

## Applying to Graduate School II

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In the last issue of STATUS I presented a list of advice from the community (solicited via AASWOMEN e-newsletter) for students applying to graduate school in astrophysics. One issue that was not addressed in the previous article is advice on writing the personal statement or essay in the graduate application. I have been asking around and while there is a range in opinions about the importance of the personal statement, there was more or less consensus on what the application readers are looking for. Another perennial thorny issue is the value of the physics GRE exam as a predictor of success in grad school. At the Women In Astronomy II conference (June 2003) I presented a poster showing the statistics from that year's applicant pool to the University of Colorado. I have now added statistics for the 2004 and 2005 application pools and present the results.

### Personal Essay

Most graduate applications ask the applicant to write a statement of their objectives in going to grad school or an essay about themselves. There are books and websites that provide suggestions on how to write such essays. I asked various colleagues who had just finished reading hundreds of applications what were the important criteria for judging a student statement. Here are a list of their comments:

- By far most important objective of the essay is to show that the student can write coherent intelligent sentences that communicate relevant thoughts.
- Show genuine motivation and enthusiasm (for grad school and for astronomy).
- Readers are looking for expression of a past that reflects motivation and enthusiasm, i.e. a path that has not been blindly meandering.
- The essay should show some general idea of where the student wants to go in the future (in research topic, career, etc. It is understood that on entering grad school students often have varied interests and their ambitions can change during grad school. But the application should indicate some thought on the issue.
- Have you advisor proofread the statement. As most faculty have served on an admissions committee, they will offer critical and helpful advise.
- Be concise. Admissions committees have to read hundreds of applications, and ignore most fluff anyhow. One to two pages are ideal.

- Discuss a topic of research you have done in some depth. Showing that you understand the research, from motivation to results, implies a great potential for future research abilities.
- Spell check, and grammar check. It sounds silly, but in the modern age of technology the misuse of homophones goes widely unnoticed.
- Avoid clichés such as: I have always wanted to be an astronomer, I have been fascinated by the stars since my father/aunt/neighbor gave me a telescope, I grew up in wonder of the Universe, etc.
- Don't litter your essay with exclamations!!

### Physics GRE Scores

Turning to the issue of the physics GRE exam, having served on the graduate admissions committee for the Department of Astrophysical and Planetary Sciences at the University of Colorado I have read many, many applications and wondered whether some gender tendencies were real, figments of my imagination or urban myths. Specifically, I had an impression that women tend to have lower scores in the physics GRE, even when they have good course grades. So, I took the applicant pools for springs of 2003, 2004 and 2005 (approximately 100-150 students per year) and plotted their grade point average in all physics and courses (Physics/Math GPA) against the percentile ranking in the physics GRE (Figure 1).

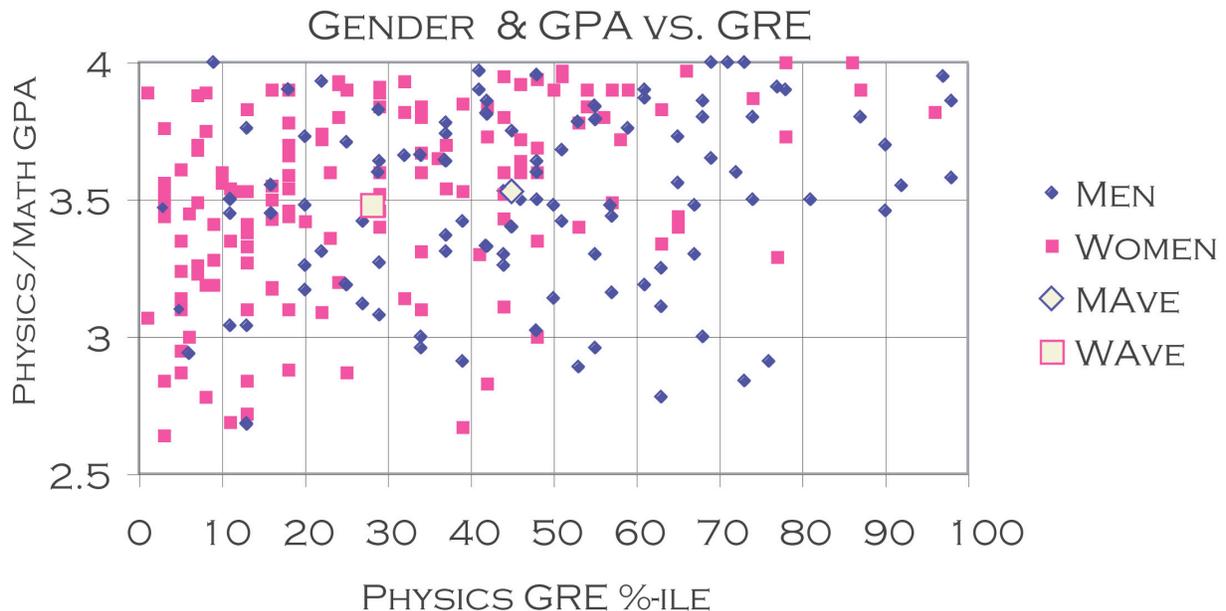


Figure 1 – Grades of 316 applicants to the PhD program in Astrophysical and Planetary Sciences at the University of Colorado, Spring 2003, 2004 and 2005.

The first thing that struck me when I looked at the plot was the lack of correlation. Why are people with excellent physics GPAs ranked so low in the physics GRE? When separated by gender, the average GPA scores are similar for men ( $3.53 \pm 0.34$ ) and women ( $3.48 \pm 0.40$ ) but the women have a lower average GRE position ( $28 \pm 21\%$ ) compared to the men ( $45 \pm 23\%$ ). But look at the huge range.

Most puzzling are the cluster of women towards the top left and the cluster of men towards the bottom right. Women with really good physics/math GPAs are performing poorly on the physics GRE. At the same time, there is a cluster of men who have mediocre GPAs but get strong GRE scores. Are the men better at taking exams? Are women doing well in the physics courses that they take but are perhaps not taking the courses that prepare them for the GRE? Or is the gender difference related to who is applying to grad school? One could imagine different pressures from peers, teachers, advisers, parents that might be factors.

One hypothesis might be that the GRE is doing its job of distinguishing the rigor of physics programs. The better physics programs should produce higher GRE scores. I asked the chair of the admissions committee for 2005 to sort the applicant pool (excluding non-US applicants) by ranking of the school. This was entirely subjective – but this is exactly what admissions committees are doing when looking at applications.

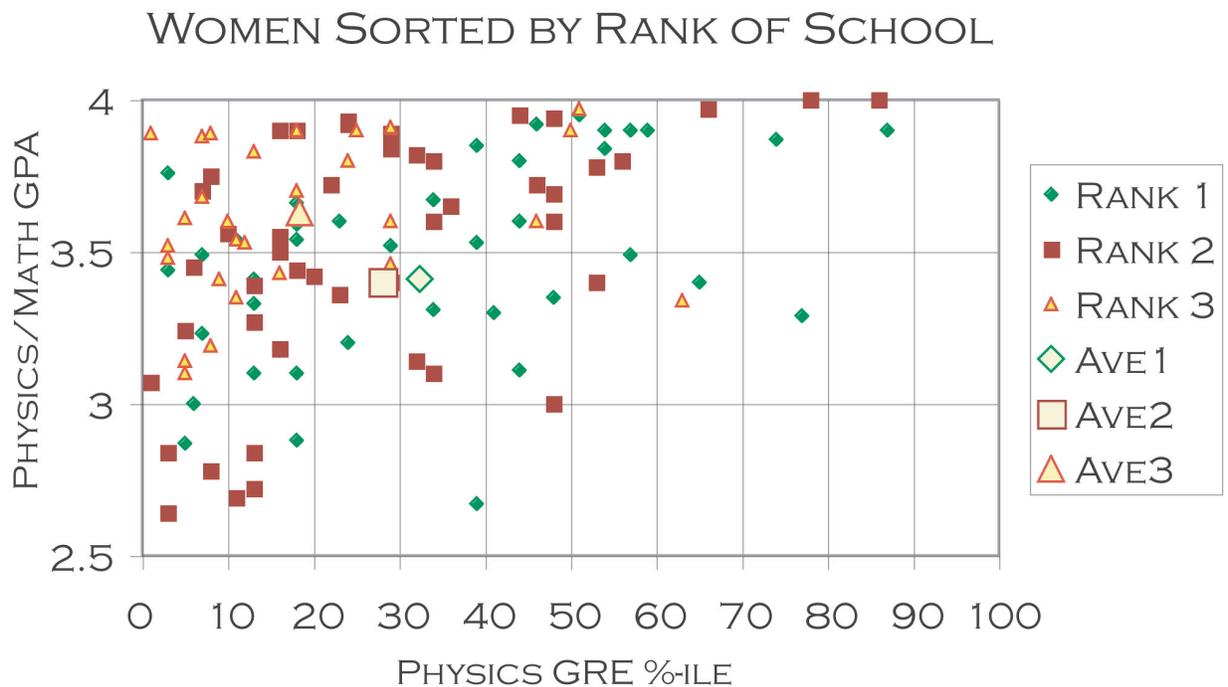


Figure 2 - Physics scores of women applicants sorted by perceived rank of undergraduate physics program.

Figure 2 shows that there is little difference in performance between applicants from the top- and middle-ranked schools but the 3<sup>rd</sup>-ranked physics programs are not preparing students as well for the physics GRE. My advice to students wanting to go to graduate school in the physical sciences is to recognize that your undergraduate training does matter – not all physics programs

are equal. This does not mean that only people from ivy league schools get to grad school. Far from it (some of those “top left” applicants are from the “big name” schools). But if you are acing all the physics courses in your local state college then perhaps you need to consider transferring to a research university – most states have at least one good physics program at a public university.

Wondering why some women from good schools and with good GPAs are bombing the GRE I developed another hypothesis. I wondered if women undergraduates are spending time on research projects rather than studying for GREs. To test this idea I took the top 25-GPA-scorers (for 2003 only) and sorted them by the number of REUs (Research Experience for Undergraduates) mentioned in their application. I found no correlation – so much for that theory.

What can we conclude about the value of the physics GRE in applying to grad school? I am afraid to say the answer is “Not very much.” It is actually very hard to get faculty to talk honestly about their own admissions process and even less about their graduation rate. It seems that each department thinks it has a secret recipe. There are rumors (reaching almost mythic proportions) that the high-GRE-scorers do indeed tend to do well in grad school, the very-low-GRE-scorers tend not to survive, and the ones in the middle are unpredictable. Some faculty have a “magic minimum” GRE score. Others prefer to look at verbal GRE scores.

All very surprising, eh? And not very helpful, I am afraid to say. The most important thing remains, of course, to be accepted by the program of your choice. All I can say to applicants is:

- The physics GRE continues to be an important factor in graduate admissions to most astronomy PhD programs.
- Are you taking the physics courses that prepare you for the physics GRE? Upper division physics courses may not seem necessarily for the topic of your intended research but they usually build on (hence provide further experience in) basic material and expose you to more concepts that will be tested in the GRE.
- You *can* do well in the physics GRE – it is an exam in which it really pays to learn the tricks from those who have done well before you (preferably just a few years before). You may be philosophically opposed to such exams but consider it a necessary hurdle, swallow your indignation and cram for it.
- You might consider taking the GRE a year early – for practice.

At the University of Colorado we have started a short preparation course for the physics GRE taught mostly by graduate students, who have recent experience of taking the exam. But such courses do not help the applicants from schools without a graduate program.

Of course, what we really need to know is how well does the physics GRE actually predict *success*. What is the correlation of GRE with PhD graduation? With career “success”? Has anyone researched this issue? If you have some statistics send them my way, please.