other factors such as research area, the results suggested that applicants who had applied to the newly reconfigured study sections and been successful were more satisfied with the overall review process than were their funded counterparts who had applied prior to reorganization. Even for unfunded applicants, those responding to the more recent survey reported higher levels of satisfaction than did those who were unfunded in the 1997 survey.

Figure 2

Perceived Changes in Application Review as Compared to Review Prior to Neuroscience Review Reorganization



Changes in the Research Funding Application Process

While encouraging, the results above still fall short of providing clear evidence that review reorganization itself produced changes in either satisfaction or judgments about the quality of review. Unfortunately, retrospective surveys are limited in their ability to link with confidence events and changes in perception. An attempt was made, however, to solicit Institute staff and applicant views about factors affecting the process of pursuing NIH support. Not surprisingly, both groups viewed increases in the NIH's extramural research budget as having the most impact in terms of improving the process (nearly three quarters of applicants and nearly 70 percent of staff indicated that budget increases made the process better). Applicants also strongly endorsed the initiation of modular budgeting (77 percent), but program staff members were noticeably less

enthusiastic about this (22 percent). Regarding the reorganization of neuroscience review, 31 percent of applicants and 49 percent of staff judged it beneficial.

3. Analysis of Internal Data

Reorganization markedly reduced the incidence of IC captivity among CSR's neuroscience study sections. The percentage of captive study sections fell from 60% prior to the reorganization (in fiscal year 1997) to 10% after reorganization (in fiscal year 1999). In addition, in the years following reorganization, there has been no overall trend among the neuroscience study sections toward captivity. These data provide one indication that the principles set forth by outside working groups composed of IC representatives and extramural scientists to guide CSR's neuroscience reorganization were initially followed and adherence to these principles has been generally sustained.

Table 1

Scoring of applications reviewed by CSR neuroscience study sections after reorganization as sorted by Institute where applications were assigned for funding consideration

Institute	FY	10th Percentile or Better	20th Percentile or Better	Unscored	N
	1999	5.4%*	12.	44 %	2
NIA		6.6%	13.5%*	43.3%	289
	2001	5.3%*	15.4%	41.5%	246
	2002	8.4%	16.1%	48.6%	249
	1999	9.9%	21 %	36 %	2
NIDCD		7.2%	15.5%	41.3%	264
	2001	11.1%	20.6%	34.6%	243
	2002	11.9%	22.2%	34.5%	252
	1999	9.8%	17 %	39 %	3
NIDA		7.8%	15.5%	38.0%	258
	2001	7.9%	16.9%	37.2%	266
	2002	8.6%	16.8%	39.1%	256
	1999	10.4%	20 %	30 %	5
NIMH		9.5%	21.7%	31.7%	483
	2001	8.8%	19.8%	32.9%	486
	2002	7.8%	18.7%	38.1%	525
	1999	9.8%	21 %	35 %	1436
NIN S	2000	10.6%	21.3%	36.1%	1327
	2001	10.3%	20.1%	37.2%	1238
	2002	10.2%	21.5%	38.5%	1438
	1999	6.3%	17 %	34 %	3
Other		9.4%	17.9%	42.7%	330
Institutes		11.0%	22.6%	36.1%	310
		7.8%	16.2%	42.1%	321

The chi square goodness of fit test was used to compare the observed number of applications scoring at or better than the 10th and 20th percentiles to the number of applications expected to score at those percentiles or better. All comparisons were considered significant at $p<.05$.

* For the years indicated, significantly lower proportions of applications than expected scored at or above the indicated percentile.

In the analysis of scoring by the reorganized CSR neuroscience study sections, in some years there is a slight but significant under-representation of NIA-assigned applications that score at or better than the 10th and/or 20th percentiles (see Table 1). However, it appears there has been a trend of improvement in the proportion of NIA applications that score at or better than the 20th percentile over the four years studied. The underlying causes of these trends have not been considered here.

Conclusions

Data analyzed in this evaluation generally indicate that CSR's neuroscience study sections are functioning well. The data also are consistent with the interpretation that the principles set forth by outside working groups composed of NIH Institutes representatives and extramural scientists to guide CSR's neuroscience reorganization were initially followed and adherence to these principles has been generally sustained.

In areas where concerns have been raised, including the need for improvement in reviewer training, the need for "senior reviewers" and review of new investigator applications, these concerns generally, extend beyond the neuroscience study sections and CSR is taking steps to address these concerns.

Observations of some under representation of NIA-assigned applications that score at or below the 10th and 20th percentiles suggest that the scoring behavior of the neuroscience study sections should continue to be monitored with special attention given to scoring trends for applications assigned for funding consideration to NIA.

General Overview

In June of 1998, study sections of the Center for Scientific Review's (CSR's) three new neuroscience Integrated Review Groups (IRGs) met for the first time. The reason for creating these new IRGs and the process and principles that were used to develop a reorganized neuroscience review structure are presented in several places throughout this document to establish appropriate context and rationale (see Chapter 2 for a complete treatment) for evaluative efforts that were undertaken and are not recapitulated here.

CSR initiated several efforts to examine the outcomes of reorganization. In planning these activities, input was obtained from two formal committees. The CSR Evaluation Advisory Committee included individuals with expertise in measurement and evaluation design, who were suggested by major professional organizations such as the American Psychological Society. The Neuroscience Advisory Group, chaired by Dr. Elliot Postow of CSR, was also convened to solicit the advice of the neuroscience community. Its membership included both NIH program staff and neuroscience researchers from the academic community (see Chapter 2, Appendix 2.A).

CSR's evaluation of its neuroscience review reorganization is presented in this document in three chapters.

Chapter 1: ***Center For Scientific Review (CSR) Advisory Committee ad hoc Working Group Reports on CSR Neuroscience Integrated Review Groups***

Reports from ad hoc Working Groups of the CSR Advisory Committee studying the neuroscience IRGs and the actions CSR took in response to these observations are summarized. Observations for these IRG Working Group reports took place in October 2000. The reports represent the first systematic external analysis of CSR's neuroscience review operations since component study sections of CSR's new neuroscience IRGs began meeting. These reports have been presented to the CSR Advisory Committee and common themes were discussed at the CSR Advisory Committee meeting on January 28, 2002.

Chapter 2: ***Outcomes of Neuroscience Review Reorganization: Perceptions of R01 Applicants and NIH Program Officials***

The results of two surveys, expressly done for this evaluation, form the bulk of this report.

The first survey, administered to 1758 scientists who recently submitted grant applications that were reviewed in the reconfigured neuroscience study sections, was conducted in October 2001. All applicants who submitted a new or competing renewal R01 application between June and November 2000 were queried about their satisfaction with the review of their applications and their perceptions regarding how well reviewers seemed to understand various aspects of their proposed research. The subset of these scientists who had also applied for R01 research grants in the year preceding the reorganization of neuroscience review also were asked to judge how the review of their applications had changed (if at all) and the possible reasons for this change. These surveys were administered either by hard copy or online (via the World Wide Web).

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Chapter 3: ***Analysis of Center for Scientific Review Neuroscience Study Section Captivity and Study Section Scoring Behavior***

One of the operating principles of the reorganization of the neuroscience study sections was that applications being considered by a study section should be determined by the scientific focus of the research, rather than by the professional affiliation of the principle investigator. Another operating principle of the neuroscience reorganization was to allow flexibility in review so that the range of scientific expertise of study sections overlaps. An expected outcome of reorganization based on these principles was a substantial decline in "captive" study sections. A study section is commonly defined as captive at NIH if the percent of applications that the study section reviews for any one Institute or Center (IC) is 80% or greater. Thus, one aspect of this evaluation was to examine the captivity of the neuroscience study sections.

A hallmark of fair peer review is that no particular group of applications is disadvantaged or, for that matter, overly advantaged in a study section. For example, grant applications should be reviewed without regard to their IC assignment. This part of the evaluation analyzed the scoring behavior of the neuroscience study sections for applications sorted by the IC to which they were referred. Application scores were sorted based on the primary IC where they were considered for funding and the percentages of R01 applications ranked at or below the 10th and 20th percentiles were calculated. The percentages of unscored or "streamlined" applications were also calculated. While trends of high or low scoring patterns for applications referred to individual ICs may warrant further examination and continued monitoring, it also is appreciated that such trends may not be the result of a flaw in peer review, but rather may result from any number of factors, such as differences in the maturation level of different scientific areas, etc.

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CHAPTER 1

Center For Scientific Review (CSR) Advisory Committee ad hoc Working Group Reports on CSR Neuroscience Integrated Review Groups

In September 1998, the CSR Advisory Committee recommended the formation of ad hoc Working Groups to provide advice on the organization, management, and leadership of the IRGs and their component study sections. The goal was to ensure that all applications assigned to the IRGs consistently receive high quality reviews. The Working Groups were to include active, widely respected researchers in disciplines related to those reviewed by the IRGs.

To develop their reports, the IRG Working Groups examining the three neuroscience IRGs attended the study section meetings during the October 2000 Council round. This was approximately two years after CSR completely reorganized its review structure for neuroscience to accommodate review responsibilities for the National Institute on Drug Abuse (NIDA) and National Institute of Mental Health (NIMH), whose research components were transferred to NIH as a result of Public Law 103-321. This reorganization of neuroscience review at CSR resulted in the institution of three new neuroscience IRGs: Brain Disease and Clinical Neuroscience (BDCN) with six study sections (BDCN-1 - BDCN-6); Integrative, Cognitive, and Functional Neuroscience (IFCN) with eight study sections (IFCN-1 - IFCN-8); and Molecular, Cellular, and Developmental Neuroscience (MDCN) with seven study sections (MDCN-1 - MDCN-7).

Working Groups were constituted, conducted their reviews of their assigned IRG, and developed their reports. Rosters and summaries of observations for all 19 Working Groups, and also actions in response to these observations are presented at http://www.csr.nih.gov/EVENTS/IRG_WG_Summary.htm. The IRG Working Group report for MDCN was presented to the CSR Advisory Committee on September 25, 2000 and IRG Working Group Reports for BDCN and IFCN were presented the this committee on January 23, 2001. A final report on common themes in all IRG Working Group reports and actions CSR has taken to in response to these observations was presented to the CSR Advisory Committee in January 2002 (http://www.csr.nih.gov/drgac/jan02min.doc).

The IRG Working Group reports are the first systematic external analysis of CSR's neuroscience review operations since the new study sections began meeting in June 1998. This chapter summarizes some of primary observations made by the neuroscience Working Groups and CSR actions in response to these observations.

Charge and Operations of Working Groups

Each of the Working Groups (rosters for the neuroscience IRG Working Groups are attached in Appendices 1.A.1-1.A.3) reviewed the organization and operation of study sections within an IRG. They specifically assessed the scope and depth of the study sections review responsibilities, the distribution of topics and grant applications among study sections, shared interests between/among study sections, and the capability of the study sections to recognize and assess novel approaches, concepts, and methodologies that may emerge in the portfolio of grant applications reviewed in the IRG. The Working Groups also examined the manner in which

different grant mechanisms were reviewed and the consistency of review practices among the several study sections of the IRG. They considered the procedures and criteria used to select both charter and temporary members of the study sections and discussed ways these practices could be changed to improve the review process. The appropriateness of the specific areas of expertise represented among study section members was also examined. In addition, the Working Groups examined how Scientific Review Administrators (SRAs) and manage the review process to ensure fair, comprehensive, and consistent reviews.

To develop their reports, Working Group members attended at least one study section meeting and participated in the review of grant applications as a temporary study section member. They subsequently wrote a review of their study section experiences, discussed these experiences in meetings with other Working Group members and CSR review staff, and then prepared a final report.

For this summary, IRG Working Group comments are categorized into three general areas: (1) scope and breadth of the science reviewed; (2) appropriateness, qualifications, and stature of the reviewers; and (3) meeting management. Some comments pertain to more than one of the areas listed above. To avoid redundancy these comments were placed in the section that appeared to be the best fit.

Observations of Neuroscience Working Groups

1 Scope and Breadth of Science Reviewed

1.1 Study Section Workload

Review workload has impact on the effectiveness of the peer review process. Workload has to be balanced with the cohesiveness of the science reviewed to optimize the functioning of study sections. A workload of 60 to 80 applications per study section each review round is generally considered optimal (see http://www.csr.nih.gov/events/IRG_WG_Summary.htm).

The BDCN Working Group did not make any specific comments regarding the impact of workload on the function of any BDCN study sections, though the small number of applications that some study sections reviewed was noted. The IFCN Working Group recommend reviewing vestibular grants in IFCN-5 rather than IFCN-6 since this would be scientifically appropriate and would help balance the workloads of these study sections. The IFCN IRG Working Group also commented that CSR should consider ways to be proactive rather than reactive in its approach to distributing applications and possibly revise its review structure into "ideally-sized" study sections. However, there were no specific recommendations on how this might be accomplished. The MDCN IRG Working Group recommended adjustments to the boundaries of existing study sections and possibly eliminating one study section to ensure that all study sections handle 60-90 applications during an average review cycle. MDCN-2 was identified as reviewing too many applications. There was a recommendation to modify the boundaries of some MDCN study sections to ensure that individual study sections have broad focus and can adjust, if needed, in order to more equitably distribute workload.

1.2 Cohesiveness of Research Topics

The BDCN IRG Working Group expressed concern that BDCN-1, BDCN-4, BDCN-5, and BDCN-6 were reviewing research areas that might be too broad or not optimally coherent. The Working Group recommended collapsing BDCN 1-5 into three study sections and keeping BDCN-6 as a separate study section as a remedy. The IFCN IRG Working Group indicated that some study sections review a very broad range of applications. The IFCN IRG Working Group also commented that techniques (e.g., genetics, computational) should not be the basis of separate study sections and that study sections need to accommodate expertise in any emerging approach to scientific problems. The MDCN IRG Working Group commented that some study sections had drifted from optimal balance between breadth and expertise. This "drift" resulted in different outcomes. Some study sections in the MDCN IRG were viewed as too narrowly focused, others were considered "bimodal" (involving separate groups with little cross-discipline expertise), and still others were felt to be too broad, requiring excessively large review panels to ensure appropriate expertise.

1.3 CSR Actions

No action regarding workload or cohesiveness was taken with the BDCN IRG. There was no clear way to collapse 5 study sections (BDCN 1-5) into 3 study sections while decreasing the breadth of the science reviewed by individual study sections.

In the IFCN IRG, applications relating to vestibular system involvement in sensorimotor integration were moved to IFCN-5. In addition, the spread of a given topic among many study sections is carefully monitored to ensure that a critical mass of expertise is available in the group reviewing a given topic.

In the MDCN IRG, study section referral/review guidelines were modified to reduce the heavy workload of MDCN-2. MDCN-1 now handles applications focused on glycolipid/glycoproteins and MDCN-5 now handles applications focused on mitochondria. This shift in review locale is designed to net MDCN-2 a workload reduction of 10 to 30 applications per round.

2 Appropriateness, Qualifications, and Stature of the Reviewers

2.1 General Observations

All three neuroscience IRG Working Groups generally acknowledged that reviewers serving on neuroscience IRG study sections were mostly appropriate and provided fair reviews. However some concerns were expressed. The need for "senior" or "experienced" reviewers was a consistent theme and is treated in a separate section (2.2).

The BDCN IRG Working Group commented that in some study sections a majority of the reviewers were in the early to middle parts of their careers and too junior for the responsibility of study section service. There was also concern that in some cases clinical expertise was under-represented; and conversely, the rigor of review of cellular and molecular research in one largely clinical study section was questioned. Regarding study section membership, there was a general concern that it is becoming

more difficult to recruit scientists to serve on study sections because of the added time, workload, and effort required. Finally, it was noted that a lack of commitment, as evidenced by study section members arriving late and leaving early, might be the result of the study sections in the BDCN IRG not being chartered.

The IFCN IRG Working Group emphasized that study section membership should reflect the interdisciplinary nature of research today. It was noted that stable study section membership with appropriate representation of women and minorities is important. The presence of a core group of regular member reviewers that the applicant can identify and in whose expertise they have confidence was considered essential.

The MDCN IRG Working Group expressed its sense that while qualified reviewers had generally been recruited, improvement seemed possible in many study sections. SRAs must be intimately familiar with science and scientists to fulfill their responsibilities and recruit qualified and high profile reviewers. The Working Group stressed that SRAs must regularly attend scientific meetings to be familiar with the scientific directions and the prominent and emerging scientists in each area covered by their study section. The IRG was encouraged to devise mechanisms to support SRAs in efforts to recruit study section members and chairs. It was also generally recognized that all the neuroscience IRGs were tardy in chartering their study sections.

2.2 Senior/Experienced Reviewers

The BDCN IRG Working Group expressed concern that "junior" reviewers seemed to lack perspective on what was reasonable to accomplish during one grant funding period and had a narrower focus than more senior members of study sections. The IFCN IRG Working Group recommended increasing the number of experienced, mature reviewers used on review panels. Experienced reviewers were thought to be important in setting examples and providing broad expertise. The MDCN IRG Working Group recommended implementing a second track of study section membership for distinguished senior reviewers. To encourage service, it was suggested that members on this second track be allowed to make commitments to fewer meetings per year.

2.3 CSR Actions

Regarding concerns about clinical reviewer representation in the BDCN IRG, CSR has retained the services of Dr. Theodore Kotchen as Special Advisor on Clinical Research. He is studying CSR review practices and will suggest new approaches to reviewing clinical research proposals. Also, the BDCN IRG is in the process of chartering its study sections. The BDCN-1 study section is currently chartered and progress is being made toward chartering the other study sections in the IRG. It should be noted that a new BDCN IRG Chief has been hired since the time that the BDCN IRG Working Group met. In addition there has been substantial turnover in SRAs overseeing meetings within the IRG. Recent visits to BDCN study section meetings by the BDCN IRG Chief and other CSR officials have not identified any problems with reviewer attendance or punctuality. In general, the meetings seem to be running with a new level of energy.

The majority of the IFCN IRG study sections are now chartered and the IRG continues to make progress in chartering all of its study sections.

Regarding comments by the MDCN IRG Working Group about SRAs attending scientific meetings, CSR encourages its SRA staff to attend at least one scientific meeting per year and supports attendance of additional meetings as budget and work coverage considerations allow. Concerns about the tardiness of chartering its study sections resulted in positive action by the MDCN IRG. MDCN was the first neuroscience IRG to charter all of its component study sections (MDCN-1 to MDCN-7).

CSR is implementing a "senior reviewer" pilot during the June 2003 review round. Initially, six study sections from across CSR will participate. In this pilot, senior reviewers will be added to study sections to bring additional broad scientific perspective to the review and help set and maintain proper tone for the meeting. It is intended that senior reviewers will be widely recognized as leaders in their field. Minimum eligibility requirements for "senior reviewers" include a strong publication record and history of grants support, current involvement in directing research, and previous full-term service on a chartered study section.

3 Meeting Management

3.1 Orientation

The BDCN IRG Working Group commented that it would be helpful if the SRA and Chair organized an orientation meeting for new study section members. The focus of this orientation meeting would be instruction on presenting reviews at the study section meeting. It was felt that this orientation would improve the quality and consistency of the reviews and discussions. The IFCN IRG Working Group took the idea of an orientation meeting a step further. This group suggested that there should be a comprehensive and uniform orientation and training session for all Chairs as well as orientation and training for new or ad hoc members of study sections before they start their term. It was thought that this training would help improve the discussion and the calibration of scores, as well as foster proactive leadership. While the MDCN IRG Working Group did not specifically call for training of reviewers and Chairs, it did comment that there were differences in the roles assumed by Chairs of the various study sections within the IRG. Some were criticized for being over-domineering and others for being excessively passive. It was the sense of the MDCN Working Group that feedback could correct these problems.

3.2 Review Package Materials

The IFCN Working Group commented that the package of instructions sent to reviewers can be overwhelming. It should be made more user friendly and clearer.

3.3 Assignment of Applications To Reviewers

The IFCN Working Group had two concerns regarding assignment of applications. First, for revised applications, there should be some continuity of reviewers, but the review team should not be exactly the same team that reviewed the application previously. It was also recommended that a reader with broad perspective be

assigned to revised applications. Second, it was recommended reviewers' review loads should be six to seven written reviews and not exceed ten written reviews. In addition, it was suggested that each reviewer's assignment load should be balanced equally between primary and secondary assignments.

The MDCN IRG Working Group noted that including more than 30 persons in a meeting impaired the functioning and fairness of the study section. The Working Group recommended that individual study sections should not have more than 20-25 permanent members with 5-10 temporary members recruited for special expertise to individual meetings.

3.4 Unscored Applications

The IFCN Working Group recommended that CSR develop a more systematic approach to unscored applications. There was an additional concern that there should be improved instructions to reviewers on preparing critiques to reflect adequately the reasons for merit evaluations of both scored and unscored applications. The MDCN IRG noted that not all study sections use the same procedure for identifying applications for streamlining. They suggested submitting scores in advance of the meeting and compiling a list of applications recommended for streamlining based on these scores.

3.5 Review of Fellowship Applications

The BDCN IRG Working Group commented that fellowship applications should be reviewed separately from R01 applications. The IFCN IRG Working Group recommended reviewing fellowship applications in separate study sections or "en bloc". The MDCN IRG Working Group commented that study section members could not easily make the "mental shift" required to apply the criteria for "F" applications appropriately when only a small number were included in the group of proposals to be reviewed.

3.6 Matching SRAs to Study Sections

The MDCN IRG Working Group suggested that it might be possible to reassign some SRAs within the IRG to create better fits among the SRAs and the meetings that they oversee.

3.7 CSR Actions

The training of reviewers and Chairs is a long-standing concern for CSR. In a recent effort specifically addressing training, CSR established a committee to suggest "recommended practices" for training reviewers and Chairs and to develop materials to facilitate the training process. In its work, the committee incorporated suggestions of materials that should be included in the pre-meeting packages and addressed ways to avoid overwhelming new reviewers. The committee presented its recommendations and materials to the CSR Advisory Committee in September 2002 and the materials are now being finalized for publication on CSR's Internet and Intranet sites as appropriate. While the committee carefully considered the possibility of specific training meetings for new reviewers and Chairs, it was felt that this would be an additional burden on reviewers and potential barrier to service and

therefore did not recommend instituting training meetings.

All of the Working Groups' suggestions regarding assignment of applications to reviewers parallel standard practices at CSR. SRAs are trained to assign readers with broad perspective to all applications and to pay particular attention in this regard to revised applications; it is standard practice to limit the number of written reviews for each reviewer to less than ten and to evenly distribute primary and secondary assignments; and SRAs are encouraged to limit the number of reviewers to 30 or fewer.

Use of the Internet Assisted Review (IAR) system is now widespread across CSR study sections. This system allows reviewers to view the critiques and preliminary scores of other reviewers prior to the meeting and thereby enhances the meeting by making reviewers more informed. Because reviewers feel less pressured and more prepared for discussion, meeting time is used more productively, and the overall quality of the reviews is improved. The IAR is also helpful in the streamlining process. Those applications that receive 1) high scores or recommendations to be "unscored" and 2) uniformly unenthusiastic critiques are known prior to the meeting. This information is then used at the meeting to speed and enhance (by facilitating informed decisions) the streamlining process.

Beginning with the August 5, 2001 submission date, CSR began reviewing nearly all fellowship applications in dedicated fellowship study sections. It is hoped that this change in CSR's review policy will help ensure proper emphasis on the training opportunity and provide clear separation from the review of R01 applications.

Finally, the MDCN IRG, working with professional societies for guidance, implemented several staffing changes to improve the quality of review and enhance efficiency. These staffing changes were announced to the NIH community in May 2001.

Summary of CSR Actions

The following lists key CSR actions in response to comments of the neuroscience IRG Working Groups in some cases:

BDCN IRG

- Enhanced efforts to charter study sections BDCN-1 through BDCN-6

IFCN IRG

- Enhanced efforts to charter study sections IFCN-1 through IFCN-8
- Movement of applications relating to vestibular system involvement in sensorimotor integration to IFCN-5
- Monitoring the spread of a given topic among study sections to ensure a critical mass of expertise

MDCN IRG

- Enhanced efforts to charter study sections MDCN-1 through MDCN-7

- Modification of referral/review guidelines to reduce the heavy workload of MDCN-2
- Implemented staffing changes to improve the quality of review and enhance efficiency

CSR-Wide Initiatives

- Encouraged attendance by SRAs of one scientific meeting or more per year as budget and work coverage considerations allow
- Implementation of "senior reviewer" pilot, October 2003
- Development of materials and recommended practices for training reviewers and Chairs
- Expansion of the use of Internet Assisted Review
- Implementation of dedicated fellowship study section

Appendices

Appendix 1.A.1

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Appendix 1.A.3

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CHAPTER 2

Outcomes of Neuroscience Review Reorganization: Perceptions of R01 Applicants and NIH Program Officials

Effective October 1992, Public Law 103-321 transferred the research components of the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) to the National Institutes of Health (NIH). The three institutes affected by this legislation were the National Institute of Mental Health (NIMH), the National Institute of Drug Abuse (NIDA), and the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Congress recognized that each of these institutes had directed its own peer review operation and that for the purpose of achieving consistency throughout the NIH, this transfer should integrate these peer review operations with the existing policies and procedures in the NIH's Center for Scientific Review (CSR). Because changes in peer review affect the larger extramural research community and ultimately the progress of biomedical and behavioral sciences, Congress postponed the reorganization until at least 1996.

Since that time, the reorganization of peer review within the CSR has progressed systematically by categorical scientific area. With the exception of two NIAAA review committees, which were combined with two CSR study sections on a more limited scale, the first major effort involved the neurosciences. This scientific area is of interest both to the former ADAMHA Institutes and to other ICs whose applications were already reviewed by the CSR. It was decided that the CSR would completely reorganize the review of neuroscience applications rather than simply add the ADAMHA study sections or incorporate those applications into the CSR review structure. In planning this change, consultation was obtained from staff of the affected ICs and the neuroscience community as a whole.

Twenty-one new study sections were established to review neuroscience applications for all NIH ICs. These study sections were distributed across three Integrated Review Groups (IRGs): Brain Disorders and Clinical Neuroscience (6 study sections); Molecular, Cellular, and Developmental Neuroscience (7 study sections); and Integrative, Functional, and Cognitive Neuroscience (8 study sections). The new study sections first convened to review their assigned applications in June 1998.

CSR initiated several efforts to examine the outcomes of reorganization. In planning these activities, input was obtained from two formal committees. The CSR Evaluation Advisory Committee included individuals with expertise in measurement and evaluation design, who were suggested by major professional organizations such as the American Psychological Society. The Neuroscience Advisory Group, chaired by Dr. Elliot Postow of CSR, was also convened to solicit the advice of the neuroscience community. Its membership included both NIH program staff and neuroscience researchers from the academic community.[1]

Because the neurosciences review reorganization was already underway, the use of research designs that are known to yield the strongest evidence regarding the impact of reorganization was not feasible. For example, the reconfiguration of the existing study sections, along with expected negative reactions by prospective applicants, made random assignment of applications to either newly created versus previously operating study sections impossible. The

[1] The memberships of both committees are listed in Appendix A.

lack of measures for assessing the quality of the peer review process precluded having time-series data over a sufficient time period prior and subsequent to reorganization. It was believed possible, however, that the current system's performance could be monitored and its relationship to other factors assessed through the use of several sources of evidence. For example, data on grant review activity (e.g., distribution of priority scores) are regularly collected by the NIH and are available from its administrative management database (IMPAC II). Perceptions regarding how well the review process was working and whether any changes had occurred after reorganization could be solicited from applicants for NIH research grants. Although such data would not permit confident determination of the effectiveness of review reorganization, it could inform and guide future reorganization activities as well as their evaluation in other scientific areas within CSR.

GOALS AND EXPECTED OUTCOMES OF STUDY SECTION REORGANIZATION

The primary goal of the neuroscience review reorganization was to "*insure quality review of peer applications that identifies the most meritorious science for each Institute to consider funding*." With regard to the review process itself, this can be translated into more specific objectives:

- **Study sections for neuroscience research should**:
  - Be organized by scientific focus rather than Principal Investigator (PI) affiliation, grant mechanism, or proposed research technique.
  - Consider science that represents a breadth of perspectives and depth of scientific expertise.
  - Have expertise that overlaps to provide flexibility in review.
  - Represent expertise in both basic and clinical research as appropriate.

- **Clusters of study sections that review similar types of research (IRGs) should be sufficiently flexible to accommodate emerging scientific areas.**

- **Research grant applications in the neurosciences should**:
  - Be assigned (referred) to the study section that is appropriate for the proposed research.
  - Be reviewed by individuals with appropriate expertise.
  - Be judged on the criteria identified by the NIH and scored according to stated procedures.
  - Have summary statements that communicate reviewer judgments and their rationale clearly and accurately to applicants.
  - Be selected for funding if they are most meritorious.
  - Be at no distinct disadvantage if submitted by individuals from specific groups (e.g., young investigators or patient-oriented researchers).

- **The review process should strengthen the missions of relevant institutes** by accurately assessing the quality of the proposed research.

Sources of Data on Outcomes

The CSR initiated several efforts to collect information relevant to examining the extent to which each of these outcomes has occurred. These include:

- **A survey of all members of CSR study sections** (including the 21 neuroscience groups) was conducted in the summer of 2000. Members were asked about their perceptions of study section functioning and the helpfulness of materials and staff for carrying out their review responsibilities. Although separate results for the neuroscience study sections were not reported, the findings did provide information on the perceptions of study section members as a whole (Herzenberg, 2001).

- **Expert opinions of the neuroscience research community** were obtained through the establishment of Working Groups that observed the functioning of the newly configured study sections and IRGs during the Fall 2000 Council rounds. Separate reports were issued by each of the three neuroscience IRGS in addition to an overall summary of Working Group findings and recommendations for all IRGs that had been reconfigured, including those in the neurosciences and other research fields (Center for Scientific Review, 2002--see Chapter 1).

- **A survey of 1758 recent applicants** to the reconfigured neuroscience study sections was conducted in October 2001. All applicants who submitted a new or competing renewal R01 application between June and November 2000 were queried about their satisfaction with the review of their applications and their perceptions regarding how well reviewers understood various aspects of their proposed research. Individuals who had applied for R01 research grants in the year preceding study section reorganization also were asked to judge how the review of their applications had changed (if at all) and the possible reasons for this change. In addition, a handful of questions on satisfaction with the review process that were previously used in a 1997 survey of R01 applicants was included (Pion, Schaffer, Sedar, Marks, & Bouffard, 1999). Provided a sufficient number of responses, this would allow a comparison of satisfaction levels among neuroscience applicants in 2001 with those of respondents to the earlier survey.

- **A survey of 103 program staff in the NIH Institutes** that had applications assigned to the neuroscience study sections during the same time period was conducted. The survey also was administered in October 2001 and sought staff views on the functioning of the review process both overall and for specific fields and subgroups. When appropriate, the questions were constructed to parallel those asked of the applicants.

This Chapter focuses on the findings from the surveys of neuroscience applicants and NIH program staff that were conducted in Fall 2001.

Design of the Neuroscience Applicant Survey

The purposes of this survey were (1) to obtain information on applicants' current satisfaction with the NIH grant application and review process; and (2) to acquire some sense of how they viewed this process relative to the one that existed prior to reorganization of the neuroscience study sections. A questionnaire was developed and was reviewed by several members of the IRG Working Groups, the Neuroscience Advisory Group, the CSR Evaluation Advisory Committee, and CSR staff. The final survey instrument included items on: (1) applicant experiences in recently submitting a research grant application that was reviewed by a neuroscience study section; (2) the extent to which these experiences differed from those for applications reviewed prior to implementation of the reorganization; (3) their judgments regarding the degree to which these changes were associated with how study sections were reconfigured versus other factors; and (4) relevant background characteristics.[2]

All 1,758 individuals who submitted at least one new or competing renewal application between June 1 and November 1 of 2000 to one of the 21 neuroscience study sections were included in the survey sample. This time period was chosen because it occurred after study sections had been reorganized, it allowed sufficient time for the newly reconfigured study sections to stabilize, and it was not so long ago that applicants could not remember their experiences.

As the survey was being designed, it was unclear which mode of administration would yield the optimal response rate. Although a previous large-scale applicant satisfaction survey conducted by mail achieved an 85% response rate (Pion et al., 1999), advances in computer technology and increased use of the Internet and e-mail allowed consideration of a web-based survey. Because there was little experience with web surveys of the NIH target population and because prior research on response rates to Web surveys was scarce and reported mixed results, it was decided that a randomized trial of the Web versus mail modes of administration would be conducted.

Eight hundred and eighty individuals were randomly assigned to receive a mail questionnaire, and 878 were included in the web survey sample. On October 11, 2001, an advance letter was sent to applicants in both samples, informing them of the survey's importance and asking for their cooperation and confirmation of address information. Approximately 8-11 days later, the survey was either mailed or its web link e-mailed to applicants, depending on their sample assignment, and one week after that, reminder postcards/e-mails were sent to nonrespondents. After another two weeks had elapsed, another survey was mailed/e-mailed to all nonrespondents. Finally, attempts were made to contact all remaining nonrespondents by telephone three weeks after that.

Of the 1,758 applicants, seven no longer resided in the United States or were deceased. Another 85 individuals informed the survey contractor that they had not applied during the requested time period (32 in the mail sample and 53 in the web sample), thus, making them ineligible. Overall, 137 applicants did not complete the mail survey and 119 did not respond to the web survey. This resulted in a total of 1,410 usable questionnaires.

To determine the response rate, two measures are useful. The first is the upperbound response rate, also known as the cooperation rate, which is computed as I/(I+R), where I = the

[2] Appendix B includes a copy of the applicant questionnaire.

number of completed surveys and R = the number of refusals. This rate measures the level of cooperation attained among those identified, reached, and eligible. For this survey, the cooperation rate was 85%, and this figure was similar for both the mail and web samples. The second measure is the lower bound response rate, which measures the amount of completed surveys per total sample. The lower bound response rate was 80%.[3]

Characteristics of applicant respondents. Of the 1,410 individuals who responded to the survey, slightly over three-quarters (79 percent) were male, and 5 percent self-identified underrepresented minorities.[4] As would be expected, the large majority (75 percent) had earned the PhD, 11 percent had completed the MD, and another 11 percent held both degrees. The remaining 3 percent were mostly other types of dual-degree holders (e.g., the DVM and the PhD). On average, approximately 18.5 years had passed since respondents had completed their degree (SD = 9.7 years). Nearly all respondents (97 percent) were employed in institutions of higher education; of this group, 40 percent were professors, 27 percent were associate professors, 28 percent held the rank of assistant professor, and 5 percent were either Instructors or Lecturers or were working in research, non-faculty positions. Approximately 40 percent were employed by institutions ranked in the top 25 of those receiving NIH research funding in FY 2001, and this figure increased to 61 percent if the top 50 institutions are considered.

Consistent with the types of research funded by the NIH, nearly three-quarters (74 percent) identified themselves as basic biomedical investigators. Considerably smaller proportions were behavioral scientists (14 percent), were conducting patient-oriented research (10 percent), or described their research as having another focus, e.g., design-directed (3 percent). Slightly over 90 percent reported that they were a principal investigator (PI) on one or more sponsored research projects, and 64 percent indicated that they were a PI on an NIH research grant. In terms of their success on the application referenced in the survey, 37 percent had been awarded funds.

The web and mail samples were compared on a variety of respondent characteristics, including current NIH funding status, research focus, and demographic characteristics (e.g., gender and highest degree). No significant differences were found (see Appendix 2.E-2). Consequently, the results for the two samples are reported as a whole.

Design of the Neuroscience Program Staff Survey

The *Experiences of NIH Program Staff with the Review of R01 Applications in the Neurosciences* survey was designed to elicit information from experienced program officials working in the NIH Institutes that fund neuroscience research. Of interest were their perceptions regarding: (1) the characteristics of study section memberships that were consistent with the goals of review reorganization, e.g., appropriate scientific breadth and experience; (2) the extent to which study sections understood the criteria for reviewing applications; (3) whether the qualities of study sections such as scientific breadth had improved, remained the same, or worsened since review reorganization; and (4) the degree to which these changes were associated with how study sections were reorganized versus other factors.[5]

[3] Appendix Table E-1 provides more detailed information on applicant participation in the survey.
[4] Appendix Table E-2 presents information on the demographic and educational backgrounds of the respondents, along with selected characteristics of their R01 application and NIH funding status.
[5] Appendix C includes a copy of the program staff questionnaire. In developing this survey instrument, input was received from CSR staff, along with NIH staff who were members of the Neuroscience Advisory Group.

Individuals in relevant positions were those who handled R01 grant applications assigned to their respective institute and reviewed by one of the newly constituted neuroscience study sections. These staff members are often involved in the review process in numerous ways. They can suggest individuals with the appropriate expertise who can serve on study sections, help prospective applicants identify study sections that may be most appropriate to their application, attend study section meetings where applications of interest to their institute are discussed, and respond to questions about the review from applicants. As such, their perceptions provide another perspective of the review process and any changes since reorganization – one that is grounded in experiences with a range of research topics, multiple study sections and their group processes, and applicants from several different disciplines.

A representative of each institute was asked to identify members of their staff who were familiar with the review of applications by the newly reconfigured neuroscience study sections.[6] Based on their responses, 103 individuals in 10 institutes were asked to complete a web survey in October 2001. Follow-up strategies were the same as those used for the applicant sample that received web surveys, with the addition of a final request to nonrespondents by e-mail in early January 2002. Nineteen of the 103 staff members were later excluded from the survey population after it was determined that they had not handled any R01 applications reviewed by the CSR neuroscience peer review committees for their institute during the specified time period. Of the remaining 84 individuals, 62 returned usable questionnaires.[7] Participation did vary among institutes. Whereas strong cooperation rates (93 to 100 percent) characterized staff from such institutes as the National Institute on Aging (NIA), the National Institute of Deafness and Communication Disorders (NIDCD), and the NIMH, this was noticeably less true for program officials in the NIDA, the National Institute of Neurological Disorders and Strokes (NINDS), and the National Institute of Child Health and Human Development (NICHD), where the response rates were 67, 55, and 55 percent, respectively. [8]

Characteristics of program staff respondents. Among program officials who completed the survey 21 percent were from the NIMH, 19 percent were from the NIDA, and 19 percent worked in the NINDS. The NIA, NIDCD, and NICHD each accounted for between 9 and 11 percent. The remaining 10 percent were from the other four institutes that consider R01 applications reviewed by neuroscience study sections for funding, namely, the National Institute of Arthritis and Musculoskeletal Disorders (NIAMS), the National Institute of Diabetes, Digestive, and Kidney Disorders (NIDDK), the National Institute of Dental and Craniofacial Research (NIDCR), and the National Institute of General Medical Sciences (NIGMS). In general, this distribution mirrors that of all program staff who were eligible to complete the survey, with one exception. Whereas NINDS staff comprised 26 percent of the survey sample, they accounted for 19 percent of respondents (see Appendix Table 2.E-3).

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[6] Eligible staff included those who had handled one or more R01 grant applications that were assigned to their respective Institutes and reviewed by CSR neuroscience study sections between October 1, 2000 and March 31, 2001.

[7] The upper bound response rate or cooperation rate was 73.8 percent. If the amount of completed surveys per total sample is used, the lower bound response rate was 60.2 percent.

[8] These are the upperbound response or cooperation rates. More detailed information on staff participation in the survey is reported in Appendix Table E-3.

Program staff respondents appeared well acquainted with the review of neuroscience research applications. Nearly all (92 percent) were familiar with the review of R01 applications that focused on basic biomedical research. Slightly more than half (52 percent) had been assigned applications proposing patient-oriented research; the corresponding figures for applications that focused on behavioral and other (e.g., design-directed research) were 40 and 27 percent, respectively. The majority (61 percent) of program staff reported that they had handled at least one application that was reviewed by study sections within BDCN, and the same was true for the handling of applications reviewed by MDCN study sections. Half of the institute officials had been involved in the review of applications assigned to IFCN review groups. The median number of applications assigned to individual program staff was 30; however, this varied markedly among institutes. Much heavier application loads were typical of program staff from the NINDS, the NIMH, and NIDA (median number of applications = 50).

Given responsibility for multiple applications, program staff typically had interacted with CSR staff and members of several study sections. On average, program staff reported contact with 4.1 study sections (SD = 2.7) during the two application rounds of interest, but again, this was not the same for all institute staff. The most noticeable difference was that NINDS staff handled applications that were spread across nearly twice as many study sections (mean = 7.8). If one looks at the exposure to study sections within the three different IRGs, 39 percent had one or more applications assigned to study sections in each of the three IRGs, and 31 percent had applications assigned to two IRGs. The experience with neuroscience review had been confined to study sections within IFCN for approximately one-fifth of program staff (21 percent), and only a minority (9 percent) had applications that were reviewed by only MCDN or BDCN study sections.

PERCEIVED OUTCOMES RELATED TO STUDY SECTION AND IRG COMPOSITION

One impetus for reconfiguring study sections in the neurosciences was to ensure quality review by having the IRGs and study sections within them reflect the state of science in this area. This was translated into the expectation that the newly established review groups would:

- Be organized by scientific focus rather than PI affiliation, grant mechanism, or proposed research technique.
- Be able to judge science on a breadth of perspectives and depth of scientific expertise.
- Have expertise that overlaps to provide flexibility in review.
- Represent expertise in both basic and clinical research as appropriate.

Further, it was hoped that grouping study sections into IRGs would enhance the capacity of the CSR to review new and emerging areas of science and be more responsive to broader changes in scientific investigation.

The NIH program staff survey addressed a subset of these expectations in two ways. First, program staff members were asked to rate the appropriateness of the current neuroscience study section memberships on several characteristics, including scientific breadth, scientific experience, depth of scientific expertise, and ability to accommodate emerging areas of research. Staff members who were involved in the review of neuroscience research prior to reorganization

(between June 1997 and May 1998) were also requested to compare their recent experiences with those that they had with relevant study sections prior to the neuroscience review reorganization. [9]

Scientific Breadth, Experience, and Depth of Expertise of Study Section Members

Depending on the variable of interest, between two-thirds and three-quarters of staff respondents believed neuroscience study section memberships to be "very appropriate" or "appropriate" in terms of scientific breadth, depth of expertise, and experience (see Table 2.1). Ratings of "somewhat appropriate" were provided by 23 to 30 percent. Only small minorities of staff rendered harsher assessments (responses of "not very appropriate" or "inappropriate").

Table 2.1
NIH Program Staff Perceptions of Study Section Membership and Changes in Composition After Neuroscience Review Integration

Member Characteristics	Appropriateness				Compared to Before Reorganization of Study Sections			
	Very appropriate or Appropriate	Somewhat appropriate	Not very appropriate or Inappropriate	*N*	Substantially or Somewhat better	About the same	Substantially or Somewhat worse	*N*
Scientific breadth	66.7	30.0	2.3	60	30.8	43.6	25.6	39
Depth of scientific expertise	71.7	25.0	3.3	60	28.2	59.0	12.8	39
Scientific experience	75.0	23.3	1.7	60	28.2	59.0	12.8	39
Representation of all relevant disciplines	73.3	23.3	3.3	60	46.2	38.5	15.4	39
Demographic diversity	69.0	24.1	6.9	58	27.0	67.6	5.4	37
Ability to accommodate emerging areas of research	36.2	43.1	20.7	58	33.3	51.3	15.4	39

Note. Percentages may not total to 100.0 percent due to rounding.

[9] These survey questions focused on staff experiences with the review process for neuroscience research applications that had been submitted between February 1997 and March 1998. The study section meetings for these applications occurred between June 1997 and May 1998.

Staff who had been involved in neuroscience review before reorganization were asked to judge how these member qualities had changed since review reorganization. Between 28 and 31 percent judged the composition of study sections in neuroscience to have improved in terms of the breadth, expertise, and experience represented. The more common view, however, was that there had been no change; 59 percent perceived the depth of expertise and research experience to have remained the same, and 44 percent expressed similar views about scientific breadth. It should be noted that a response of "about the same" should not be interpreted as criticism. For example, of the 59% who saw no change in study section member experience and expertise, the majority judged them to have been appropriate prior to reorganization (76 and 81 percent, respectively).

A somewhat different situation occurred for scientific breadth, however. The proportion of institute staff who believed that the situation had, in fact, worsened (26 percent) was nearly double that for expertise and experience (13 percent). Further, among the 44 percent who viewed these qualities as "about the same", a smaller percentage (69 percent) believed them to have been appropriate prior to review reorganization.

Because neuroscience review reorganization may have had a differential impact on the NIDA and the NIMH, which were previously housed at ADAMHA with their own peer review policies, staff responses from these two institutes were compared with those from the NINDS – one of the largest institute sponsors of neurosciences research – and from staff in the other institutes surveyed. Although samples sizes were small, the data suggest that NINDS staff held more skeptical views of the scientific breadth and experience possessed by the current study sections.[10] For example, noticeably smaller fractions of NINDS staff (58 percent) rated study sections positively in terms of their breadth and experience as compared to 74 percent of NIDA and NIMH staff. A difference in opinion also surfaced between NINDS staff and those from other institutes but only for scientific experience (58 and 84 percent, respectively). The most visible disagreement was found in judgments of how these member qualities had changed. Much larger fractions of NINDS staff believed that the situation had worsened in terms of these two characteristics. For example, whereas 29 percent of NIDA and NIMH staff and 6 percent of staff from other institutes believed the breadth of study sections to have worsened, this sentiment was voiced by two-thirds of the NINDS staff who had been involved in neuroscience review before reorganization.

Responsiveness and Flexibility to Emerging Research Areas

In addition to scientific breadth, experience, and expertise, having the requisite disciplines represented in study sections and within the IRGs may work toward ensuring that the quality of review for grant applications in new research areas is high. As shown in Table 2.1, a large majority (73 percent) of institute staff surveyed believed that the necessary disciplinary perspectives are covered within the neuroscience study sections. Moreover, nearly half (46 percent) viewed this as a significant improvement over the situation that existed before review reorganization, and this proportion was noticeably higher than those obtained for scientific breadth, expertise, and experience.

These positive views, however, did not extend to the specific question about study sections' capability to accommodate emerging research areas. Only 36 percent judged reviewer membership to be appropriate – the lowest proportion reported for this set of study section

[10] Appendix E-4 presents more information on these results.

attributes. Slightly more than one fifth viewed it as not very appropriate or inappropriate (again the largest percentage for this assessment). Similar to the results for scientific breadth and experience, the most critical views were voiced by NINDS respondents where only 17 percent expressed positive views as compared to 46 percent of their NIDA and NIMH counterparts and 38 percent of staff from the other NIH institutes (see Appendix Table 2.E-4).

Study Section Diversity

Although review reorganization was not intended to aid in diversifying the demographic characteristics of study sections, increasing the participation of women and underrepresented minorities in peer review is a goal of the CSR and program staff were asked to assess the neuroscience review groups in this regard. Sixty-nine percent believed that there was appropriate representation, 24 percent saw it as somewhat appropriate, and 7 percent believed diversity to be insufficient. Two-thirds of those who had been involved with peer review prior to reorganization also felt that study section composition had not appreciably changed since neurosciences review had been reconfigured. As before, respondents from the NINDS held the least favorable views on this subject (see Appendix Table 2.E-4).

OUTCOMES RELATED TO THE REVIEW PROCESS

As previously noted, one major goal of the neuroscience reorganization was to ensure quality review for submitted applications. Review quality was operationally defined to encompass several characteristics. A neuroscientist who submits an application should expect that her/his application would:

- Be assigned (referred) to the study section most appropriate to its research focus.
- Be reviewed by individuals with appropriate expertise.
- Be judged on appropriate criteria and scored according to stated procedures.
- Have summary statements that communicate judgments and their rationale clearly and accurately to applicants.
- Be at no distinct disadvantage or bias stemming from characteristics unrelated to the quality of research (e.g., submitted by a new investigator or patient-oriented researcher).

Applicants were asked to indicate their satisfaction on each of the above for the review of the R01 application that they submitted between June 1 and November 1, 2000. They also were asked to rate their overall satisfaction regarding how the NIH handled their application. Finally, they were queried as to how well they believed reviewers understood various aspects of their application that corresponded to the review criteria used in judging the quality of the proposed research.

Applicant Satisfaction with the Assignment and Review of Their Applications

Slightly more than half (51 percent) of respondents were satisfied with their recent encounter with the application and review process, 28 percent held mixed views (i.e., they were equally satisfied and dissatisfied), and 21 percent expressed dissatisfaction.[11] Differences in opinions did surface, however, for individual components of the process, with satisfaction being highest in terms of the assignment of the application to a specific study section (see Figure 2.1). About 63 percent stated that they were completely or mostly satisfied with the review group to which their application had been referred, about one-quarter (23 percent) had mixed opinions, and 14 percent were dissatisfied. In contrast, the expertise of the reviewers and their understanding of the research design and methodology elicited substantially lower levels of satisfaction (54 and 51 percent), along with the time that elapsed between submission of the application and receipt of the summary statement (55 percent were satisfied). The helpfulness of the reviewers' comments contained in the summary statement received the weakest endorsement, with less than half (46 percent) being satisfied.

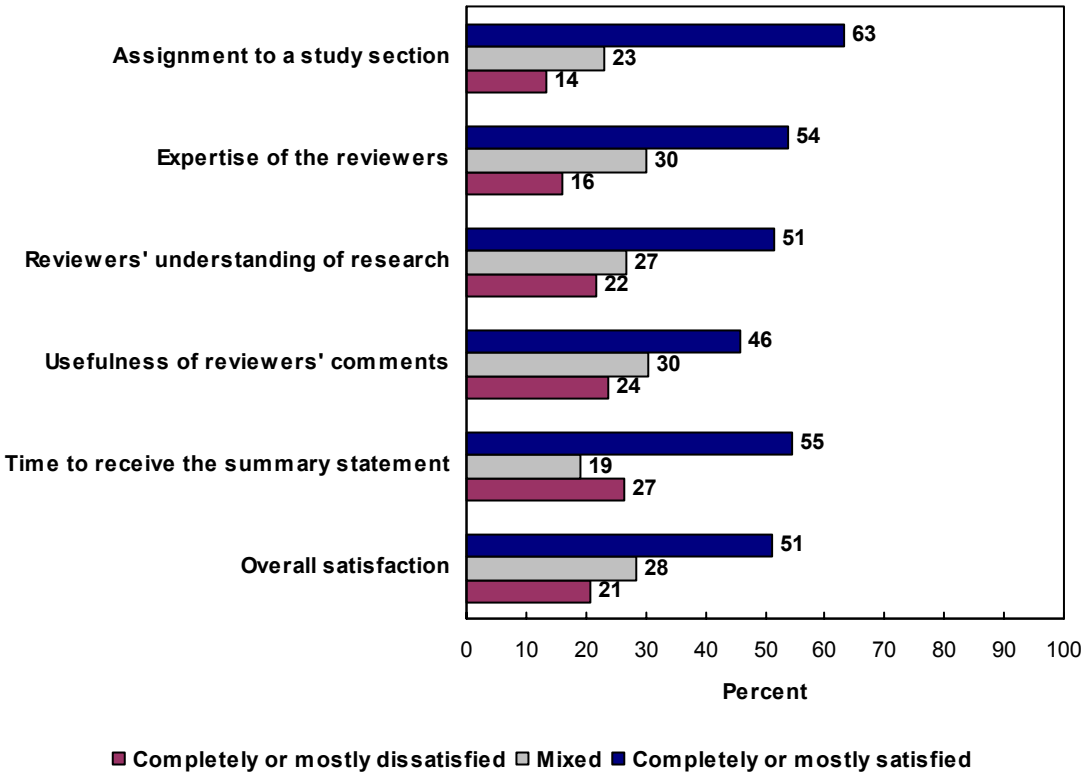
Differences in satisfaction levels by funding status of application. Typically, customer satisfaction is influenced by several factors. Not surprisingly and consistent with past applicant surveys conducted by the NIH (Pion et al., 1999), one key contributing factor to satisfaction was whether the submitted application was awarded funds. Thirty-six percent of respondents were awarded funds for the application targeted in the survey. This group was distinctly more satisfied – both overall and with regard to specific characteristics of the assignment and review process – than those whose application was unsuccessful (see Table 2.2).

Concerning the assignment of their application to a study section, about half (51 percent) of unfunded applicants were either completely or mostly satisfied with its appropriateness as compared to 86 percent of funded applicants. Even more striking disparities surfaced with regard to reviewers and the summary statements that described the strengths and weaknesses of the proposed research. For funded applicants, 80 percent were satisfied with the expertise of reviewers, and 82 percent believed that reviewers understood the proposed research design and methodology. A somewhat smaller majority (72 percent) reported that they were satisfied with the usefulness of the reviewer comments. These proportions were more than double the corresponding figures for unfunded applicants (i.e., 39, 34, and 31 percent, respectively).

The gap between funded and unfunded applicants did narrow, although it remained appreciable, in terms of satisfaction with the time that had elapsed between submission of the application and receipt of the summary statement. Approximately two-thirds of funded applicants were satisfied versus 47 percent of unfunded applicants. For funded applicants, it also was the case that this aspect of review elicited the highest fraction of disgruntlement (13 percent were completely or mostly dissatisfied).

[11] The design of these questions was partly influenced by the need to include the same set of items as those asked in the 1997 survey of R01 and R29 applicants so as to be able to compare responses for the two surveys. This meant that applicants also were queried about their satisfaction with other features of the application and review process, namely, the time required to learn of the NIH's funding decision, the helpfulness of the reviewers' comments in understanding this decision, and the fairness of the decision. Because these features may have contributed to the respondents' ratings of overall satisfaction, their summary judgment should not be viewed as reflecting their views on the peer review process as a whole. The results for these other questions are not included in this report because they are less directly tied to the peer review process.

Figure 2.1
Applicant Satisfaction with Selected Features of the Review Process



Note. Percentages may not total to 100.0 percent due to rounding.

Table 2.2
Applicants' Satisfaction with the Assignment and Review Process by Funding Status of Application

	Funded Applicants				Unfunded Applicants			
Characteristic	Satis-fied	Mixed	Dissat-isfied	*N*	Satis-fied	Mixed	Dissat-isfied	*n*
Assignment to the appropriate study section	85.5	13.1	1.4	504	50.6	29.1	20.3	891
Expertise of the reviewers	80.1	18.1	1.8	503	38.8	36.8	24.4	884
Reviewers' understanding of research design	81.9	14.7	3.4	502	34.2	33.6	32.2	889
Usefulness of the reviewers' comments	71.6	22.8	5.6	500	31.2	34.5	34.3	887
Time to receive the summary statement	67.1	20.1	12.7	502	47.3	18.4	34.3	884
Overall satisfaction with the handling of the application	86.1	12.1	1.8	504	31.4	37.5	31.2	899

Note. "Funded Applicants" refer to those whose application was awarded funds. Percentages may not total to 100 percent due to rounding. Based on the results of chi-square analyses, all group differences in satisfaction levels between funded and unfunded applicants were statistically significant ($p < 0.001$).

Satisfaction levels for applications with different research foci. Recently, concern has been expressed that the review process may not operate the same for investigators in certain research areas. To examine this claim, satisfaction levels were compared for investigators whose applications were reviewed by study sections within different IRGs. Small differences in satisfaction were apparent and depended on which IRG handled the review. Respondents whose application was reviewed by a study section within IFCN – the IRG that handles research focused on the organization of the nervous system -- typically voiced slightly more satisfaction than neuroscientists whose applications were reviewed by study sections housed within the IRGs that review research on nervous system disease and injury (BDCN) and research on the development of and basic mechanisms underlying the nervous system (MDCN). Whereas 57 percent of IFCN applicants were satisfied with the overall handling of their application, this was true for only 50 and 47 percent of BDCN and MDCN applicants, respectively.

This pattern also characterized applicants' ratings for the individual features of the peer review process. For example, 68 percent of applicants whose research was reviewed by an IFCN study section were satisfied with the referral of their application as compared to 59 and 61 percent of BDCN and MCDN applicants.[12]

Other analyses suggested that applicants who described their research as patient-oriented were more disenchanted with the review process, particularly as compared to basic biomedical and behavioral sciences researchers. Overall, less than half (47 percent) of patient-oriented investigators provided positive assessments of how their application was handled; 52 and 57 percent of biomedical and behavioral sciences researchers shared similar views. Once again, this pattern of results (smaller disparities between patient-oriented researchers and their biomedical sciences counterparts as compared to behavioral scientists) surfaced for the individual components of application review with one exception. With regard to study section assignment, the magnitude of group differences somewhat widened; whereas 70 percent of behavioral scientists voiced satisfaction with the referral process, this was true for 64 percent of investigators in the basic biomedical sciences and 54 percent of those conducting patient-oriented research.[13]

However, for both types of comparisons (satisfaction by IRG and research area), group differences disappeared once funding was taken into account. The fact that the proportion of funded applicants was lower for patient-oriented researchers (27 percent versus 38 percent for basic biomedical science investigators and 40 percent for those in the behavioral sciences) expressed itself in what appeared to be lower levels of satisfaction. Once funding was controlled for, however, respondents who received research funds expressed similar views, regardless of their research field or the IRG in which their application was reviewed, and these views were noticeably more positive than those of their unfunded counterparts (see Appendix Tables 2.E-5 and 2.E-6).

Reviewer Application of Review Criteria

Reviewers are instructed to rely on established criteria in evaluating an R01 research grant application. The survey asked applicants to rate the extent to which they believed the reviewers understood each of these when judging their submitted application, based on the comments contained in the summary statement. In addition, program staff were posed similar

[12] Appendix Table 2.E-5 presents these analyses.

[13] The results of these comparisons are presented in Appendix Table 2.E-6.

questions about reviewer adherence to these criteria for the neuroscience applications that they handled for their institute.

Figure 2.2 summarizes applicants' views with regard to each criterion. Based on applicants' recall of the summary statement, assigned reviewers were generally given the highest marks for understanding and judging the adequacy of institutional resources and support; nearly two-thirds (65 percent) believed that the reviewers had exhibited "a great deal" of understanding in terms of applying this review criterion. A somewhat distant second and third in perceived levels of understanding were the judgments of the PI's capacity to conduct the proposed research and the significance of the research problem, although slightly more than half of the respondents did respond "a great deal." Ratings were less positive for reviewers' understanding of the research's potential to advance concepts, theories, and methods in the field (44 percent), the extent to which the PI had arranged useful collaborations with other scientists (44 percent), and the relevance of preliminary data to support the investigator's research plan (41 percent). Reviewer understanding was perceived to be even lower for what is often considered the core of research proposals; only 38 percent considered reviewers to possess a strong understanding of the conceptual framework underlying the research, and one-third believed that reviewers adequately grasped the planned research design and methodologies. Evaluations regarding the innovativeness of the proposed research and the use of new methods and technologies – judgments that have been viewed by some as needing more attention by study sections – were seen by 36 percent of the applicants as being well-understood by the reviewers.

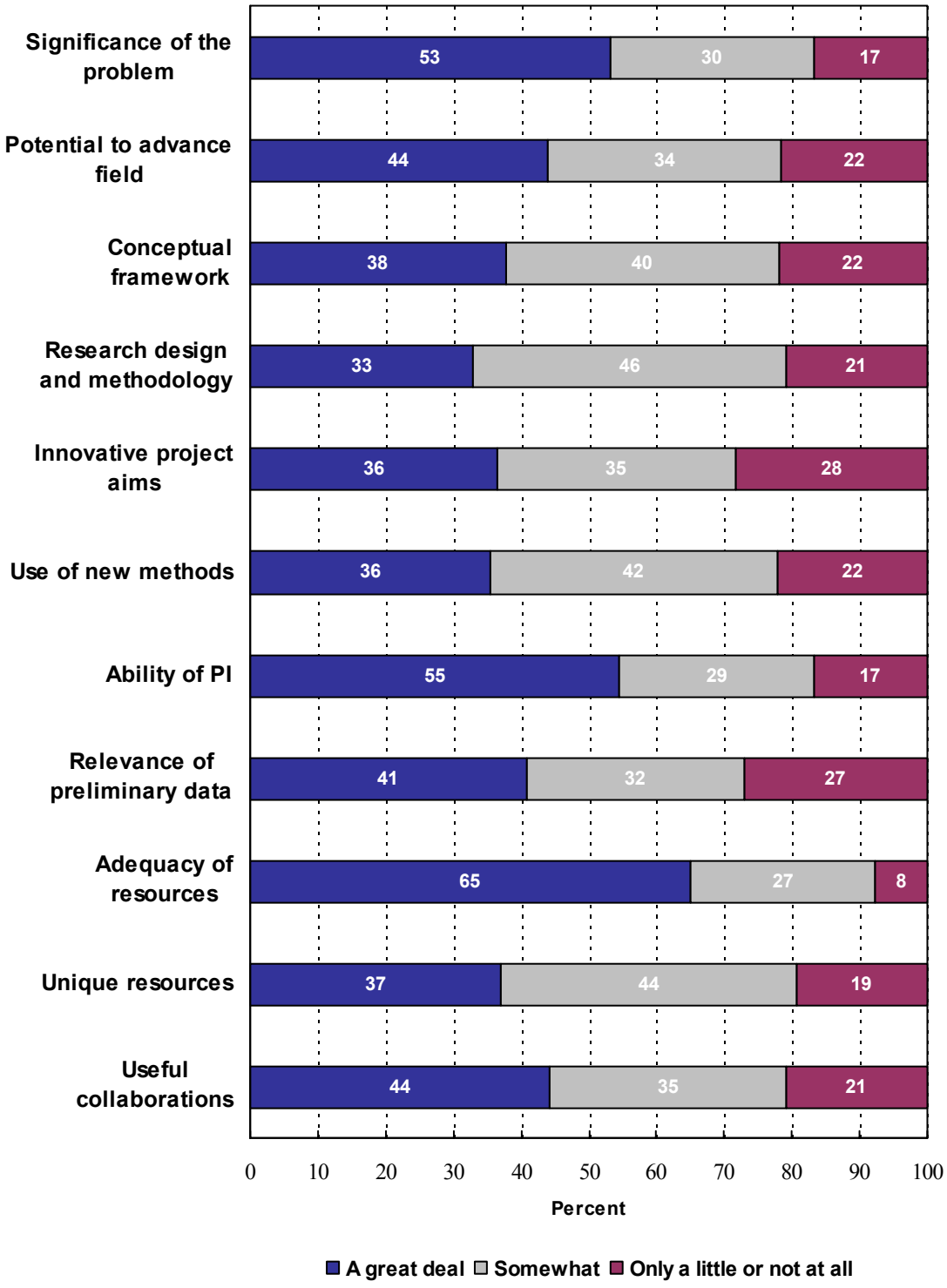
Once again, however, applicants' assessments were strongly linked to the funding status of their application (See Table 2.3). Among funded applicants, more than half of respondents believed that the reviewers had understood and applied the evaluation criteria well. At least 70 percent or more rated highly reviewers' judgments about the degree to which the research addressed and important problem, its potential to advance the field, the relevance of preliminary data, the adequacy of institutional resources, and the PI's ability to carry out the research. Reviewer performance in judging the study design and methodology, the use of new methods and technologies, and the innovativeness of the proposed research were less well regarded, although anywhere from 55 to 58 percent felt that reviewers had understood these aspects "a great deal."

For unfunded applicants, the belief that reviewers understood the evaluation criteria was typically shared by a small fraction of investigators. Only with regard to judging the adequacy of institutional support did more than half of the respondents award the reviewers high marks (59 percent). Typically, the percent believing that the reviewers' comments had reflected "a great deal" of understanding was between 21 and 31 percent.

Large discrepancies surfaced between funded and unfunded applicants on every criterion. In most instances, the proportions of funded applicants who believed that reviewers displayed a strong understanding of the review criterion (and thus applied it well when judging the quality of the proposed research) was at least twice that expressed by unfunded applicants on all aspects. The exceptions occurred for those related to institutional resources. The largest gap between these two groups occurred with regard to reviewer judgments about the relevance of preliminary data. Nearly three-quarters (73 percent) of funded applicants gave strong endorsements as compared to 24 percent of unfunded applicants – a difference of 49 percentage points. Marked disparities also were visible for determining the extent to which the research addressed an important problem (a 40 percentage point difference), would advance the theories or methods in the discipline (a 43 percentage point difference), and had a sound conceptual framework (a 42 percentage point difference).

Figure 2.2

Applicant Perceptions of the Reviewers' Understanding of Their Proposed Research on Those Criteria Involved in Evaluating R01 Applications



Note. Percentages may not total to 100.0 percent due to rounding.

Table 2.3
Applicants' Perceived Reviewer Understanding of Evaluation Criteria by Funding Status of Applicant

Review Criteria	Funded Applicants				Unfunded Applicants			
	A great deal	Some-what	Only a little or not at all	*n*	A great deal	Some-what	Only a little or not at all	*n*
Degree to which the re-research addressed an important problem	78.3	18.7	3.0	504	37.7	37.7	24.6	888
Potential to advance theory, concepts, or methods in the field	70.8	26.2	3.0	504	27.8	38.6	33.6	886
Conceptual framework underlying the research	63.2	33.2	3.6	500	21.3	44.7	34.1	884
Study design, methods, and analyses	54.1	40.1	5.8	501	21.1	49.2	29.7	880
Extent to which the project's aims were innovative	57.6	32.6	9.9	497	24.9	37.3	37.8	881
Extent to which new methods or technologies were planned	54.8	35.9	9.4	449	24.5	45.8	29.7	811
Ability of PI and staff to carry out the research	76.5	20.0	3.6	501	44.7	33.1	22.2	884
Relevance of preliminary data to assessing the project's feasibility	72.8	21.6	5.6	499	23.5	39.2	37.3	881
Adequacy of resources at the institution	78.6	18.1	3.3	487	59.1	31.3	9.5	849
Extent to which project cap-italized on unique resources[a]	55.3	36.0	8.7	389	31.4	44.6	24.0	700
Extent to which useful col-laborations had been ar-ranged[a]	65.2	27.7	7.1	394	34.0	36.5	29.5	723

Note. "Funded Applicants" refer to those whose target application was awarded funds. Percentages may not total to 100.0 percent due to rounding.

[a]The decrease in the number of individuals who rated reviewers on this criterion is due to the higher proportion of "don't remember" responses. This may be a function of the lower salience of reviewers' comments about these criteria to applicants as compared to comments about the quality and merit of the proposed research.

Differences in satisfaction for investigators with different research emphases. In contrast to what was found for satisfaction with the assignment and review process, perceptions of reviewer understanding differed very little among investigators whose applications were reviewed by different IRGs or who were in different research areas. For example, 36 percent of basic biomedical scientists, 35 percent of behavioral scientists, and 38 percent of patient-oriented researchers believed the reviewers exhibited appreciable understanding of the innovativeness of the project's aims.[14] With regard to the planned use of new methods and technologies, the corresponding figures were 36, 35, and 38 percent. In terms of the relevance of preliminary data, behavioral scientists were most positive (48 percent) as compared to their counterparts in the basic biomedical sciences (41 percent) and patient-oriented research (40 percent). However, the latter group was most positive about reviewer performance in judging their capability to conduct the proposed research (68 percent); the proportions for behavioral and biomedical scientists were 60 and 55 percent, respectively. Moreover, these differences in perceptions among investigators in different areas did not disappear when views were examined separately for funded and unfunded applicants.

Program staff provided slightly different assessments for how well study sections understood the review criteria (see Table 2.4). This may be expected; whereas an applicant's views were based on a particular application, those of institute staff include applications from multiple applicants and the processes of several study sections. In addition, the outcomes of the review process are different for each group (e.g., investigators seek funds to carry out their own research program whereas program staff are interested in having the most meritorious research funded that matches their institute's mission and priorities). Compared to applicants as a whole, smaller minorities of program staff members perceived reviewer understanding to be minimal or non-existent on any of the 11 criteria. In this way, their responses mirrored those of funded applicants. As indicated by the percentages of staff who judged reviewers to possess "a great deal of understanding," similar proportions of both staff and applicants were confident in the reviewers' ability to understand the significance of the proposed research (48 percent of staff and 53 percent of applicants), the research's potential to advance the field (42 and 44 percent), the incorporation of new techniques and methodologies (33 and 36 percent), and the importance that preliminary data should serve in determining the project's feasibility (46 and 41 percent).

However, institute staff were more likely than R01 applicants to award reviewers high marks for their understanding of the conceptual framework underlying the proposed research, along with the quality of the study design and methodology; 50 and 60 percent of staff responded "a great deal" as compared to 38 and 33 percent of the applicant sample, respectively. At the same time, staff were slightly less positive about reviewers' ability to understand the innovativeness of the proposed research (27 percent of staff versus 36 percent of applicants).

[14] Appendix Tables 2.E-7 and 2.E-8 report the results of these comparisons.

Table 2.4
Perceptions of Program Staff on Reviewer Understanding of Criteria for Evaluating R01 Grant Applications

Review Criteria	Level of Understanding			
	A great deal	Some-what	Only a little or not at all	*n*
Degree to which the research addressed an important problem	48.3	48.3	3.3	60
Potential to advance theory, concepts, or methods in the field	41.7	55.0	3.3	60
Conceptual framework underlying the research	50.0	40.0	10.0	60
Study design, methods, and analyses	60.0	35.0	5.0	60
Extent to which the project's aims were innovative	26.7	56.7	16.7	60
Extent to which new methods or technologies were planned	33.3	51.7	15.0	60
Ability of PI and staff to carry out the research	55.0	43.3	1.7	60
Relevance of preliminary data to assessing the project's feasibility	45.8	50.9	3.4	59
Adequacy of resources at the institution	66.1	30.5	3.4	59
Extent to which project capitalized on unique resources	36.2	48.3	15.5	58
Extent to which useful collaborations had been arranged	58.6	37.9	3.5	58

Note. Percentages may not total to 100.0 percent due to rounding.

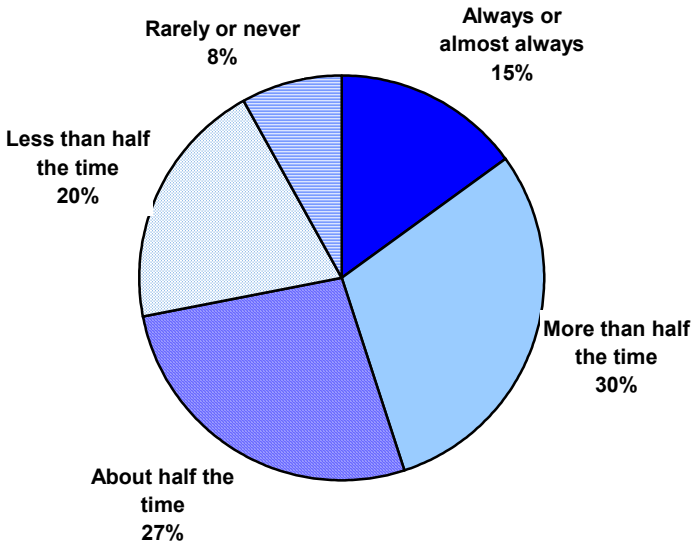
Other Characteristics of the Review Process

Because of their role and expectations for peer review, program staff members were asked about two other selected aspects of the review process about which discussion has occurred. The first addressed the extent to which proposed budgets were appropriately reviewed, given the introduction of modular budgets. The second focused on staff perceptions regarding how applications from new investigators were reviewed following the replacement of the R29 grant mechanism with a simple "new investigator" check off box on the R01 application. As shown in Figures 3 and 4, respondents judged the adequacy of review in these two areas similarly. Nearly half (45 to 46 percent) believed that the review policies were being appropriately implemented more than half the time (if not always). Approximately one-quarter (25 to 27 percent) thought that this occurred about half the time, and the remaining 28 to 29 percent believed that this was more infrequent. Staff from the NINDS were much more critical regarding the treatment of new investigator applications; whereas 45 percent believed that appropriate review occurred less than half the time, this was true for only 24 percent of staff from the other institutes.

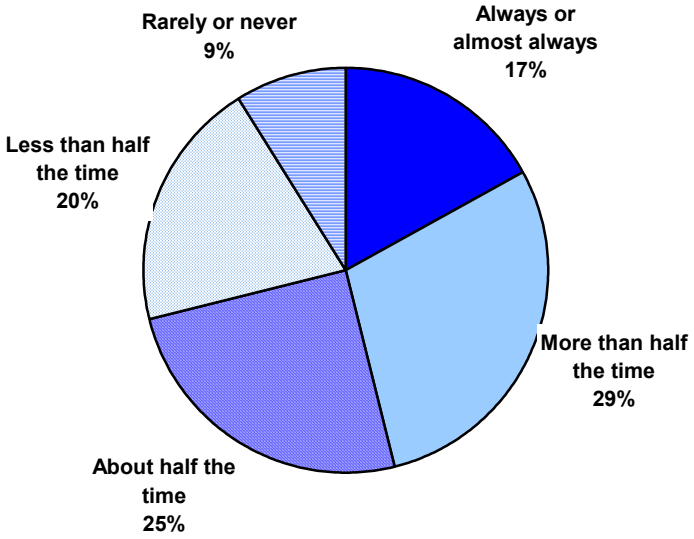
Figures 2.3 and 2.4

Staff Ratings as to the Frequency that Proposed Budgets and New Investigators Are Appropriately Reviewed by Study Sections

Modular Budgets



New Investigators



The Overall Quality of Review

As previously noted, concerns have regularly been voiced as to possible inequities in the review process for specific clusters of applicants. In particular, complaints have surfaced with regard to study section judgments about patient-oriented research and research involving the behavioral sciences. Furthermore, the plight of young investigators in the review process has frequently been noted, and this has attracted additional attention with the elimination of the R29 mechanism, which was specifically targeted at new investigators.

Table 2.5 presents the views of program staff with regard to the quality of the review process for these groups and how it compares to review efforts prior to neuroscience review reorganization. It is quite evident that staff place the most confidence in the quality of peer review for basic research – a traditional mission of the NIH. Nearly three-quarters (73 percent) viewed the performance of study sections as either "excellent" or "very good", 16 percent saw it as "good," and about 11 percent judged it as "fair" or "poor." The percentage of "excellent" and "very good" ratings, however, was noticeably lower for patient-oriented research (56 percent), and 25 percent believed it was below average. It also was the case, however, that following reorganization 43 percent felt the review process improved for these types of studies.

High performance ratings were much less frequent for both behavioral and design-directed research; the percentages rating review as "excellent" or "very good" were 36 and 28 percent, respectively. Following reorganization, staff were less likely to believe that improvement had occurred, and for behavioral science research, one third thought that the situation had worsened.

Table 2.5
Program Staff Perceptions on the Quality of Peer Review and Changes Since Neuroscience Review Reorganization for Types of Research and New Investigators

Member Characteristics	Appropriateness				Compared to Before Reorganization of Study Sections			
	Excellent or Very good	Good	Fair or Poor	*N*	Sub-stantially or Somewhat better	About the same	Sub-stantially or Somewhat worse	*n*
Basic research	73.7	15.8	10.5	57	30.0	50.0	20.0	40
Patient-oriented research	56.3	18.8	25.0	32	42.9	33.3	23.8	21
Design-directed research	28.0	56.0	16.0	25	26.3	57.9	15.8	19
Behavioral research	35.5	45.2	19.4	31	29.2	37.5	33.3	24
Research from new investigators	43.6	29.1	27.3	55	8.5	48.6	42.9	35
Multidisciplinary research	47.9	22.9	29.2	48	30.0	50.0	20.0	30
Identification of most meritorious applications	81.7	13.3	5.0	60	32.5	50.0	17.5	40

Note. Percentages may not total to 100.0 percent due to rounding.

Returning to the status of new investigators in the process, 44 percent rated review by neuroscience study sections as above average, with the remainder being split between "good" and "fair or poor". In addition, very few staff (9 percent) thought that things had become better for this subset of researchers. In fact, nearly half believed the situation had remained the same, and 43 percent believed that the review process was operating more poorly than before (43 percent).

If peer review functions as intended, the most scientifically meritorious applications should be identified for institute funding. Across all respondents, the large majority of program staff judged the performance of the neuroscience study sections as strong in this regard. Slightly more than 80 percent described it as "excellent" or "very good," 13 percent viewed it as "good," and a very small minority (5 percent) gave it "fair" marks.

How did institute staff view this function as compared to that exercised by the study sections that existed prior to review reorganization? Overall, 50 percent of program staff did not note any change in performance. Nearly one-third, however, thought that the selection of the most meritorious applications had improved, and 18 percent thought the current study sections performed less well.

In terms of examining these changes, it is most useful to place the ratings of change in the context of staff assessments of current functioning. Ideally, review reorganization would be seen as facilitating the selection of the most meritorious applications for institute funding, i.e., making the situation "somewhat better" or "substantially better". Of course, if this had not been a problem in the past and the performance of study sections had been sound, reconfiguring study sections would make no difference (the situation would be viewed as "about the same"). The responses of 37 staff who were responsible for neuroscience research applications during the year preceding review reorganization and more recently are shown in Table 2.6. Eighty-one percent viewed study section performance as either "excellent" (24 percent) or "very good" (56 percent)", 11 percent considered it "good", and 8% judged it as only "fair" (no respondent judged it to be "poor"). Almost one third (32 percent) awarded study sections high ratings (excellent or very good) and also believed that this situation was an improvement over what had existed prior to reorganization. Another 46 percent believed that the newly configured study sections were performing well, but this was no different than what had occurred under the previous review groups. Erosion of study section performance -- those rating it as worse than before review reorganization – was cited by 14 percent. Based on these results, it appears that a large majority of program staff felt study sections functioned well in terms of selecting the "best science" for funding. Of this group who gave positive assessments, about two-fifths considered this to have improved since review reorganization, and three-fifths felt that reorganization had no impact (that is, peer review had previously been successful in this regard, and this did not change with the newly constituted study sections).

Table 2.6
Perceived Performance of Study Sections in Identifying the Most Meritorious Applications by Judgment of Change Since Review Reorganization

Assessment of Current Performance	Perceived Nature and Direction of Change			Total (n = 37)
	Better	About the same	Worse	
Excellent or very good	**32.4**	**45.9**	2.7	81.0
Good	0.0	8.1	2.7	10.8
Fair or poor	0.0	0.0	8.1	8.1
Total	32.4	54.0	13.5	100.0

Note. Percentages are cell percentages and may not total to 100.0 percent due to rounding.

ADDITIONAL COMPARISONS OF REVIEW NOW AND PRIOR TO REORGANIZATION

The survey results of neuroscience applicants and institute staff with experience in the peer review process are useful in gauging the sentiments of these two constituencies on the current functioning of peer review. At the same time, it is obvious that they provide little information by themselves about whether peer review changed as a result of the reorganization of neuroscience study sections in 1998. Developing a definitive answer to that question, however, is in all likelihood impossible for several reasons. One involves the lack of psychometrically sound measures for assessing the quality of peer review. For example, it could be argued that the data collected in these surveys, at best, capture only individuals' perceptions about peer review, and the survey questions most likely measure constructs other than the quality of review. In addition, even if the decision was to rely on attitudinal measures, the timing of the evaluation did not permit collecting information from the same groups prior to the reconfiguring of the study sections. Further complications in determining the impact of reorganization also exist due to other changes in research grant application and review policies and noticeable increases in the resources that the NIH had to fund investigator-initiated research.

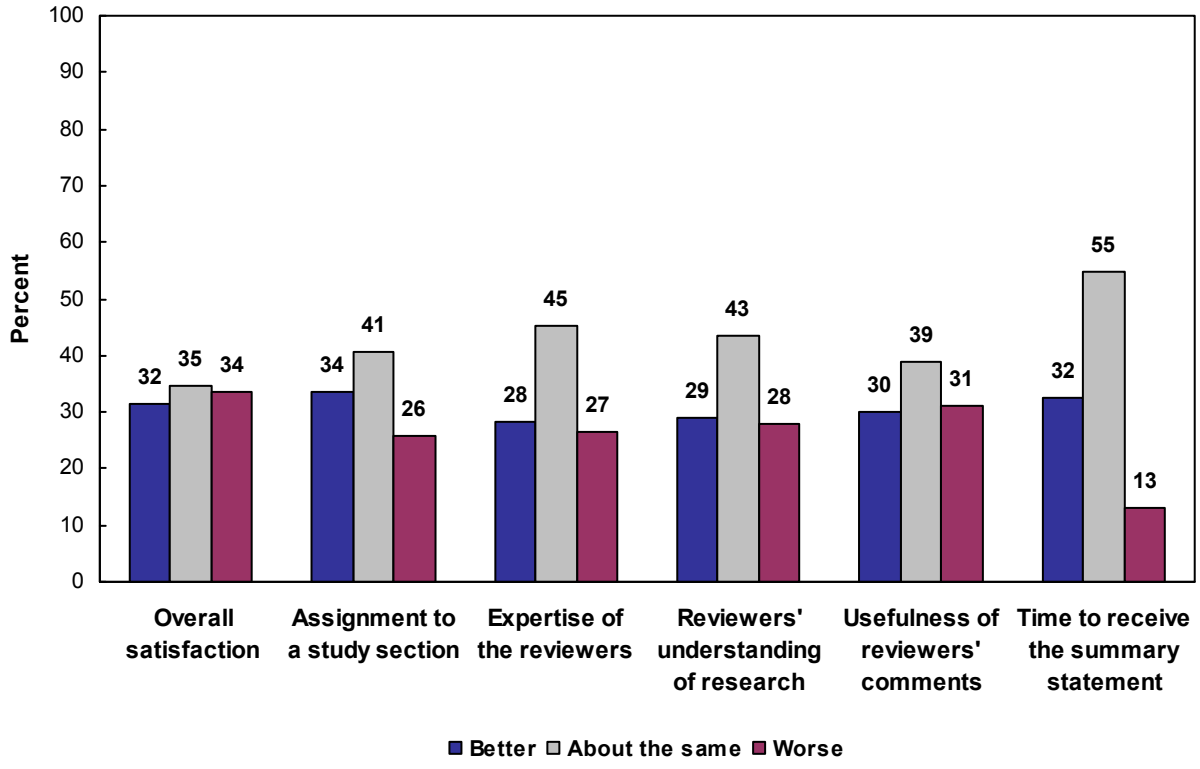
Despite these limitations, some data were available to address at least partly whether neuroscience review reorganization affected peer review. First, both the applicant and institute staff surveys included questions that asked respondents to judge how their recent experiences with research grant application review compared to those that happened the year prior to reorganization. Second, applicant satisfaction data were compared with those collected in a previous 1997 survey of a sample of NIH R01 applicants whose grant submissions were reviewed by those study sections that then were most likely to review neuroscience research.

Applicant Perceptions of Changes in the Review of Research Grants

In order to obtain a sense of whether the community of neuroscience researchers perceived that the review process had changed "post-review reorganization," respondents who submitted R01 grant applications between February 1, 1997 and March 1, 1998 were asked to compare their more recent review experiences with these earlier ones. Overall, there was no clear consensus or predominant view. Approximately one-third each believed that their recent review was either substantially or somewhat better than the one they received during the year prior to review reorganization, about the same, or substantially or somewhat worse.

When queried about specific aspects of assignment and review, the results were reasonably consistent overall (see Figure 2.5). For study section assignment, reviewer expertise and understanding of the research design, and providing useful summary statements, between 28 and 34 percent judged their most recent review to be better in these regards. Between 39 and 45 percent thought that no real change was obvious, and between 26 and 31 percent believed the reviews to have worsened in these aspects. The one exception involved the time that had elapsed between submission of the grant application and receipt of the summary statement. Although about the same proportion believed the situation had improved, 55 percent considered it to have not changed, and only 12 percent viewed it as worse. One possible reason for this difference is that other factors such as separate management efforts at CSR have influenced preparation and forwarding of the summary statements – factors that are not affected by changing the composition of study sections.

Figure 2.5
Perceived Changes in Application Review as Compared to Review Prior to Neuroscience Review Reorganization



Note. Percentages may not total to 100.0 percent due to rounding.

Once again, it is instructive to consider these comparisons of attitude in the context of applicants' recent satisfaction with the review of their R01 application. As Table 2.7 shows, nearly half (47 percent) were completely or mostly satisfied with the handling of their application, 30 percent held mixed views, and nearly one-quarter (23 percent) were dissatisfied. Again, one might hope that review reorganization had increased applicants' perception that their application had received a competent and fair review by experts in their field, and at the very least, previously held positive views had not been diluted. One also would hope that very few applicants would judge peer review to have diminished in quality as compared to their earlier experiences. Comparing their experiences with those occurring prior to review reorganization, the percentages of neuroscientists who believed the process had improved, remained the same, or worsened were about equally distributed across the three categories. Among those who were primarily satisfied with how their application was treated by the newly configured review process, opinions were equally divided between seeing this as an improvement or no different than what had occurred prior to reorganization.

Table 2.7
Applicant Satisfaction with the Handling of Recent R01 Applications and Comparison with Satisfaction Prior to Review Reorganization

Assessment of Current Performance	Perceived Nature and Direction of Change			Total
	Better	About the same	Worse	
Completely or mostly satisfied	**22.3**	**20.3**	4.3	46.9
Mixed	6.5	10.6	12.4	29.5
Completely or mostly dissatisfied	2.7	3.8	16.9	23.4
Total	31.5	34.7	33.6	100.0

Note. Numbers are cell percentages and may not total to 100.0 percent due to rounding.

Perceptions About the Factors Responsible for Most Recent Review Experiences

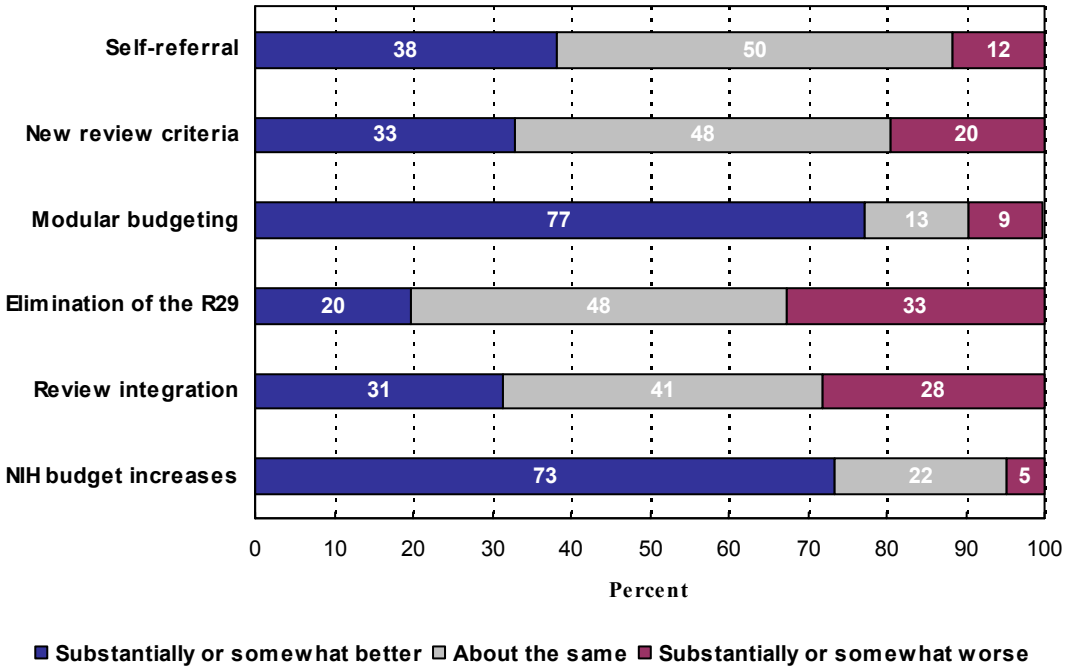
Reconfiguring study sections that review neuroscience research was only one of the changes that occurred in terms of the preparation, submission, review, and funding of research grant applications to the NIH. The 21 study sections that were newly formed to review neuroscience research first convened in June 1998. This was also the same time that the R29 grant – a mechanism targeted to facilitate the success of new investigators at securing NIH research grants – was eliminated and replaced with a "check box" on the R01 application form that indicated that the person was a new researcher. Approximately six months before that, new criteria for study sections to use in the review of research grant applications were instituted. Subsequent to review reorganization, other policies were implemented. In order to make the referral of research grant applications easier and more accurate, applicants were given the opportunity to request a specific study section to review their proposed research. Modular budgets, which require less budgetary detail by applicants when they request $250,000 or less per year in direct costs, were adopted in April 1999. Last and not least, the budget of the NIH grew

noticeably over this time period, thus providing more resources to fund investigator-initiated research.

Even with a more rigorous evaluation design, disentangling the impact of these changes from any that were produced by review reorganization would be extremely difficult and is not possible with these survey data. However, the views of applicants and program staff about these changes and their impact on the application and review process can be informative in terms of understanding constituencies' reaction to these policy changes and review reorganization in this context.

Not surprisingly, nearly three-quarters of neuroscience applicants viewed the increases in the NIH research budget as improving their recent efforts to obtain NIH research funding (see Figure 2.6). In addition, the implementation of modular budgeting struck a responsive chord with applicants, with 77 percent stating that it had improved the grant application process. Other policy changes were viewed as improvements by noticeably smaller proportions of investigators. Having the opportunity to request a specific study section was endorsed by 38 percent, and one third saw the new review criteria as facilitating their search for research grants. The reorganization of neuroscience review was viewed as an improvement by 31 percent.

Figure 2.6
Applicants' Views on the Influence of Other NIH Policies and Resources on Their Seeking of NIH Research Funds



Note. Percentages may not total to 100.0 percent due to rounding.

Again, these responses are more insightful when coupled with whether individuals judged the review process to have improved, remained the same, or worsened relative to before the reorganization of the study sections. Figure 2.7 compares applicant perceptions of impact of

various policies, including review reorganization, for respondents who believed the review process itself had improved, remained the same, or actually worsened as compared to the review that they had received the year prior to the creation of the new neuroscience study sections. As previously noted, the ideal situation would be for review reorganization to show a positive impact (i.e., a noticeable fraction of applicants would view their more recent application experiences to have improved and attribute this at least partly to reorganization). As can be seen in Figure 2.7, approximately 22 percent perceived this to be the case. About 7 percent believed the review process had improved but review reorganization had no impact, and only 3 percent saw the review process as better but felt that reorganization had detracted from this improvement.

The proportion who cited an improvement in the review of their recent application and indicated that the reconfiguring of the study sections made the process of seeking NIH research grants better was similar to that reported for self-referral and the adoption of new review criteria. All three ranked somewhat – but not dramatically -- below the groups who saw an improvement in review and attributed modular budgeting and NIH budget increases to making the seeking of research funds better.

Figure 2.7

Applicants' Attribution of Other Influences on Their Recent Seeking of Research Grants by Their Assessment of Changes in the Review Process Since Review Reorganization

Influence of Self-Referral

The Review Process Changed for the . . .	Self-Referral Made Seeking Research Grants . . .			Total
	Better	About the same	Worse	
Better	**19.5**	**11.7**	0.6	31.8
Same	14.0	23.6	1.2	38.8
Worse	7.0	14.3	8.1	29.5
Total	40.5	49.6	9.9	100.0

Influence of New Review Criteria

The Review Process Changed for the . . .	New Criteria Made Seeking Research Grants . . .			Total
	Better	About the same	Worse	
Better	**20.1**	**9.6**	2.0	31.7
Same	9.3	24.5	5.0	38.8
Worse	5.8	13.4	10.2	29.4
Total	35.2	47.5	17.2	100.0

Figure 2.7 (*continued*)

Applicants' Attribution of Other Influences on Their Recent Seeking of Research Grants by Their Assessment of Changes in the Review Process Since Review Reorganization

Influence of Modular Budgeting

The Review Process Changed for the . . .	Modular Budgeting Made Seeking Research Grants . . .			Total
	Better	About the same	Worse	
Better	**27.1**	**3.2**	1.5	31.8
Same	29.5	5.0	4.4	38.9
Worse	20.4	5.5	3.5	29.4
Total	77.0	13.7	9.4	100.0

Influence of Budget Increases

The Review Process Changed for the . . .	NIH Budget Increases Made Seeking Research Grants . . .			Total
	Better	About the same	Worse	
Better	**27.7**	**3.8**	0.3	31.8
Same	27.7	9.3	1.8	38.8
Worse	19.5	7.0	2.9	29.4
Total	74.9	20.1	5.0	100.0

Influence of Review Reorganization

The Review Process Changed for the . . .	Review Reorganization Made Seeking Research Grants . . .			Total
	Better	About the same	Worse	
Better	**21.9**	**7.3**	2.6	31.8
Same	7.6	26.8	4.4	38.8
Worse	3.8	7.6	18.1	29.5
Total	33.3	41.7	25.1	100.0

Note. The responses are based on 343 respondents who (a) had applied for an R01 research grant between February 1997 and March 1998 and also more recently (between June and November 2000); and (b) had rated each of the policies of interest and their impact on the seeking of NIH research grants. As such, the percentages of applicants believing a policy's impact was better, the same, or worse are slightly different than those in Figure 2.5. Percentages may not total to 100.0 percent due to rounding.

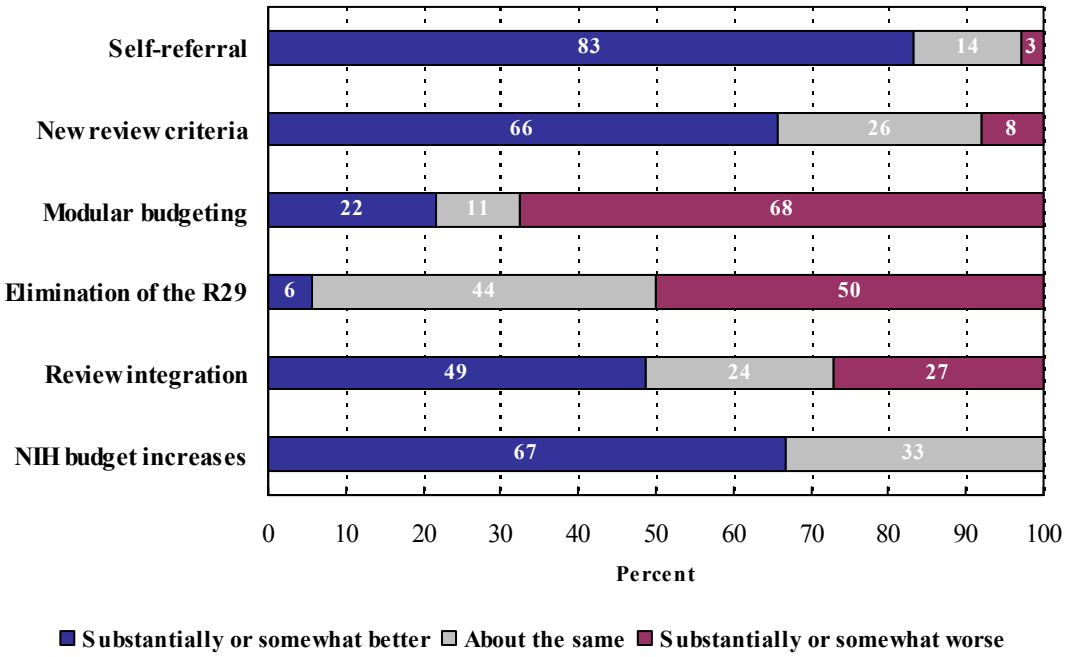
Approximately, 27 percent thought there had been no change in the review process and subsequently no influence of review reorganization on the process of applying for research grants. This group also held similar opinions about the influences of self-referral (24 percent) and the new review criteria (25 percent).

Modular budgeting and increases in NIH extramural research budgets clearly were viewed as major improvements, regardless of how respondents viewed the review process to have changed. Large majorities believed that these two events had made applying for NIH grants at least somewhat better. Further, small minorities (less than 10 percent) thought that this new policy and additional resources had made it more difficult to seek research funding.

In comparison with other factors associated with investigator-initiated research, applicant assessment of the influence of review reorganization was more mixed. A distinctly smaller proportion (33 percent) of investigators saw it as enhancing their successful pursuit of NIH support as compared to modular budgeting (77 percent) and increases in NIH extramural research budgets (75 percent). These results are not surprising inasmuch as modular budgeting tends to directly reduce the time spent in preparing research grant applications, and investigators had long often complained about the hours spent writing proposals. Larger NIH research budgets, of course, result in more grants (and researchers) being funded – a favorable outcome from the applicant's perspective.

Figure 2.8

NIH Institute Staff Views on the Influence of Other NIH Policies and Resources on the Review of Neuroscience Research Grant Applications



The percentage of respondents who regarded review reorganization as an improvement was more similar to that found for the use of new review criteria (35 percent), and both were somewhat less than the corresponding figure for self-referral (40 percent). All three policy changes would not be expected to have as significant an impact as modular budgeting and the increased likelihood of having one's application funded with larger NIH budget allocations. It

was the case, however, that a distinctly smaller proportion (10 percent) saw self-referral as worsening the process of applying for research support. In addition, review reorganization elicited a somewhat more negative reaction (25 percent judged it to have made the situation worse) than was obtained for the influence of new review criteria (17 percent shared the same sentiments).

On the other hand, program staff were considerably more positive than applicants in their assessment of review reorganization (see Figure 2.8). Nearly half (49 percent) saw the newly established study sections as improving the review of neuroscience research grant applications, 24 percent saw them as having no effect, and 27 percent viewed them as having a negative role. At the same time, self-referral, the new review criteria, and, of course, having more funds for grant awards, were more likely to be seen as strengthening the review process. Modular budgeting was viewed in nearly the opposite light and in stark contrast to how applicants viewed this policy change, and half of institute staff believed that the elimination of the R29 mechanism had weakened the review process.

Comparison of Satisfaction Levels: FY 1994 and FY 2001 Applicants

The questions on satisfaction with various aspects of the review process were identical to those included in an earlier survey of R01 applicants that was conducted in 1997. The rationale was that responses to the two surveys could be compared. Although this comparison is less than ideal for several reasons (e.g., different cohorts), it is another source of information that addresses the functioning of the review process prior to and subsequent to review reorganization and supplements the data on recent applicants' perceptions of how the review process has changed that were reported in previous sections.[15]

Table 2.8 compares the satisfaction of applicants who were sampled in the earlier survey and who applied to study sections that were primarily focused on reviewing neuroscience research in FY 1994 to that of applicants whose research was reviewed by one of the newly reconfigured neuroscience review groups in FY 2001.[16] Overall, the proportion completely or mostly satisfied with the handling of their application was 52 percent for 2001 respondents as compared to 35 percent for 1997 respondents – a difference of 17 percentage points. For every specific aspect of the review process queried, satisfaction levels were significantly higher among neuroscientists who applied after review reorganization as compared to their counterparts who participated in the 1997 survey. For example, with regard to the adequacy of study section assignments, the difference was even more pronounced; whereas 41 percent of the applicants in the earlier survey were satisfied that their research was reviewed by the appropriate study section, this was true of nearly two thirds (66 percent) of applicants to the reorganized study sections.

Satisfaction levels were between 11 and 16 percentage points higher for the remaining aspects surveyed. Slightly more than half of the FY 2001 applicants were generally positive about the expertise of the reviewers (53 percent), the extent to which reviewers understood the proposed research design and methodology (51 percent), and the time required to receive the summary statement (55 percent). The corresponding figures for those surveyed in 1997 were

[15] The most appropriate and useful comparison would be to compare survey responses for individuals who were eligible and had responded to both surveys (i.e., they submitted an R01 application in the years from which the samples were drawn for each survey). Unfortunately, the number who met this criterion was too small for meaningful analysis ($n = 25$).

[16] The list of study sections that reviewed neuroscience research prior to review reorganization is reported in Appendix 2.D.

significantly lower – between 38 and 40 percent. Current satisfaction levels fell below 50 percent in only one area – how useful applicants viewed the comments of the reviewers. Forty-five percent of those recently surveyed were satisfied as compared to 30 percent of those responding in 1997, and in both surveys, this aspect received the weakest endorsement by neuroscientists.

Of course, these differences could be a product of several factors other than the reorganization of the review process. The most obvious possibility involves differences in the success rates of the two survey cohorts. Among the 2001 survey recipients, 37 percent received a positive funding decision as compared to 32 percent of the earlier cohort. However, this discrepancy in success cannot account for the different satisfaction levels (see Table 2.8). Looking at funded applicants, markedly larger proportions were mostly or completely satisfied with both the overall handling of their application and specific aspects of the assignment and review process in 2001 as compared to 1997. The large majority (87 percent) voiced satisfaction with the NIH in 2001 as compared to 56 percent in 1997. With regard to the particular components, satisfaction levels reached or exceeded 69 percent, and these figures were between 25 and 32 percentage points higher than those obtained in the 1997 survey. Once again, fewer expressed positive views on the utility of the reviewer comments and the time required to receive the summary statement, but the percentages still were 69-71 percent.

As expected, unfunded applicants were considerably less satisfied than their successful counterparts. Less than one third (32 percent) of unfunded applicants in 2001 were satisfied with the handling of their application as compared to 25 percent in 1997. It is important to note that the difference in satisfaction was markedly smaller between the two cohorts, and this pattern characterized nearly all of the rated aspects. For example, with regard to reviewer understanding of the research design, there were no substantial differences; approximately one third of respondents in both surveys were satisfied, one third were mixed, and 35 percent were dissatisfied. There were two exceptions. Applicants to the newly reconfigured study sections were more satisfied with the time required to receive the summary statement than those surveyed four years earlier (46 versus 36 percent, respectively). Satisfaction also was distinctly different with regard to the routing of applications to an appropriate review group – 54 percent of unfunded applicants in 2001 as compared to 31 percent in 1997.

Other variables could be operating that might produce such differences. For example, the characteristics of the two survey cohorts could have differed in ways that are related to satisfaction. Using the limited available demographic data from the two surveys, small differences did emerge. Respondents in 2001 were slightly more likely to be male (79 percent) than in 1997 (72 percent), but the percentages of underrepresented minorities were the same (5 percent). There were some differences in terms of applicants' highest degree. Whereas 75 percent of the applicants to the reorganized study sections were PhDs, 12 percent were MDs, and 13 percent were MD/PhDs, the corresponding percentages for 1997 applicants were 71 percent, 21 percent, and 8 percent. Given that the review of patient-oriented research has often been viewed as somewhat problematic and that MDs are more likely to propose these types of studies, this greater concentration of MDs in the earlier cohort may have produced part of the observed differences in satisfaction levels. Among PhDs, those whose doctorate had been earned in the behavioral sciences were more characteristic of the earlier cohort (34 versus 15 percent). Once again, there is some perception that applications from investigators in the behavioral sciences may be treated differently in the review process and in ways that would heighten dissatisfaction;

if this situation exists, then the higher proportion of behavioral scientists in the earlier sample might contribute to the differences found in satisfaction for the two survey years.[17]

Multivariate analyses were performed in order to examine the role that other variables played with regard to the higher satisfaction levels reported by the 2001 applicants. Logistic regressions were performed to predict the proportion of applicants who were completely or mostly satisfied with the assignment and review of their application. In addition to survey cohort (1997 or 2001), potential explanatory variables included gender, member of an underrepresented minority group, type of highest degree (MD only versus PhDs and MD/PhDs), and funding status of the submitted application. For those with a PhD, a separate regression also was conducted to examine the role of degree field (behavioral and health sciences versus biomedical sciences) in addition to these variables. The results of both regressions indicated that the major predictor of satisfaction was funding status. The only other variable that significantly contributed to satisfaction was year of the survey; 2001 applicants were more likely to be satisfied than those surveyed in 1997.

Using the same predictor variables, logistic regressions also were performed on the responses indicating levels of satisfaction with each individual component of the application and review process (e.g., assignment to a study section and expertise of the reviewers). Similar results were obtained. Consequently, the differences in gender, highest degree, and field of degree do not appear to be responsible for the improved satisfaction levels seen for 2001 applicants. If highest degree and field of degree capture focus and type of research to some degree, this suggests that differences in the research problem area also may play a minimal role.

Although encouraging, these results do not provide convincing evidence that review reorganization itself was responsible for the observed differences. It is clear that the outcome of review and institute resources (having one's application funded or not) is an important predictor of satisfaction (it accounted for 25 percent of the variation in satisfaction levels in the logistic regression). Compared to this, the year of the survey played a minor role (about 3 percent of the variance). Better measures of research area, particularly those that could identify areas that are viewed as being vulnerable to reviewer bias or gaps in expertise, would be more diagnostic in identifying the factors contributing to the differences in satisfaction levels. In addition, differences in survey methodology may be responsible. In the above comparisons, these were kept to a minimum to the extent possible. For example, only the results of the mail survey component were used so as to parallel the survey process for the 1997 survey. Further, the questions preceding the common set in each survey were quite similar, reducing the possibility of a context effect on responses if respondents answered the questions in the order that they appeared in the survey.

However, because the two surveys were conducted for different purposes, there were some differences. Most noticeable is that respondents to the 1997 survey were asked to rate their satisfaction with the assignment and review process since they had submitted their application in FY 1994. Investigators who submitted multiple applications may have consequently had a set of more heterogeneous experiences, which would have factored into their ratings. It also is the case that the data included for the 1997 survey were from scientists who applied to a study section that was viewed as most likely to focus on neuroscience research. The research covered by these study sections most likely differed in some ways from that reviewed by the reconfigured study

[17] It should be noted that the results of the 1997 survey found no significant differences in satisfaction levels between biomedical and behavioral scientists. This would argue against the possibility of research area contributing to the higher satisfaction found among 2001 applicants.

sections; that is, review reorganization was implemented precisely to better address changes in the neurosciences as an area of scientific investigation.

It is recognized that there are limitations to the conclusions that can be drawn from survey data collected from two different cohorts of applicants, using two different survey instruments administered at two different times. For example, the general perception of the availability of NIH funding may have been very different for the FY1994 applicants and the FY2001 applicants and this may have affected the outlook, attitudes, and responses of both funded and unfunded applicants in a consistent (positive or negative) manner depending on the fiscal year when the application was submitted. Holding funding status constant would not control for differences in overall cohort outlook. Despite these limitations, the results of the comparisons above are consistent with the interpretation that those applicants who had applied, had their research reviewed by the newly reconfigured study sections, and were successful in attracting support were more satisfied with the application and review process and those features directly related to peer review than were their counterparts who had applied a number of years prior to review reorganization. Even unfunded applicants responding to the more recent survey expressed higher levels of satisfaction than did unfunded applicants in the 1997 survey.

Table 2.8

Applicant Satisfaction with NIH Referral and Review of R01 Application and Review by Survey Year and Funding Status of Application

Characteristic of the Review Process and Application Year	Funded				Not Funded				All Applicants			
	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*
Appropriate study section assignment												
FY 1994 applicants	60.0	26.7	13.3	60	31.4	38.8	29.8	121	41.4	34.4	24.2	181
FY 2001 applicants	85.3	13.6	1.2	258	54.1	25.2	20.7	444	65.5	20.9	13.5	702
Expertise of the reviewers												
FY 1994 applicants	54.2	35.6	10.2	59	30.0	40.8	29.2	120	38.0	39.1	22.9	179
FY 2001 applicants	79.5	20.2	0.4	258	37.4	35.5	27.1	439	52.9	29.8	17.2	697
Reviewer understanding of research design and methodology												
FY 1994 applicants	56.7	25.0	18.3	60	31.7	33.3	35.0	120	40.0	30.6	29.4	180
FY 2001 applicants	81.7	16.3	2.0	257	33.4	31.4	35.2	446	51.1	25.9	23.0	703
Usefulness of reviewer comments												
FY 1994 applicants	40.0	41.7	18.3	60	24.8	37.2	38.0	121	29.8	38.7	31.5	181
FY 2001 applicants	71.9	23.4	4.7	256	30.2	32.4	37.4	444	45.4	29.1	25.4	700
Time required to receive the summary statement												
FY 1994 applicants	42.4	20.3	37.3	59	36.1	23.5	40.3	119	38.2	22.5	39.3	178
FY 2001 applicants	69.3	18.7	12.1	257	46.2	19.1	34.7	444	54.6	19.0	26.4	701
Overall satisfaction												
FY 1994 applicants	55.9	35.6	8.5	59	24.6	36.9	38.5	122	34.8	36.5	28.7	181
FY 2001 applicants	87.2	10.9	1.9	258	32.1	37.1	30.8	448	52.3	27.4	20.3	706

Note. Funded Applicants" refer to those whose target application was awarded funds. Percentages may not total to 100.0 percent due to rounding.

Summary and Conclusions

The core goal of the neuroscience review reorganization was to "identify the most meritorious science for each institute to consider for funding." To achieve this goal, principles of neuroscience review reorganization were established to guide study section development and general function of the review process. These principles established that CSR's reorganized neuroscience study sections should: (a) be organized by scientific focus rather than PI affiliation, grant mechanism, or proposed research technique; (b) review research grant applications that span a wide range of perspectives and depth of scientific expertise; (c) have overlapping expertise so as to provide flexibility in review; and (d) represent expertise in both basic and clinical research as appropriate. An additional consideration was that study sections should be organized in clusters to review similar types of research (IRGs), in part to enhance the review of emerging scientific areas.

In addition to the principles of the neuroscience reorganization, the NIH review process layers additional (and sometimes parallel) criteria for quality peer review. For example, research grant applications should be assigned to the study section that is most appropriate for the proposed research. Once referred to a review group, scientists with appropriate expertise should judge the application based on factors established by the NIH for review. Priority scores and summary statements should clearly convey assessment of merit and the reasons for this assessment. Finally, the review process should be the same for all investigators regardless of their previous experience in obtaining NIH research funds (e.g., new investigators) or focus of research (basic biomedical scientists or patient-oriented researchers).

As one part of a larger effort to ascertain whether neuroscience review reorganization at CSR achieved these outcomes, the views of NIH institute staff and recent R01 grant applicants in the neurosciences were surveyed. These two groups provided different perspectives in their assessments of the assignment and review process. Applicants have first-hand experience in applying for NIH research grants. Their opinions are shaped to varying degrees by several factors including the outcome of their most recent application to NIH (receipt of NIH funds), their knowledge of how the process has worked for other investigators with whom they are familiar, and their earlier experiences seeking research funds from NIH and other sponsors. In contrast, the views of institute staff are likely shaped by their experience with peer review across a relatively wide range of research areas. In addition, program staff members attend study section meetings, have regular interactions with Scientific Review Administrators, and interact on a regular basis with applicants who have made successful and unsuccessful applications. Also, whereas the review process primarily affects the ability of applicants to conduct their research, institute staff view the review process in terms of furthering the mission of their respective institutes.

Study Section and Reviewer Expertise

In general, large majorities of NIH program staff regarded study section membership appropriate in terms of scientific breadth, experience, and depth. Anywhere from 28 to 31 percent also viewed current neuroscience study section membership as an improvement over the constitution of study sections before review reorganization. Nearly three-quarters of staff indicated that study sections had appropriate mixtures of disciplinary perspectives needed to judge the quality of the proposed science, and nearly half (46 percent) felt this has been enhanced by reorganization.

From program staff responses there were two areas falling under the category of "expertise" where more attention may be warranted. First, although one third of institute program staff thought that the reorganized neuroscience study sections were better equipped to accommodate emerging areas of research in the review process, this encouraging result needs to be viewed cautiously, since only 36 percent felt the reorganized study sections had the capacity to adequately accommodate emerging areas. Consequently, it appears that program staff members still see room for improvement in accommodating emerging areas of science. Second, the fact that two-thirds of program staff respondents thought that the scientific breadth of study sections was either "very

appropriate" or "appropriate" is somewhat offset by the fact that 26 percent believed the situation to have worsened--nearly double the fraction of "worse" ratings for any other study section or reviewer expertise factor.

Applicants also addressed the expertise of reviewers, but from a different perspective. Because applicants are not likely to be as well informed about study section membership as are program staff, they were asked about their satisfaction with reviewers' expertise and understanding of their proposed research. Between 51 and 54 percent of applicants reported that they were mostly or completely satisfied. Not surprisingly, these judgments were clearly influenced by award status. Whereas 80 percent of funded applicants were satisfied with the expertise of reviewers, this was true for only 39 percent of those investigators whose applications were not awarded funds.

Another partial indicator of applicant views concerning reviewer expertise involves how useful they perceived the comments of the reviewers. Again differences between funded and unfunded applicants were clear. Where 72 percent of funded applicants expressed satisfaction with the usefulness of reviews' comments, only 31 percent of unfunded applicants indicated they were satisfied with this same feature of review.

Application Review Criteria

Both institute staff and applicants provided judgments about how well they believed reviewers understood and implemented the review criteria established by the NIH. Investigator assessments differed substantially depending on the specific criterion of interest. Nearly two thirds (65 percent) believed reviewers' judgments about the adequacy of applicants' institutional resources reflected that they understood this criterion "a great deal." Substantially lower proportions (between 41 and 44 percent) provided high ratings of reviewer ability to judge an application's potential for advancing the field, the relevance of preliminary data, and the appropriate collaboration with other scientists. Overall, applicants were the least positive with regard to the reviewers' understanding of the conceptual framework, the innovativeness of the project, and the planned use of new methods and technologies. Based on the way review criteria were applied, between 36 and 38 percent of respondents felt that the reviewers understood their proposal "a great deal." Again, funded applicants gave distinctly higher marks to the application of review criteria as compared to their unfunded counterparts.

Program staff assessments of reviewer application of review criteria, in general, were closer to those of unfunded applicants. For example, whereas 38 percent of unfunded applicants (as compared to 78 percent of funded applicants) cited that reviewers understood "a great deal" about how their research addressed an important problem, this opinion was shared by 48 percent of institute staff.

Review for Different Groups and Research Areas

Institute staff members were most confident in study section functioning for the review of basic research. Nearly three-quarters (73 percent) indicated that the neuroscience study sections were either excellent or very good at evaluating basic research. The proportion of program staff members giving excellent or very good ratings to the review of patient-oriented research was much lower, although it still was a majority (56 percent). Furthermore, 43 percent of program staff viewed review of patient-oriented research improved since review reorganization--the highest percentage reported for a research area. Only 36 percent of program staff indicated that the neuroscience study sections were either excellent or very good at evaluating behavioral science research, and one-third believed review had worsened, which was the largest "worse" percentage reported for this category.

Although not asked the same questions, it might be expected that applicants' satisfaction with the review process also may have differed, depending on the research focus of investigators. Indeed there were differences among basic biomedical, behavioral, and patient-oriented researchers in terms of overall satisfaction with the review process, satisfaction with individual features of review, and judgments of reviewers' understanding of

review criteria. Patient-oriented researchers typically expressed higher levels of dissatisfaction with the review process, particularly as compared to behavioral scientists. This is somewhat expected, given that the proportion of funded applicants (27 percent) was lower for this group of investigators; the corresponding figures for basic biomedical and behavioral science applicants were 38 and 40 percent, respectively. However, once the impact of funding status was taken into account, these disparities in views disappeared. Respondents who received research funds judged the review process similarly, regardless of their research field or even the IRG in which their application was reviewed.

Changes in the Review of Research Grants

Among neuroscience applicants who submitted R01 applications both prior and subsequent to reorganization, there was no clear consensus or predominant view about the extent to which the review process was different since review reorganization. Approximately one third believed their most recent review was substantially or somewhat better, while similar fractions believed it had remained the same or was worse. Concerning reviewer qualities including expertise of the reviewers, reviewer understanding of the proposed research, and usefulness of reviewer comments, between 39 and 45 percent felt no real change had occurred, and between 27 and 31 percent thought the quality of review had declined.

The views of applicants were compared with the results of a prior applicant satisfaction survey conducted in 1997 before review reorganization had occurred. For every aspect of the review process, satisfaction levels were significantly higher among neuroscientists who responded to the 2001 survey. After controlling for other factors such as research area, the results suggested that applicants who had applied to the newly reconfigured study sections and been successful were more satisfied with the overall review process than were their funded counterparts who had applied prior to reorganization. Even for unfunded applicants, those responding to the more recent survey reported higher levels of satisfaction than did those who were unfunded in the 1997 survey.

Changes in the Research Funding Support Process

While encouraging, the results above still fall short of providing clear evidence that review reorganization itself produced changes in either satisfaction or judgments about the quality of review. Unfortunately, retrospective surveys are limited in their ability to link confidently events and changes in perception. An attempt was made, however, to solicit institute staff and applicant views about factors affecting the process of pursuing NIH support. Not surprisingly, both groups viewed increases in the NIH's extramural research budget as having the most impact in terms of improving the process (nearly three quarters of applicants and nearly 70 percent of staff indicated that budget increases made the process better). Applicants also strongly endorsed the initiation of modular budgeting (77 percent), but program staff members were noticeably less enthusiastic (22 percent). Regarding the reorganization of neuroscience review, 31 percent of applicants and 49 percent of staff judged it beneficial. This level of endorsement by applicants was similar to their approval rating of new review criteria (33 percent viewed the new criteria as an improvement) and self-referral (38 percent). As compared to these two policy changes, reconfiguring the neuroscience study sections was, however, viewed by a slightly larger group of respondents as making the process of seeking NIH research funds worse (28 percent versus 20 and 12 percent, respectively).

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Appendix 2.A

Memberships of Neuroscience Advisory Group and CSR Evaluation Advisory Committee

Neuroscience Advisory Group

Connie Atwell
National Institute of Neurological Disorders and Stroke

Robin Barr
National Institute on Aging

Robert Baughman
National Institute of Neurological Disorders and Stroke

Barbara Bregman
Department of Neuroscience
Georgetown University

Catherine Carr
University of Maryland

Stewart Hendry
Department of Neuroscience
Johns Hopkins University

Deborah Henken
National Institute of on Child Health and Human Development

Sharon Juliano
Department of Neuroscien ce
Uniformed Services University of the Health Sciences

Teresa Levitin
National Institute on Drug Abuse

Richard Nakamura
National Institute of Mental Health

Elliot Postow
Center for Scientific Review

George Ricaurte
Department of Neurology
Johns Hopkins University

Daniel Sklare
National Institute on Child Health and Human Development

Robert Weller
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CSR Evaluation Advisory Group

Mark Appelbaum
Department of Psychology
University of California, San Diego

Gwyneth Boodroo
Educational Testing Service

Thomas D. Cook
Department of Sociology
Northwestern University

John J. McArdle (Chair)
Department of Psychology
University of Virginia

Barbara Mellers
Department of Psychology
Ohio State University

William Meredith
Department of Psychology
University of California, Berkeley

Samuel Rawlings
Center for Scientific Review
(now at the National Eye Institute)

Appendix 2.B

OMB No. 0925-0474 Expiration 9/2002

Survey of Recent Applicants to NIH Neuroscience Study Sections

Conducted by Humanitas, Inc.

for the

Center for Scientific Review
National Institutes of Health

4 October 2001

INSTRUCTIONS

Thank you for taking the time to complete this questionnaire. In order to get comparable data from respondents, we are asking that you refer to your experiences with submitting R01 research grant applications to any of the National Institutes of Health (NIH) study sections charged with reviewing applications in the neurosciences. This includes all types of research in these disciplines (e.g., biomedical, behavioral, and clinical).

- The 21 study sections that review neuroscience applications are:
  - **Brain Disorders and Clinical Neuroscience** (6 study sections that are abbreviated as BDCN-1 through BDCN-6)
  - **Molecular, Cellular, and Developmental Neuroscience** (7 study sections that are abbreviated as MCDN-1 through MCDN-7)
  - **Integrative, Functional, and Cognitive Neuroscience** (8 study sections that are abbreviated as IFCN-1 through IFCN-8)
    - Other directions for filling out this survey are provided with each question. Because not all questions will apply to everyone, you may be asked to skip certain questions.
    - Either a pen or pencil may be used.
    - When answering questions that require marking a box, please use an "X".

Thank you again for your help. It is really appreciated.

Section A. Recent Experiences in Applying to NIH Study Sections in the Neurosciences

We are interested in your ***recent*** experiences with submitting an R01 research grant application that was reviewed by an NIH study section that handles applications in the neurosciences. These study sections are identified on the opposite page.

By ***recent experiences***, we mean those related to the R01 application that you submitted ***between June 1, 2000 and November 1, 2000***. If you submitted more than one R01 application during these five months, please answer the questions with respect to the ***last*** application you submitted during this period. In the event that you submitted two applications on the same date (e.g., for the June 1st deadline), select ***one*** of these to answer the questions in this section.

1 **Did you submit an R01 application between June 1, 2000 and November 1, 2000 that was reviewed by a neuroscience study section?** *[Neuroscience study sections are those listed on the opposite page.]*

- ☐ Yes
- ☐ No
- ☐ Don't remember

} → ***Skip to Question 22 on Page 7***

2 **Was this application the first R01 grant application for which you were the principal investigator (PI)?**

- ☐ Yes
- ☐ No

3 **Was this application the first NIH R01 grant application that you had reviewed by any of the 21 neuroscience study sections?** *[These 21 study sections are listed on the opposite page.]*

- ☐ Yes
- ☐ No

4 **Which of the following best describes the type of research proposed in this application?**
► *Select one only*

- ☐ Basic research
- ☐ Patient-oriented research, i.e. research conducted with human subjects or on human materials (e.g., tissues, specimens, or cognitive phenomena) and where the investigator interacts directly with the human subjects
- ☐ Design-directed research (i.e., research that focuses primarily on developing new technologies, methodologies, instrumentation, or other tools that facilitate the conduct of research)
- ☐ Behavioral research
- ☐ Other (*specify*): _____

5 **Was this application . . .**

- ☐ A new or competing renewal application → ***Skip to Question 7 on Page 2***
- ☐ A revision and resubmission of a previous application

6 **Did the same study section review the previous submission?**

- ☐ Yes
- ☐ No
- ☐ Don't remember

7 **Did you request that a particular study section be assigned to review your application?**

- ☐ Yes → ***Skip to Question 9***
- ☐ No
- ☐ Don't remember → ***Skip to Question 11***

8 **What was your reason for <u>not</u> identifying a study section that should review your application?**

► *Select <u>one</u> only*

- ☐ I did not know that I could request that a specific study section review my application
- ☐ I was not sure which study section would be most appropriate to review my application.
- ☐ I believed that the NIH would assign my application to the appropriate study section.
- ☐ Other (specify): _____

9 **How did you identify the study section that would be the most appropriate to review your application?**

► *Select Yes or No for each*	**Yes**	**No**
I reviewed descriptions of the study sections that are available from the NIH	☐	☐
I reviewed the rosters of study section members	☐	☐
I contacted a scientific program official at one of the NIH Institutes	☐	☐
I contacted an NIH review official (i.e., a staff person in the Center for Scientific Review)	☐	☐
I received information and guidance from other colleagues or researchers	☐	☐
Other (specify) _____	☐	☐

10 **Was your application reviewed by the study section that you requested?**

- ☐ Yes
- ☐ No
- ☐ Don't remember

11 **Was your application assigned a priority score?**

- ☐ Yes
- ☐ No → ***Skip to Question 13 on Page 3***

12 **Did the NIH award funds based on the review of this application?**

→

13 What is the status with regard to the proposed research project that was described in your application?

► *Select one only*

- ☐ I have resubmitted (or plan to resubmit) a revised proposal to the NIH.
- ☐ I obtained funding for this research from a sponsor other than the NIH.
- ☐ I have submitted (or plan to submit) the proposed project to a sponsor other than the NIH.
- ☐ I am still reviewing what options are appropriate.
- ☐ I am not planning to pursue the research project described in my application.
- ☐ Other (*specify*): _____

14 How satisfied or dissatisfied are you with the assignment and review of this application in terms of the . . .

	Level of Satisfaction or Dissatisfaction					
	Completely satisfied	**Mostly satisfied**	**Mixed**	**Mostly dissatisfied**	**Completely dissatisfied**	**Don't remember/ Not applicable**
1.2 Appropriateness of the scientific peer review group	☐	☐	☐	☐	☐	☐
Expertise of the reviewers	☐	☐	☐	☐	☐	☐
Reviewers' understanding of the research plan, design, and methodology	☐	☐	☐	☐	☐	☐
Usefulness of the reviewers' comments	☐	☐	☐	☐	☐	☐
Time it took to receive the summary statement from the NIH	☐	☐	☐	☐	☐	☐
Time it took to find out the funding decision by the NIH	☐	☐	☐	☐	☐	☐
Helpfulness of the reviewers' comments in understanding the funding decision made by the NIH	☐	☐	☐	☐	☐	☐
Fairness of the NIH's funding decision	☐	☐	☐	☐	☐	☐

► *Select one for each*

15 Overall, how satisfied or dissatisfied are you with how the NIH handled your recent application?

- ☐ Completely satisfied
- ☐ Mostly satisfied
- Mixed
- Mostly dissatisfied
- Completely dissatisfied

16 **Assigned reviewers are instructed to rely on established criteria in evaluating an R01 research grant application. Based on the written feedback that you received about your application, how well did the reviewers understand the . . .**

► *Select one for each*	Level of Understanding: A great deal	Somewhat	Only a little	Not at all	Don't remember/ Not applicable
Degree to which your proposed research addressed an important problem	☐	☐	☐	☐	☐
Potential of the project, if successfully conducted, to advance theory, concepts, or methods in the field	☐	☐	☐	☐	☐
Conceptual framework underlying your proposed research	☐	☐	☐	☐	☐
Proposed study design, methods, and analyses	☐	☐	☐	☐	☐
Extent to which the project's aims were innovative	☐	☐	☐	☐	☐
Extent to which you planned to use new methods or technologies	☐	☐	☐	☐	☐
Ability of you and your research staff to carry out the proposed work	☐	☐	☐	☐	☐
Relevance of preliminary data to assessing the feasibility of conducting the proposed work	☐	☐	☐	☐	☐
Adequacy of resources and support at your institution	☐	☐	☐	☐	☐
Extent to which the project capitalized on unique resources at your institution	☐	☐	☐	☐	☐
Extent to which you had arranged useful collaborations with other scientists	☐	☐	☐	☐	☐

17 **In your opinion, what should the NIH do to improve the process for preparing, submitting, and reviewing research grant applications in the neurosciences?**

Section B. Previous Experiences in Applying to NIH Study Sections in the Neurosciences

18 **Did you submit an R01 application between February 1, 1997 and March 1, 1998 for neuroscience research that was reviewed by an NIH study section?**

- ☐ Yes
- ☐ No
- ☐ Don't remembe

→ *Go to Question 22 on Page 7*

19 **The study sections for neuroscience research grant applications were reconfigured in June 1998 to better reflect changes in the neurosciences themselves and to improve the quality of review for applications in these fields.**

Compared to your previous experiences in applying for an R01 research grant (i.e., applications that you submitted between February 1, 1997 and March 1, 1998), rate the review of your most recent application on each of the following characteristics:

► *Select one for each*	Substantially better	Somewhat better	About the same	Somewhat worse	Substantially worse	Don't remember/ Not applicable
The Review of My MOST RECENT Application Was . . .						
In terms of the . . .						
Appropriateness of the scientific peer review group	☐	☐	☐	☐	☐	☐
Expertise of the reviewers	☐	☐	☐	☐	☐	☐
Reviewers' understanding of the research plan, design, and methodology	☐	☐	☐	☐	☐	☐
Usefulness of the reviewers' comments	☐	☐	☐	☐	☐	☐
Time it took to receive the summary statement from the NIH	☐	☐	☐	☐	☐	☐
Time it took to find out the funding decision by the NIH	☐	☐	☐	☐	☐	☐
Helpfulness of the reviewers' comments in understanding the funding decision made by the NIH	☐	☐	☐	☐	☐	☐
Fairness of the NIH's funding decision	☐	☐	☐	☐	☐	☐

20 **Overall, how would you rate the review of your most recent application in comparison with earlier reviews?**

- ☐ Substantially better
- ☐ Somewhat better
- ☐ About the same
- ☐ Somewhat worse
- ☐ Substantially worse
- ☐ Don't remember

21 **When the neuroscience study sections were reconfigured in June 1998, the NIH also made other changes in how investigator-initiated research grant applications were reviewed. Changes in the overall environment for seeking research funds also occurred. These changes may or may not have affected applicants' experiences in applying for NIH research funding.**

How do you believe each of the following affected (if at all) your <u>recent</u> experiences in seeking NIH research grant funding?

	My MOST RECENT Experiences Were . . .					
	Substantially better	Somewhat better	About the same	Somewhat worse	Substantially worse	Don't remember/ Not applicable
► *Select <u>one</u> for each*						
Because of the . . .						
Opportunity to identify the section that should review my application	☐	☐	☐	☐	☐	☐
Use of new review criteria that emphasize the project's significance and innovativeness	☐	☐	☐	☐	☐	☐
Reconfiguring of the study sections that review research grant applications in neuroscience	☐	☐	☐	☐	☐	☐
Elimination of the grant mechanism that was explicitly targeted at new investigators (R29 grants)	☐	☐	☐	☐	☐	☐
Implementation of modular grants that require less budgetary detail when total direct costs do not exceed $250,000 per year	☐	☐	☐	☐	☐	☐
Increases in the NIH budget that allowed more research grant applications to be funded	☐	☐	☐	☐	☐	☐

Section C. Background Information

22 **Are you currently employed by an institution of higher education?** (*Include postdoctoral training appointments*).

- ☐ Yes
- ☐ No ⟶ ***Skip to Question 25***

23 *If you are employed or have a postdoctoral training appointment in an institution of higher education*:

What is the name of this institution? _____

24 **What (if any) is your faculty rank?**

- ☐ Not applicable at this institution
- ☐ Not applicable for my position
- ☐ Professor
- ☐ Associate professor
- ☐ Assistant professor
- ☐ Instructor
- ☐ Lecturer
- ☐ Adjunct faculty
- ☐ Other (*specify*): _____

25 **Which of the following best describes your current research area?**

► *Select one only*

- ☐ Cell biology
- ☐ Development and regeneration
- ☐ Disorders of the nervous system
- ☐ Endocrine and autonomic regulation
- ☐ Excitatory membrane and synaptic transmission
- ☐ Motor systems and sensory integration
- ☐ Neural bases for behavior
- ☐ Neurological and psychiatric conditions
- ☐ Neurotransmission, modular transport, and receipt
- ☐ Sensory systems
- ☐ Other (*specify*): _____

26 **Do you <u>currently</u> serve (1) as a principal investigator (PI) or (2) in another key role on any research projects?**

Key roles include serving as a collaborator, co-principal investigator, project manager, research associate, or consultant.

☐ Yes
☐ No ⟶ ***Skip to Question 28***

27 **If YES, please indicate the funding sources for these research projects and your role.**

► *Select <u>all</u> that apply.*

	As a Principal Investigator	In Another Key Research Role
One or more Institutes of the NIH	☐	☐
A federal agency (*other than* the NIH)	☐	☐
A private nonprofit foundation or charitable organization	☐	☐
A private for-profit company or business	☐	☐
A state or local government agency	☐	☐
Other source not mentioned above (*specify*): _____	☐	☐

28 **Please indicate which of these degrees apply to you and in what year you received the degree.**

► *Select <u>all</u> that apply and fill out years accordingly.*

	<u>Type of Degree</u>	<u>Year Degree Received</u>
☐	D.D.S.	19_____
☐	D.V.M.	19_____
☐	M.D.	19_____
☐	Ph.D. or other research doctorate	19_____
☐	Other (*specify*): _____	19_____

29 *If you earned a Ph.D. or other research doctorate*:

What is the field of your doctorate degree? _____

30 **Are you . . .**

☐ Male
☐ Female

31 **Are you of Hispanic, Spanish, or Latino origin or descent?**

☐ Yes
☐ No

32 **Which of the groups below best describes you?**

- ☐ American Indian/Native American
- ☐ Asian
- ☐ Pacific Islander
- ☐ Black
- ☐ White
- ☐ Other (*specify*):

33 **In what year were you born?** _____

If you have any additional comments about any item in this survey or on the NIH review process, please write them below.

THANK YOU FOR YOUR PARTICIPATION

We appreciate the time and effort you have taken to answer these questions. Please mail your completed questionnaire in the enclosed envelope to the survey contractor:

Survey of Recent Applicants to NIH Neuroscience Study Sections
Humanitas, Inc.
8630 Fenton Street, Suite 910
Silver Spring, MD 20910

Appendix 2.C

Experiences of NIH Program Staff with the Review of R01 Applications in the Neurosciences

Conducted by Humanitas, Inc.

for the

Center for Scientific Review
National Institutes of Health

5 October 2001

*Thank you for taking the time to complete this questionnaire. This survey asks for your views regarding the **review of R01 applications** by the **neuroscience study sections** in the Center for Scientific Review (CSR). We are particularly interested in your assessment of the **quality of the review process** from your perspective as an NIH program official. We also value your judgments on how the current review of neuroscience applications compares to review taking place before the study sections in the neurosciences were reconfigured in June 1998.*

*Please keep in mind that **your responses are confidential**. The results will be reported to CSR only as summaries where no individual's answers can be identified.*

INSTRUCTIONS

In order to get comparable data from respondents, we are asking that you refer to your experiences as an Institute staff member who was assigned R01 applications reviewed by CSR study sections in the neurosciences.

NEUROSCIENCE STUDY SECTIONS

- The 21 study sections that review neuroscience applications are:
  - **Brain Disorders and Clinical Neuroscience** (6 study sections that are abbreviated as BDCN-1 through BDCN-6)
  - **Molecular, Cellular, and Developmental Neuroscience** (7 study sections that are abbreviated as MDCN-1 through MDCN-7)
  - **Integrative, Functional, and Cognitive Neuroscience** (8 study sections that are abbreviated as IFCN-1 through IFCN-8)
- Other directions for filling out this survey are provided with each question. Because not all questions will apply to everyone, you may be asked to skip certain questions.
- Either a pen or pencil may be used.
- When answering questions that require marking a box, please use an "X".

Thank you again for your help. It is really appreciated.

Section A: Recent Program Staff Experience with the Review of R01 Applications in the Neurosciences

The questions in this section ask about your experiences with the review of R01 applications by CSR neuroscience study sections. These study sections are identified on the opposite page. In answering the questions, please respond in terms of your **recent experiences**—that is, those that pertained to new, competing renewal, or amended R01 applications that:

(a) Were reviewed by any of the 21 neuroscience study sections listed on the opposite page during their **October 1, 2000 through March 31, 2001** meetings (the relevant Council meetings would have occurred between **February and June 2001),**

(b) Received a primary or dual assignment to your Institute, and

(c) Were handled by you as a program officer.

1 **Were you assigned any R01 applications that were reviewed by CSR neuroscience study sections that met between October 1, 2000 and March 31, 2001?** [*Neuroscience study sections are those listed on the opposite page.*]

☐ Yes
☐ No ⟶ ***Skip to Question 15 on Page 6***

2 **Approximately how many R01 applications reviewed during this time period by a CSR neuroscience study section were assigned to you?** *(Include both primary and dual assignments.)*

☐ R01 applications

3 **Which CSR neuroscience study sections reviewed one or more of your assigned applications?**

► *Select all that apply*

☐ BDCN-1	☐ MCDN-1	☐ IFCN-1
☐ BDCN-2	☐ MCDN-2	☐ IFCN-2
☐ BDCN-3	☐ MCDN-3	☐ IFCN-3
☐ BDCN-4	☐ MCDN-4	☐ IFCN-4
☐ BDCN-5	☐ MCDN-5	☐ IFCN-5
☐ BDCN-6	☐ MCDN-6	☐ IFCN-6
	☐ MCDN-7	☐ IFCN-7
		☐ IFCN-8

4 **Which types of research did one or more of these applications address?**

► *Select all that apply*

- ☐ Basic research
- ☐ Patient-oriented research, i.e., research conducted with human subjects or on human materials (e.g., tissues, specimens, or cognitive phenomena) and where the investigator interacts directly with the human subjects
- ☐ Design-directed research (i.e., research that focuses primarily on developing new technologies, methodologies, instrumentation, or other tools to facilitate the conduct of research)
- ☐ Behavioral research
- ☐ Other (*specify*): _____

5 **Program staff may have different experiences and involvement with the review process, depending on the types of applications that were assigned, their workload, the priorities of their Institute, and other factors. During the past 12 months, approximately how many times have you . .**

	Number of times
Helped identify potential reviewers or study section members whom CSR might contact to serve on neuroscience study sections	☐
Helped researchers identify which neuroscience study sections to request in their application	☐
Attended scheduled CSR neuroscience study section meetings for applications assigned to you	☐
Responded to questions about summary statements from individuals whose neuroscience applications were not funded	☐
Discussed specific, science-based questions about reviews with the appropriate SRA for a neuroscience study section	☐
Interacted with the SRA on other problems or issues that were raised in the reviews	☐
Other (specify) _____ _____	☐

6 **Considering your experiences with the study sections to which these R01 applications were assigned, were the applications assigned to appropriate reviewers . . .**

- ☐ Always or almost always
- ☐ More than half the time
- ☐ About half the time
- ☐ Less than half the time
- ☐ Rarely or never

7 **Overall, how appropriate were the memberships of the study sections in terms of the . . .**

	Appropriateness of Study Section Memberships				
	Very Appropriate	Appro-priate	Somewhat Appropriate	Not Very Appropriate	Inap-propriate
► *Select one for each*					
Representation of all relevant disciplines	☐	☐	☐	☐	☐
Objectivity of members	☐	☐	☐	☐	☐
Scientific breadth of members	☐	☐	☐	☐	☐
Depth of scientific expertise of members	☐	☐	☐	☐	☐
Scientific experience of members	☐	☐	☐	☐	☐
Demographic diversity of members	☐	☐	☐	☐	☐
Ability to accommodate emerging areas of research	☐	☐	☐	☐	☐

8 **As you know, assigned reviewers are instructed to rely on established criteria in evaluating an R01 research grant application. Recognizing that study sections may differ in their adherence to these criteria, please consider your experiences with those applications that were assigned to you and reviewed by a CSR neuroscience study section. As a whole, how well do you believe the reviewers understood the . . .**

	Level of Understanding				
	A Great Deal	Somewhat	Only a Little	Not at All	Don't Know
► *Select one for each*					
Degree to which the proposed research addressed an important problem	☐	☐	☐	☐	☐
Potential of the projects, if successfully conducted, to advance theory, concepts, or methods in the field	☐	☐	☐	☐	☐
Conceptual framework underlying the proposed research	☐	☐	☐	☐	☐
Proposed study designs, methods, and analyses	☐	☐	☐	☐	☐
Extent to which project aims were innovative	☐	☐	☐	☐	☐
Extent to which applicants planned to use new methods or technologies	☐	☐	☐	☐	☐

	Level of Understanding				
► *Select one for each*	**A Great Deal**	**Somewhat**	**Only a Little**	**Not at All**	**Don't Know**
Ability of the applicants and other key research staff to carry out the proposed work	☐	☐	☐	☐	☐
Relevance of preliminary data to assessing the feasibility of conducting the proposed work	☐	☐	☐	☐	☐
Adequacy of resources and support at the applicants' institutions	☐	☐	☐	☐	☐
Extent to which projects capitalized on unique resources at the applicants' institutions	☐	☐	☐	☐	☐
Extent to which applicants had arranged useful collaborations with other scientists	☐	☐	☐	☐	☐

9 **Based on your experiences with these research grant applications, how would you rate the <u>overall quality</u> of the reviews performed by the CSR neuroscience study sections for applications that primarily involved . . .**

	Overall Quality of the Reviews					
► *Select one for each*	**Excellent**	**Very Good**	**Good**	**Fair**	**Poor**	**Too Little Experience To Say**
Basic research	☐	☐	☐	☐	☐	☐
Patient-oriented research	☐	☐	☐	☐	☐	☐
Design-directed research	☐	☐	☐	☐	☐	☐
Behavioral research	☐	☐	☐	☐	☐	☐
Research proposed by new investigators	☐	☐	☐	☐	☐	☐
Multidisciplinary research	☐	☐	☐	☐	☐	☐

10 **Program staff may have very different experiences with study sections, depending on the particular study section and characteristics of the application. These differences may prompt judgments that are noticeably more positive or negative than the ones you provided in Questions 7, 8 and 9. Briefly describe any such experiences that you have had, which you believe identify issues that should be addressed by the CSR in its review of neuroscience research grant applications.**

11 **Considering all relevant R01 applications, which encompass many types of research and disciplines in the neurosciences, how would you rate the performance of the CSR neuroscience study sections in identifying those applications that most merit funding by the NIH?**

► *Select one only*

- ☐ Excellent
- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor

12 **Study sections also review R01 research grant applications on the appropriateness of the proposed budgets (total direct costs). Following the implementation of modular grants, study sections now are to base their assessment on the overall effort and resources required. Based on your experiences, do CSR neuroscience study sections appropriately review proposed budgets . . .**

► *Select one only*

- ☐ Always or almost always
- ☐ More than half the time
- ☐ About half the time
- ☐ Less than half the time
- ☐ Rarely or never

13 **The grant mechanism for new investigators (R29) was eliminated and replaced with a "new investigator check off" box on R01 research grant applications. Based on your experiences, do CSR neuroscience study sections appropriately review applications from new investigators . . .**

► *Select one only*

- ☐ Always or almost always
- ☐ More than half the time
- ☐ About half the time
- ☐ Less than half the time
- ☐ Rarely or never

14 **In your opinion, what could CSR do to improve the process for reviewing the types of neuroscience research grant applications that you handle for your Institute?**

15 **In your opinion, what could CSR do to facilitate your role and responsibilities as a program official?**

Section B: Previous Experiences with the Review of R01 Applications in the Neurosciences

16 **Were you assigned any R01 applications that involved neuroscience research and were reviewed by CSR study sections during the year prior to their reorganization in June 1998, i.e., between June 1997 and May 1998?** [*Examples would include such study sections as Neurology A and Neurological Sciences-1.*]

☐ Yes

☐ No ⟶ ***Skip to Question 20 on Page 9***

17 **The study sections for R01 applications in the neurosciences were reconfigured in June 1998 to better reflect changes in the neurosciences themselves and to improve the quality of review for applications in these fields. The following items ask you to compare your recent experiences as a program officer responsible for handling R01 neuroscience applications with those that were reviewed by CSR study sections prior to their reorganization.**

Would you say that the current membership of the neuroscience study sections is substantially better, somewhat better, about the same, somewhat worse, or substantially worse than that of the study sections prior to reorganization in terms of . . .

► *Select one for each*	**The Current Membership is…**					
	Substantially better	**Somewhat better**	**About the same**	**Somewhat worse**	**Substantially worse**	**Don't Know**
In terms of :						
Representation of all relevant disciplines	☐	☐	☐	☐	☐	☐
Objectivity of members	☐	☐	☐	☐	☐	☐
Scientific breadth of members	☐	☐	☐	☐	☐	☐
Depth of scientific expertise of members	☐	☐	☐	☐	☐	☐
Scientific experience of members	☐	☐	☐	☐	☐	☐
Demographic diversity of members	☐	☐	☐	☐	☐	☐
Ability to accommodate emerging areas of research	☐	☐	☐	☐	☐	☐

18 **Would you say that the <u>overall quality of current reviews</u> conducted by the reorganized neuroscience study sections is now <u>substantially better, somewhat better, about the same, somewhat worse, or substantially worse</u> than the reviews carried out by study sections prior to reorganization for neuroscience applications that involve . . .**

The Quality of Current Reviews is…

	Substanti-ally better	Somewhat better	About the same	Somewhat worse	Substanti-ally worse	Don't Know
► *Select <u>one</u> for each*						
For applications that involve :						
Basic research	☐	☐	☐	☐	☐	☐
Patient-oriented research	☐	☐	☐	☐	☐	☐
Design-directed research	☐	☐	☐	☐	☐	☐
Behavioral research.....	☐	☐	☐	☐	☐	☐
Research proposed by new investigators	☐	☐	☐	☐	☐	☐
Multidisciplinary research	☐	☐	☐	☐	☐	☐

19 **Considering all types of research and investigators who submit R01 applications in the neurosciences, how would you rate the performance of the neuroscience study sections in <u>identifying those applications that most merit funding</u> by your Institute as compared to the performance of the study sections prior to reorganization?**

► *Select <u>one</u> only*

- ☐ Substantially better
- ☐ Somewhat better
- ☐ About the same
- ☐ Somewhat worse
- ☐ Substantially worse

20 **When the neuroscience study sections were reconfigured in June 1998, the NIH made other changes in how investigator-initiated research grant applications were reviewed. Changes in the overall environment for seeking research funds also occurred. These changes may or may not have affected the review of NIH research grant applications.**

Please rate how each of these items did or did not affect the review of neuroscience research grant applications that were assigned to your Institute.

	Made the Review Process…					
► *Select <u>one</u> for each*	**Substantially better**	**Somewhat better**	**About the same**	**Somewhat worse**	**Substantially worse**	**Don't Know**
The opportunity for applicants to request a specific study to review an application	☐	☐	☐	☐	☐	☐
The use of new review criteria that emphasize the project's significance and innovativeness	☐	☐	☐	☐	☐	☐
The reconfiguring of the study sections that review research grant applications in neuroscience	☐	☐	☐	☐	☐	☐
The elimination of the grant mechanism that was explicitly targeted at new investigators (R29 grants)	☐	☐	☐	☐	☐	☐
The implementation of modular grants where less budgetary detail is required for certain applications	☐	☐	☐	☐	☐	☐
Increases in the NIH budget that allowed more research grant applications to be funded	☐	☐	☐	☐	☐	☐

21 **Please write any other comments that you may have about how neuroscience research grant applications are reviewed or about this survey.**

THANK YOU FOR YOUR PARTICIPATION

We appreciate the time and effort you have taken to answer these questions. Please return your completed questionnaire in the enclosed envelope to the survey contractor:

Experiences of NIH Program Staff
Humanitas, Inc.
8630 Fenton Street, Suite 910
Silver Spring, MD 20910

Appendix 2.D

Study Sections of Respondents to 1997 Customer Satisfaction Survey

CSR Study Sections

Sensory Disorders and Language (CMS)
Hearing Research (HAR)
Neuroscience, Behavior, and Sociology of Aging, Subcommittee B (NEUA)
Neurology, Neurology Subcommittee (NEUB1)
Neurology, Neurobiology Subcommittee (NEUB2)
Neurology, C (NEUC)
Neurological Sciences, Subcommittee 1 (NLS1)
Neurological Sciences, Subcommittee 2 (NLS2)

NIAAA Study Section

Alcohol Biomedical Research: Neuroscience and Behavior (ALCB2)

NIDA Study Sections

Drug Abuse Biomedical Research, Pharmacology Research (DABR1)
Drug Abuse Biomedical Research, Biochemistry Research (DABR2)
Drug Abuse Biomedical Research, Subcommittee 3(DABR3)

NIMH Study Sections

Bio-Psychology (BPO)
Cognitive Functional Neuroscience (CFN)
Molecular, Cellular, and Developmental Neurobiology (MCDN)
Neuropharmacology and Neurochemistry (NPNC)
Perception and Cognition (PEC)

Appendix 2.E

Appendix Table 2.E-1

Response Rates for the *Survey of Recent Applicants to NIH Neuroscience Study Sections*

Survey Mode	Sent (N)	Total eligible[1] (N)	Refused or unusable (N)	Completed (N)	Response Rate (%)	
					Upperbound	Lowerbound
Mail	880	845	137	708	83.8	80.5
Web	878	821	119	702	85.5	80.0
Total	1,758	1,666	256	1,410	84.6	80.2

Note. The upperbound response rate, also known as the cooperation rate, measures the level of cooperation attained among those identified, reached, and eligible. It is computed as I/(I+R), where I = the number of completed surveys and R = the number of refusals. The lower bound response rate measures the amount of completed surveys per total sent to all individuals in the sample (whether or not they were later determined ineligible).

[1]The total eligible excludes sampled individuals who were deceased, those who were no longer residing in the United States, and those who indicated that they had not submitted an R01 grant application during the time period of interest (i.e., one that had been submitted between June 1st and November 1st, 2000).

Appendix Table 2.E-2

Selected Characteristics of Mail and Web Samples for the *Survey of Recent Applicants to NIH Neuroscience Study Sections*

Characteristic	Mail Sample		Web sample		All Respondents	
	N	%	N	%	N	%
Gender						
Male	554	78.6	525	74.9	1,079	76.7
Female	151	21.4	176	25.1	327	23.3
Underrepresented minority						
Yes	30	5.4	43	6.5	73	5.4
No	655	94.6	619	93.5	1,274	94.6
Highest degree						
Ph.D. only	530	75.0	529	75.3	1,059	75.1
M.D. only	79	11.2	79	11.2	158	11.2
Dual degree (M.D./Ph.D., D.V.M./Ph.D., D.D.S./Ph.D.)	97	13.7	95	13.5	192	13.6
Other (e.g., Ed.D.)	1	0.1	0	0.0	1	0.1
Field of Ph.D. (for those with a Ph.D., D.Sc., or similar research degree)						
Biomedical (e.g., neuroscience or genetics)	476	78.0	484	79.3	960	78.7
Behavioral (e.g., psychology or sociology)	93	15.3	87	14.3	180	14.8
Other (e.g., mathematics)	41	6.7	39	6.4	80	6.6
Employed by an institution of higher education						
Yes	688	97.3	669	95.9	1,357	96.6
No	19	2.7	29	4.2	48	3.4
Faculty rank (if employed by an institution of higher education)						
Professor	270	39.7	267	40.5	537	40.1
Associate professor	182	26.8	180	27.3	362	27.0
Assistant professor	191	28.1	169	25.6	360	26.9
Other (e.g., instructor or lecturer)	35	5.2	39	5.9	74	5.5
No rank	2	0.3	5	0.8	7	0.5
Type of research described in application						
Basic biomedical	450	74.1	469	72.8	919	72.9
Behavioral	83	13.6	79	12.3	162	12.9
Patient-oriented	58	9.6	79	12.3	137	11.7
Other (e.g., design-directed)	16	2.6	17	2.6	33	2.6

Appendix Table 2.E-2

Selected Characteristics of Mail and Web Samples for the *Survey of Recent Applicants to NIH Neuroscience Study Sections* *(continued)*

Characteristic	Mail Sample		Web sample		All Respondents	
	N	%	N	%	N	%
Primary research focus						
Cell biology	86	12.3	72	10.8	158	11.6
Development and regeneration	72	10.3	84	12.6	156	11.4
Endocrine and autonomic regulation	21	3.0	21	3.2	42	3.1
Excitatory membrane and synaptic transmission	69	9.9	53	8.0	122	8.9
Motor systems, sensory integration, and sensory systems	88	12.6	88	13.2	176	12.9
Neurotransmission, modular transport, and receipt	31	4.4	34	5.1	65	4.8
Neural bases for behavior	107	15.3	95	14.2	202	14.8
Disorders of the nervous system	130	18.6	123	18.4	253	18.5
Neurological and psychiatric conditions	76	10.9	74	11.1	150	11.0
Other	20	2.9	23	3.5	43	3.1
Application targeted in survey received a priority score						
Yes	519	73.3	485	69.0	1,004	71.2
No	189	26.7	218	31.0	407	28.8
Application targeted in survey was a:						
A new or competing renewal	429	60.6	430	61.2	859	60.9
A revision and resubmission of a previous application	279	39.4	273	38.8	552	39.1
Application targeted in survey was awarded funds						
Yes	262	37.0	245	34.9	507	35.9
No	446	63.0	458	65.1	904	64.1
Respondent also applied between February 1997 and March 1998						
Yes	220	31.1	233	33.2	453	32.2
No	487	68.9	468	66.8	955	67.8
Respondent was a PI on other NIH research grants at time of survey						
Yes	409	64.4	414	64.6	823	64.5
No	226	35.6	227	35.4	453	35.5

Appendix Table 2.E-3

Response Rates for the *Survey on the Experiences of NIH Program Staff with the Review of R01 Applications in the Neurosciences*

Institute	Sent (N)	Ineligible (N)	Total Eligible		Refused or unusable	Completed		Response Rate (%)	
			N	%		N	%	Upperbound	Lowerbound
NIA	6	0	6	7.1	0	6	9.7	100.0	100.0
NICHD	16	5	11	13.1	5	6	9.7	54.5	37.5
NIDA	21	3	18	21.4	6	12	19.4	66.7	57.1
NIDCD	7	0	7	8.3	0	7	11.3	100.0	100.0
NIMH	18	4	14	16.7	1	13	21.0	92.9	72.2
NINDS	27	5	22	26.2	10	12	19.4	54.5	44.4
Other Institutes	8	2	6	7.1	0	6	9.7	100.0	100.0
Total	103	19	84	100.0	22	62	100.0	73.8	60.2

Note. The upperbound response rate, also known as the cooperation rate, measures the level of cooperation attained among those identified, reached, and eligible. It is computed as I/(I+R), where I = the number of completed surveys and R = the number of refusals. The lower bound response rate measures the amount of completed surveys per total sent to all individuals in the sample (whether or not they were later determined ineligible).

Appendix Table 2.E-4

Perceptions of NIH Program Staff on Study Section Membership Characteristics and Changes Since Neuroscience Review Reorganization by NIH Institute

Member Characteristics	Appropriateness			Compared to Before Re-organization of Study Sections		
	Very appropriate or Appropriate	Somewhat or not very appropriate/Inappropriate	*n*	Better or the Same	Worse	*n*
Scientific breadth						
NIDA and NIMH	73.9	26.1	23	70.6	29.4	17
NINDS	58.3	41.7	12	33.3	66.7	6
Other	64.0	36.0	25	93.7	6.3	16
Depth of scientific expertise						
NIDA and NIMH	69.6	30.4	23	82.3	17.7	17
NINDS	66.7	33.3	12	83.3	16.7	6
Other	76.0	24.0	25	93.7	6.3	16
Scientific experience						
NIDA and NIMH	73.9	26.1	23	94.1	5.9	17
NINDS	58.3	41.7	12	50.0	50.0	6
Other	84.0	16.0	25	93.7	6.3	16
Representation of all relevant disciplines						
NIDA and NIMH	87.0	13.0	23	82.3	17.7	17
NINDS	50.0	50.0	12	66.7	33.3	6
Other	72.0	28.0	25	93.8	6.2	16
Demographic diversity						
NIDA and NIMH	69.6	30.4	23	100.0	0.0	16
NINDS	54.6	45.4	11	83.3	16.7	6
Other	75.0	25.0	24	93.3	6.7	15
Ability to accommodate emerging areas of research						
NIDA and NIMH	45.5	54.5	22	88.2	11.8	17
NINDS	16.7	83.3	12	66.7	33.3	6
Other	37.5	62.5	24	87.5	12.5	16

Appendix Table 2.E-5

Satisfaction with NIH Referral and Review of R01 Application and Review by Funding Status and Integrated Review Group (IRG): Applicants to Neuroscience Study Sections

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*
Appropriate study section assignment												
BDCN	84.9	12.7	2.4	126	46.8	34.2	19.0	263	59.1	27.3	13.6	389
IFCN	87.1	11.9	1.0	194	55.7	26.8	17.5	291	68.3	20.8	10.9	485
MCDN	84.2	14.7	1.1	184	49.3	27.0	23.7	337	61.6	22.7	15.7	521
Expertise of the reviewers												
BDCN	74.6	23.0	2.4	126	36.8	36.8	26.4	261	49.1	32.3	18.6	387
IFCN	84.5	14.5	1.0	193	42.0	34.7	23.3	288	59.0	26.6	14.4	481
MCDN	79.4	18.5	2.2	184	37.6	38.5	23.9	335	52.4	31.4	16.2	519
Reviewer understanding of research design and meth-odology												
BDCN	78.6	15.1	6.4	126	34.2	35.0	30.8	263	48.6	28.5	22.9	389
IFCN	84.0	13.9	2.1	194	36.4	32.3	31.3	291	55.5	25.0	19.6	485
MCDN	81.9	15.4	2.8	182	32.2	33.7	34.0	335	49.7	27.3	23.0	517
Usefulness of reviewer comments												
BDCN	71.2	25.6	3.2	125	32.2	31.8	36.0	264	44.7	29.8	25.5	389
IFCN	78.2	18.1	3.6	193	32.1	36.2	31.7	290	50.5	29.0	20.5	483
MCDN	64.8	25.8	9.3	182	29.7	35.1	35.1	333	42.1	31.8	26.0	515
Time required to receive the summary statement												
BDCN	64.0	23.2	12.8	125	39.9	21.3	38.8	263	47.7	21.9	30.4	388
IFCN	68.6	22.7	8.8	194	53.5	16.7	29.9	288	59.5	19.1	21.4	482
MCDN	67.8	15.3	16.9	183	47.8	17.7	34.5	333	54.8	16.9	28.3	516

Appendix Table 2.E-5 (*Continued*)

Satisfaction with NIH Referral and Review of R01 Application and Review by Funding Status and Integrated Review Group (IRG): Applicants to Neuroscience Study Sections

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*
Overall satisfaction												
BDCN	88.9	11.1	0.0	126	30.1	39.5	30.5	266	49.0	30.4	20.7	392
IFCN	89.2	9.3	1.6	194	35.5	34.1	30.4	293	56.9	24.2	18.9	487
MCDN	81.0	15.8	3.3	184	28.8	38.8	32.4	340	47.1	30.7	22.1	524

Note. "Funded Applicants" refer to those whose target application was awarded funds. The IRGs are abbreviated as follows: Brain Disorders and Clinical Neuroscience (BDCN); IFCN (Integrative, Functional, and Cognitive Neuroscience); and MCDN (Molecular, Cellular, and Developmental Neuroscience). Percentages may not total to 100 percent due to rounding.

Appendix Table 2.E-6

Satisfaction with NIH Referral and Review of R01 Application and Review by Funding Status and Research Focus: Applicants to Neuroscience Study Sections

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	Satisfied	Mixed	Dissat-isfied	*N*	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*
Appropriate study section assignment												
Basic biomedical sciences	84.2	14.5	1.3	393	52.1	28.3	19.6	637	64.4	23.0	12.6	1,030
Behavioral sciences	89.4	9.1	1.5	66	56.8	27.4	15.8	95	70.2	19.9	9.9	161
Patient-oriented research	89.7	7.7	2.6	39	40.6	35.9	23.6	106	53.8	28.3	17.9	145
Expertise of the reviewers												
Basic biomedical sciences	78.6	19.4	2.0	392	38.6	37.2	24.3	635	53.9	30.4	15.8	1,027
Behavioral sciences	86.4	13.6	0.0	66	43.2	36.8	20.0	95	60.9	27.3	11.8	161
Patient-oriented research	82.1	15.4	2.6	39	37.3	38.2	24.5	102	49.7	31.9	18.4	141
Reviewer understanding of research design and meth-odology												
Basic biomedical sciences	79.9	16.3	3.8	392	33.2	34.4	32.4	636	51.0	27.5	21.5	1,028
Behavioral sciences	90.8	9.2	0.0	65	44.2	25.3	30.5	95	63.1	18.8	18.1	160
Patient-oriented research	84.6	10.3	5.1	39	32.4	35.2	32.4	105	46.5	28.5	25	144
Usefulness of reviewer comments												
Basic biomedical sciences	67.7	25.6	6.7	390	29.8	35.1	35.1	635	44.2	31.5	24.3	1,025
Behavioral sciences	83.1	15.4	1.5	65	37.9	28.4	33.7	95	56.3	23.1	20.6	160
Patient-oriented research	87.2	10.3	2.6	39	31.7	35.6	32.7	104	46.9	28.7	24.5	143
Time required to receive the summary statement												
Basic biomedical sciences	66.8	18.4	14.8	392	47.0	18.1	34.9	634	54.6	18.2	27.2	1,026
Behavioral sciences	62.1	33.3	4.6	66	46.8	18.1	35.1	94	53.1	24.4	22.5	160
Patient-oriented research	73.7	15.8	10.5	38	52.4	20.0	27.6	105	58.1	18.9	23.1	143

Appendix Table 2.E-6 (*Continued*)

Satisfaction with NIH Referral and Review of R01 Application and Review by Funding Status and Research Focus: Applicants to Neuroscience Study Sections

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*	Satisfied	Mixed	Dissat-isfied	*n*
Overall satisfaction												
Basic biomedical sciences	85.0	13.0	2.0	393	31.6	37.7	30.7	642	51.9	28.3	19.8	1,035
Behavioral sciences	92.4	6.1	1.5	66	33.3	36.5	30.2	96	57.4	24.1	18.5	162
Patient-oriented research	87.2	12.8	0.0	39	32.7	37.4	29.9	107	47.3	30.8	21.9	146

Note. "Funded Applicants" refer to those whose target application was awarded funds. Percentages may not total to 100 percent due to rounding.

Appendix Table 2.E-7

Applicant Ratings of Reviewer Understanding of Evaluation Criteria by Funding Status and Research Area of Application

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*
Degree to which the research addressed an important problem												
Basic biomedical sciences	78.5	18.7	2.8	391	37.5	37.5	25.0	635	53.1	30.3	16.6	1,026
Behavioral sciences	75.8	19.7	4.6	66	41.1	35.8	23.2	95	55.3	29.2	15.5	161
Patient-oriented research	79.5	18.0	2.6	39	38.5	36.5	25.0	104	49.7	31.5	18.9	143
Potential to advance theory, concepts, or methods												
Basic biomedical sciences	70.3	26.3	3.3	391	27.8	39.4	32.8	634	44.0	34.4	21.6	1,025
Behavioral sciences	71.2	25.8	3.0	66	29.5	33.7	36.8	95	46.6	30.4	23.0	161
Patient-oriented research	71.8	28.2	0.0	39	30.8	33.7	35.6	104	42.0	32.2	25.9	143
Conceptual framework underlying the research												
Basic biomedical sciences	63.1	33.0	3.9	388	22.2	44.9	32.9	632	37.8	40.4	21.9	1,020
Behavioral sciences	56.9	40.0	3.1	65	22.1	41.1	36.8	95	36.3	40.6	23.1	160
Patient-oriented research	74.4	23.1	2.6	39	19.2	48.1	32.7	104	34.3	41.3	24.5	143
Study design, methods, and analyses												
Basic biomedical sciences	51.3	42.0	6.7	388	21.3	48.9	29.8	628	32.8	46.3	21.0	1,016
Behavioral sciences	65.1	33.3	1.5	66	22.1	50.5	27.4	95	39.8	43.5	16.8	161
Patient-oriented research	61.5	33.3	5.1	39	21.2	51.0	27.9	104	32.2	46.2	21.7	143
Extent to which the project's aims were innovative												
Basic biomedical sciences	56.6	32.8	10.6	387	24.0	37.0	39.1	630	36.4	35.4	28.2	1,017
Behavioral sciences	48.7	43.1	7.8	58	25.8	53.9	20.2	89	34.7	50.0	15.7	147
Patient-oriented research	73.7	18.4	7.9	38	25.0	42.3	32.7	104	38.0	35.9	26.1	142

Appendix Table 2.E-7 (*Continued*)

Applicant Ratings of Reviewer Understanding of Evaluation Criteria by Funding Status and Research Area of Application

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*
Extent to which new methods or technologies were planned												
Basic biomedical sciences	55.7	34.3	10.0	350	23.4	47.0	29.7	573	35.6	42.2	22.2	923
Behavioral sciences	48.3	43.1	8.6	58	25.8	53.9	20.2	89	34.7	49.7	20.2	147
Patient-oriented research	63.6	30.3	6.1	33	29.3	35.4	35.4	99	37.9	34.1	28.0	132
Ability of PI and staff to carry out the research												
Basic biomedical sciences	74.5	21.4	4.1	388	42.4	33.4	24.2	632	54.6	28.8	16.6	1,020
Behavioral sciences	81.8	16.7	1.5	66	45.3	31.6	23.2	95	60.3	25.5	14.3	161
Patient-oriented research	82.1	15.4	2.6	39	62.5	24.0	13.5	104	67.8	21.7	10.5	143
Relevance of preliminary data to assessing the project's feasibility												
Basic biomedical sciences	71.2	22.5	6.2	386	22.2	38.3	39.6	632	40.8	32.3	26.9	1,018
Behavioral sciences	77.3	19.7	3.0	66	27.4	36.8	35.8	95	47.8	29.8	22.4	161
Patient-oriented research	76.9	18.0	5.1	39	26.2	43.7	30.1	103	40.1	36.6	23.2	142
Adequacy of resources at the institution												
Basic biomedical sciences	77.3	18.7	4.0	379	57.3	32.5	10.3	604	65.0	27.2	7.8	983
Behavioral sciences	82.0	16.4	1.6	61	65.6	26.7	7.8	90	72.2	22.5	5.3	151
Patient-oriented research	82.1	18.0	0.0	39	68.3	24.0	7.7	104	72.0	22.4	5.6	143

Appendix Table 2.E-7 (*Continued*)

Applicant Ratings of Reviewer Understanding of Evaluation Criteria by Funding Status and Research Area of Application

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	A great deal	Some-what	Only a little/not at all	*n*	A great deal	Some-what	Only a little/not at all	*n*	A great deal	Some-what	Only a little/not at all	*n*
Extent to which project capitalized on unique resources												
Basic biomedical sciences	51.3	38.6	10.1	298	28.0	46.8	25.2	485	36.9	43.7	19.4	783
Behavioral sciences	56.0	40.0	4.0	50	39.7	41.2	19.1	68	46.6	40.7	12.7	118
Patient-oriented research	80.0	14.3	5.7	35	43.6	36.6	19.8	101	52.9	30.9	16.2	136
Extent to which useful collaborations had been arranged												
Basic biomedical sciences	63.4	30.1	6.5	309	32.4	38.1	29.5	512	44.1	35.1	20.8	821
Behavioral sciences	71.1	17.8	11.1	45	35.3	33.8	30.9	68	49.6	27.4	23.0	113
Patient-oriented research	69.7	21.2	9.1	33	45.3	31.6	23.2	95	51.6	28.9	19.5	128

Note. "Funded Applicants" refer to those whose target application was awarded funds. Percentages may not total to 100 percent due to rounding.

Appendix Table 2.E-8

Applicant Ratings of Reviewer Understanding of Evaluation Criteria by Funding Status and Integrated Review Group

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*
Degree to which the research addressed an important problem												
BDCN	75.4	19.1	5.6	126	39.3	38.2	22.5	262	51.0	32.0	17.0	388
IFCN	80.3	17.6	2.1	193	36.2	39.0	24.8	290	53.8	30.4	15.7	483
MCDN	78.8	19.1	2.2	183	37.8	36.3	25.9	336	52.2	30.3	17.5	519
Potential to advance theory, concepts, or methods												
BDCN	67.5	27.8	4.8	126	27.1	42.4	30.5	262	40.2	37.6	22.2	388
IFCN	70.5	27.5	2.1	193	27.0	36.7	36.3	289	44.4	33.0	22.6	482
MCDN	73.8	23.5	2.7	183	29.0	37.3	33.7	335	44.8	32.4	22.8	518
Conceptual framework underlying the research												
BDCN	62.4	32.0	5.6	125	19.5	45.2	35.3	261	33.4	40.9	25.7	386
IFCN	63.0	34.4	2.6	192	21.4	44.5	34.1	290	38.0	40.5	21.6	482
MCDN	64.1	33.2	2.8	181	22.5	44.4	33.0	333	37.2	40.5	22.4	514
Study design, methods, and analyses												
BDCN	51.2	40.8	8.0	125	23.1	45.4	31.5	260	32.2	43.9	23.9	385
IFCN	57.0	37.8	5.2	193	19.9	50.5	29.6	287	34.8	45.4	19.8	480
MCDN	53.6	42.5	3.9	181	20.7	51.1	28.2	333	32.3	48.1	19.7	514
Extent to which the project's aims were innovative												
BDCN	60.8	24.8	14.4	125	23.2	39.0	37.8	259	35.4	34.4	30.2	384
IFCN	63.7	27.4	9.0	190	26.2	36.4	37.4	286	41.2	32.8	26.1	476
MCDN	49.4	43.3	7.2	180	25.0	36.9	38.1	336	33.5	39.2	27.3	516

Appendix Table 2.E-8 (*Continued*)

Applicant Ratings of Reviewer Understanding of Evaluation Criteria by Funding Status and Integrated Review Group

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*N*	A great deal	Somewhat	Only a little/not at all	*n*
Extent to which new methods or technologies were planned												
BDCN	52.3	34.2	13.5	111	21.1	45.3	33.6	232	31.2	41.7	27.1	343
IFCN	54.7	35.5	9.9	172	27.5	45.7	26.8	269	38.1	41.7	20.2	441
MCDN	56.7	37.8	5.5	164	24.5	46.1	29.4	310	35.7	43.3	21.1	474
Ability of PI and staff to carry out the research												
BDCN	73.8	22.2	4.0	126	48.9	32.4	18.7	262	57.0	29.1	13.9	388
IFCN	80.8	16.6	2.6	193	49.0	31.9	19.1	288	61.8	25.8	12.5	481
MCDN	73.9	21.7	4.4	180	37.7	34.7	27.5	334	50.4	30.2	19.5	514
Relevance of preliminary data to assessing the project's feasibility												
BDCN	68.6	23.4	8.1	124	24.5	38.7	36.8	261	38.7	33.8	27.5	385
IFCN	76.6	19.8	3.7	192	24.9	41.1	34.0	285	45.7	32.5	21.8	477
MCDN	71.8	22.1	6.1	181	21.5	37.9	40.6	335	39.2	32.4	28.5	516
Adequacy of resources at the institution												
BDCN	78.6	18.3	3.2	126	57.5	32.4	10.0	259	64.4	27.8	7.8	385
IFCN	81.6	17.8	0.5	185	59.6	32.0	8.4	275	68.5	26.3	5.2	460
MCDN	75.3	18.4	6.3	174	60.0	29.8	10.2	315	65.4	25.8	8.8	489
Extent to which project capitalized on unique resources												
BDCN	60.9	25.2	13.9	115	31.7	41.9	26.4	227	41.5	36.3	22.2	342
IFCN	56.4	38.9	4.7	149	34.8	43.0	22.2	221	43.5	41.4	15.1	370
MCDN	48.4	42.7	8.9	124	28.2	48.4	23.4	252	34.8	46.5	18.6	376

Appendix Table 2.E-8 (*Continued*)

Applicant Ratings of Reviewer Understanding of Evaluation Criteria by Funding Status and Integrated Review Group

Type of Research and Characteristic of Review Process	Funded Applicants				Unfunded Applicants				All Applicants			
	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*	A great deal	Somewhat	Only a little/not at all	*n*
Extent to which useful collaborations had been arranged												
BDCN	66.1	25.7	8.3	109	39.9	32.5	27.6	228	48.4	30.3	21.4	337
IFCN	66.2	28.9	4.9	142	32.4	37.0	30.7	238	45.0	34.0	21.1	380
MCDN	64.1	27.5	8.5	142	30.4	39.7	30.0	257	42.4	35.3	22.3	399

Note. "Funded Applicants" refer to those whose target application was awarded funds. Percentages may not total to 100 percent due to rounding.

CHAPTER 3

ANALYSIS OF CENTER FOR SCIENTIFIC REVIEW NEUROSCIENCE STUDY SECTION CAPTIVITY AND STUDY SECTION SCORING BEHAVIOR

In June of 1998, 21 constituent study sections of the CSR's three newly created neuroscience IRGs met for the first time. These new IRGs were created in a reorganization of CSR's neuroscience review structure, which was largely undertaken to accommodate review for NIDA and NIMH whose research components were transferred to NIH as a result of Public Law 103-321.[18]

Prior to reorganization, neuroscience review at CSR (Division of Research Grants prior to 1998) was primarily focused in eight study sections. These study sections and their acronyms are listed in Table 3.1.[19]

Table 3.1
CSR Neuroscience Study Sections Prior to June 1998 Review Round (October 1998 Council)

Study Section Name	Acronym
Hearing Research	
Neurology A	NEUA
Neurology B-1	NEUB-1
Neurology B-2	NEUB-2
Neurology C	NEUC
Neurological Sciences-1	NLS-1
Neurological Sciences-2	NLS-2
Neurological Sciences-3	NLS-3

Subsequent to the reorganization, 21 newly developed study sections were organized under three IRGs. The new IRG and study section organization is shown in Table 3.2.[20]

A number of different NIH institutes fund neuroscience research. This is different than for some biomedical science sub-disciplines that focus on a specific disease or organ system and are essentially the exclusive concern of one NIH Institute. A concern held by several neuroscience institute directors during the reorganization

[18] A more complete treatment of CSR's reorganization to accommodate review for former Alcohol, Drug Abuse and Mental Health Administration Institutes that were integrated into NIH as a result of Public Law 103-321 is presented in Chapter 2.
[19] These eight study sections include only those whose focus was overwhelmingly neuroscience. They do not, for example, include the Physiological Sciences (PHY) study section that reviewed many neuroscience applications but had a broader focus on membrane physiology and biophysics. Also excluded are study sections dedicated to the visual sciences--these were excluded from the reorganization activity at the request of NEI.
[20] This large increase in the number of neuroscience study sections (from 8 to 21) was due in part to the addition of NIMH and NIDA applications, which previously would have been reviewed in study sections in those Institutes, and the addition of neuroscience applications, which previously would have been reviewed in other (non-neuroscience) CSR study sections, and in part to an effort to design study sections with "room for growth."

process was that individual institutes might dominate subsets of the newly developed neuroscience study sections. In this situation, applications assigned to other (non-dominant) institutes that are reviewed in dominated study sections might not receive fair review since programmatic focus might be confused with the quality or relevance of the proposed research.

To avoid this problem, one of the operating principles applied to the process of reorganizing CSR's neuroscience study sections was that applications being considered by a study section should be determined by the scientific focus of the research, rather than by the professional affiliation of the principle investigator. Another operating principle of the neuroscience reorganization was to allow flexibility in review so that the range of scientific expertise of study sections overlaps.

Table 3.2
CSR Neuroscience IRG and Study Section Organization as of June 1998 Review Round (October 1998 Council)

IRG and Study Sections	Acronyms
Brain Disorders and Clinical Neuroscience IRG	**BDCN**
Brain Disorders and Clinical Neuroscience 1-6	BDCN-1 to BDCN-6
Integrative, Functional, and Cognitive Neuroscience IRG	**IFCN**
Integrative, Functional, and Cognitive Neuroscience 1-8	IFCN-1 to IFCN-8
Molecular, Cellular and Developmental Neuroscience IRG	**MDCN**
Molecular, Cellular and Developmental Neuroscience 1-7	MDCN-1 to MDCN-7

One of the expected and desired outcomes of reorganizing based on these principles was reduction in study section "captivity". A study section is commonly defined as captive at NIH if the percent of applications that the study section reviews for any one IC is 80% or greater. NIMH and NIDA conducted their own peer review prior to their reorganization and therefore their study sections were all captive. While CSR's neuroscience study sections reviewed applications referred to a number of ICs for funding consideration, captivity was relatively common prior to the reorganization since there were few primary customers--most notably NINDS.

Given the discussion above, one metric that could be used to ascertain success in reorganizing CSR's review of neuroscience is the incidence of captivity. If the principles of reorganization were followed then the incidence of neuroscience study section captivity soon after reorganization should be low. It is also logical to investigate if the principles, once established, have been maintained. Increased incidence of study section captivity over time might be a marker indicating drift from reorganizing principles on which the study sections were based.

Another metric of reorganization success is fair review for all applications. A hallmark of fair peer review is that no particular group of applications is disadvantaged or, for that matter, overly advantaged in a study section. For example, grant applications should be reviewed without regard to their IC assignment.

As part of CSR's evaluation of the reorganized neuroscience study sections, captivity and the scoring of applications referred to different ICs are studied below. It should be noted that applications are reviewed several months before IC Councils meet (e.g., applications considered by Council in October are generally reviewed in

June), therefore review of applications does not always occur in the same calendar year or fiscal year (FY) in which they are considered by Council, or in which they are funded. IC Councils meet three times each year. The data presented below are reported according to the fiscal year (FY) of review (that is, the fiscal year during which the peer review occurred)--not the fiscal year that the applications reviewed were considered by Council. Applications reviewed in all three review cycles of a given FY are combined except in the case of FY1998, which includes only one review round (June 1998) as a result of the timing involved in implementing the reorganized neuroscience study sections.

Captivity

In order to determine whether reorganization of CSR neuroscience study sections significantly reduced captivity, CSR neuroscience study sections reviewing applications in FY1997 were compared to those created after the reorganization. Neuroscience study sections meeting to review applications in FY1999 were used as the reorganized comparison group. Study sections were considered captive to an Institute when 80% or more of the R01 applications they reviewed were for a single NIH IC.

In FY1997, there were eight CSR neuroscience study sections (see Table 3.1). Five (62.5%) of the eight neuroscience study sections in FY1997 were captive to a single institute (Appendix Fig. 3.1). In each of the remaining three CSR study sections, one IC accounted for more than 60% of reviewed R01 applications. As mentioned above, the neuroscience study sections organized by NIMH and NIDA were of course captive to their respective institutes.

In contrast to FY1997, only two (9.5%) of the 21 new neuroscience study sections reviewing applications in FY1999 (BDCN-4, IFCN-6) were captive to a single IC (Appendix Figs. 3.2-3.4). Therefore, an immediate result of the reorganization was a substantial reduction in the incidence of captivity amongst neuroscience study sections.

In order to determine if there was a trend back toward captivity in the years following the reorganization, the IC assignments of R01 applications reviewed in CSR's post-reorganization neuroscience study sections from FY1998 to FY2002 were examined. No general trend toward captivity is apparent when looking at IC assignments of applications reviewed amongst CSR's neuroscience study sections meeting in FY1998 to FY2002 (Appendix Figs. 3.5-3.7). Even though substantial proportions of all applications reviewed by many study sections are often assigned to a single institute, we observed captivity in only 6 study sections (BDCN-1, BDCN-2, BDCN-4, IFCN-5, IFCN-6, MDCN-1) across the five years analyzed. Only IFCN-6 was captive to a single institute across all five years. IFCN-5 and MDCN-1 were captive only in FY1998, the first year following the reorganization.[21] BDCN-4 was captive only in FY1999 and showed a consistent trend away from captivity in subsequent years. Only BDCN-1 showed evidence of a trend toward captivity, with an increasing percentage of its R01 applications being assigned to a single institute from FY1998 to FY2002. Indeed, the most commonly observed trend in the data was toward more diversity in IC assignments among applications that neuroscience study sections reviewed. Nearly half of the study sections had a smaller proportion of applications assigned to any single IC in FY2002 than in FY1999. Thus, in general, CSR's neuroscience study sections do not appear to be moving toward captivity (See Table 3.3).

[21] As mentioned earlier, the data from FY1998 for the new neuroscience study sections represent only a single review round .

Table 3.3

Highest Percentage of Applications Referred to Any One IC for Funding Consideration Among CSR Neuroscience Study Sections by Fiscal Year of Review

Study Section	FY1998	FY1999	FY2000	FY2001	FY2002
BDCN-1	56.8	64.8	63.8	**80.6**	**83.8**
BDCN-2	76.7	75.7	**86.0**	**83.2**	
BDCN-3	79.1	69.3	73.5	69.1	71.7
BDCN-4	70.7	**80.1**	69.7	68.8	59.7
BDCN-5	34.6	46.6	55.1	41.3	40.4
BDCN-6	68.9	57.4	65.2	67.2	64.8
IFCN-1	64.4	57.4	63.8	63.6	61.4
IFCN-2	46.7	45.4	29.8	36.6	42.3
IFCN-3	42.1	45.8	57.7	39.4	46.9
IFCN-4	44.3	39.8	34.6	35.5	40.7
IFCN-5	**82.9**	59.8	56.3	54.0	55.3
IFCN-6	**93.2**	**88.4**	**91.8**	**94.7**	**93.3**
IFCN-7	41.0	58.5	57.8	58.8	52.9
	40.0		46.2	37.2	
MDCN-1	**83.3**	59.7	58.5	61.5	53.1
MDCN-2	75.8	64.9	53.9	64.6	67.0
MDCN-3	60.0	61.2	54.5	45.7	47.3
MDCN-4	69.0	57.9		52.2	57.2
MDCN-5	42.0		33.6	36.4	41.8
MDCN-6	75.0		53.5		57.1
MDCN-7	79.4	70.9	72.0	71.9	71.6

Study sections where 80% or more of applications were assigned to one IC (captive study sections) are highlighted.

Scoring

Is review within CSR's reorganized neuroscience study sections fair for all applications, regardless of the IC where the application is assigned for funding consideration?

In NIH's priority scoring system, the lower the score an application receives the more favorable its evaluation of overall merit. For this analysis, we sorted application scores based on the IC where they were considered for funding and then compared the percentage of R01 applications ranked at or below the 10^{th} and 20^{th} percentiles. For any sample of applications, higher percentages of applications scoring at or below the 10th and 20th percentiles indicate more favorable peer review outcomes.

The National Institute on Aging (NIA), National Institute on Deafness and Other Communication Disorders (NIDCD), National Institute on Drug Abuse (NIDA), National Institute of Mental Health (NIMH) and National Institute of Neurological Disorders and Stroke (NINDS) all had more than 100 applications reviewed in CSR's neuroscience study sections in each FY after reorganization and were analyzed separately. Data for those ICs with fewer than 100 applications reviewed in the reorganized neuroscience study sections each FY were combined and analyzed as an "Other Institutes"[22] cohort. To observe any trends in the scoring data over time, we compared data for reviews that took place in the neuroscience study sections each FY from FY1999 to FY2002.

As shown in Table 3.4, the percent of applications scoring at or below the 10th and 20th percentiles varied somewhat by IC. Applications assigned to NINDS most consistently appeared to achieve or surpass "expected" percentages of 10 percent scoring at or better than the 10th percentile and 20 percent scoring at or better than the 20th percentile. In contrast, the percentages of applications assigned to NIA that scored at or better than both the 10th and 20th percentiles consistently appeared lower than "expected". There appears, however, to be a fairly consistent trend for an increase in the percentage of NIA referred applications that are scored at or below the 10th and 20th percentile in the neuroscience study sections since FY1999.

A chi square goodness of fit test was used to compare the observed number of applications scoring at the 10th and 20th percentiles or better to the number of applications expected to score at those percentiles (10% and 20% respectively). In FY1999 and FY2001 NIA had significantly ($p < .05$) lower than expected numbers of applications score at or better than the 10th percentile and in FY1999 and FY2000 significantly ($p < .05$) lower than expected numbers of NIA-assigned applications scored at the 20th percentile.

Similar to NIA, the percentage of NIDA-assigned applications that scored at or better than the 10th percentile or 20th percentile appeared generally less than 10 percent and 20 percent, respectively, across the fiscal years studied. However, for NIDA assigned applications the differences between the observed and "expected" percentages scoring at or better than the 10th or 20th percentiles do not appear as great as is the case for NIA. The chi square goodness of fit test did not demonstrate for any individual year that the numbers of NIDA-assigned applications scoring at or better than the 10th or 20th percentile were less than expected.

[22] "Other Institutes" include: National Institute on Alcohol Abuse and Alcoholism (NIAAA), National Institute of Allergy and Infectious Diseases (NIAID), National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), National Center for Complementary and Alternative Medicine (NCCAM), National Cancer Institute (NCI), National Institute of Dental and Craniofacial Research (NIDCR), National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institute of Biomedical Imaging and Bioengineering (NIBIB), National Institute of Environmental Health Sciences (NIEHS), National Eye Institute (NEI), National Institute of General Medical Sciences (NIGMS), National Heart, Lung, and Blood Institute, National Institute of Nursing Research (NINR), and National Center for Research Resources (NCRR).

Table 3.4

Scoring of Applications Reviewed By CSR Neuroscience Study Sections After Reorganization as Sorted by Institute Where Applications Were Assigned for Funding Consideration

Institute	FY of Review	10th Percentile or Better	20th Percentile or Better	Unscored	N
NIA	1999	5.4%*	12.1%*	44.4%	257
	2000	6.6%	13.5%*	43.3%	289
	2001	5.3%*	15.4%	41.5%	246
	2002	8.4%	16.1%	48.6%	249
NIDCD	1999	9.9%	21.0%	36.2%	243
	2000	7.2%	15.5%	41.3%	264
	2001	11.1%	20.6%	34.6%	243
	2002	11.9%	22.2%	34.5%	252
NIDA	1999	9.8%	17.1%	39.7%	315
	2000	7.8%	15.5%	38.0%	258
	2001	7.9%	16.9%	37.2%	266
	2002	8.6%	16.8%	39.1%	256
NIMH	1999	10.4%	20.4%	30.3%	565
	2000	9.5%	21.7%	31.7%	483
	2001	8.8%	19.8%	32.9%	486
	2002	7.8%	18.7%	38.1%	525
NINDS	1999	9.8%	21.7%	35.3%	1436
	2000	10.6%	21.3%	36.1%	1327
	2001	10.3%	20.1%	37.2%	1238
	2002	10.2%	21.5%	38.5%	1438
Other Institutes	1999	6.3%	17.0%	34.7%	300
	2000	9.4%	17.9%	42.7%	330
	2001	11.0%	22.6%	36.1%	310
	2002	7.8%	16.2%	42.1%	321

The chi square goodness of fit test was used to compare the observed number of applications scoring at or better than the 10th and 20th percentiles to the number of applications expected to score at those percentiles or better. All comparisons were considered significant at $p<.05$.

* For the years indicated, significantly lower proportions of applications than expected scored at or above the indicated percentile

While the percent of NIMH applications that scored at or better than the 10th percentile appear to be falling since FY1999, the percent of applications assigned to that institute scoring within the 20th percentile or better remain close to the "expected" level. With the exception of FY2000, 20 percent or more NIDCD assigned applications scored at or better than the 20th percentile. In chi square analysis there were no significant differences found between observed and expected frequencies of applications scoring within the 10th and 20th percentiles for either NIDCD or NIMH.

Also studied were the percentage of applications assigned to each IC that were "streamlined" or not considered to rank in the upper half in quality of applications assigned to the study section and not given a priority score. From 1999 to 2002, there were consistent increases in the percentages of applications assigned to NIMH and NINDS that were streamlined (See Table 3.4). NIA generally had higher percentages of applications streamlined than other neuroscience ICs. The percentages of NIDA assigned applications that were streamlined were comparatively stable, ranging from 37.2 percent to 39.7 percent across FY1999 to FY2002. Likewise, the percentages of applications assigned to NIDCD that were streamlined were generally stable (in the mid 30 percent range) with the exception of FY2000 when the percentage of unscored applications jumped to 41.3 percent.

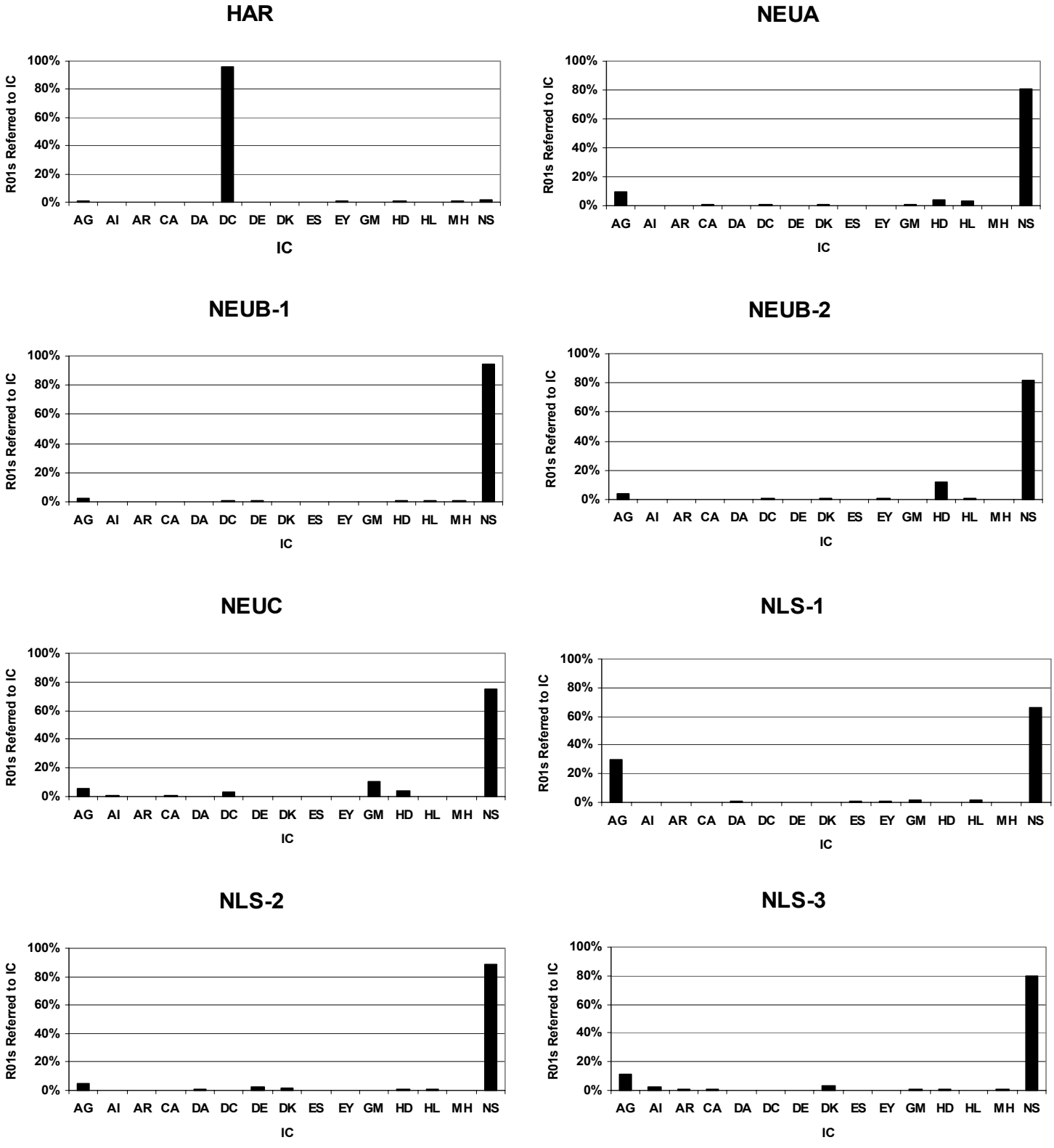
Conclusions

Data presented here indicate that the reorganization markedly reduced the incidence of IC captivity among CSR's neuroscience study sections. The percentage of captive CSR neuroscience study sections fell from 60% prior to the reorganization (and 100% captivity for the NIDA and NIMH study sections) to 10% one year after reorganization (FY1999). In addition, in the years following reorganization, there has been no overall trend among the neuroscience study sections toward captivity. These data provide one indication that the principles set forth to guide CSR's neuroscience reorganization were initially followed and adherence to these principles has been generally sustained.

The analysis of scoring by the reorganized CSR neuroscience study sections shows that, as expected, there are modest fluctuations in how well applications assigned to different ICs do in the neuroscience study sections. Both at the "upper" end of the scoring scale and at the "lower" end, certain trends were recognized. The potential causes of these trends are not considered here. Together, these observations suggest that the scoring behavior of the neuroscience study sections should continue to be monitored with special attention perhaps given to scoring trends for applications assigned for funding consideration to NIA.

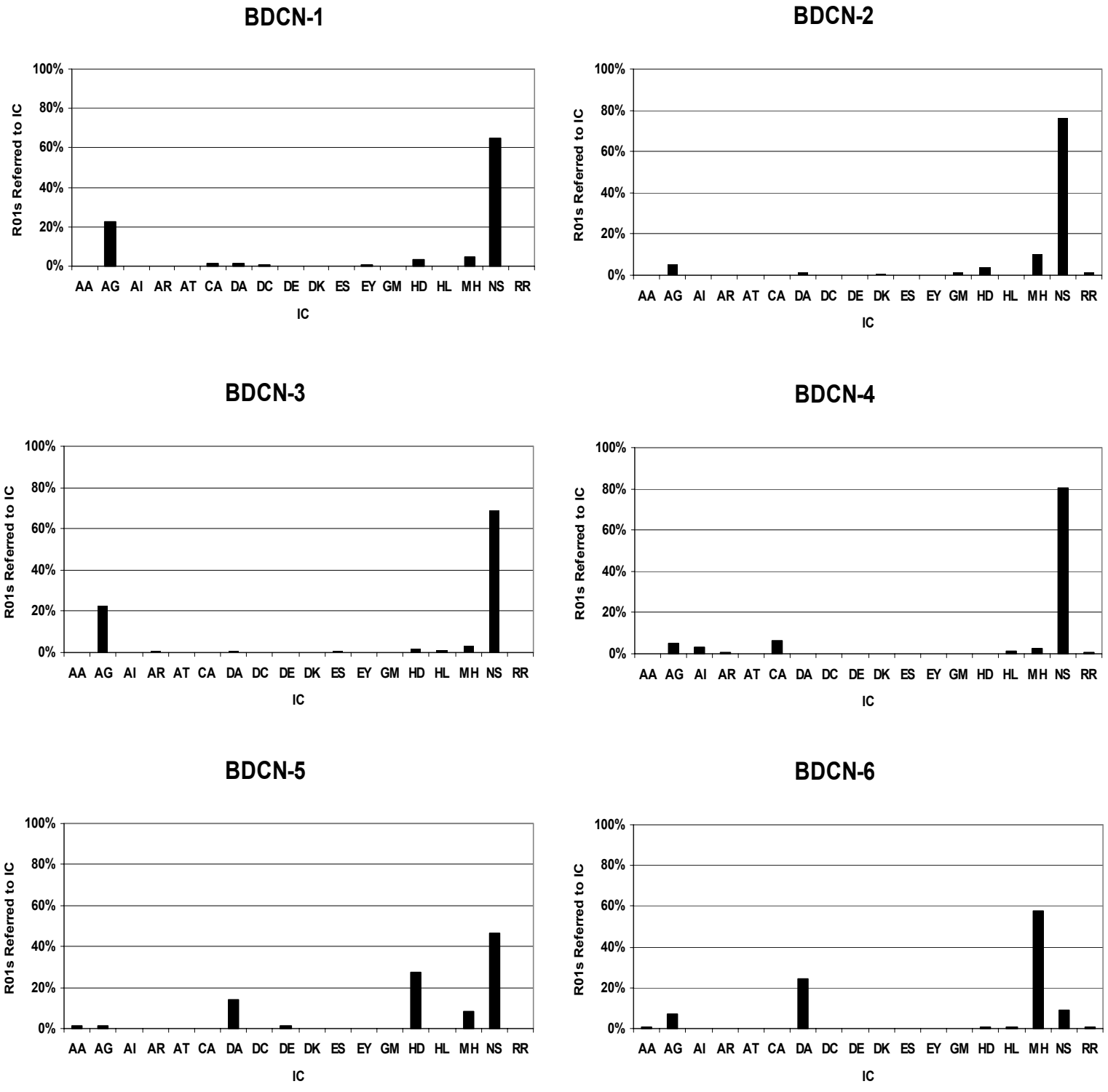
Appendix Figure 3.1

Funding IC Referrals of R01 Applications Reviewed in CSR Neuroscience Study Sections in FY1997



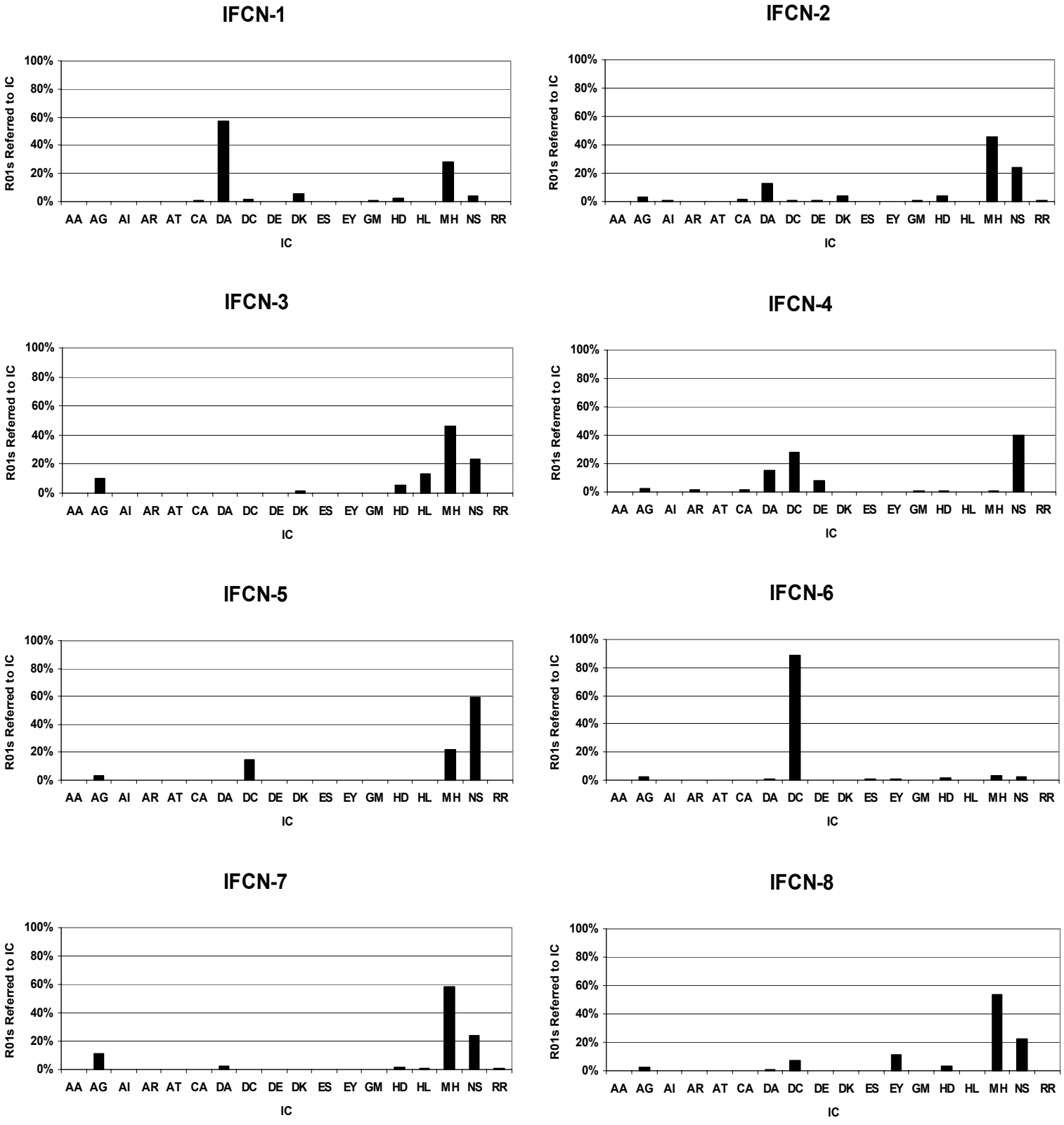
Appendix Figure 3.2

Funding IC Referrals of R01 Applications Reviewed in Component Study Sections of CSR's BDCN IRG in FY1999



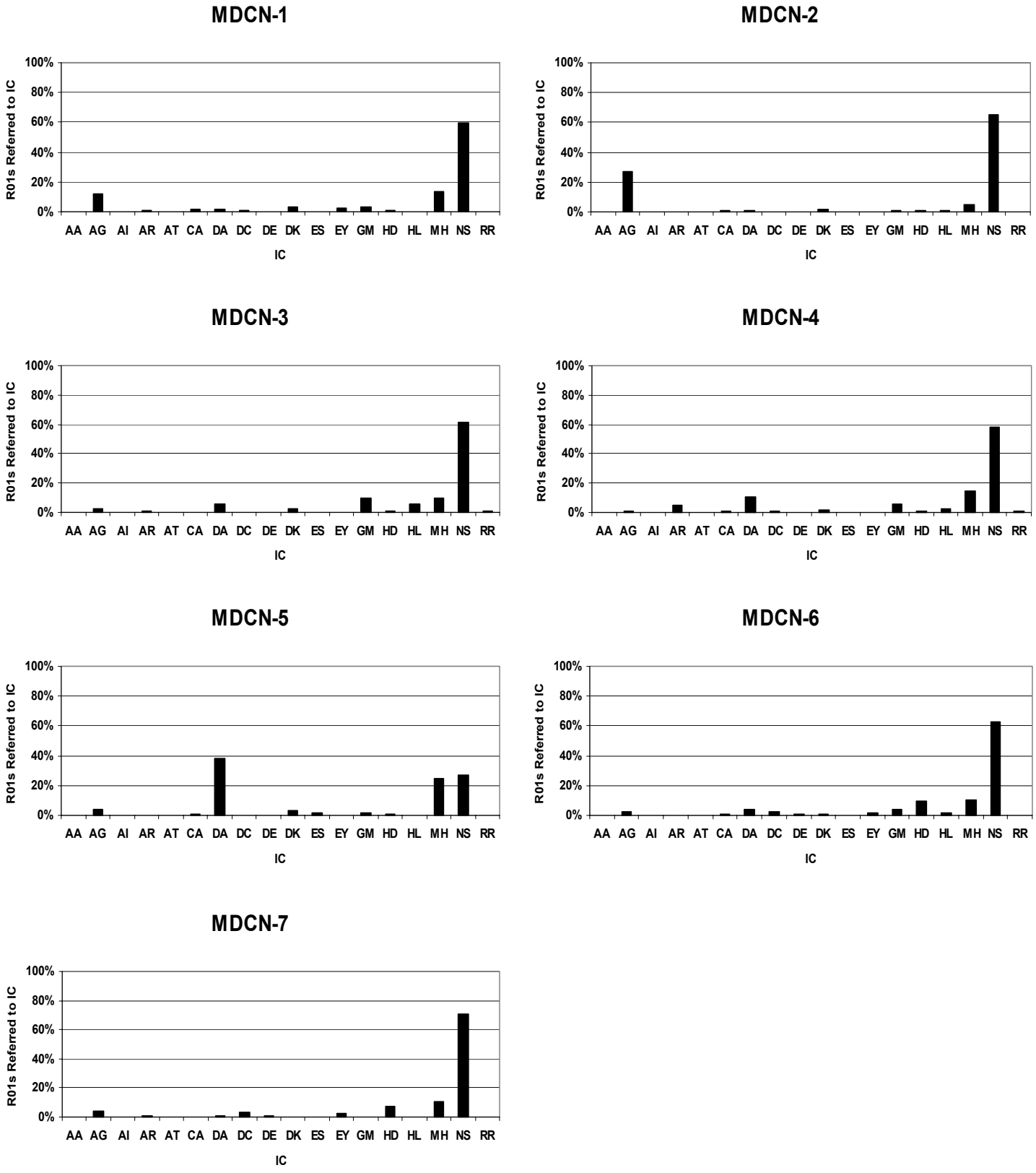
Appendix Figure 3.3

Funding IC Referrals of R01 Applications Reviewed in Component Study Sections of CSR's IFCN IRG in FY1999



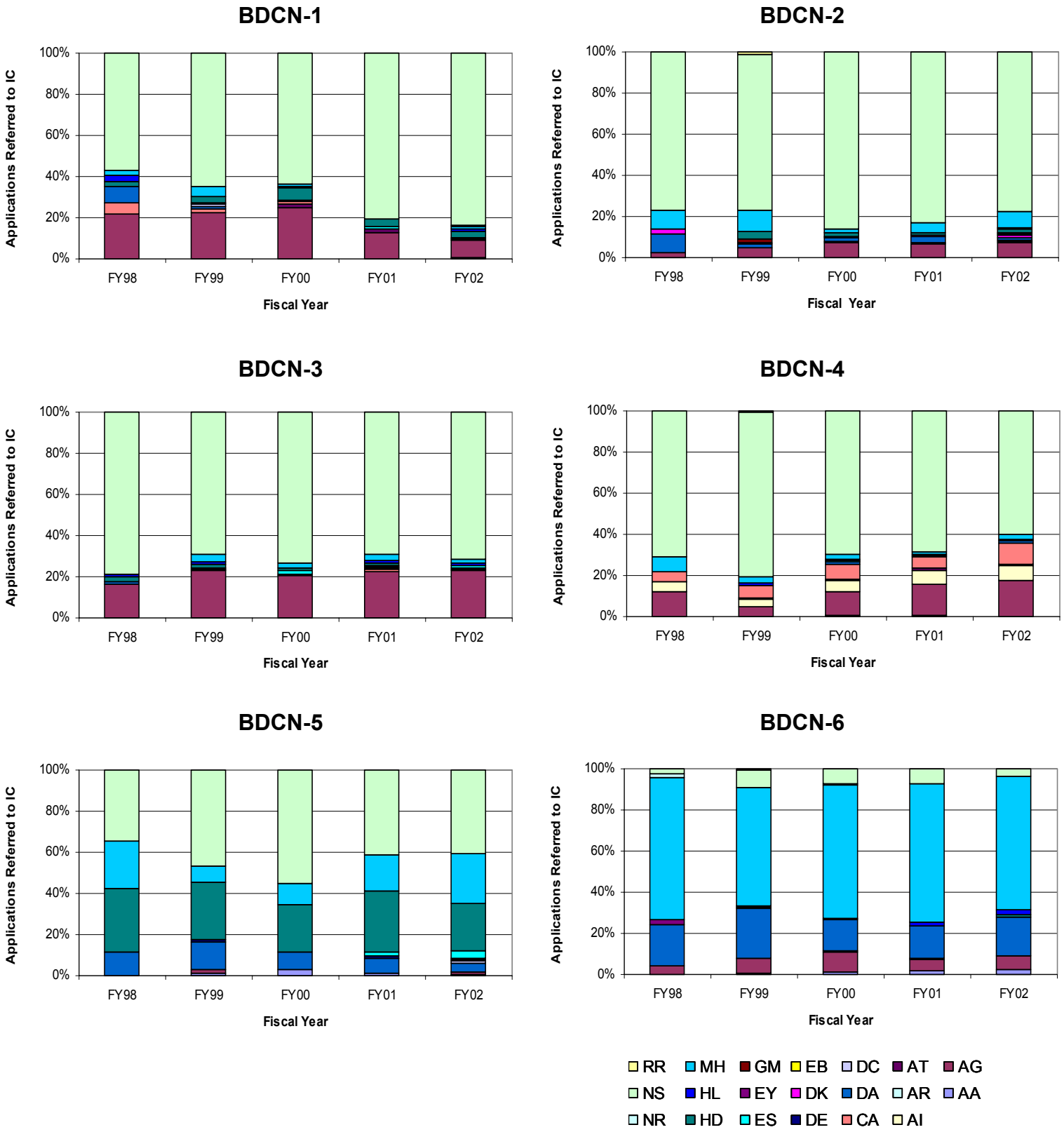
Appendix Figure 3.4

Funding IC Referrals of R01 Applications Reviewed in Component Study Sections of CSR's MDCN IRG in FY1999



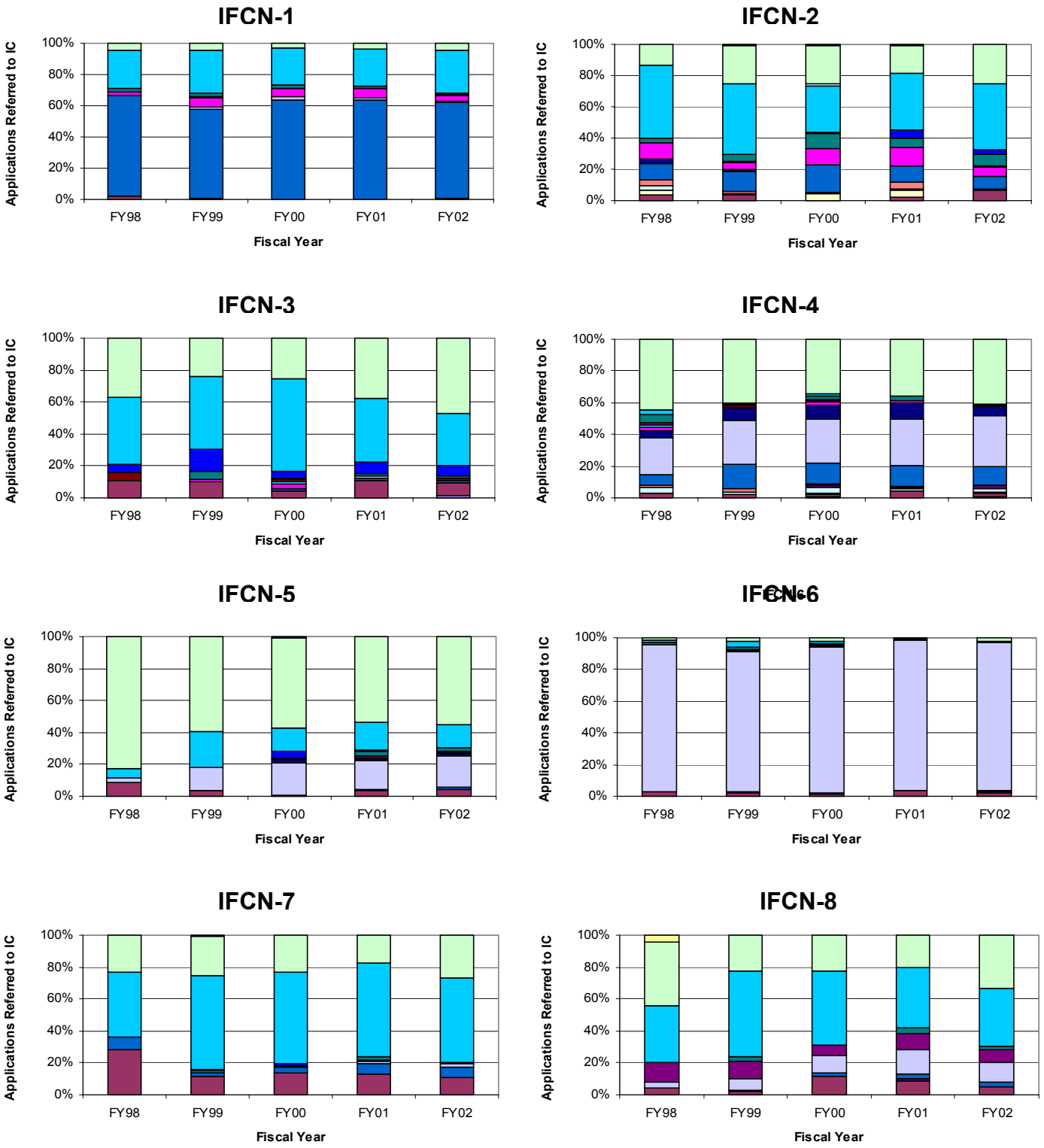
Appendix Figure 3.5

Funding IC Referrals of R01 Applications Reviewed in Component Study Sections of CSR's BDCN IRG in FY1998 through FY2002



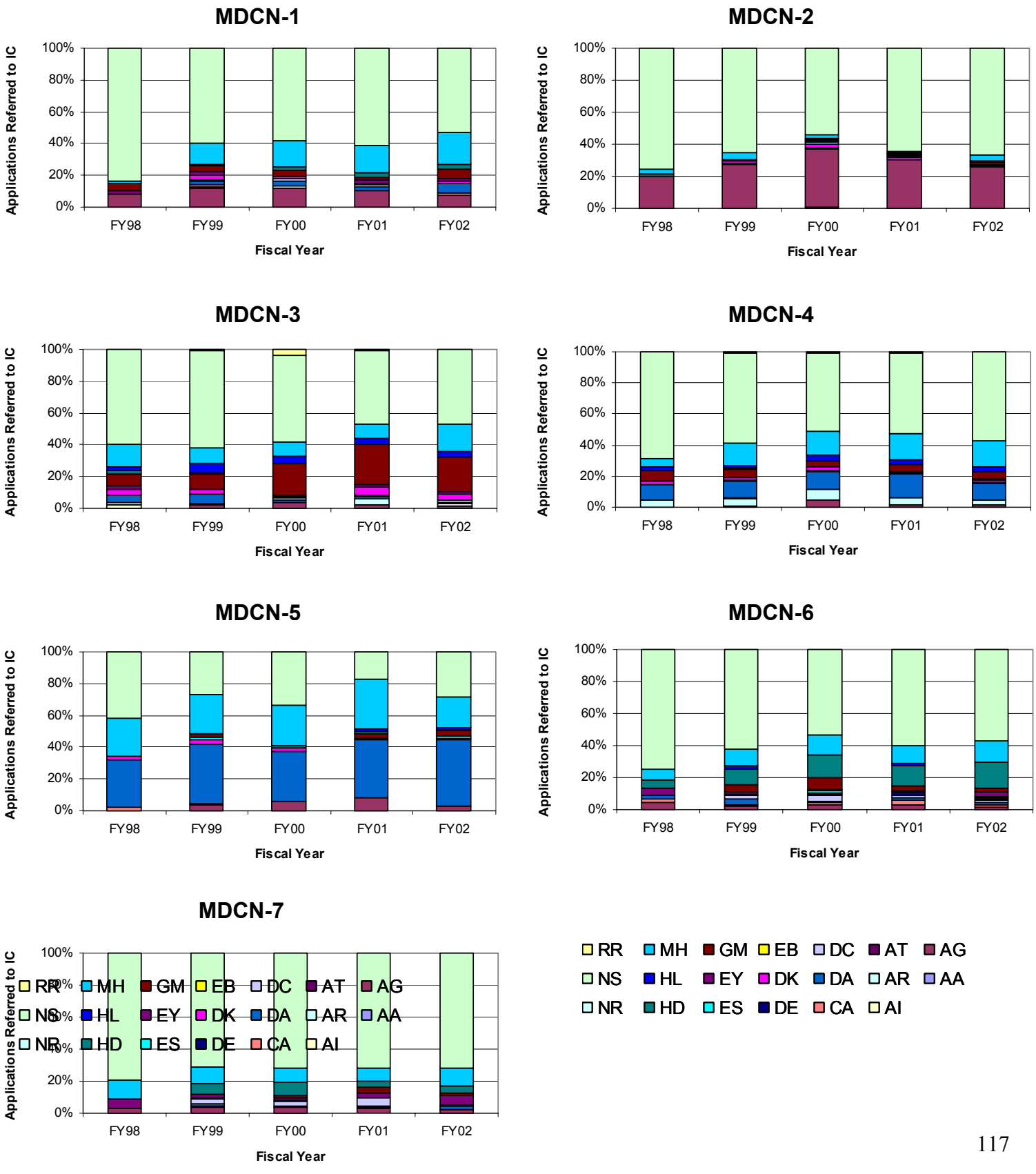
Appendix Figure 3.6

Funding IC Referrals of R01 Applications Reviewed in Component Study Sections of CSR's IFCN IRG in FY1998 through FY2002



Appendix Figure 3.7

Funding IC Referrals of R01 Applications Reviewed in Component Study Sections of CSR's MDCN IRG in FY1998 through FY2002



Conclusions

While most significant observations are summarized in each chapter of this report, this section serves as a brief overview of key observations and findings. In addition, where appropriate, recommendations are given for consideration by CSR management.

Neuroscience Working Group Reports

Three consistent areas of focus were evident among the comments of the CSR Advisory Committee ad hoc Working Groups studying the neuroscience IRGs. First, all three neuroscience IRG Working Groups commented that more "senior" or "experienced" reviewers would enhance review in the neurosciences. Second, the training of reviewers and/or Chairs was a common concern among the neuroscience IRG Working Groups, with two of the three Working Groups calling for separate training or orientation meetings prior to service. Finally, all three neuroscience Working Groups considered the practice of reviewing fellowship applications in study sections primarily focused on the R01 applications. Comments ranged from indications that study section members could not easily make the "mental shift" required to apply the criteria for fellowship applications appropriately when only a small number were included in the group of proposals to be reviewed to suggestions that fellowship applications be reviewed "en block" or in separate meetings.

All three concerns discussed above are not limited to CSR review in the neurosciences, but instead are common across CSR study sections. Initiatives to address these concerns are either in development or have been established. For example, CSR is implementing a "senior reviewer" pilot during the June 2003 review round. A CSR committee focused on developing recommended practices and materials for training reviewers and Chairs presented its recommendations to the CSR Advisory Committee in September 2002 and the materials are now being finalized for publication on CSR's Internet and Intranet sites as appropriate. Finally, beginning with the August 5, 2001 submission date, CSR began reviewing most fellowship applications for individual National Research Service Awards in dedicated study sections.

Surveys of Applicants and NIH Program Staff

This study was the first to test systematically NIH grant applicant response rates to surveys administered in paper and pencil format or online. There were no differences in the response rates or response patterns between the "mail" and "web" groups, a key finding that should be considered in development of future surveys of applicant groups. While there may be no financial savings in administering surveys online because the of costs associated with web development and hosting, there are clear advantages in terms of data accuracy and speed of analysis since data from an online survey are automatically entered into a database. In addition, problems associated with reading handwritten comments in paper and pencil surveys are eliminated. Future survey activities aimed at NIH applicants should clearly consider the web format.

For applicants, satisfaction with assignment and review within the neuroscience study sections was largely predicated on funding status. This effect was so potent and pervasive that, for example, observed differences in satisfaction among researchers with different research emphases (e.g., basic biomedical, behavioral and patient-oriented research) disappeared once the impact of funding status was taken into account. Respondents who received research funds judged the review process similarly, regardless of their research field or even the IRG in which their application was reviewed.

Whereas 82% of institute program staff indicated that the reorganized neuroscience study sections were excellent or very good at identifying the most meritorious applications, there were differences in their perceptions of the quality of peer review for different research areas. Basic research received the highest "excellent" or "very

good" ratings (74 percent), while patient-oriented research (56 percent) and behavioral research (36 percent) received lower ratings.

One area of concern was program staff ratings of the quality of review for research from new investigators. Only 8.5 percent of program staff indicated that review for new investigators was somewhat or substantially better compared to before reorganization, while 48.6 percent indicated it was about the same and 42.9 percent marked it as worse. It should be noted that the neuroscience reorganization took place at the same time that the R29 mechanism for new investigators was discontinued and this may have contributed to this relatively negative perception. It should also be noted that concerns regarding review of new investigator applications are not limited to the neuroscience study sections. CSR has already taken steps to ensure fair review for new investigator applications. These steps include implementing the practices of reminding reviewers of considerations for review of new investigator applications at each study section meeting and showing each study section its scoring of new investigator applications in the previous review round.

Analysis of Internal Data

Reorganization markedly reduced the incidence of IC captivity among CSR's neuroscience study sections. The percentage of captive study sections fell from 60 percent prior to their reorganization (study sections meeting in fiscal year 1997) to 10 percent after reorganization (study sections meeting in fiscal year 1999). In addition, in the years following reorganization, there has been no overall trend among the neuroscience study sections toward increased captivity. These data provide one indication that the principles set forth by outside working groups composed of IC representatives and extramural scientists to guide CSR's neuroscience reorganization were initially followed and adherence to these principles has been generally sustained.

In the analysis of scoring by the reorganized CSR neuroscience study sections, in certain years there has been some under representation of NIA-assigned applications that score at or below the 10th and/or 20th percentiles. The roots of these under representations have not been considered here. There seems, over time, to have been a small yet consistent improvement in the proportion of NIA applications that score at or better than the 20th percentile. These observations suggest that the scoring behavior of the neuroscience study sections should continue to be monitored with special attention perhaps given to scoring trends for applications assigned for funding consideration to NIA.

Final Conclusions

Data analyzed in this evaluation generally indicate that CSR's neuroscience study sections are functioning well. The data also indicate that the principles set forth by outside working groups composed of NIH institutes representatives and extramural scientists to guide CSR's neuroscience reorganization were initially followed and adherence to these principles has been generally sustained. In areas where concerns have been identified, these concerns generally transcend the neuroscience IRGs and generalize across CSR study sections. In addition, for the most part CSR is already taking steps to address or remedy these concerns. Finally, a number of observations were made in this report that merit further and continued monitoring by CSR and NIH staff.

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