

**To: Canadian mathematics community**

**From: Mathematics Committee for liaison with NSERC**

**Re: NSERC Discovery Grants in Mathematics**

**Date: April 21, 2009**

We are writing to provide information about the general outcome of this year's competition for NSERC Discovery Grants in Mathematics and the context in which the competition was held. We are concerned about the effects on mathematics research of the Federal Government's declining support for the three national research granting councils. We also believe that some of NSERC's own policy changes need to be refined in order to more effectively support the highest quality of mathematics research and the research environment in Canada.

NSERC was one of 21 federal agencies (including also SSHRC and CIHR) asked to conduct a Strategic Review in 2008. The Review was part of an exercise that requires agencies to review all direct program spending on a four-year cycle to ensure effectiveness and efficiency, and to identify a minimum of 5% of their budgets for potential reallocation to other federal government priorities. As a result of the exercise, the government reallocated some funding from NSERC grants programs to other priorities (including scholarships). This was described by NSERC President Suzanne Fortier in a March 2009 memo to the community. She noted that "all of our major core programs were found to be high performing and were protected in this exercise. For example, the budget for our Discovery Grants Program is projected to be \$326 million in 2009–10, compared to \$323 million in 2008–09".

In addition to the changing fiscal context for research grants, NSERC has introduced some significant policy changes this year that have influenced the outcome of the current competition. We describe these changes in more detail below.

**Competition overview.** The following table summarizes NSERC Discovery Grant competition results for the last five years for the combined Mathematics GSCs 336 and 337 (with comparative data for all GSCs).

	Mathematics GSCs				All GSCs	
	Total budget	Number of applicants	Mean grant	Success rate	Mean grant	Success rate
2009	\$2.280M	177	\$20.2K	64%	\$33.7K	64%
2008	\$2.476M	167	\$19.3K	77%	\$29.8K	71%
2007	\$2.616M	196	\$17.6K	76%	\$29.4K	70%
2006	\$2.314M	174	\$15.8K	84%	\$29.8K	73%
2005	\$2.652M	189	\$15.9K	88%	\$29.7K	75%

NSERC discontinued its Reallocations Exercises after that of 2003 (which affected the GSC budgets until 2006). During the years 2005–2007, the Mathematics GSCs were among those GSCs with the lowest ratios of available funds to the total grants of returning applicants. Although the total amount of funding available per applicant to the Discovery Grants Program in the 2009 competition was slightly higher than in 2008, the amount per applicant in the Mathematics GSCs dropped from \$14.8K in 2008 to \$12.9K in 2009.

*Funding formula.* NSERC’s initial budget for the Mathematics GSCs this year was based on a 6% increase to the total of the grants of returning applicants, together with an additional \$4.2K for each new early-career applicant and \$4.9K for each new established applicant. The budget was increased later by about 4.2%.

A new funding system implemented this year involved two stages:

- A. Ratings stage. Rating of all applicants (as exceptional, outstanding, very strong, strong, moderate or insufficient) on each of three criteria (excellence of the researcher, merit of the proposal, training of highly-qualified personnel), and grouping of the applicants into bins determined by the three ratings (weighted equally).
- B. Funding stage. Distribution of the budget among the bins. NSERC fixed a minimum grant level of \$12K for the Mathematics GSCs.

The main changes in the overall results of this year’s competition relative to recent years are:

- (1) Reduction in the percentage of successful applicants, eliminating many smaller grants.
- (2) Decrease in the funding level of a significant number of larger grants.

(1) above was a result of a decision to cut off funding for the bins at a point chosen in order to maintain an average grant level comparable to that of recent years, with the constraint that the bin at the cut-off point not be divided into funded and unfunded parts. The constraint resulted in an actual minimum grant of \$14K for this year's competition.

The two Mathematics GSCs 336 and 337 operated as a conference for the first time this year, meaning that some key decisions (including the preceding) were made as a large joint committee.

(2) was a result of a new policy to minimize the effect of current grant levels on funding decisions. There were both big increases and big decreases.

**Assessment of the results.** The main issue is that the overall budget is simply inadequate to support high quality mathematics research in Canada, especially given the calibre of new entries to the system over the last decade. Yearly GSC budgets are calibrated to historical grant levels and do not account for the actual costs or value of research. The funding formula above does not allow the Mathematics GSCs to adequately fund both returning and new applicants of high quality. Although comparable formulas are applied to all disciplines, the problem of absorbing new applicants is more acute in Mathematics than in other GSCs where the average grants are much higher. The later addition to the Mathematics budget was some help this year, but does not alleviate the systematic underfunding of Mathematics.

Our colleagues at smaller institutions are at a relative disadvantage because NSERC's system does not have the flexibility to distinguish between a weaker justification for funding (based on quality of research) and the possibility of a well-justified need for funding at a lower level (for example, at institutions without graduate or doctoral programs). Current policy threatens NSERC support to mathematics in some Atlantic and western provinces.

The new policy reflected in (2) above has positive and negative aspects that need to be discussed. The more dynamic approach provides faster upward mobility to deserving applicants. But there is no longer a rule that prevents large cuts, and the resulting instability might discourage working on difficult long-term projects or making longer-term plans for HQP. The right balance between fast upward mobility and long-term stability is important in attracting and retaining top researchers. NSERC should consider how best to take into account career impact and long-term contributions in the ratings stage.

NSERC's new binning method was introduced this year and has resulted in certain improvements. Any new system introduces bugs or problems that take time to work out. NSERC needs greater flexibility in implementing the new system during a transitional period.

In general, greater involvement of researchers in NSERC policy-making would provide enormous benefit to the scientific community and to NSERC itself. The current funding process (stage B above) constrains GSC chairs or members to act in a bureaucratic way. Research communities need advocates within the system. In the NSF, for example, the program officers are themselves researchers who are involved with and advocates for their scientific communities.

We repeat that the main problem is that overall funding is inadequate. We laud the Government's investment in our universities and colleges through its infrastructure funding initiative. The mathematics community must urge the Government to follow this up with a crucially needed investment in Canadian research via NSERC and the other federal granting agencies. In the US under President Obama, the NSF's budget has been increased by 40% and investment in scientific research is an integral part of plans for economic revival. We need at least to keep up to be able to compete with the best in the world.

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